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EDITORIAL

HEPATITIS B VIRAL INFECTIONS: PREVENTION IS STILL THE KEY

Hepatitis B viral infection is world- wide and in West Africa about 20% of apparently healthy population may be carriers. The DNA virus has three antigens: HBsAg, HBcAg, and HBeAg. The first has subtypes which are used to determine the different geographic distribution of the disease. HBeAg is the core antigen and is a marker of infectivity. After infection HBsAg appears first and lasts longest, followed by anti-HBsAg. HBeAg appears later to be followed by anti–HBcAg and anti-HBeAg. In the persistent carrier stage HBsAg persists in the serum and is an indicator of that state.

The liver changes are related to immune response of the host to the structural components of the virus. Chronic active hepatitis, macronodular cirrhosis and hepatocellular carcinoma may be the consequence. Transmission through blood transfusion is common. Drug addicts, homosexuals, workers in renal dialysis units are at risk of infection. Vertical transmission in pregnancy is important and in some countries infections in clustered families is found.

Immunization is indicated in health workers in constant touch with needles and syringes, inmates of prisons, sexual partners and family contacts of carriers, infants of carrier mothers and helpers in contact with refugees from the tropics where Hepatitis B is common. Active immunization using the surface Ag separated from the core is given in 3 doses: at 0, 1 and 6 months. Passive immunization is by hepatitis B immunoglobulin, HBIG (2).Post exposure protection is by a combination of HBIG and HBV vaccine. Pregnant women are to be screened for HBsAg. Neonates of positive HBsAg mothers are given both active and passive immunization. The most commonly used antiviral agents for treatment are interferon, lamivudine, adefovir, entecavir and tenofovir. Response to therapy is assessed by the level of HBV DNA level. The treatment is expensive and the drugs have many side effects.

The global burden of Hepatitis B infection is enormous. The risk of developing cirrhosis and hepatocellular carcinoma is associated with disease activity and HBV DNA. The suppression of HBV DNA to undetectable levels is an important treatment goal of infected patients. The most recent treatment guidelines recommend prioritizing treatment in those with persistently abnormal ALT and HBV DNA replication as well as liver cirrhosis to reduce risk of liver cancer.

In the current issue of the Journal, Archampong and Nkrumah state that there is currently no structured national Hepatitis B treatment programme in Ghana. Patients frequently present with liver cancer and liver cirrhosis. In addition 23.3% had both ALT > 40IU/L and HBV DNA >2,000 IU/mL which are associated with increased risk of progression to cirrhosis and hepatocellular carcinoma. In achieving WHO recommendations there is the need for an affordable and sustainable screening and treatment programme for eligible patients including periodic ultrasonography surveillance and public education. Issah et al also in their study from Nigeria have emphasised the need to prevent vertical transmission of the disease by strategies that have been well documented.

JD Seffah
Editor-in- Chief

COMMENTARY

PROSTATE CANCER

Prostate cancer is the most common non-skin cancer in men in the western world and the second leading cause of cancer mortality in men. In a study in Ghana, a sub- Saharan African country, it was the second cause of cancer mortality after hepatocellular carcinoma[1]

The established risk factors for developing prostate cancer include advancing age, race (high in men of African ancestry) and a positive family history. Androgens, dietary factors such as high saturated fat intake, physical inactivity, sexual factors with associated inflammation and obesity are also acknowledge risk factors[2]

Genetic factors are considered important and said to account for about 42% of the risk of developing prostate cancer. A high penetrant gene inherited as autosomal dominant is implicated in 10% of all cases of prostate cancer. Of the many loci investigated, only HPC1 has been found to have positive results[2]. This suggests interactions between multiple low penetrant genes and environmental factors in the causation of hereditary prostate cancer. Migrant studies reveal that ethnic factors, life style, or environmental factors may explain the difference between high risk and low-risk populations.

Surgical treatment of localized disease by open radical prostatectomy has been shown to decrease disease-specific mortality in patients with prostate cancer. The introduction of robotic radical prostatectomy with its technical innovation of binocular three-dimensional visualization, a times 10 magnification, tremor filtration, motion scaling and wristed instruments allow for ease of working in the male pelvis[3]. With reduction in the occurrence of side effects such as erectile dysfunction and urinary incontinence, no or minimal blood transfusions and same day discharge from hospital, more patients are opting for these procedures. While the robotic technology is being used in increasing proportions of men with prostate cancer opting for surgery, it is yet to be available in most developing/ low-resource countries.

The use of external beam radiotherapy (>74 Gy) has been noted to have a prostate cancer specific mortality higher than that of radical prostatectomy[4]. However, with use of computer based treatment planning such as 3-dimensional conformal radiotherapy (3D-CRT), intensity- modulated radiotherapy (IMRT) and image-guided radiotherapy (IGRT), it has led to a more precise radiation delivery and the ability to escalate the tumor dose to the prostate, seminal vesicles and adjacent adventitia with reduction of toxicity to normal tissues. Current reports indicate that the use of brachytherapy alone for prostate cancer with low risk of extra capsular extension offers satisfactory survival rate comparable to radical prostatectomy[4]. With its relatively minimal side effects it is likely to increase in importance in the management of localized prostate cancer. (T1/T2, PSA<10ng/ml, and Gleason score $\leq$ 6). However if there is a significant risk of extra capsular extension then brachytherapy and a supplementing external beam radiotherapy has a better survival advantage[5]. Post-operative supplemental external beam radiation therapy has also been found to lead to significant PSA remission rate in patients with a rising PSA after radical prostatectomy[6].

For locally advanced disease (T3/T4), the use of adjuvant androgen ablation in addition to external beam radiation therapy offers an improved survival advantage.

The management of metastatic prostate cancer with androgen deprivation continues to be practiced. The challenge is the management of castrate resistant prostate cancer (rising PSA or development of symptoms of metastatic disease despite androgen deprivation therapy) with disease progression within a median of 18-24 months. Initial institution of maximum androgen blockade using androgen receptor blockers such as bicalutamide leads to an observed PSA responses in 30% -35% of the patients. Should there be evidence of disease progressing, withdrawing of the anti- androgen leads to a response rate in the range of 20% -30% of patients. It has been suggested that other anti- androgens such as nilutamide, flutamide or ketoconazole if instituted are associated with a transient PSA reductions in about 30%[7]. The use of diethylstilboesterol with aspirin (to counteract the feared thrombo-embolism) is practiced in low resource countries. As the androgen receptors remain active, androgen deprivation therapy is recommended to be continued even in the presence of perceived castrate resistant state. While newer treatments such as enzalutamide (androgen receptor blocler) and abiraterone (irreversible inhibitor of CYP17) with prednisone is of clinical benefit, the order in which to use them to achieve the greatest survival advantage is under investigation. The availability and cost makes it largely in accessible to those in low income regions.

Systemic chemotherapy using docetaxel (75mg/ m^2 every three weeks) with oral prednisone (5mg twice a day) is recommended in men with clinical or biochemical progression and with detectable macroscopic metastatic disease. This is observed to

lead to improve over all survival, disease control, symptom palliation and quality of life.

Immunotherapy using sipuleucel-T has been found to lead to improvement in mortality risk. Palliative radiation is used for pain associated with bone metastasis. Radioisotopes such as Strontium and samarium are useful in the presence of wide spread bony metastasis. Their use results in an improvement in the quality of life due to reduction in metastatic bone pain. The use of bisphosphonates such as zoledronic acid (4mg every 3-4 weeks) prevents prostate cancer related skeletal complications such as bone pain and pathological fractures. Denosumab (inhibitor of receptor activator for nuclear factor κB ligand) prevents bone loss resulting from androgen deprivation therapy.

Screening for prostate cancer has been an area of debate in recent times. There is however an agreement on the fact that early detection of a localized prostate cancer can be cured with an improved survival rate or quality of life. Two approaches have been described; early detection and systematic screening. Early detection is based on evaluation from a patient's request or as part of a medical examination. Systematic screening is that of a planned examination of the at risk population. The evaluation involves the use of digital rectal examination and serum PSA. The overall benefit of population based screening (systematic) as relates to reducing deaths due to prostate cancer has been called into question. In some countries however, screening using the serum PSA with digital rectal examination is a policy in men above 50 years with life expectancy more than 10 years[8].

The areas that need research has to do with disparity in the incidence, presentation, clinical and survival between those of African ancestry and the rest of the world. Genome wide studies/ research have identified some association between high risk prostate cancers with abnormalities of specific chromosomes. The clinical significance of these findings are yet to be integrated into clinical practice. It is expected that these studies will contribute to understanding some of the genetic associations. Of interest also is the effective management of castrate resistant prostate cancer to achieve a longer survival more so after failure of docetaxel based chemotherapy.

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References

1. Wiredu EK, Armah HB. Cancer mortality patterns in Ghana: a 10 year review of autopsies and hospital mortality. *BMC Public Health* 2006; 6:159-165
2. Hsing AW, Chokkalingam AP. Prostate cancer epidemiology. *Frontiers in Bioscience*, 2006; 11:1388-1413
3. Patel VR, Thaly R, Shah K. Robotic radical prostatectomy: outcomes of 500 cases. *BJU int* 2007; 99: 1109-1112
4. Lee BH, Kibel AS, Ciezki JP, Klein EA, Reddy CA, Yu C, Kattan MW, Stephenson AJ. Are Biochemical recurrence outcomes similar after radical prostatectomy and Radiation Therapy? Analysis of prostate cancer -specific mortality by nomogram-predicted risks of biochemical recurrence Eur Urol. 2015; 67:204-9
5. Grimm P, Billiet I, Bostwick D, Dicker AP, Frank S, Immerzeel J, Keyes M, Kupelian P, Lee WR, Machtens S, Mayadev J, Moran BJ, Merrick G, Millar J, Roach M, Stock R, Shinohara K, Scholz M, Weber E, Zietman A, Zelefsky M, Wong J, Wentworth S, Vera R, Langley S. comparative analysis of prostate- specific antigen free survival outcomes for patients with low, intermediate and high risk prostate cancer treatment by radical therapy results from the Prostate Cancer Results Study Group. *BJU int*. 2012; 109 suppl 1:22-9
6. Thompson IM, Valicenti R, Albertsen Pc. adjuvant and salvage Radiotherapy after Prostatectomy: ASTRO/AUA Guideline. American Urological Association.http://www.auanet.org/education/guidelines/radiation-after-prostatectomy.cfm (accessed 25/01/2016)
7. Hotte SJ, Saad F. Current management of castrate-resistant prostate cancer. *Curr Oncol*. 2010; 17:S72-S79
8. Ramon J, Denis LJ, (2007). Prostate cancer, in recent results in cancer research Springer-Verlag Berlin Heidelberg, pg 64-81. 2014; 22: 157-162

ORIGINAL ARTICLES

VIROLOGICAL CHARACTERIZATION OF HEPATITIS B VIRUS INFECTION AT A MAJOR GASTROENTEROLOGY CLINIC IN ACCRA, GHANA

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Abstract

Introduction *:* Hepatitis B is prevalent in sub-Saharan Africa. Adverse outcomes of infection include cirrhosis and hepatocellular carcinoma with prognosis worse in endemic areas. Hepatitis B treatment guidelines recommend treatment in patients with active chronic inflammation or liver cirrhosis to reduce risk of disease progression. However, there is as yet no national hepatitis B treatment program in Ghana. This study risk-stratifies new patients by serology and viremia at the tertiary centre in Accra.

Methods : Retrospective study of new patients referred with chronic hepatitis B at the Korle-Bu Teaching Hospital, Accra. Serologic data were obtained from medical records using standard data collection form. Means, medians, linear range (±SD) were presented for continuous variables and frequencies for categorical variables.

Results : Overall, 387 patients with hepatitis B were reviewed. Of the 255 patients with serology, 209 (82.0%) were HBeAg-negative. Serum ALT was elevated, > 40 IU/mL, in 38.5%. HBV DNA > 2,000 IU/mL in 52.7% (n = 167). ALT > 40 IU/mL and HBV DNA > 2,000 IU/mL in 23.3% (n = 150). Patients with ALT > 40 IU/mL were more likely to have HBV DNA > 2,000 IU/ml, P=0.001. In patients with liver ultrasound (n=51), liver cirrhosis and hepatocellular carcinoma were diagnosed in 8 and 9 patients respectively.

Conclusions : Liver cirrhosis and hepatocellular carcinoma were evident at presentation in some patients. Furthermore, 23.3% had ALT > 40 IU/mL and HBV DNA > 2,000 IU/mL, associated with increased risk of liver-related complications. In achieving current hepatitis B guidelines, there is the need for a sustainable national treatment program for eligible patients in Ghana.

Keywords : *Hepatitis B, Ghana, ALT, viremia*

Introduction

It is estimated that there are more than 240 million hepatitis B (HBV) carriers in the world[1]. The prevalence of HBV carriers varies from 0.1-2% in low prevalence areas (United States, Western Europe), to 10-20% in high prevalence areas such as Sub-Saharan Africa[2, 3]. The reported prevalence of HBV infection ranges from 12-15% from blood donors in Ghana[4]. The rate of progression from acute to chronic HBV infection is approximately 90% for peri-natally acquired infection as pertains in Sub-Saharan Africa[4]. The sequelae of chronic HBV infection varies from an inactive carrier state to the development of cirrhosis, hepatic decompensation and hepatocellular carcinoma (HCC) [5]. The prognosis is worse in HBV-infected patients from endemic areas[5].

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Conflict of Interest: none declared

Liver cancer is the leading cause of cancer deaths in males and the third in females among Ghanaians based on a ten-year review of autopsies and hospital mortality in Korle-bu Teaching hospital, the largest tertiary center in Ghana[6]. A case-control study on HBV sero-prevalence among patients with cirrhosis of the liver in Ghana showed that the risk of cirrhosis of the liver was strongly associated with HBV status[4].

Treatment is therefore needed in patients with chronic HBV to reduce risk of transmission to others and long-term complications such as cirrhosis and hepatocellular carcinoma[7]. The European Association for the Study of the Liver (EASL) updated guidelines in 2012 suggest patients with chronic HBV be considered for treatment when they have HBV DNA levels greater than 2000 IU/mL and have serum ALT levels above the upper limit of normal[8]. The American Association for the Study of Liver Diseases (AASLD) and Asia-Pacific Association for the study of the Liver (APASL) recommend that treatment may be initiated once a diagnosis of HBeAg-negative chronic HBV (ALT > 2 x ULN and HBV DNA > 2000 IU/mL) or HBeAg-positive chronic HBV (ALT > 2 x ULN and HBV DNA > 20,000 IU/mL) is established[7, 9].

Although widespread HBV screening occurs in endemic sub-Saharan countries, there is as yet no

countrywide HBV treatment program in Ghana and investigations such as HBV DNA and anti-viral medications are expensive for many patients. It would therefore be important to risk-stratify chronic HBV patients by serology and viremia to guide therapy in a sub-Saharan country like Ghana. This study presents the biochemical, serological and virological characteristics of patients with HBV at the major teaching hospital and treatment center in Accra, Ghana.

Methods

Study design

This study utilized a retrospective design to recruit new patients with chronic hepatitis B infection at the Gastroenterology Unit of the Korle-Bu Teaching Hospital in Accra, Ghana from 2010 to 2014.

Study participants

Patients were eligible for inclusion if they were chronically infected, HBsAg (Hepatitis B-surface-Antigen)-positive on two occasions more than 6 months apart or were HBsAg and HBcIgG positive[10]. Hepatitis B core-IgM positivity indicated acute infection[10]. HBsAg positivity with the Core HBsAg rapid test were confirmed serologically using ELISA. The study was performed in compliance with relevant laws and conducted in accordance with the ethical standards of the Declaration of Helsinki.

Study variables, data collection and statistical analysis

Demographic and clinical data were obtained from medical records of patients using standard data collection form. Demographic data included age, sex, ethnicity[11] and hometown by regional groupings. These comprised of the Northern belt (Northern region, Upper West, Upper East), Middle belt (Ashanti, Brong-Ahafo, Volta) and Southern belt (Western Central, Eastern). Biochemical data included liver function tests (LFTs). Data collated were hepatitis B serology (hepatitis B-s-Antigen, hepatitis B-e-Antigen, HBeAg; hepatitis B-e Antibody, HBeAb; Hepatitis B-core IgG, HBcIgG; Hepatitis B-core IgM, HBcIgM) by ELISA and serum hepatitis B DNA determined using COBAS® TaqMan® Analyzer. The lower limit of detection of the Roche TaqMan assay was 20 IU/mL and the linear range 20 – 170,000,000 IU/ml. All data extracted from medical records had no patient identifiable information. Data were subsequently entered into Microsoft Access database. Statistical analyses were performed using Software SPSS 16 program. Means, medians, linear range (±SD) were presented for continuous variables and frequencies for categorical variables.

Results

Baseline characteristics of study participants

Overall, 387 new patients with hepatitis B were reviewed at the Gastroenterology Clinic between 2010 and 2014. The mean age of patients was 35.6yrs, ranging from 11 – 80 years, (SD 12.42). Two hundred and nineteen (56.6%) were males and 168 (43.4%) females. Table 1 illustrates the distribution of patients by clinical presentation, demographics, serological and virological characteristics. Two hundred and fifty-two (65.5%) were asymptomatic, 35 (9.0%) presented with jaundice, 29 (7.5%) weight loss and 19 (3.6%) extra-gastro-intestinal symptoms such as headache, arthralgia, numbness; Table 1.

Of the 255 patients with Hepatitis B serology, 210 (82.4%) were HBeAg-negative and 45 (17.6%) HBeAg-positive. All patients (100.0%) were HBsAg-positive on two occasions more than 6 months apart and were HBcIgG positive on serologic profile establishing chronicity. In addition, 11 (4.3%) were HBcIgM positive suggesting acute-on-chronic hepatitis B.

Two hundred and seventy-eight (278) patients had liver biochemical tests. Median ALT was 32 IU/L (range 2 – 4176 IU/L; mean ALT 76.8 IU/L; SD 278.01). Serum ALT was elevated above the upper limit of normal (ULN), > 40 IU/mL, in 38.5% (n=107).

Of the study participants, one hundred and sixty-seven (167) had HBV DNA quantification. The median Hepatitis B viral DNA titre was 2,537 IU/mL. Eighty-eight (52.7%) had HBV DNA > 2,000 IU/mL while 79 (47.3%) had < 2,000 IU/mL. Sixty-three (37.7%) and 104 (62.3%) had HBV DNA > 20,000 IU/mL and < 20,000 IU/mL respectively. Of the 150 patients with liver biochemistry and HBV DNA, 23.3% (n=35) had both ALT > 40 IU/mL and HBV DNA > 2,000 IU/mL.

In patients presenting with liver ultrasonography (n=51), liver cancer and liver cirrhosis was evident in 9 and 8 patients respectively, figure 1. Alpha Feto-protein (AFP) levels ranged from 0.1 - > 50,000 ng/mL, SD 8245.1, n=79. Seventy-two-percent (n=57) had AFP less than 10 ng/mL with 13% (n=10) AFP levels greater than 500 ng/mL. The median AFP was 4.3 ng/mL.

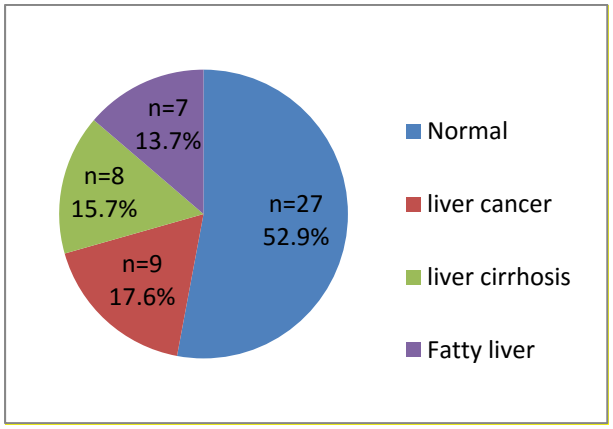

Figure 1. Distribution of ultrasonographic diagnoses at presentation in patients with chronic hepatitis B (n=51)

Table 1: Baseline clinical, demographic and serological characteristics of patients with Chronic Hepatitis B

Clinical presentation	**n**	**(%)**
Asymptomatic	252	(65.1)
Abdominal pain	14	(3.6)
*Constitutional symptoms	11	(2.8)
Anorexia	6	(1.6)
Weight loss	29	(7.5)
Abdominal distension	12	(3.1)
Leg swelling	3	(0.8)
Jaundice	35	(9.0)
Vomiting	1	(0.3)
Haematemesis	1	(0.3)
**Extra-gastrointestinal	23	(5.9)
Total	387	(100.0)
Ethnicity		
Akan	174	(45.0)
Ga-Adangme	54	(14.0)
Ewe	57	(14.7)
Guan	5	(1.3)
Gurma	31	(8.0)
Mole-Dagbani	38	(9.8)
Grusi	2	(0.5)
Mande	8	(2.1)
Other	15	(3.9)
Not indicated	3	(0.8)
Total	387	(100.0)
Occupation		
Professionals	77	(19.9)
Technicians	25	(6.5)
Clerks	35	(9.0)
Sales/service worker	32	(8.3)
Agriculture/fishery	11	(2.8)
Craft & related trade workers	17	(4.4)
Drivers, mechanical operators	27	(7.0)
Elementary occupations	76	(19.6)
Other	87	(22.5)
Total	387	(100.0)
Serologic profile		
HBeAg +	46	18.0
HBeAg -	209	82.0
HBeAB +	203	79.6
HBeAB -	52	20.4
HBcIgM +	11	(4.3)
HBcIgM -	244	(95.7)
HBcIgG +	255	(100.0)
HBcIgG -	0	(0.0)
HBV DNA		
20 – 2,000 IU/mL	79	(47.3)
2000 – 20,000 IU/mL	24	(14.9)
>20,000 IU/mL	64	(38.3)
Total	167	(100.0)

*constitutional symptoms (e.g. fever, malaise, lethargy)

**Extra-gastrointestinal(e.g.headache, arthralgia, palpitations, anxiety)

Table 2. Factors associated with Hepatitis B viremia in chronically infected patients at KBTH, Accra

Characteristic	HBV DNA < 2000IU/mL (n/%)	HBV DNA ≥ 2000IU/mL (n/%)	Total	P-value T test
Age (years)				0.192
< 20	4 (26.7)	11 (73.3)	15	
21-30	26 (42.6)	35 (57.4)	61	
31-40	32 (58.2)	23 (41.8)	55	
41-50	8 (42.1)	11 (57.9)	19	
51-60	9 (60.0)	6 (40.0)	15	
>60	0 (0)	2 (100.0)	2	
Sex				0.095
Male	43 (42.2)	59 (57.8)	102	
Female	36 (55.4)	29 (44.6)	65	
Regional belt				0.106
Southern	36 (48.0)	39 (52.0)	75	
Middle	15 (34.9)	28 (65.1)	43	
Northern	26 (55.3)	21 (44.7)	47	
Other	2 (100.0)	0 (0.0)	2	
HBeAg status				0.001
Positive	4 (16.7)	20 (83.3)	24	
Negative	65 (55.3)	57 (46.7)	122	
Liver function tests				
Total bilirubin				0.306
Normal (< 20umol/l)	49 (50.0)	49 (50.0)	98	
Elevated (> 20umol/l)	21 (41.2)	30 (58.8)	51	
Alanine aminotransferase				0.001
Normal (5-40 U/L)	57 (55.3)	46 (44.7)	103	
Elevated >ULN	13 (27.1)	35 (72.9)	48	
Aspartate aminotransferase				<0.0001
Normal (5-40 U/L)	60 (56.1)	47 (43.9)	107	
Elevated >ULN	10 (22.7)	34 (77.3)	44	
Albumin				0.113
Normal (35-50 g/L)	65 (48.1)	70 (51.9)	135	
Low < LLN	4 (26.7)	11 (73.3)	15	

Factors associated with Hepatitis B viremia in Hepatitis B infected patients

Table 2 describes the demographic and serological factors associated with detectable HBV > 2,000 IU/mL. HBeAg-positive patients were more likely to have detectable viremia (> 2,000 IU/mL); HBeAg-positive (83.3%) vs HBeAg-negative (46.7%), P=0.001. Patients with elevated serum ALT above ULN had higher prevalence of detectable HBV > 2,000 IU/mL, (72.9%), in comparison with patients with ALT within normal limits, (44.7%) P=0.001. An elevated serum AST above ULN was associated with detectable HBV > 2,000 IU/mL, P < 0.0001. Elevated serum bilirubin did not reliably predict HBV viremia > 2,000 IU/mL, P=0.306.

Table 3. Factors associated with Hepatitis B E-antigen status in chronically infected patients at KBTH, Accra

Characteristic	HBeAg Positive	HBeAg Negative	Total	P-value T test
Age (years)				0.006
< 20	7 (50.0)	7 (50.0)	14	
21-30	8 (14.5)	47 (85.5)	55	
31-40	3 (6.4)	44 (93.7)	47	
41-50	4 (26.7)	11 (73.3)	15	
51-60	2 (14.3)	12 (85.7)	14	
>60	0 (0)	1 (100.0)	1	
Sex				0.580
Male	16 (17.8)	74 (82.2)	90	
Female	8 (14.3)	48 (85.7)	56	
Regional belt				0.592
Southern	10 (14.5)	59 (85.5)	69	
Middle	6 (18.2)	27 (81.8)	33	
Northern	7 (16.7)	35 (83.3)	42	
Other	1 (50.0)	1 (50.0)	2	
Liver function tests				
Total bilirubin				0.196
Normal (< 20umol/l)	12 (13.8)	75 (86.2)	87	
Elevated (> 20umol/l)	10 (22.7)	34 (77.3)	44	
Alanine aminotransferase				0.009
Normal (5-40 U/L)	10 (11.0)	81 (89.0)	91	
Elevated >ULN	12 (29.3)	29 (70.7)	41	
Aspartate aminotransferase				0.027
Normal (5-40 U/L)	12 (12.4)	85 (87.6)	97	
Elevated >ULN	10 (28.6)	25 (71.4)	35	
Albumin				0.523
Normal (35-50 g/L)	19 (16.1)	99 (83.9)	118	
Low < LLN	3 (23.1)	10 (76.9)	13	
HBV DNA				0.001
<2000 IU/mL	4 (5.8)	65 (94.2)	69	
>2000 IU/mL	20 (26)	57 (74.0)	77	

Factors associated with Hepatitis B E-Antigen status in Hepatitis B infected patients

Table 3 illustrates the demographic and serological factors associated with HBeAg positivity. There was an increased prevalence of HBeAg-negative chronic hepatitis B with increasing age above 20 years, P=0.006. Elevated serum ALT above ULN was associated with increased prevalence of HBeAg positivity in comparison with patients with ALT within normal limits P=0.009. Similarly, an increase in prevalence of HBeAg was seen in patients with elevated serum AST above ULN (P=0.027) and HBV DNA > 2000 IU/mL (P=0.001) respectively.

Discussion

In this study, the prevalence of HBeAg-positivity was low (18.0%) with majority of chronically infected patients being HBeAg-negative. This was similar to an earlier study on blood donors in Kumasi, Ghana where HBeAg-positivity was 13.3%[12]. The typical patient referred to the tertiary center in Korle-Bu, Accra was HBeAg-negative and HBeAb positive. HBeAg-negative chronic hepatitis B infection defines strains that are not producing the HBeAg, usually testing positive for HBeAb, hepatitis B viremia and demonstrating fluctuating or elevated liver function tests[13]. There is loss of immune tolerance against the wild type virus with clearance of HBeAg and subsequent selection of HbeAg-negative mutants[14]. There is an increased prevalence in males compared to females[15], as shown in Korle-Bu, Accra. At presentation, many are asymptomatic and identified usually by screening[13], as demonstrated in this study. The age range of this group of HBeAg-negative patients in most studies was 40 – 55 years, significantly higher than HBeAg positive patients[16, 17]. Although, no major differences exist in

clinical presentation, prognosis is relatively poor in comparison to HBeAg-positive patients[13], with an increased prevalence of advanced liver disease[18]. This may reflect the increased duration of infection and in some treatment-refractory disease. Forty-percent have been shown to have histologic cirrhosis at presentation in earlier studies[18,19]. A large cohort series demonstrated mortality and hepatocellular carcinoma formation within 4 years from diagnosis was 29% and 14% respectively, being higher than in HBeAg-positive chronic hepatitis B[13]. The younger age of diagnosis of HBeAg-negative chronic HBV (mean age in this study 35.6 years), suggests patients may be more susceptible to disease progression and the highlighted adverse outcomes.

The serum aminotransferases are sensitive indicators of liver cell injury and inflammation[20]. The most commonly measured are alanine aminotransferase (ALT) and aspartate aminotransferase (AST)[21]. Elevated HBV DNA (> 2,000 IU/mL) and elevated ALT are among the most important determinants of risk of progression to liver cirrhosis[22-24]. Additionally, Elevated HBV DNA is a key predictor of hepatocellular carcinoma risk[22, 23]. In this study, we found that patients with detectable viremia > 2,000 IU/ml were more likely to have elevated AST or ALT above the upper limit of normal (ULN) than patients with viremia < 2,000 IU/mL, P < 0.0001. Additionally, HBeAg-positivity was associated with detectable viremia > 2000 IU/mL, P= 0.001. At presentation, 23.3% had both abnormal serum ALT > 40 IU/mL and elevated HBV DNA > 2,000 IU/mL, suggesting active chronic inflammation and an increased risk for liver-related complications. In patients with alpha-feto-protein levels, ten (10) out of 79 patients had levels greater than 500 ng/mL; high-risk for diagnosis of hepatocellular carcinoma in predisposed individuals[25].

In achieving international hepatitis B guidelines, this study emphasizes the need for a sustainable national screening and treatment program for eligible patients including periodic liver ultrasonography surveillance and public education in Ghana.

Limitations in our study included lack of comparative liver histology data, however it provides a basis for prospective evaluation of the temporal relationship between biochemical, serological, virological factors and the stage and grade of chronic hepatitis B in treatment-naïve and treated patients in an endemic area.

Conclusion

Liver cirrhosis and hepatocellular carcinoma were evident at presentation in some chronically infected patients. Furthermore, 23.3% had ALT > 40 IU/mL and HBV DNA > 2,000 IU/mL, associated with increased risk of liver-related complications. In achieving current hepatitis B guidelines, there is the need for a sustainable national screening and treatment program for eligible patients in Ghana.

Abbreviations

ALT: serum alanine Aminotransferase
AST: serum aspartate Aminotransferase
HBcIgG: Hepatitis B-c-IgG
HBcIgM: Hepatitis B-c-IgM
HBeAb: Hepatitis B-e-Antibody
HBeAg: Hepatitis B-e-Antigen
HBsAg: Hepatitis B-surface Antigen
HBV: Hepatitis B
HCC: Hepatocellular carcinoma
KBTH: Korle-Bu Teaching Hospital
ULN: Upper limit of normal
WHO: World Health Organization

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References

1. World Health Organization: Guidelines for the Prevention, Care and Treatment of persons with Chronic Hepatitis B Infection. In., March, 2015 edn. www.who.int/hiv/pub/hepatitis/hepatitis-b-guidelines/en/; 2015: 19-28.
2. Maynard JE: Hepatitis B: global importance and need for control. Vaccine 1990, 8 Suppl:S18-20; discussion S21-13.
3. Alter MJ, Hadler SC, Margolis HS, Alexander WJ, Hu PY, Judson FN, Mares A, Miller JK, Moyer LA: The changing epidemiology of hepatitis B in the United States. Need for alternative vaccination strategies. *JAMA: the journal of the American Medical Association* 1990, 263(9):1218-1222.
4. Blankson A WE, Gyasi RK, Adjei A, Tettey Y: Sero-Prevalence of Hepatitis B and C Viruses in Cirrhosis of the Liver in Accra, Ghana. *Ghana Med J* 2005, 39(4):132-137.
5. Fattovich G, Brollo L, Giustina G, Noventa F, Pontisso P, Alberti A, Realdi G, Ruol A: Natural history and prognostic factors for chronic hepatitis type B. Gut 1991, 32(3):294-298.
6. Di Martino V, Thevenot T, Colin JF, Boyer N, Martinot M, Degos F, Coulaud JP, Vilde JL, Vachon F, Degott C et al: Influence of HIV infection on the response to interferon therapy and the long-term outcome of chronic hepatitis B. *Gastroenterology* 2002, 123(6):1812-1822.
7. Lok AS, McMahon BJ: Chronic hepatitis B: update 2009. Hepatology 2009, 50(3):661-662.
8. European Association for the Study of the Liver (EASL): Clinical practice guidelines: Management of chronic hepatitis B virus infection. *Journal of hepatology* 2012, 57(1):167-185.

9. Yun-Fan Liaw J-HK, Teerha Piratvisuth, Henry Lik Yuen Chan, Rong-Nan Chien, Chun-Jen Liu, Stephen Locarnini, Seng-Gee Lim, Kwang-Hyub Han, Masao Omata: Asian-Pacific Consensus Statement on the Management of Chronic Hepatitis B: a 2012 update. *Hepatology international* 2012, 6:531-561.
10. Center for Disease Control: http://www.cdc.gov/hepatitis/hbv/hbvfaq.htm.general. last updated December 16th 2015.
11. Population of Ghana by region d, age groups and sex, 2010 In: Population Statistics: Ghana Statistical Service wwwstatsghanagovgh 2015.
12. Rufai T, Mutocheluh M, Kwarteng K, Dogbe E: The prevalence of hepatitis B virus E antigen among Ghanaian blood donors. *The Pan African medical journal* 2014, 17:53.
13. Hadziyannis SJ, Vassilopoulos D: Hepatitis B e antigen-negative chronic hepatitis B. *Hepatology* 2001, 34(4 Pt 1):617-624.
14. Lee WM: Hepatitis B virus infection. *The New England journal of medicine* 1997, 337(24):1733-1745.
15. Hadziyannis SJ: Hepatitis B e Antigen Negative Chronic Hepatitis B: from clinical recognition to pathogenesis and treatment. . *Viral Hepat Rev* 1995, 1(7):7-36.
16. Lok AS, Hussain M, Cursano C, Margotti M, Gramenzi A, Grazi GL, Jovine E, Benardi M, Andreone P: Evolution of hepatitis B virus polymerase gene mutations in hepatitis B e antigen-negative patients receiving lamivudine therapy. *Hepatology* 2000, 32(5):1145-1153.
17. Rizzetto M, Volpes R, Smedile A: Response of pre-core mutant chronic hepatitis B infection to lamivudine. *Journal of medical virology* 2000, 61(3):398-402.
18. Zarski JP, Marcellin P, Cohard M, Lutz JM, Bouche C, Rais A: Comparison of anti-HBe-positive and HBe-antigen-positive chronic hepatitis B in France. French Multicentre Group. *Journal of hepatology* 1994, 20(5):636-640.
19. Brunetto MR, Oliveri F, Demartini A, Calvo P, Manzini P, Cerenzia MT, Bonino F: Treatment with interferon of chronic hepatitis B associated with antibody to hepatitis B e antigen. *Journal of hepatology* 1991, 13 Suppl 1:S8-11.
20. Ellis G, Goldberg DM, Spooner RJ, Ward AM: Serum enzyme tests in diseases of the liver and biliary tree. *American journal of clinical pathology* 1978, 70(2):248-258.
21. Ijaz B, Ahmad W, Javed FT, Gull S, Hassan S: Revised cutoff values of ALT and HBV DNA level can better differentiate HBeAg (-) chronic inactive HBV patients from active carriers. *Virology journal* 2011, 8:86.
22. Chen CJ, Yang HI, Su J, Jen CL, You SL, Lu SN, Huang GT, Iloeje UH, Group R-HS: Risk of hepatocellular carcinoma across a biological gradient of serum hepatitis B virus DNA level. *JAMA: the journal of the American Medical Association* 2006, 295(1):65-73.
23. Iloeje UH, Yang HI, Su J, Jen CL, You SL, Chen CJ, Risk Evaluation of Viral Load E, Associated Liver Disease/Cancer-In HBVSG: Predicting cirrhosis risk based on the level of circulating hepatitis B viral load. *Gastroenterology* 2006, 130(3):678-686.
24. Terrault NA, Bzowej NH, Chang KM, Hwang JP, Jonas MM, Murad MH: AASLD guidelines for treatment of chronic hepatitis B. *Hepatology* 2016, 63(1):261-283.
25. Wu JT: Serum alpha-fetoprotein and its lectin reactivity in liver diseases: a review. Annals of clinical and laboratory science 1990, 20(2):98-105

HEPATITIS B VIRUS VERTICAL TRANSMISSION IN BOOKED PREGNANT WOMEN IN ABUJA, NIGERIA

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Abstract

Background: Perinatal (vertical) transmission has remained the most important route of spread of Hepatitis B Virus in many endemic areas worldwide. Determining magnitude of vertical transmission to the new born fetuses may allow for planning and modification of strategies to curtail the menace

Objectives: To determine the prevalence of vertical transmission and Sero-prevalence of Hepatitis B virus infection rate in pregnant women in Abuja, Nigeria.

Materials and Methods: This was a longitudinal, cohort study involving one hundred and five (105) pregnant women that were serially recruited between January 2nd and March 31st, 2013 and tested for serum Hepatitis B surface antigen (HBsAg) using commercial rapid diagnostic Elisa kits. Those women that were positive for HBsAg were tested for envelope antigen (HBeAg) variant. Recruited patients were followed up till delivery. The data was analyzed using statistical package for social sciences (SPSS) version 17. P-value of < 0.05 was considered as statistically significant. The results were presented as Simple per cents and chi square was employed to test for the significance.

***Results*:** There were 8 pregnant women that were positive for HBsAg among 105 consecutive women, giving a prevalence rate of 7.6%. There was no in-utero (vertical) transmission recorded in the study population.

***Conclusion*:** The prevalence of HBsAg is relatively high but with zero pre-natal vertical transmission. Proper precautionary measures at delivery are however advocated to keep the vertical transmission at its lowest bearable status.

Keywords: *Hepatitis B surface antigen, Prevalence, Pregnancy, Vertical transmission*

Introduction

Infection with Hepatitis B virus remains a public health challenge worldwide, and a major cause of chronic Hepatitis, liver cirrhosis, and hepatocellular carcinoma[1-5]. Transmission of Hepatitis B virus from carrier mothers to their babies can occur during the prenatal period, and is reported to be the most important factor in determining the prevalence of infection in high endemic city areas, particularly in Sub-Saharan Africa, and Asia[4, 5]. Before Hepatitis B virus vaccine was integrated into the routine immunization programs in some countries, the proportion of babies that became Hepatitis B virus carrier was about 10-30% for mothers who were HBsAg positive[6]. However, the frequency of perinatal infection becomes higher, between 70-90%, when the mother also had co-infection with HBeAg[6, 7]. There are known important routes of transmission of Hepatitis B virus from infected mothers to infants including antepartum transmission, in-utero, intrapartum, and postpartum transmission through breast milk during breast feeding[7]. In endemic areas, most individuals are infected by vertical transmission[7]. Hepatitis B virus infection in pregnancy is associated with a high risk of maternal complications, high rate of vertical transmission, causing neonatal hepatitis, and has been reported as a leading cause of neonatal morbidity and mortality[7]. Epidemiological data on Hepatitis B virus infection are important to program managers and health policy designers to plan vaccination and other preventive measures or strategies[8]. It is therefore important to ascertain data on Hepatitis B virus infection in pregnancy and note the rate of in-utero transmission of the infection to new born babies to aid planning and evaluation of the preventive strategies9. This study investigated the Sero-prevalence of Hepatitis B surface antigen (HBsAg) among pregnant women, and to document the in-utero infectivity status among the new born.

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Materials and Methods

This was a longitudinal, cohort study involving one hundred and five (105) pregnant womenthat were serially recruited between January 2nd and March 31st, 2013 and tested for serum Hepatitis B surface antigen (HBsAg) using commercial rapid diagnostic (enzyme linked immune-sorbent assay) Elisa kits. Those women that were positive for HBsAg were further tested for envelope antigen (HBeAg) as evidence has shown that co-infection with the later variant confers higher risk of vertical transmission. Recruited patients were followed up till delivery where the cord blood sample was obtained and tested for both Hepatitis B surface antigen (HBsAg) and Hepatitis B envelope antigen (HBeAg). All eligible participants were counseled for Hepatitis B

virus testing using opt-out methods in groups at recruitment while the post-testing counseling was conducted on an individual basis. Inclusion criterion was all eligible pregnant women who gave their consent during the study period until the required sample size was met. Those women who were not infected with Hepatitis virus as well as those that were Hepatitis B virus positive but declined or withheld consent were excluded. Pregnant women who were Human Immunodeficiency Virus (HIV) positive and those with co-existing medical disorders, such as Diabetes mellitus, chronic hypertension, chronic renal disease,

Haemoglobinopathies, acute hepatitis, acute or chronic symptomatic liver disease were also excluded. The study was conducted at the antenatal clinic of the Department of Obstetrics and Gynaecology, University of Abuja Teaching Hospital, Abuja, Nigeria. The hospital is the only teaching tertiary

Health institution located in the Nigerian capital city, Abuja serving about projected one million population. The data was analyzed using statistical package for social sciences (SPSS) version 17. P-value of < 0.05 was considered as statistically significant at 95% confidence level. Simple per cents were used to compare categorical variable and chi square was used to determine significant association.

Results

There were 8 pregnant women who tested positive for the HBsAg among 105 women recruited for the study, giving the prevalence of 7.6%. All the Sero-positive women however, tested negative for the Envelope (HBeAg) antigen. The age and parity distribution of the study population is shown in Table 1.

Table I: Age and Parity distribution

Variable	No	%
Age		
19 – 24	26	24.7
25 – 29	27	25.7
30 – 34	30	28.6
35 – 39	15	14.3
40 – 44	7	6.7
Total	105	100.0
Parity		
1	35	33.3
2 – 4	15	14.3
≥ 5	55	52.4
Total	**105**	**100.0**

Majority (54.3%) of the studied population are between 25 and 34 years.

Majority (54.3%) of the study population were between 25 and 34 years with only 6.7% age 40 years and above. Over 52% of the whole study groups were grand-multiparous. Table 2 describes the percentage Sero-prevalence of HBsAg among the study group. Only 8 of the 105 were positive for HBV and none had HBeAg. Co-infection with HBeAg is said to facilitate vertical transmission. The comparative analysis of demographic and pregnancy outcome variables between Sero-positive and Sero-negative women is shown in

Table 2: Sero positivity status of the patients

Status	No	%
Sero-Positive	8	7.6
Sero-Negative	97	92.4
Total	**105**	**100.0**

The Sero-prevalence rate was 7.6%.

Table 3. The study demonstrated no statistical significant relationship between educational status and parity with HBsAg Sero-positivity. There was no vertical transmission among neonates for HBsAg using Elisa method, giving Zero in-utero vertical transmission rate. This suggests that as at the time of birth, the neonates were Sere-negative for both HBsAg and HBeAg. Whether they may acquire the particles during breast feeding is a subject of another research.

Table 3: Comparative analysis of demographic and pregnancy outcome

Parameter	Pos (+)	Neg (-)	Total	P-value
Educational level				
Non-formal	2	20	22	0.65
Formal	6	77	83	
Total	8	97	105	
Parity				
Nulliparity	2	18	20	0.20
Multiparity	6	79	85	
Total	8	97	105	
Pregnancy outcome No complication	8	90	98	0.08
	0	7	7	
With complication				
Total	**8**	**97**	**105**	

There was no statistical difference in the educational level, parity and antenatal complications between the Sero-positive and Sero-negative women in this study.

Discussion

The prevalence rate of 7.6% reported in this study is similar to earlier reports from Keffi4 in the same

geopolitical location and Lagos[9], South West Nigeria but relatively higher than the reported value of 5.5% from Port Harcourt, South-South Nigeria[3]. The similarity in the populations studied, the antenatal patients may have accounted for the observed similarity. Perhaps, a community based survey may have yielded more representative prevalence figure. The prevalence rate is however lower than those reported from Bangladesh[10] and Eastern Sudan[11]. While the study from Bangladesh was a National survey, the Sudanese study was on middle to high socio economic healthy non-pregnant population hence, the likely higher prevalence rates as opposed to our facility based study that focused on pregnant population. Differences in genetic factors, socio-economic status and cultural taboos may have also been additional contributing factors to these wide variations in the rate of Sero-prevalence of hepatitis B virus infection among the various pregnant populations. There was a gradual decline in the Sero-positivity status with increasing maternal age from 25% below the age 34 years to 12.5% above the age 35 years. The association was however, most probably a chance factor ($p > 0.05$). A similar association was demonstrated in a previous study from India[7]. Whether an advance maternal age is associated with prudent precautions against primary prevention may be a subject of further research. Perhaps, a larger community based study may be revealing in establishing a reasonable relationship between maternal age and Sero-positivity, if any. Educational level and parity were also found to have no significant association with likelihood of Sero-positivity (table 3) albeit, the small but appropriate sample size in this study. It may be likely that if the sample size was larger, a reasonable conclusion may be more evident. Unexpectedly, there was recorded maternal illness among 7 Sero-negative women compared with none among those that were Sero-positive. The difference was not statistically significant ($p = 0.08$). All but one of those 7 patients had confirmed malaria in pregnancy while the last had urinary tract infection in pregnancy. These febrile illnesses could not be attributable to maternal HBsAg positivity but rather an incidental finding. Given that both Sero-positive and negative patients had at least the standard 2 dose regimen of intermittent prophylaxis with sulphadoxine- pyrimethamine combination against malaria in pregnancy, a suspicious relationship of protection against malaria in those with Hepatitis B infection may be alluded. This may form the subject of further molecular studies in due course. It has been reported that tattooing and facial tribal marks are known risk factors for HBsAg transmission[12-16]. This was not corroborated in this study as those pregnant women who were HBsAg positive with tribal and tattoo marks showed no statistical difference with those that were negative ($p > 0.05$). Tribal marks are a common cultural norm in the study location by the Gbagyi, Igbira and Nupe speaking people. There was no detectable envelope antigen (e- antigen) among those that tested positive for HBsAg during the study period just as there was no detectable vertical transmission to the fetus as at the time of birth. The presence of the e-antigen has been associated with vertical transmission and infectivity of HBsAg virus 13-25. Arising from the above, the zero vertical transmission rate was therefore, not unexpected. It could probable be that a combination of e-antigen and HBsAg might be a more sensitive marker of vertical transmissions than HBsAg alone. All the babies were delivered by the vaginal route with strict compliance with preventive measures at birth toward limiting vertical transmission. They were all singleton babies. Probably the universal precautions employed during vaginal delivery could further have accounted for the Zero per cent vertical transmission rate. The finding of this study may be employed to allay fears among those pregnant women with HBsAg positivity that careful antenatal follow up and delivery safety measures may significantly reduce chances of neonatal infection at birth especially, when the envelope antigen is negative. The limited size of Sero-positive women however, made generalization of our finding difficult. Perhaps if this study was conducted among the pregnant women in the community as opposed to a hospital setting, it would have been more appropriate to generalize the research findings.

Conclusion

The study has shown a relative high prevalence rate of HBsAg among our pregnant population but with amazingly zero vertical transmission rate as at the time of birth. The feared complication of vertical transmission may not be as real as anticipated especially, when the maternal serum e-antigen is negative and careful antenatal / intrapartum precautions are adhere to. The younger mothers should be considered a high risk population for the viral infection. Health education on primary preventive measures could be sustained to reduce the burden of Hepatitis B Virus infection in pregnancy.

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References

1. Damale NKR, LasseyAT, Bekoe V. Hepatitis B virus seroprevalence among parturients in Accra, Ghana. *International journal of Gynaecology and Obstetrics* 2005; 90: 240-241

2. World Health Organization. Hepatitis B factsheet N°204http://www.who.int/mediacentre/factsheets/fs204/en/ (last accessed July 2013).
3. Akani CI, Ojule AC, Opurum HC, Ejilemele AA. Seroprevalence of hepatitis B surface antigen (HBsAg) in pregnant women in Port Harcourt, Nigeria. *Niger Postgrad Med J* 2005; 12(4): 266-270.
4. Pennap GR, Osanga ET, Ubam A. Seroprevalence of hepatitis B surface antigen among pregnant women in Federal Medical Centre, Keffi, Nigeria. *Research Journal of Medical Sciences* 2012; 5(2): 80-82.
5. Imade GE, Sagay AS, Ugwu BT, Thatcher TD, Ford RW. Seroprevalence of Hepatitis B and HIV infection in pregnant women in Nigeria. *Journal of Med. In the Tropics* 2004; 6 (2): 15-21
6. Eke AC, Eke UA, Okafor CI, Ezebialu IU, et al. Prevalence correlates and pattern of hepatitis B surface antigen in a low resource setting 2011; 8: 12-23.
7. Manisha D, Sri Prakash M, Vatsala M, Arvind P, et al. Seroprevalence of Hepatitis B virus infection during pregnancy and risk of perinatal transmission. *Indian J Gastroentol* 2011; 30(2): 66-71.
8. Wright TL. Introduction to chronic Hepatitis B infection. Am J Gastroentol 2006; 101 (l): 51-6.
9. Rabiu KA, Akimola OI, Adewunmi AA, Omololu O M, et al. Risk factors for hepatitis B virus infection among pregnant women in Lagos, Nigeria. *Acta Obstet Gynecol Scand* 2010; 19: 1024-1028.
10. World Health Organization. WHO. Expanded Programme On Immunization. Report of the 14th Global advisory group (Antalya, Turkey; Oct. 14-18, 1991). Geneva: WHO; 1991: WHO/EPI/GEN/92.1
11. Abdallah TM, Mohammed MH, Ali AA. Seroprevalence and epidemiological factors of hepatitis B virus (HBV) infection in Eastern Sudan. *Int J of Med and Med Sci* 2011; 3(7): 239-241.
12. Ndams IA, Joshua SA, Luke HO. Epidemiology of hepatitis B infection among pregnant women in Minna, *Nigeria Hiraz E-Medical Journal* 2012; 13(1): 50-52.Hesham M, Elgouhari TI, Abu-Rajab T, William DC. Hepatitis B virus infection: Understanding its epidemiology, course, and diagnosis 2008; 75(12): 881-889.
13. Batayneh NB. Risk of perinatal transmission of Hepatitis B virus in Jordan. *Infect. Dis. ObsteGynaecol* 2012; 10: 127-132.
14. Akami M, Ojule AC, Opurum HC, Ejimele AA. Sero-prevalence of HBs Ag in pregnant women in Port Harcourt, Nigeria. *Postgraduate Medical Journal* 2005; 12(4): 266-270.
15. Luka SA, Ibrahim MB, Iliya SN. Sero prevalence of Hepatitis B surface antigen amongst pregnant women attending Ahmadu Bello University Teaching Hospital, Zaria, Nigeria. *Journal of Parasitology* 2008; 29(1): 38-41.
16. Jatau ED, Yahaya A. Seroprevalence of Hepatitis B virus in pregnant women attending a clinic in Zaria, *Nigeria Science world journal* 2009; 4(2): 7-9.
17. Zhang SL, Yue YF, Bai GQ. Mechanism of intrauterine infection of Hepatitis B virus. *World J Gastroenterol* 2004; 10(3): 437-438.
18. Nilgun-Col A, Ebru D. Seroprevalence of hepatitis B virus among pregnant women in Southern Turkey. Short Report 2011; 161(2): 176 -177.
19. Saraswarthi KS. The study of prevalence of Hepatitis B surface antigen during pregnancy in a tertiary care hospital, South India. Der Pharmacia letter 2012; 4(3): 983-985.
20. Yingijiie Z et al. should chronic Hepatitis B Mothers breastfeed? A mete- analysis. *BMC Health public Health* 2011; 11: 502.
21. Anikwe HC, Favour O. Risk of M-T-C-T of Hepatitis B among children. *International Journal of Tropical Medicine* 2012; 7(1): 34-37.
22. Olokoba AB, Salawu FK, Danburam A, Olokoba LB, et al. Hepatitis B virus infections amongst pregnant women in North-Eastern Nigeria- A call for action. *Nigerian Journal of Clinical Practice* 2011; 14(1): 10–13.
23. Mbamara SU, Obiechina NJA. Seroprevalence of Hepatitis B Surface Antigen among Antenatal Clinic attendees in a private Specialist Hospital in Onitsha Southern Nigeria. *Niger Med J* 2010; 51(4): 152-154.
24. Yan G, Jianqiong L, Liping M, Hu M, et al. Survey of HBsAg-positive pregnant women and their infants regarding measures to prevent maternal-infantile transmission. *BMC Diseases* 2010; 10: 26.
25. Manisha D, Sri Prakash M, Vatsala M, Arvind P, Sanjay P, Rita S, Manju V. Seroprevalence of hepatitis B infection during pregnancy and risk of perinatal transmission. *Indian J Gastroentol* 2011; 30(2):66-71

CHALLENGES OF INGUINAL HERNIA SURGERY IN GHANA

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Abstract

Background: In Ghana inguinal herniais a very common cause of considerable morbidity and significant mortality especially in rural communities.
Objective : To perform a brief review of the published data on the epidemiology of and the surgical output on inguinal hernia in Ghana.
Method : In this review the author presents data from a series of recent publications derived from his work on inguinal hernia in Ghana. Other articles that also have data on inguinal hernia surgery in Ghana were selected in support of or to compliment the publications in possession of the author. The search terms used to select these articles were : inguinal hernia in Ghana, groin herniaepidemiology in Ghana, hernia repair, strangulated inguinal hernia, inguinal hernia surgery output in Ghana in Medline, Pubmed and Embase. All journal articles containing information on inguinal hernia epidemiology and surgical output between January 1, 2000 and November 30, 2015 were selected and carefully analyzed for data on inguinal herniaprevalence and repair or operations.
Results : Literature on inguinal hernia surgery in Ghana is mostly clinical reports based on analysis of hospital based patients. Two sources of population based data wereavailable but were nearly four decades apart. Based on tis data inguinal henria is very prevalent in Ghana. However, surgical correction rates are very low leaving many men with longstanding untreated inguinal hernias.
Conclusion : Inguinal hernia is very prevalent in Ghanaian men in both urban and rural communities. Access to hernia repair surgery is limited by patient education, health care costs and health facilitycapacity. Intervention is needed to build the capacity for increased hernia repair.

Key Words : Inguinal Hernia, Epidemiology, Surgical Output, Ghana.

Introduction

In Ghana inguinal hernia disease is very common. In a recent survey of 10 district hospitals in Ghana inguinal herniorrhaphy was a frequent major surgical procedure performed second only to Caesarean section[1]. Hospital data from the second largest Teaching Hospital in Ghana indicates that inguinal hernia is the most common external hernia seen accounting for 70.5% of over 2000 cases[2]and most commonly seen in male adults. Over the past three decades or more strangulated inguinal hernia is still the most common cause of acute bowel obstruction in Ghana[3]. All these data when considered together suggests that inguinal hernia is very prevalent and an important disease in Ghana.

The treatment of inguinal hernia is by a surgical operation. However inguinal hernia repair rates in Ghana are low estimated at 30 repairs per 100 000 population per year[4,5].The high prevalence alongside the low repair rates results in the situation where there is an accumulation of large numbers of untreated inguinal hernia in many communities in Ghana[5,7]. This paper is a review of the available data on inguinal hernia prevalence and repair rates in Ghana over the years. The purpose of the review is to highlight the wide gap between prevalence and repair rates and to consider what can be done to increase repair rates and narrow the gap.

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Conflict of interest : none declared

Methodology

In this paper the author reviewed the data from a series of recent publications derived from his work on inguinal hernia in Ghana. Other articles that also have data on inguinal hernia surgery in Ghana were selected to support or to compliment the publications in possession of the author. The search for these other articles was done using Medline via Pubmed and Embase. The key words used for the search were hernia in Ghana/ inguinal hernia in Ghana/ inguinal hernia in sub Saharan Africa/ strangulated inguinal hernia. Only articles published in English language were considered for selection. These search yielded some 25 abstracts and citations. The WHO sponsored network for access to publications on health- The Health InterNetwork Access to Research Initiative(HINARI) and the African Journal On Line (AJOL) access to medical research facilities were then used to locate articles that contained information or data on the prevalence of inguinal hernia, inguinal hernia surgery or repair in Ghana. The inclusion criteria for the articles in this review were: the article must have been published between January 1st 2000 and November 30th 2015, must contain data or information on the epidemiology, prevalence, surgical output and repair rates of inguinal hernia in Ghana.

Results

Eleven articles satisfied the selection criteria for inclusion. Of the 11 articles two contained data or information on the epidemiology (including prevalence) of inguinal hernia and 9 papers had data or information on surgical output or repair rates of inguinal hernia in Ghana. Fourteen publications were excluded for lack of data or information on either prevalence or epidemiology and surgical output / repair of inguinal hernia in Ghana. The 11 publications selected were added to 8 publications in possession of the author. Thus a total of 19 papers were used for the review. Of the 19 articles 15 were published within the period between January 1, 2000 and November 30th 2015. Four other papers published outside the review period were also selected for the review because one paper contained data on the prevalence (1978), and three papers on surgical output (1970, 1984, 1993) of strangulated inguinal hernia in Ghana.

Discussion

Prevalence of inguinal hernia in Ghana

Inguinal hernia is very prevalent in Ghana especially in rural communities. Over three decades ago Belcher and his colleagues using standard public health methods determined that the prevalence of inguinal hernia in adult men was 7.7% rural southern Ghana[6]. Beard used a mathematical epidemiologic model to estimate the prevalence of inguinal hernia in Ghana at 3.15% of the general population and calculated that 800 000 Ghanaians have inguinal hernia today[5]. In a recent well designed population - based study in the Barekese sub-district of Ashanti region Ohene-Yeboah and his co-investigators estimated the over-all prevalence of untreated inguinal hernia as 10.8% of adult males, varying from 5.1% in men aged 15-44 years to as high as 32.3% in men aged 65 years or above (table 2). Based on the prevalence figures it is estimated that there are 780 397 adult men living with unrepaired hernia in Ghana today[8]

Table 2. Prevalence of treated and untreated inguinal herniain 803 men in the Barekesesub –district of Ashanti, Ghana [(8)].

Age group (years)	Number of men	Inguinal herniaprevalence (95 % CI)	Scarprevalence (95 % CI)	Treated and untreated inguinal herniaprevalence (95% CI)
15-44	557	5.1 (2.9, 7.2)	1.4 (0.5, 3.0)	6.6 (3.8, 9.4)
45-64	181	20.4 (14.6, 26.2)	4.4 (1.4, 7.4)	24.9 (18.7, 30.8)
65 or older	65	32.3 (20.9, 43.7)	3.1 (0, 7.5)	35.4 (23.6, 47.2)
Total	803	10.8 (8.0, 13.6)	2.2 (0, 5.4)	13.0 (10.2, 15.7)

Inguinal hernia surgery output in Ghana: low repair rates.

Inguinal hernia surgery output from Ghana is very low. A recent review of case series of strangulated inguinal hernias from four health facilities in Kumasi: namely the KomfoAnokye Teaching Hospital, the Seventh Day Adventist, the University and the Kumasi South Hospitals over a period of five years (2007-2011) revealed some amazing facts about surgery for inguinal hernia in Ghana[9]. In each year of study less than 1% of the estimated 44 917 adult men in Kumasi who require a surgical correction actually got a repair done. In the teaching hospital more emergency hernia projections. A mathematical model of inguinal hernia epidemiology in Ghana estimates that at the current rate of repair of 30 per 100,000 population there could be a backlog of one million inguinal hernia cases that need repair over the next 10 years, figure1[5]. Furthermore the impact of the current repair rates of 30 per 100 000 population is almost similar to a zero repair rate[5].

repairs were done compared with elective herniorrhaphy.

Further information on inguinal hernia repair rates in Ghana was obtained from the population -based study of Barekese[8]. This study revealed that population based repair rates (measured as scar prevalence rates in the population) in Barekese sub-district of Ashanti region was 2.2% and varied from 1.4% in adult men aged 15-44 years to 4.4% in the age group 45-64 years(table2). The wide gap between the prevalence and repair rates of inguinal hernia in Ghana is further highlighted using epidemiological

The scourge of untreated inguinal hernia: strangulations, obstructions and intestinal necrosis.

Complications of untreated inguinal hernia are potentially fatal. In a report on strangulated external hernias in adults in Kumasi Ohene-Yebaoh documented the high morbidity and mortality associated with surgery for strangulation[10].

In that study the bowel resection rate for strangulated inguinal hernia with intestinal necrosis was 18.7%. The associated mortality rate was 6.2%. In a review of a series of 652 cases of acute bowel obstruction in Kumasi,Ghana, Ohene-Yeboah and his colleagues reported that half (49%) of the patients had a pre–operative diagnosis of strangulated inguinal hernia[3]. The mortality from strangulated inguinal hernia in this series was 8.5%. The over- all mortality for bowel obstruction was 12%.

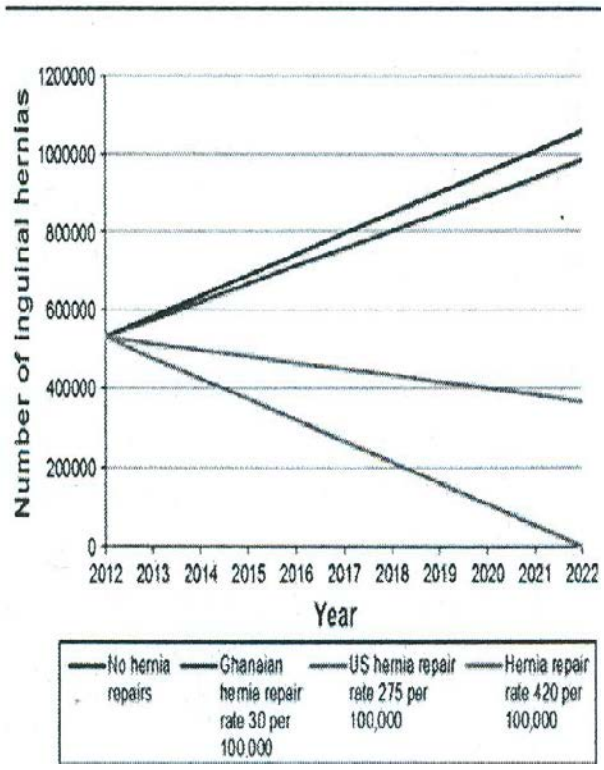

Figure 1. Projection of inguinal hernia prevalence in Ghana over the next ten years [(5)]

In earlier reports by Badoe[11], Archampong[12] and Naaeder[13] strangulated inguinal hernia was the most important cause of bowel obstruction in Ghana with a mortality of 10%. It is a fact of life in Ghana that many men (young and old) in the rural farming communities may be unable to work as a consequence of large or complicated inguinal hernias[7]. In one such a case a 49 – year old farmer lost several months of yam production when he developed an entero-scrotal fistula as a result of a neglected strangulated left inguinal hernia[14]. That year this farmer was in hospital for several weeks away from his farm. These data when considered together make a strong case for the need to increase the elective repair rate of inguinal hernia to prevent these complications. Many surgeons believe that strangulated inguinal hernia is a preventable emergency and that in hernia surgery an elective repair prevents an emergency operation.

Barriers to elective repair of inguinal hernia.

The health care system.

In Ghana the health care system lacks the capacity to meet the need of inguinal hernia surgery. Recently Abantanga and co- investigators surveyed 10 district hospitals in Ghana in order to document the range of surgical operations that are performed in these hospitals and the capacity of these hospitals to perform[1]. They reported that Ghana appears to be relatively unique among developing countries in that the district hospitals are relatively well equipped with supplies and equipment and the number of supporting staff appear adequate. Ghana is however lacking in trained personnel to perform these basic surgeries[1]. The limited number of trained surgeons and experienced medical officers especially in the district hospitals constitutes a major barrier to elective repair of inguinal hernia in Ghana.

Inguinal hernia disease awareness

The level of awareness of inguinal hernia as a surgical disease among the adult male population is low. The results of population-based study in which participants completed an interviewer administered questionnaire that probed their knowledge, attitudes and practices regarding inguinal hernia disease are revealing[8]. Of the 87 men with untreated inguinal hernia 54(62.8%) knew that a medical doctor can cure the hernia however 33 of them (36%) believed that a herbal or traditional practitioner can also cure the hernia. Furthermore of the 54 men with untreated inguinal hernia who chose to see a doctor only 18 of them 33.3% expected to have a surgical operation, 36 of them 66.7% would prefer some form of medication or non – surgical treatment as surgery was considered too expensive or unsafe. Men who failed or delayed to seek medical advice for an inguinal hernia cited high cost of surgery 48.8%, fear of death from anaesthesia, of impotence and of surgical complications 32.7%, preference for traditional treatment 12.8% and long waiting time at hospitals 5.7% as the reasons for the behaviour.

To achieve control over inguinal hernia disease Ghana needs a repair rate of 420 per 100 000 population far above the current US repair rates of 275 per 100 000 population[5]. This is a formidable task that requires a focused attention and approach to address the lack of trained personnel and to remove the misconceptions that constitute barriers to increasing repair.

Interventions.

Operation Hernia Foundation

Already efforts are underway to increase the hernia operations in some communities in Ghana. The Operation Hernia Foundation based in Plymouth

Table 3. A multi-facetedapproach to expand the capacity for herniarepair in Ghana [8]

Awareness	**Advocacy**	**Repair**	**Research**
Create population awarenessof : 1. Inguinal hernia causes and treatment 2. The potential life threatening complications of untreated inguinal hernia 3. Resourcesavailable for hernia repair (camps, nearby hospitals) Inform Government of the negativeimpact of untreated Inguinal Hernia on productivity and GDP *Methods* Radio and television programs and advertisements	Policy change on inguinal hernia : **1**. Advocate for inguinal hernia as a public health priority similar to malaria, TB and HIV. 2. Educategovernment on the prevalence of hernia and negative impact of hernia on population productivity **3**. Advocate for NHIS to cover full cost of herniarepairincludingmesh **4**. Coordinate with government and developmen tpartners for hernia repair voucher program **5.** Advocate for licensing of NPCs to perform hernia surgery ***Collaborators*** Ministry of Health, Ghana Hernia Society, The Parliamentary Select Committee on Health, Conferences of Regional and District Directors of Health, Global Developmentpartners.	Goal : to increase the repair rate of inguinal herniafrom 30 to 90 per 100,000 population per year in 10 years. Program for training non-surgeon clinicians outlined in Figure 1 ***Collaborators.*** Ministry of Health, Ghana Hernia Society, Global developmentpartners.	A comprehensivenational database on Inguinal Herniacollecting information on : -epidemiology -riskfactors -clinicalpresentationsurgical output, outcomes -repair rates -ongoing data collection to assess the effectiveness of the educational interventions ***Supervision*** Ghana Hernia Society ***Management Sites.***Departments of surgery of the three major teachinghospitals in Ghana.

England has set up Ghana's first ever hernia centre in the west of the country[15]. Using the facilities at the centre a group of European surgeons visit to operate alongside their Ghanaian counterparts to perform up to 50 repairs per visit[16]. There are other groups from Poland that also provide short term humanitarian medical projects or missions to repair inguinal hernias in the north of Ghana[17]. These are excellent examples of international support and collaboration needed to strengthen the health system of Ghana to meet the needs of inguinal hernia surgery. Nevertheless Ghanaian surgeons have to initiate programmes that are comprehensive and address all aspects of the disease.

Ghana Hernia Society

The Ghana Hernia Society (GHS) [18] is an association of surgeons who have special interest in anterior abdominal wall and inguinal hernia surgery. It is a response to the suggestions outlined in a recent review on inguinal hernia disease in Africa[19]. Members of this society are committed to a multi –faceted approach to the hernia disease burden in Ghana and will lead the implementation of a program aimed at surgical capacity building to increase access to inguinal hernia repair surgery. This approach involves awareness creation, advocacy, repair of hernias and research (table 3). The first line of action involves a collaboration with Health Promotion Department of the Ghana Health Service to inform the public that untreated inguinal hernia may develop life- threatening complications requiring expensive emergency care with poor outcome and to emphasize that the disease is curable with a safe and effective surgical operation.

Recently Kingsnorth and his co –authors summarized the available evidence that indicated that there is a need for major policy changes in hernia surgery in Ghana[20]. In the second line of action members of the GHS will provide strong advocacy for these policy changes that have the potential to increase the capacity to access inguinal hernia surgery. These policy changes include: listing inguinal hernia as public health priority similar in importance to malaria, TB and HIV, accepting a nation-wide use of the Lichtenstein tension free mesh repair for inguinal hernias, licensing non – physician clinicians to

undertake hernia repair, expanding the coverage of the NHIS to cover the cost of mesh and other indirect costs of surgery and considering a payment voucher to motivate hernia operators.

Thirdly the members of the GHS must spearhead a campaign to increase the repair of inguinal hernias from 30 to 90 repairs per 100 000 population per year over the next five years. The campaign involves a collaboration with Co-operate Ghana and the Ghana Association of Industries and our Global Developmental Partners to fund regular outreach services to district hospitals to perform hernia surgery and train medical officers in mesh repair as well as regular courses and workshops on mesh repair of inguinal hernia (table 3).

In addition a comprehensive national data base or bank on the epidemiology, risk factors, clinical presentation, surgical output and correction rates and complications will be compiled. This has to be coordinated and supervised by the Ghana Hernia Society and based at the departments of surgery of the three major teaching hospitals. Data on traditional and other non surgical treatments of the disease as well as the level of awareness of the population on inguinal and other hernias could become available. This is the kind of data that health planners in Ghana need to meet the needs of the increasing population of hernia sufferers.

Conclusions

Inguinal hernia disease in Ghana is characterized by the extremes of high prevalence but low rates of repair. The condition is an important cause of morbidity and mortality in both urban and rural communities. Access to hernia repair surgery is limited by patient education, health care costs and health facility capacity. Intervention to build the capacity for increased hernia repair could consist of a multifaceted program aimed at increasing patient awareness, health policy advocacy, increased repair rates through increased outreach services, training of medical officers and non-surgeon physicians and ongoing pragmatic research. Such a program is likely to narrow the gap between the prevalence and repair rates of inguinal hernia in our communities.

References

1. Abantanga FA, Hesse A, Sory E, Osen H, Choo s et al Policies for improving access to quality of basic and essential surgical care ot district hospitals in Ghana. *Post Grad Med J Ghana*. 2012;1: 3-8.
2. Ohene-YeboahM, Abantanga F, Oppong J, Togbe B. Some aspects of the epidemiology of external hernias in Kumasi, Ghana. Hernia 2009; 13: 529-532
3. Ohene-Yeboah M, Adippah E, Gyasi-Sarpong K. Acute intestinal obstruction in adults in Kumasi, Ghana. *Ghana Med J* 2006; 40: 50-54.
4. Grimes CE, Law RSL, Borgstein ES, Mkandawire NC, Lavy CBD. Systematic review of met and unmet needs of surgical disease in rural sub-Saharan Africa. *World J Surg* 2012; 36: 8-23.
5. Beard JH, Oresanya LB, Ohene-Yeboah M, Dicker RA, Harris HW. Characterizing the global burden of surgical disease: A method to estimate inguinal hernia epidemiology in Ghana. *World J Surg*2013;37: pg 498-503.
6. Belcher DW, Nyame PK, Wurapa FK. The prevalence of inguinal hernia in adult Ghanaian males. *Trop Geo Med* 1978; 30: 39 – 43.
7. Sanders DL, Porter CS, Mitchell KCD, Kingsnorth A. A prospective cohort study comparing the African and European hernia. Hernia 2008; 12: 527-529.
8. Ohene-YeboahM, BeardJ, Frimpong-Twumasi B, Koranteng A, Mensah S. Prevalence of inguinal hernia in adult men in the Ashanti Region of Ghana. *World J Surg* 2015 online DOI 10.1007/s00268-015-3335-7
9. Ohene- Yeboah M. Dally CK. Strangulated inguinal hernia in adult males in Kumasi. *Ghana Med J* 2014; 48: 101-105
10. Ohene-Yeboah M. Strangulated external hernias in Kumasi. *West Afri J Med* 2003; 22: 310-313.
11. Badoe EA. Acute intestinal obstruction in Kor Le Bu Teaching Hospital, Accra: 1965-1969. *Ghana Med J* 1970; 9: 283-287
12. ArchampongEQ, Owusu PA and Amankwa JA. The pattern of acute intestinal obstruction at Korle Bu teaching Hospital, Accra. *West Afr J Med* 1984; 263-270.
13. Naaeder SB, Archampong EQ. Changing pattern of acute intestinal obstruction in Accra. *West Afr J Med* 1993;12: 82-88.
14. Ohene-Yeboah M. Entero-Scrotal fistula in a Ghanaian adult: a case report of the spontaneous rupture of a neglected strangulated inguinal hernia. Hernia. 2011; 15: 455-457.
15. Sanders Dl, Kingsnorth A. Operation hernia: humanitarian hernia repairs in Ghana. Hernia 2007;11: 389-391.
16. Clarke MG, Oppong C, Simmermarcher R, Park K, Kurzer M, Vanotoo L, Kingsnorth AN. The use of sterilized polyester mosquito net for inguinal hernia repair in Ghana. *Hernia* 2009; 13:155-159
17. Mitura K, KozielS, Pasierbek M. Groin hernia surgery in northern Ghana—humanitarian mission of Polish surgeons in Tamale Pol Przegl Chir (*Polish J Surg)* 2015;87: 16-21
18. GhanaHernia Society (GHS).www.ghanahernia.org
19. Ohene-YeboahM, Abantanga F A. Inguinal Hernia Disease in Africa: A Common but Neglected Surgical Condition. *West Afr J of Med* 2011; 30: 77-83.
20. Kingsnorth A, Clarke MG, Shillcutt S. Public Health Policy Issues of Hernia Surgery in *Africa World J Surg*. 2009 33:1188-93.

COMPARISON OF HAND AND ULTRASONIC INSTRUMENTATION ON PERIODONTAL PARAMETERS IN GHANAIAN PATIENTS WITH MODERATE CHRONIC PERIODONTITIS

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Abstract

Background: The traditional method of treating chronic periodontitis initially is non surgical therapy which involves oral hygiene instructions and mechanical instrumentation using either hand or machine driven instruments. This reduces infection and then subsequent healing of the periodontal tissues with a resultant pocket elimination or reduction.

General Aim: The aim of this study was to determine if hand and ultrasonic instrumentation produce comparable periodontal pocket reduction among Ghanaian patients with moderate chronic periodontitis.

Methodology: The study was an interventional study, spanning a period of 5 months for each patient. Twenty patients with pocket depth 5 – 7 mm between the ages of 30 – 81 years were treated using hand and ultrasonic instrumentation at the University of Ghana Dental School clinic. Periodontal parameters measured include plaque scores, bleeding on probing (BOP) scores, probing pocket depth (PPD), probing attachment level (PAL) and gingival recession. Significance level was set at 0.05.

Results: The mean PPD at baseline for patients treated using hand instrumentation was 5.5mm and was reduced to 3.4mm at fifth session of instrumentation. Ultrasonic instrumentation recorded a reduction of baseline value of 5.5mm to 3.6mm at fifth session. Bothmethods of instrumentation recorded a significant reduction of the mean PPD without a significant difference in the mean reduction between the two methods of instrumentation.

Conclusion: The use of hand or ultrasonic instrumentation produced similar results with respect to reduction in BOP, plaque scores, PPD and PAL

Keywords : Chronicperiodontitis, hand instrumentation, ultrasonic instrumentation, non surgicalperiodontaltherapy, probingpocketdepth.

Introduction

Chronic periodontitis is an infectious disease resulting in inflammation within the supporting tissues of the teeth, progressive attachment loss and alveolar bone loss[1] It begins as plaque induced gingivitis, a reversible condition that when left untreated may develop into chronic periodontitis and eventual loss of teeth[2]

Globally, chronic periodontitis is most prevalent in adults but can be observed in children. It has been difficult to determine the level of oral health status of Ghanaians because of limited data. There have been only a few studies on the prevalence of periodontal disease and mostly of only 6 – 12 year old school children covering only a few selected cities[3] Available data indicate a very high proportion (97%) of children with poor oral hygiene defined as percentage with stain or debris on the gingival third of two or more teeth.[4] One study detected relatively few (4%) 12 of year old with shallow periodontal pockets whilst another study detected shallow periodontal pockets (4 – 5mm) in 21% of school children although no deep pockets (6mm) were found[5,6] Mechanical therapy can be achieved by scaling and root planning with hand or engine driven instruments. Studies have shown high success rates of non surgical therapy in the treatment of mild to moderate periodontitis[7,8] It has been demonstrated that hand or ultrasonic and sonic scalers produce similar periodontal healing response with respect to probing pocket depth, bleeding on probing and clinical attachment level[9,10]

Calculus is rough, porous and plaque retentive substance that adheres to the root surface. The goal of periodontal instrumentation is to effectively remove plaque and calculus while causing the least amount of root surface damage. Attempt to completely remove calculus deposits require extensive instrumentation and can result in significant amounts of cementum and dentine loss, thereby inducing dentinal hypersensitivity and increased prevalence of pulpitis.[11] Using the ultrasonic scaler on medium to low power or using the tip of sonic scaler at an angle close to zero degrees to the tooth surface may enable the clinician perform a thorough debridement without excessive damage to root surface[12] The efficacy of a single course of scaling and root planing will be affected by the skill of clinician, time allocated for procedure, inflammatory status of the tissues and anatomy of roots[13,14] The greatest changes with respect to probing depth reduction and gain in clinical attachment can be recorded after 4 to 6 weeks, but gradual repair and

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maturation of the periodontium may occur over 9 to 12 months[15]

The amount of reduction in probing depth is directly related to the initial probing depth[16]

The teeth most affected by periodontal pocketing are the upper molars followed by the lower molars with the least being the canines, suggesting that exceptional care be given to these most susceptible teeth for periodontal disease in order to prevent the development of irreversible damage of the periodontium[17]

Surgical treatment is scheduled according to the results based on re-evaluation following the non surgical therapy to further eradicate the remaining pocket and inflammation to create a healthy environment and to stimulate regenerative potential of periodontium.[18] The aim of the present study is to determine which of the two methods of non surgical periodontal therapy produced the better result in pocket therapy in Ghanaian patients, because the extent to which periodontal pockets depth reduction or elimination in Ghanaian patients with moderate chronic periodontitis can be achieved with non surgical periodontal therapy is not known, so one cannot determine the prognosis with certainty at the start of therapy.

Patients with moderate chronic periodontitis will not be subjected to undue surgeries if it is known that they can respond successfully to treatment with non surgical therapy.

It is expected that the results of this study will provide information regarding which of the two methods of none surgical therapy will produce the better treatment outcome.

Materials and method

The study was a comparative interventional study carried out at the University of Ghana Dental School Clinic, which is a primary referral center in Ghana.

The study population consisted of 20 patients 30years and above referred to the periodontics clinic. The patients were selected consecutively as they were diagnosed of moderate chronic periodontitis.

Inclusion criteria

- Patient should be 30 years old and above.
- The selected patient should have periodontal bone loss of up to one third of the root length.
- Clinical signs of gingival inflammation and probing pocket depths 5 - 7mm with calculus at one tooth site at least, in each quadrant.

Exclusion criteria

- Patients with any past medical history of chronic disease.
- Patients on medication such as antibiotics, antidiabetics, antihypertensives (calcium channel blockers), phenytoin and immunosuppressants that may modify the disease or the response to treatment.
- Patient undergoing periodontal treatment of any form or has had periodontal treatment in the past 2 years.
- Teeth with defective and sub gingival restorations
- smokers

Method

After recruitment of patient, closed ended questionnaire was administered and basic demographic data on them was documented.

Clinical examination

Periodontal clinical examination was carried out and the following parameters recorded on the periodontal chart at each visit by the investigator for comparison with subsequent records; dental plaque, bleeding on probing, probing pocket depth and probing attachment level and gingival recession. All clinical measurements were taken from mid – buccal and mid – lingual sites and buccal aspect of interproximal contact area for mesial and distal sites of each tooth to the nearest 1 mm using Periowise probes calibrated at 3, 5, 7, 10 mm with 0.5mm diameter and round tip (Henry Schein Dental).

Dental plaque

O'leary's plaque index was used to record plaque after staining with plaque disclosing dye[19] Presence of plaque was recorded if an area of clearly visible stained material was present along the gingival margin and if this material can be removed with the side of the probe. The percentage of surfaces with plaque out of the total number of examined tooth surfaces was calculated. All teeth present were examined. This form allows the patient to visualize his own progress in learning plaque control which has a motivating effect on patients.

Bleeding on probing (BOP)

This parameter is determined if bleeding occurs subsequent to probing. A positive score is recorded for a bleeding pocket. The proportion of bleeding surfaces out of total number of examined surfaces was calculated for each patient at each visit. All teeth present in the mouth were examined.

Probing pocket depth (PPD) and probing attachment level (PAL).

PPD was measured as the distance from the gingival margin to the base of the periodontal pocket. PPD between 5 – 7mm were selected.

PAL was measured by deducting the distance from cementoenamel junction (CEJ) to the gingival margin (GM) from the distance obtained for the corresponding PPD for sites without prior recession,

where there was recession, the distance CEJ to GM was added to the corresponding PPD.

Gingival recession

This distance was taken in areas of gingival recession and was calculated as the distance from CEJ to the GM at initial examination and compared with the distance at subsequent visits.

Radiographic examination

An orthopanthomograph for each patient was examined to assess the overall pattern of bone loss and to detect any anomaly radiographically that might interfere with treatment. Periapical radiographs of selected teeth were also taken for diagnosis and further treatment planning for the patient.

Clinical procedure

Each patient was taken through oral hygiene instructions and motivation. Patients were taught sulcular method of tooth brushing and interdental cleaning either using a dental floss or an interdental brush of the appropriate size. Cleaning technique was tailored according to the patient's needs.

Instrumentation was started a month after oral hygiene instructions, using both hand and ultrasonic instruments. The left and right sides of the jaws were assigned for either ultrasonic or hand instrumentation by simple randomization. The choice of the side of jaws to start with for the first respondent was chosen by a toss of a coin, the left jaws was assigned Head and the right jaws Tail. After the first toss, subsequent toss indicated what method of instrumentation to be assigned to the first selected jaws, ultrasonic was assigned Head and hand instrumentation, Tail. After assigning an instrument to the selected jaws, the second instrument was assigned to the next jaws. This process was applied to subsequent respondents.

Each patient was seen at 5 sessions or visits over a period of 5 months as follows:

1. First session; oral hygiene instruction, motivation and baseline measurements.
2. Second session; a month after first session. Measurements and full mouth debridement using Woodpecker ultrasonic scaler model UDS – J with P3D and P4(Guilin Woodpecker Medical Instrument Co., Ltd) and Gracey 7/8, 11/12, 13/14 (Hu – Friedy) hand instruments.
3. Third session; 2 weeks from the second session. Measurement of periodontal parameters and selective instrumentation
4. Fourth session; 6 weeks from the second session. Measurements of periodontal parameters and selective instrumentation
5. Fifth session; 16 weeks from second session.

Measurements and instrumentation.

Instrumentation consisted of supra gingival scaling, sub gingival scaling and root planing.

Local anaesthesia was given when patient experienced pain during procedure. Instrumentation of surfaces of teeth were done until operator was satisfied that the surfaces have been adequately instrumented.

Reproducibility

Each tooth was instrumented 4 minutes for ultrasonic scaling and 6 minutes for hand scaling. Operator was calibrated, and was found that it took an average of 4 minutes to adequately instrument a tooth using ultrasonic scaling and 6 minutes for hand scaling.

Reproducibility of probing pocket depth was 96% within the limit of 1mm when operator was calibrated using repeated probing in 3 patients. 192 sites were duplicated, 66% of sites were duplicated with no difference, 30% were duplicated with a difference of 1mm and 0.04% of sites with a difference of 2mm.

Data collection and analysis

Data was captured by interviewer administered questionnaire; a periodontal chart (form) was used to record all periodontal parameters taken. A different chat was used at each visit. All the data collection was done by the investigator

Microsoft access database was used to capture data and cleaning done by Excel 2007. The cleaned data was exported into Statistical Package of Social Sciences (SPSS version 16) for analysis.

Means were compared using T- test for two means and ANOVA for more than two means. Significant level was set at 0.05.

Ethical consideration

Ethical approval for the study was obtained from Ethical and Protocol Review Committee of the University of Ghana Medical School. Written and verbal informed consent was obtained from the patient to be recruited into the study. Other conditions that the patients had in their mouths apart from chronic periodontitis were referred to the appropriate departments for management as part of their treatment plan.

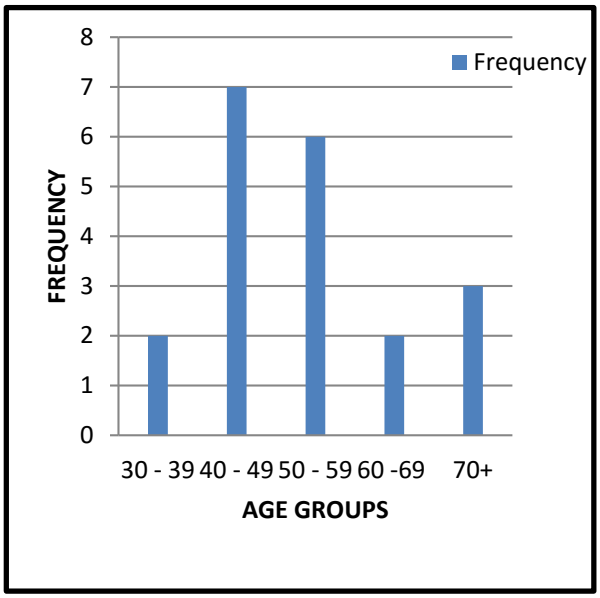
RESULTS

Patients between the ages of 30 – 81 years with an average of 53.5 ±12.9 years were selected for the study, 65% of the patients aged between 40- 59 years. A greater proportion of the patients were females (60%). Most of the patients treated had formal education with the majority (50%) having tertiary education.

Age distribution of patients treated

The majority of the patients seeking treatment reported because they had mobile teeth, bleeding gingiva or pain.

Fig 1: Age distribution of patients treated



A total number of 289 teeth were involved in the study. Of these teeth molar involvement recorded the highest frequency of 145 teeth (50%), then the premolars which recorded 74 teeth (26%) and the least was the incisors and canine.

Among the teeth affected, a higher percentage of the teeth were maxillary teeth (53%), as compared to the mandibular teeth which recorded 47%.

Mesial and distal sites of the teeth selected were more (95%) than buccal and lingual sites.

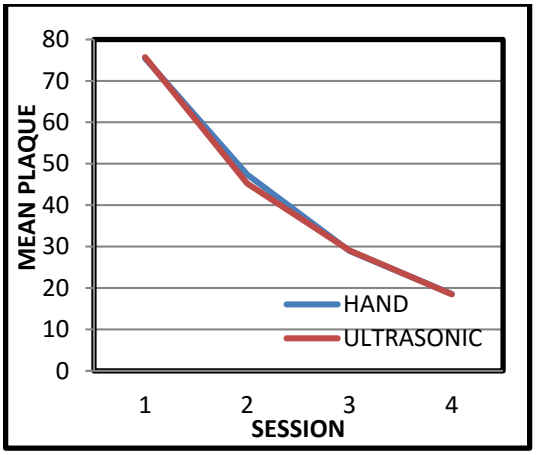
Each of the Patients had 4 sessions of instrumentation, 165 teeth, with 248 sites treated by ultrasonic instrumentation and 125 teeth with 190 sites by hand instrumentation.

Dental plaque

The mean proportion of surfaces of teeth with dental plaque at baseline before oral hygiene instruction (OHI) was given was 74.6 ±24.2. One month after OHI, the mean value for the presence of plaque reduced to 70.9 ± 23[3]. Comparison of the two means shows a significant difference (p-value = 0.0001) between surfaces of teeth with plaque before and after OHI only.

The mean dental plaque reduced significantly from treatment baseline (75%) to the last session of treatment (19%) for hand instrumentation and from 75.7% to 19% for ultrasonic instrumentation. There was no significant difference between the plaque scores observed using hand or ultrasonic instrumentation, p=0.661. However, each of the two methods of instrumentation resulted in a significant reduction in plaque levels from baseline and subsequent sessions.

Fig 2: Comparison of mean plaque reduction with hand and ultrasonic instrumentation

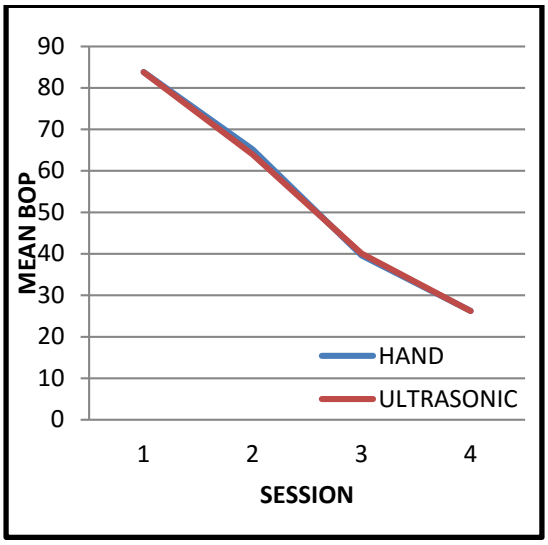


P=0.661

Bleeding on probing, (BOP)

The mean surfaces bleeding on probing before OHI at baseline was recorded at 83.4%, this figure reduced to 83.05% after initial OHI. There was an improvement of the mean percentage surfaces bleeding on probing by 0.35%. Treatment using hand instrumentation recorded a significant reduction of BOP from a mean of 83.9% at first session to 26.6% at the fifth session while the mean reduction for ultrasonic instrumentation was from a mean of 83.8% to 26.2%. A p-value of 0.965 was recorded for the difference in BOP using two methods of instrumentation.

Fig 3: Comparison of mean BOP with hand and ultrasonic instrumentation



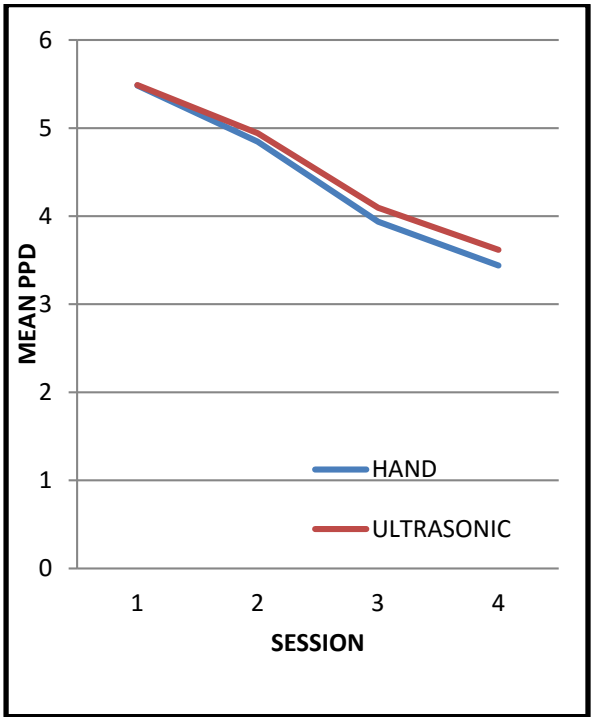
P-value = 0.965

Probing pocket depth, PPD

The mean PPD at baseline for patients treated using hand instrumentation was 5.5mm. This figure was reduced to 3.4mm at fifth session and ultrasonic instrumentation recorded a significant reduction in the mean PPD of 5.5mm at baseline to 3.6mm at the fifth session. There was a significant reduction of PPD by a mean of 2mm.

Analysis of the mean difference of the average PPD between the two methods of instrumentation yielded a p- value of 0.311.

Fig 4 : Comparison of mean PPD reduction with hand and ultrasonic instrumentation

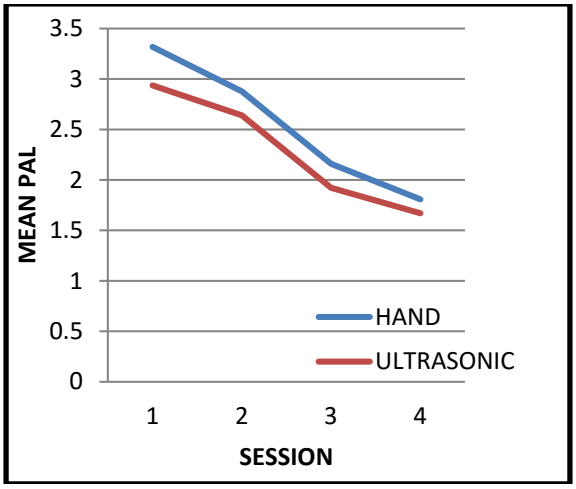


P -value = 0.31

Probing attachment loss, (PAL)

The mean PAL for teeth treated with hand instrumentation was 3.3mm at baseline and then was reduced significantly to 1.8mm. For ultrasonic instrumentation, the value was reduced from a mean of 2.9mm at baseline to 1.6 mm. Comparison of mean differences of the two methods of instrumentation resulted in a p- value of 0.197. There was no significant change in the mean PAL reduction for the two methods of instrumentation.

Fig 5: Comparison of mean PPD reduction with hand and ultrasonic instrumentation

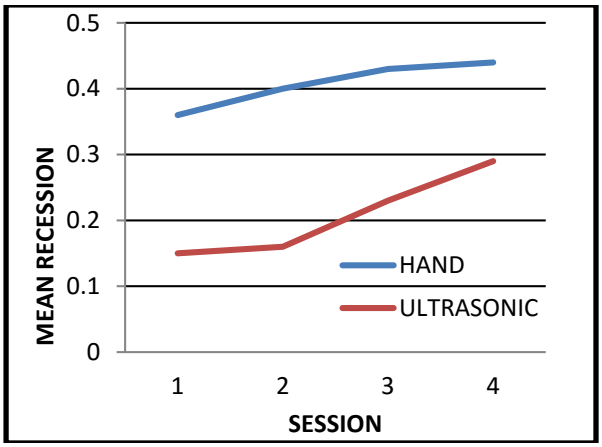


P-value = 0.197

Gingival recession

The mean recession of teeth treated with hand instruments increased from a value of 0.36mm at baseline to 0.44 at last session, there was no significant change from baseline to the last session of instrumentation. The mean value for teeth treated with ultrasonic instrumentation also increased from 0.14mm at baseline to 0.29 at last session. The increase was not significant at the various sessions. However there was a significant difference between the mean recession values of the two methods of instrumentation.

Fig 6: Comparison of mean PAL reduction with hand and ultrasonic instrumentation



P-value = 0.009

DISCUSSION

The aim of non surgical periodontal therapy is to eliminate dental plaque and calculus from the tooth surface and adjacent soft tissue, if done effectively itwill lead to resolution of inflammation and then beneficial clinical changes in plaque scores, bleeding on probing, probing pocket depth and probing attachment loss. The present study sought to determine if comparable results are obtained using either hand or ultrasonic instruments for scaling and root planing.

A greater proportion of them were females (60%) which might give the impression of higher prevalence among females. This is in contrast to a study in Nigeria which reported a higher prevalence of attachment loss and periodontal pockets in males than in females[20.] The results obtained in the present study may be attributed to better dental clinic attendance behavior among Ghanaian females than male patients.

All the patients recorded significant reduction from a baseline mean plaque score of 75% to 70.9% with OHI measures only for a period of a month, the reduction though statistically significant, was not substantial clinically.

This value further reduced significantly to an average value of 18.6% and 18.5% with hand and ultrasonic instrumentation respectively at the end of 5 months of treatment. The change in plaque score was due to effectiveness of oral hygiene measures and professional removal of plaque and calculus by scaling and root planing.

The mean bleeding scores for the whole group reduced from baseline value of 83.4% to 83.05%, a mean difference of 0.35% after a month of oral hygiene measures. The difference though significant was not substantial as compared with studies by Cercek et al [21] where clinically significant reductions of bleeding scores were realized after 3 months of oral hygiene measures alone. Significant reduction of mean bleeding scores was realized in this study with hand and ultrasonic instrumentation to 26.3% and 26.2% respectively at the end of the four sessions of instrumentation. Individuals with low mean BOP percentages (<10%) may be regarded as patients with low risk for recurrent disease, while patients with mean BOP percentages (> 25%) are considered to be at high risk for re-infection[22] The mean BOP value could possibly be reduced further over time with maintenance therapy as a measure to prevent re-infection. No significant difference in the mean BOP was observed when comparing hand and ultrasonic instrumentation because the two methods produced similar effect on BOP.

The mean PPD was reduced significantly from 5.5mm to 3.4mm for hand instrumentation and that for ultrasonic from 5.5mm to 3.6mm at the last session, a mean difference of 2mm over a period of 5 months of OHI, scaling and root planing. Also, comparing the values of the mean differences between baseline and the various sessions, the highest change was observed at the sixth week. The changes observed were similar to those of Knowles et al (1979), Cercek et al (1983) and Kaldahl et al, 16 where the mean probing depth reduction for moderately deep sites (4 – 6mm) was 1.29 mm versus 2.16 mm for deeper sites (≥7mm), but they observed that little further improvement seemed to take place after 4 – 5 months. There was no significant difference observed in the mean PPD comparing hand and ultrasonic instrumentation. This implies that the clinical effects of either hand or ultrasonic instrumentation on PPD are similar, this is in agreement with earlier studies[7,10,14] The reduction in PPD is as a result of resolution of inflammation leading to shrinkage of the tissues, gingival recession and a gain in clinical attachment in the form of long junctional epithelium.

The mean PAL observed a significant reduction of 1.5mm and 1.3mm for hand and ultrasonic instrumentation respectively over the 5 months period of therapy. A significant difference was observed between values at baseline and sixth weeks and beyond post instrumentation. There was no significant difference in the mean PAL values comparing hand and ultrasonic instrumentation. Reduction of the mean PAL depicts a gain in attachment. The desirable attachment is a connective tissue attachment that was lost to periodontitis but this attachment is usually replaced by epithelial attachment in the form of long junctional epithelium during healing after scaling and root planing. The differentiation of type of attachment can only be verified by histological means.

The two methods showed an increased mean gingival recession over the 5 months period. Hand instrumentation showed a mean increase of 0.08mm while ultrasonic instrumentation recorded 0.14mm. The mean differences of recession at the various sessions of instrumentation were insignificant. Comparing this observation with earlier study by Badersten et al (1981) in which the mean recession increase was 1.5mm (although the results were over 13 months period most of the recessions occurred within 2 – 3 month), values obtained in the present study are far lower. The differences observed between the present study and that of Badersten et al could be due to oral hygiene practices, local and anatomic factors. The significant difference observed in the comparison of the effects of the two methods of instrumentation could be due to differences in trauma produced by the two methods of instrumentation and local factors influencing gingival recession such as tissue biotype and initial gingival inflammation[23,24,25]

The results of the present study demonstrate that improvements which are clinically significant can be obtained after oral hygiene instructions, scaling and root planing in Ghanaian patients with moderate chronic periodontitis. It was also found out from the study that there was no significant difference between the results obtained if either hand or ultrasonic instrumentation was used. These findings were

consistent with those of Torfason et al and Badersten et al. Probing forces were not standardized but within a range and CEJ which is a bit difficult to access when there is no recession was used as reference point for PAL measurements as compared with the use of relative attachment level which offers a significant advantage in terms of reproducibility.
Data from this study must be interpreted within the limitations of the materials and methods utilized.

CONCLUSION

Within the limits of the study, the following conclusions were made;

1. Probing pocket depths between 5 – 7mm can be reduced significantly by a mean of 2mm using OHI measures, scaling and root planing.
2. The use of hand or ultrasonic instrumentation produced similar results with respect to reduction in BOP, plaque scores, PPD and PAL.

REFERENCES

1. Flemmig TF. Periodontitis. *Ann Periodontol.* 1999 Dec;4(1):32–7.
2. Lindhe J, Lang NP, Karring T. Clinical Periodontology and implant dentistry. 5th ed. Oxford: Blackwell Munksgaard; 2008.
3. Houpt MI, Adu-Aryee S, Grainger RM. Dental survey in the BrongAhafo Region of Ghana. *Arch Oral Biol*. 1967;12(12):1337–41.
4. Bruce I. Dental Diseases in Ghanaians. A Literature Review. *Ghana Med J*. 1999;33(3):111–7.
5. Addo-Yobo C, Williams SA, Curzon ME. Oral hygiene practices, oral cleanliness and periodontal treatment needs in 12-year old urban and rural school children in Ghana. *Community Dent Health*. 1991 Jul;8(2):155–62.
6. Clerehugh V, Laryea U, Worthington HV. Periodontal condition and comparison of toothcleaning using chewing sponge, chewing sticks and toothbrushes in 14-year-old schoolchildren in Ghana. *Community Dent Oral Epidemiol*. 1995 Oct;23(5):319–20.
7. Badersten A, Nilvéus R, Egelberg J. Effect of nonsurgical periodontal therapy. I. Moderately advanced periodontitis. *J ClinPeriodontol*. 1981 Feb;8(1):57–72.
8. Greenstein G. Nonsurgical periodontal therapy in 2000: a literature review. *J Am Dent Assoc* 1939. 2000 Nov;131(11):1580–92.
9. Lindhe J, Nyman S. Scaling and granulation tissue removal in periodontal therapy. *J ClinPeriodontol*. 1985 May;12(5):374–88.
10. Wennström JL, Tomasi C, Bertelle A, Dellasega E. Full-mouth ultrasonic debridement versus quadrant scaling and root planing as an initial approach in the treatment of chronic periodontitis. *J ClinPeriodontol*. 2005 Aug;32(8):851–9.
11. Fukazawa E, Nishimura K. Superficial cemental curettage: its efficacy in promoting improved cellular attachment on human root surfaces previously damaged by periodontitis. *J Periodontol*. 1994 Feb;65(2):168–76.
12. Flemmig TF, Petersilka GJ, Mehl A, Rüdiger S, Hickel R, Klaiber B. Working parameters of a sonic scaler influencing root substance removal in vitro. *Clin Oral Investig*. 1997 Jun;1(2):55–60.
13. Magnusson I, Lindhe J, Yoneyama T, Liljenberg B. Recolonization of a subgingival microbiota following scaling in deep pockets. *J ClinPeriodontol*. 1984 Mar;11(3):193–207.
14. Torfason T, Kiger R, Selvig KA, Egelberg J. Clinical improvement of gingival conditions following ultrasonic versus hand instrumentation of periodontal pockets. *J ClinPeriodontol*. 1979 Jun;6(3):165–76.
15. The American Academy. Proceedings of the World Workshop in Clinical Periodontics, July 23-27, 1989, Princeton, New Jersey. Chicago: American Academy of Periodontology; 1989.
16. Kaldahl WB, Kalkwarf KL, Patil KD, Molvar MP. Responses of four tooth and site groupings to periodontal therapy. *J Periodontol*. 1990 Mar;61(3):173–9.
17. Arowojolu MO. Prevalence of periodontal pocketing and tooth mobility according to tooth types in Nigerians--a pilot study. *Afr J Med Med Sci*. 2002 Jun;31(2):119–21.
18. Rosling B, Nyman S, Lindhe J, Jern B. The healing potential of the periodontal tissues following different techniques of periodontal surgery in plaque-free dentitions. A 2-year clinical study. *J ClinPeriodontol*. 1976 Nov;3(4):233–50.
19. O'Leary TJ, Drake RB, Naylor JE. The plaque control record. *J Periodontol*. 1972 Jan;43(1):38.
20. Akaji EA, Chukwuneke FN, Okeke UF. Attendance pattern amongst patients at the Dental Clinic of the University of Nigeria Teaching Hospital, Enugu, Nigeria. *Niger J Med J Natl AssocResidDr Niger*. 2012 Mar;21(1):74–7.
21. Cercek JF, Kiger RD, Garrett S, Egelberg J. Relative effects of plaque control and instrumentation on the clinical parameters of human periodontal disease. *J ClinPeriodontol*. 1983 Jan;10(1):46–56.
22. Lang NP, Adler R, Joss A, Nyman S. Absence of bleeding on probing. An indicator of periodontal stability. *J ClinPeriodontol*. 1990 Nov;17(10):714–21.
23. Löst C. Depth of alveolar bone dehiscences in relation to gingival recessions. *J ClinPeriodontol*. 1984 Oct;11(9):583–9.
24. Löe H, Anerud A, Boysen H. The natural history of periodontal disease in man: prevalence,

severity, and extent of gingival recession. *J Periodontol*. 1992 Jun;63(6):489–95.
25. Lindhe J, Nyman S. Alterations of the position of the marginal soft tissue following periodontal surgery. *J ClinPeriodontol*. 1980 Dec;7(6):525–30.

HEALTH INFORMATION SEEKING USING THE INTERNET BY PATIENTS ATTENDING A SURGICAL CARE DEPARTMENT IN A TERTIARY HOSPITAL IN SUB-SAHARA AFRICA

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Summary

Objective: To ascertain the health information seeking behavior of patients visiting a surgical care Department in a tertiary hospital using the Internet.

Subjects and Methods: A cross-sectional study was carried out at the Surgical Department of the Korle-Bu Teaching Hospital in Accra. Patients who consented to participate in the study were interviewed using a structured questionnaire. The parameters considered included the ages of the patients, their gender and educational status, the knowledge of the patients or their care-givers of the patients' clinical diagnoses, their use of mobile phones or other Internet-ready devices, as well as access to the Internet, awareness of information on their disease condition being on the Internet and having accessed such information.

Results: The total number of responses analyzed was 319.The mean age of the patients was 42 years. There were 55.2% males and 44.8% females. The largest percentage (31.9%) had had secondary (High School) education. Of the respondents, 92.2% had mobile phones and 29.8% of the patients had other Internet-ready devices. Regarding access to the Internet, 35.7% had access, 30.4% were aware of finding health information relevant to their disease condition on the Internet and 15.7% had accessed the Internet for this health information. There was a strong correlation between the educational status of the patients and having accessed heath information on the Internet. ***Conclusion:*** The majority of respondents had not accessed the Internet for information on their health condition. Patient education in the West African sub-region aimed at improving the usage of the Internet to acquire quality health-related information is needed to enhance health outcomes in this era of evidence-based health-care delivery.

Key Words: health information, internet, access, mobile phone, patients, surgical care

Introduction

The Internet has been observed to have altered significantly many aspects of life such as banking, commerce, entertainment, human relationships and education.[1] It has been noted that the use of the Internet has experienced rapid growth in both the developed and the developing countries during the last decade [2,3] with an estimated 298 million Internet users in Africa as at June 2014 and an Internet penetration of 26.5%.[4]

The Internet has been noted to have a wide range of medical information on various diseases and the search for health-related information constitutes one of the main reasons for people browsing the Internet which has been observed to offer a high degree of interactivity, anonymity and easily accessible space to find sensitive information.[5,6] This therefore makes the Internet a good place to seek health-related information as easy accessibility, anonymity and ability to interact are the desired goals of most patients. It was observed in 2002 that many more people sought medical advice on the Internet than visited health professionals worldwide.[7] Some authorities believe that the primary role of the Internet, especially in developing countries, is to deliver information and improve the health of the populations.[8,9] A study in 2004 on the use of the Internet to access reproductive health information among adolescents in Accra found 64 % of them had one time or the other accessed the Internet for reproductive health information.[10] Another study in 2012 on the adoption, penetration and usage of the Internet by a wide range of working Ghanaians revealed an Internet usage of 45.6% for educational purposes.[1] Ghana, with a population of about 26.5 million, had a mobile telephone subscription rate of 29,990,581 at the end of October 2014[11] with all the licensed network providers in the country providing services with Internet connection capabilities. It is anticipated that patients will use the Internet to enhance their knowledge of their disease conditions that will translate favorably on the management of their conditions. With the assurance of finding information on their existing medical conditions and helping them deal with health issues as some of the strongest factors influencing the use of the Internet to search for health-related information,[12] the patients as well as the care-givers were considered motivated enough to be driven

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to access health-related information on the Internet to help them better understand their disease condition(s). This is in line with the Uses and Gratifications (U&G) theory due to Blumler & Katz (1974) which assumes that the individual user of the media is in control, active, and goal-directed, as opposed to simply receiving media messages.[13]

It is however important to state that the quality of information on the Internet is vital as studies on the quality of health-related information has led to concerns about the accuracy as well as the permanence of such information.[14] Accurate relevant information is beneficial while inaccurate information is harmful.[15]

This study looked at the use of the Internet to acquire health-related information by patients visiting a tertiary surgical Care Hospital in Accra, Ghana, a sub-Saharan region.

Objective: To ascertain the health information seeking behavior of patients visiting a surgical care Department in a tertiary Hospital in Accra in terms of Internet usage

Subject and Methods

The study objective was to ascertain the health information seeking behavior using the internet as seen in the usual clients visiting the surgical clinics and in the process identify the influence of some factors such as age and educational background on the clients' health information seeking behavior using the internet. Since no such hospital based study had been done in Ghana before, the usual patient population which presented to the surgical clinics was the study population. A cross sectional study was carried out from the 1st to the 19th of December 2014 at the Surgical Department of the Korle-Bu Teaching Hospital in Accra, Ghana. Patients gave informed consent to participate in the study. Twenty-five consecutive patients were interviewed on each working day, except the 5th of December which was a public holiday, using a structured questionnaire that was investigator administered. The clinics visited included the general surgery units, urology unit and neurosurgery unit. For patients below 12 years of age their parents/ care-givers were interviewed on their health-related information seeking behavior with regards to the conditions of their children/wards.

The information captured included the ages of the patients, their gender, educational status and occupation. The knowledge of the patients or their care-givers of the nature and duration of their clinical condition (diagnosis) was also determined. Their use of mobile phones and the network they subscribed to were also determined. Their possession of Internet-ready devices such as laptops or desktop computers was ascertained as well as whether they had access to the Internet. The patients or care-givers also gave information on whether they were aware of the availability of health information on their clinical disease/ condition on the Internet and whether they had actually accessed such health information on the Internet.

The patients/ care-givers were also asked if they had ever read any book on their current disease conditions aimed at increasing their knowledge on the conditions.

Excluded from the study were patients who were first attendants at the surgical clinics, emergency cases and patients too ill to participate in the interview.

Their responses to the questionnaires were documented and analyzed using the SPSS version 17 software and presented as frequencies and tables.

Results:

The total number of responses analyzed was 319 and included 24 children 12 years of age or less whose parents/ care-givers were the respondents.

The mean age of the patients was 42.0 years ± 19.7 (range 1-91years)). There were 176 (55.2%) males and 143 (44.8%) females. A significant number of them, 102 (31.9%) had had secondary education while those with no formal education were 38 (11.9%). (Table 1)

Table 1: The educational status of the patients

Educational status of the patients	No. (%)
No formal education	38 (11.9)
Primary	80 (25.1)
Secondary	102 (31.9)
Tertiary	87 (27.3)
Pre-school	12 (3.8)
Total	319 (100)

Concerning the occupational status of the patients, the largest proportion, 63 (19.7 %) were professionals, with 5 (1.6%) being unemployed. Thirty-five of the patients (11.0%) were retired. (Table 2)

Two hundred and ninety-four (92.2 %) of the respondents had mobile phones with 85 (26.6%) of the respondents subscribing to two or more mobile telephone service networks.

With regards to the possession of other Internet-ready devices such as desktop computers, laptop computers or other devices, 95 (29.8%) of the patients had these devices while 224 (70.2%) did not possess these Internet-ready devices.

One hundred and fourteen (35.7%) of the respondents indicated that they had access to the

Table 2: Occupational status of the patients

Occupational status of the patients	No. (%)
Professionals	63 (19.7)
Business and trade	61(19.1)
Artisans	55 (17.2)
Students	45 (14.1)
Farmers	23 (7.2)
Civil Servants	11 (3.4)
Security service personnel	7 (2.2)
Retired	35 (11.0)
Prisoners	2 (0.6)
Unemployed	5 (1.6)
Pre-school	12 (3.8)
Total	319 (100)

Internet while 205 (64.3%) did not have access. (Table 3)

The adolescents between the ages of 13-19 years constituted the highest percentage (70%) of those with access to the Internet. (Table 4)

The responses of parents/ care-givers revealed that 24% of them had accessed the Internet for information on the disease conditions of their children/wards.

Of those who had access, 33.0% had accessed the Internet using their mobile phones only, 20.4% had used mobile phones or modems/ Wi-Fi while 46.6% had used modems/Wi-Fi.

Two hundred and ninety-nine (93.7%) of the patients were aware of their diagnosis with only 20 (6.3%) being unaware of their clinical diagnosis.

For the duration of their clinical condition, 154 (48.3%) had had the disease condition for one year or less, 105 (32.9%) had had the disease between 1 and 5 years while 60 (18.8%) had had the condition for more than 5 years. Ninety-seven (30.4%) of the respondents were aware they could find relevant health information on their disease condition while 222

Table 3: Responses on access, awareness and actual accessed health information on the internet

	YES No. (%)	NO No. (%)
Access to the internet	114 (35.7)	205 (64.3)
Awareness of health information on their disease condition on the internet	97 (30.4)	222 (69.6)
Accessed health information on their disease condition on the internet	50 (15.7)	269 (84.3)

(69.6%) were not aware. (Table 3) Respondents between the ages of 20 and 29 years contained the group with the highest percentage of those (51.8%) who were aware of finding health-related information on the Internet (table 4).

Fifty (15.7%) of the respondents had accessed information on their health-related conditions on the Internet while 269 (84.3%) had not. (Table 3) It was observed that 51.5% of those aware of the availability of health information on the Internet had actually accessed the Internet for information on their disease conditions while 48.5% of these knowledgeable patients had not. Patients between 20 and 29 years constituted the group with the highest percentage (28.6%) of those who had accessed health information on their disease conditions on the Internet (table 4).

In relation to educational status, those with tertiary education constituted the group with the highest percentage of those who had access to the Internet (71.3%), being aware of finding health information on their disease condition on the Internet (70.1%) and having accessed the Internet to look for health information on their disease condition (46.0%). (Table 5). There was a significant correlation between the educational status of the patients and access to the Internet ($p<0.001$)

The patients who had assessed information had used Google as the search engine. Three of the respondents indicated Wikipedia while another four indicated WebMD as the website visited for the health information. Most could not however state the website(s) visited. The majority of patients/ respondents who had not used the Internet to assess information on their health provided no reason for their action.

The few reasons advanced included their belief that their medical doctor(s) knew best and they wantedto avoid being seen as challenging the medical practitioner with such Internet-acquired knowledge. Two patients indicated they had been well-informed by their medical doctors and other relations who were in the medical field and therefore had no need for additional health information on their disease condition.

Table 4: Percentage of patients in various age groups and their responses

Age (years)	**Gender**		**Access to the internet**		**Awareness of health information on their disease condition on the internet**		**Accessed health information on their disease condition on the internet**		**Number of patients/ respondents**
	Male	Female	Yes	No	Yes	No	Yes	No	
≤12	62.5	37.5	12.5*	87.5*	4.2*	95.8*	4.2*	95.8*	24
13-19	25.0	75.0	70.0	30.0	50.0	50.0	10.0	90.0	10
20-29	50.0	50.0	67.9	32.1	51.8	48.2	28.6	71.4	56
30-39	66.7	33.3	40.3	59.7	30.6	69.4	21.0	79.0	62
40-49	46.9	53.1	31.1	68.9	29.5	70.5	11.5	88.5	61
50-59	46.9	53.1	27.9	72.1	25.6	74.4	14.0	86.0	43
60-69	57.1	42.9	30.0	70.0	36.7	63.3	16.7	83.3	30
70-79	64.3	35.7	4.5	95.5	9.1	90.9	4.5	95.5	22
≥ 80	80.0	20.0	0.0	100.0	9.1	90.9	0.0	100.0	11
									319

Data with * indicate responses obtained from the care givers of the patients ≤ 12 years.

Table 5: Showing the percentage of patients with each educational status and their responses

Educational status of the patient	**Gender**		**Access to the internet**		**Awareness of health information on their disease condition on the internet**		**Accessed health information on their disease condition on the internet**		**Number of patients/ respondents**
	Male	Female	Yes	No	Yes	No	Yes	No	
No-formal education	51.7	48.3	0.0	100.0	0.0	100.0	0.0	100.0	38
Primary education	55.6	44.4	13.2	86.8	10.3	89.7	1.5	98.5	68
Secondary education	56.4	43.6	39.2	60.8	27.5	72.5	7.8	92.2	102
tertiary	52.9	47.1	71.3	28.7	70.1	29.9	46.0	54.0	87
									295

It excludes respondents of patients ≤12 years of age (n=24).

On whether they had accessed any additional information by reading a health-related book on their health condition, the majority 324 (86.8%) had not read any medical book or written material on their disease condition. For the minority 43 (13.5%) that had done some reading, most had read a health-related magazine or pamphlet with one patient indicating that he had read a newspaper article.

Discussion

Access to the Internet in developing countries has been noted to be on the increase, with Ghana not being an exception. Ghana has a relatively high Internet penetration (20.1%) compared to its sub-Saharan neighbours, being second to Nigeria with a penetration per percentage population of 39.7%. (Togo 4.8%, Liberia 4.6%, Burkina Faso 4.4% and Cote D'ivoire 4.2%, follow in that order as at June 2014).[4] All the telephone networks in Ghana provide Internet connectivity. The study's finding that 92.2% of the patients had mobile phones with 26.6% having two or more phones with different network subscriptions confirms the assertion by Elsie Kanza that regardless of social class, almost everyone [in Africa] has a mobile phone, or two or three.[16] Since the networks subscribed to by the patients had Internet connectivity, access to the Internet for health-related information was expected to be high. However only 35.7% of the respondents indicated they had access to the Internet. This is rather low compared to the findings from other studies that found 63% of the youth in Accra[10] and 74 % of the youth in Owerri, Nigeria[17] had ever assessed the Internet. This finding is at variance with the high levels of mobile phone use among the patients. It has been observed that in most developing-countries, availability of information is one thing, access to and use of the available information is another.[9] It is therefore essential to educate and encourage the Ghanaian population and patients in the West Africa sub-Region to access and maximize the use of the Internet for health-related information. The mobile phone can serve as a means of increasing access to health information on the Internet in the sub-region. This is particularly so since the possession of other Internet-ready devices such as laptops and desktop computers other than mobile phones by the patients was only 29.8% with most of these Internet-ready devices being available and accessible at work or school. This latter finding calls for increased investments in Information Technology in the sub-region if there is to be an improvement in access to health-related information through the Internet.

The patients could not be considered as being ignorant of their clinical disease conditions or diagnoses which could have hindered getting relevant information on the Internet since 93.7% of them knew their clinical diagnoses with 51.7% of them having known the diagnosis for more than 1 year.

A study by Borzekowski et al in 2006 of adolescents in Accra on online access and the use of the Internet for health information found high levels of interest and confidence in finding online health information among Internet users but also among those who had not yet used the Internet.[10] In this study, only 30.4% of the respondents were aware of finding health-related information on their disease condition. It was however observed that the proportion within each age group that were aware of finding health-related information on the Internet was highest among the 13-19year age group (50.0%) and the 20-29 age group (51.8%), confirming the findings that young people were more confident of finding health-related information on the Internet. As this study focused specifically on finding health- related information on the Internet, this finding of 30.4% of the patients being aware was lower compared to the 48.3% of patients being aware of the Internet in a study from Sri Lanka in 2009 on Internet use by patients attending specialist clinics in Sri Lanka, a developing country.[18] That study looked at a general awareness of the Internet.

In this study, only 15.7% of the patients had actually accessed information on their health conditions on the Internet. This may be due to the diverse nature of the patient population in relation to their ages and educational status. Comparing the various age groups, it was realized that the greatest proportion within an age group that had actually accessed the Internet on their disease conditions were the 20-29 age group (28.6%) followed by the 30-39 age group (21.0%), supporting other studies that found young people to be more likely to assess the Internet than the elderly because they can easily adapt to newer technology than elderly people.[19,20] Only one patient (3%) in the above 70 year age group had accessed the Internet for health information on his disease condition.

Unlike the finding by Borzekowski et al among adolescents in Accra that 35.0% of the total sample of in-school youth and 53.3% of in-school Internet users had tried to get some type of health information on the Internet[10] in this study 50.0% of the adolescents were aware of the availability of health-related information on their disease condition on the Internet, however only 10% had actually accessed that information. Patients with tertiary education constituted the highest percentage of those who had accessed the Internet for health information (46.0%), with the finding of significant correlation between the educational level and access to the Internet, awareness of the availability of health information on the Internet and having accessed the Internet for such information. This confirms other studies that increasing education increases use of the Internet.[21]

As observed in the findings, the majority of those that had not assessed the internet did not give any reason. This could be because the patients were not aware that acquiring more information on their disease

condition could contribute to better management and a more favourable outcome. Hence the low internet usage in acquiring health-related information (15.7%).

The percentage of patients (15.7%) who had actually accessed the Internet in this study is higher compared to the 0.97% in the study from Sri Lanka, another developing country (2009).[18] Studies conducted in some developed countries between 2000 and 2007 revealed patients or their relations who had accessed health information on their disease condition on the Internet ranged from 43% to 64%.[22,23,24,25] Thus, as at the end of 2014 patients in Accra, in the Sub-Saharan West Africa region, were yet to match the practices, in terms of accessing the Internet for health-related information, of those in the developed countries observed a decade earlier. The digital divide is still persistent and yet to be bridged in terms of accessing health-related information on the Internet by patients in the Sub-Saharan region relative to those in the developed countries. There is therefore the need for a concerted effort that should involve health care providers, professional organizations, the Government and the Society in general in educating the populace on the use of the Internet to enhance the knowledge of patients on their disease condition. This is expected to have a positive effect on the management and outcomes of their clinical conditions.

It is noteworthy that the two patients who were prisoners had neither phones nor access to the Internet because of their status as prisoners. It is essential to consider the health-related information needs of prisoners as well.

The issue of the quality of available health-related information on the Internet has been of much interest. It has been noted that quality health information has a positive impact on health outcomes as it supports evidence-based healthcare delivery.[26] For the patients and caregivers that had accessed health information on the Internet in this study, the majority did remember the search engine used in retrieving the health information, with Google being preferred. They could not however state the websites visited for the health-related information. This made it difficult to ascertain the quality of the health information obtained on their disease condition. Thus in considering improving access to health-related information in the West Africa sub-region, issues of the quality of such information should receive equal attention.

Limitations of this study

The study looked at the patient's own initiative to seek the health related information (for those above 12 years of age) and by parents or guardians (for those ≥12 years of age). The role of other family members or close associates in getting assess to this internet based health information was not ascertained.

Conclusion

The majority of the patients attending the surgical care Department were aware of their health-related diagnosis. However, only few of them were aware that health information on their condition was available on the Internet. The majority had not accessed the Internet for information on their health condition even though most had mobile phones with the possibility of Internet connectivity. Patient education in the West African sub-region aimed at improving the use of the Internet to acquire quality health-related information is needed to enhance health outcomes in this era of evidence-based health-care delivery.

References

1. Quarshie HO, Ami-Narh J. The Growth and Usage of Internet in Ghana. *Journal of Emerging trends in computing and information sciences*. 2012 Vol 3; No. 9 Sep 2012 ISSN 2079-8407
2. Globalization, Technology and Globalization. 2012 [Accessed 3/01/2015]; Available from: http://www.globalization101.org/uploads/File/Technolo gy/tech2011.pdf.
3. World Economic Forum and INSEAD, the Global Information Technology Report 2012. 2012: Geneva. p. 1 - 413.
4. http://www.internetworldstats.com/africa.htm (accessed 3/01/2015)
5. Borzekowski DLG, Rickert VI. Adolescents, the internet, and health: issues of accesss and content. *J Appl Dev Psychol* 2001; 22:49-59.
6. Suzuki LK, Calzo JP. The search for peer advice in cyberspace: An examination of online teen bulletin boards about health and sexuality. *Applied Developmental Psychology* 2004; 25:685–698.
7. Veronin MA. Where are they now? A case study of health-related Web site attrition. *J med internet Res* 2002; 4(2):e10
8. Edejer TTT. Disseminating health information in developing countries: The role of the Internet. *BMJ* 2000; 321:797–800.
9. Odutola AB. Developing countries must invest in access to information for health improvements. *J med internet Res*.2003;1:e5.
10. Borzekowski DLG, Fobil JN, Asante KO. Online Access by Adolescents in Accra: Ghanaian Teens' Use of the Internet for Health Information. *Dev Psychol* 2006; 42:450–458.
11. http://www.nca.org.gh/73/34/News.html (accessed 3/01/2015)
12. Rice RE. Influences, usage, and outcomes of Internet health information searching: multivariate results from the Pew surveys. *Int J Med Inform* 2006; 75:8-28.
13. Blumler JG, Katz E. The uses of mass communications:

Current perspectives on gratifications research. Beverly Hills, CA:Sage; 1974.

14. Arunachalam S. Assuring quality and relevance of Internet information in the real world. *BMJ* 1998; 317:1501–1502.
15. Murray E, Lo B, Pollack L, Donelan K, Catania J, Lee K, Zapert K, Turner R. The Impact of Health Information on the Internet on Health Care and the Physician-Patient Relationship: National U.S. Survey among 1.050 U.S. Physicians. *J Med Internet Res* 2003;5:e17.
16. http://www.weforum.org/content/ forget-usual-tired-debates-about Africa-its-changing-better (accessed 3/01/2015)
17. Nwagu WE. The Internet as a source of reproductive health information among adolescent girls in an urban city in Nigeria. *BMC Public Health* 2007; 7: 354.
18. Kummalage M. Use of the internet by patients attending specialist clinics in Sri Lanka: a cross sectional study. *BMC Med Inform and Decis Mak.* 2009; 9:12
19. Brodie M, Flournoy RE, Altman DE, Blendon RJ, Benson JM, Rosen- baum MD. Health information, the Internet, and the digital divide. *Health Aff (Millwood)* 2000; 19:255-265.
20. Cotten SR, Gupta SS. Characteristics of online and offline health information seekers and factors that discriminate between them. Soc Sci Med 2004; 59:1795-1806.
21. Kirigia JM, Seddoh A, Gatwiri D, Muthuri LH, Seddoh J. E-health: determinants, opportunities, challenges and the way for- ward for countries in the WHO African Region. *BMC Public Health* 2005; 5:137.
22. Wainstein BK, Sterling-Levis K, Baker SA, Taitz J, Brydon M. Use of the Internet by parents of paediatric patients. *J Paediatr Child Health* 2006; 42:528-532.
23. Boston M, RuRuwe E, Duggins A, Willging JP. Internet use by parents of children undergoing outpatient otolaryngology procedures. *Arch Otolaryngol Head Neck Surg* 2005; 131:719-722.
24. de Boer MJ, Versteegen GJ, van Wijhe M. Patients' use of the Internet for pain-related medical information. *Patient EducCouns* 2007; 68:86-97.
25. Pereira JL, Koski S, Hanson J, Bruera ED, Mackey JR. Internet usage among women with breast cancer: an exploratory study. *Clin Breast Cancer* 2000; 1:148-153.
26. Levy JA, Strombeck R. Health benefits and risks of the Internet. *J Med Syst*. 2002; 26:495-510.

THE SENSITIVITY AND SPECIFICITY OF WHO CLINICAL STAGING IN PREDICTING CD4 CELL COUNTS IN HIV INFECTED PATIENTS AT THE POLICE HOSPITAL IN ACCRA, GHANA

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Abstract

Introduction : Initiating an HIV positive client on ART is an important step in the care of PLHIV. Due to a shortage of CD4 machines and reagents, the WHO clinical staging guideline is widely used to determine when to initiate ART in developing countries.

Objective : To determine whether WHO clinical staging is predictive of CD4 of 350 in initiation of ART in patients presenting at the Police Hospital ART clinic.

Methods : We reviewed the records of clients on ART, from 2010 to 2012 and compared the WHO clinical staging and CD4 counts at their first visit to the clinic. Pregnant women, hepatitis B infected patients and children below fifteen were excluded from the study.

Results : Two hundred and five PLHIVs were eligible for inclusion in the study. Sensitivity of the WHO Clinical staging to predict initiation of ART was 44% and specificity 87%. Positive predictive power was 83% and Negative predictive power was 51%.

Conclusion : Almost 50% of those needing ART as per CD4 count were classified as WHO stage 1 or 2. This means that about half of those deemed not qualified to start ART by WHO clinical staging actually needed to be initiated on ART. Access to CD4 machines and reagents must be increased to minimize delay in start of treatment for patients.

Keywords : ART, WHO staging, CD4, PLHIV, specificity and sensitivity

Introduction

The first case of HIV was discovered in Ghana in 1986[1]. As at the end of 2013, Ghana had cumulatively enrolled a total of 84,169 persons living with HIV (PLHIV) on antiretroviral therapy (ART). However, a total of 75,762 PLHIV were alive and on ART medication[2]. Again by the end of 2013, one hundred and seventy-five health facilities including 17 private ones were providing ART services[3]. Police Hospital started an ART clinic in 2008, after training of healthcare workers in management of opportunistic infections and antiretroviral therapy which was organized by the National Aids Control Programme (NACP) in 2007.

Since the early days of HIV infection and AIDS, it has been recognized that the disease progresses in several stages due to the progression of immunosuppression. The level of immunosuppression is linked directly to the CD4 cell count[4, 5, 6].

The World Health Organization (WHO) developed guidelines for such situations where clinical manifestations are presumed indicative of the progression of the disease. Such guidelines are based upon established correlations between CD4 cell count and clinical manifestations. The reliability of these established correlations for the African population, particularly those that are poor, has been questioned in literature.

In many Sub-Saharan countries, CD4 cell count is not widely available or consistently used and instead the WHO clinical staging system is used to determine ART eligibility[7]. However concerns have been raised regarding its discriminatory ability to identify patients eligible to start ART[8]. Where the CD4 count machines are available, frequent stock out of reagents means that clinicians are forced to rely on the WHO clinical classification to initiate ART to patients.

The WHO classification has four clinical stages, numbered stage 1 to stage 4. The clinical stages are hierarchical with standardized clinical parameters; stage 1 is primary HIV infection, while individuals in stage 4 have advanced HIV disease or AIDS. Stage-defining conditions are used to classify patients into one of the four clinical stages[9]. These categories apply to adults and adolescents 15 years-of-age and older. A modified version of the WHO Clinical Staging System is available for infants and children under fifteen years of age[10]. The WHO recommends that HIV-positive adults with CD4 cell count ≤500 cells/mm3 initiate ART. In Ghana, an HIV positive adult qualifies to be put on ART when his CD4 cell count is ≤ 350 or is in WHO clinical stage 3 or 4. If a person is in stage 1 or 2 but the CD4 cell count is ≤ 350, ART is still initiated. Other categories of patients that are started on ART irrespective of CD4 cell counts are pregnant women and patients with Hepatitis B co-infection or TB co-infection. Measurement of CD4 cell count is the preferred method for ART eligibility assessment in HIV-positive patients. However, in sub-Saharan Africa, this is still not widely available[11]. It is important to note

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that CD4 cell count criterion is superior to clinical staging[12]. Many health settings in Africa do not have the resources to test for CD4 cell counts and plasma viral load and in these areas, a patient's HIV stage is assessed on the basis of clinical criteria alone, using the WHO HIV clinical staging. Those at WHO stage 3 or 4 can be eligible for ART[13, 14]

With insufficient resources to test CD4 cell counts and plasma HIV viral load in many resource-limited settings, including many of the regions hardest hit by the HIV/AIDS epidemic, clinicians must rely on clinical parameters when assessing a patient's disease status[15]. In Ghana, though the National Guidelines encourage the use of CD4 cell counts, frequent breakdowns of the machines and stock out of reagents means WHO clinical staging guidelines are used to decide whether to initiate treatment on ART or not. Patients with low CD4 counts that are staged WHO 1 or 2 could be denied treatment with ARV medication for long periods till the CD4 cell count results are available.

Although the WHO clinical staging system has been widely adopted as a tool for assessing ART eligibility, healthcare workers find it time-consuming, complex and poorly applicable in resource-poor settings without access to sophisticated diagnostics[16]. When used for individual treatment decisions, WHO clinical staging misses a high proportion of individuals who are ART eligible by CD4 cell count. Access to accurate, accessible, robust and affordable CD4 cell count testing methods will be a pressing need for as long as ART initiation decisions are based on criteria other than seropositivity[7].

Objective

To determine whether WHO clinical staging is predictive of CD4 of 350 in initiation of ART in patients presenting at the Police Hospital ART clinic.

Methods

Study site

This study was conducted at the Police Hospital in Cantonments, Accra. It was established initially to take care of the health care needs of only Police Personnel and their dependents in 1976. However, this has changed and currently, over 80% of out-patient attendants are civilians.

It is located in an urban area, which is Cantonments, in the La Dade Kotopon Municipal area. Care for PLHIV started in 1995, with the use of food supplements and psychological support. In 2007, a team comprising Medical Doctors, Nurses and Pharmacists were trained by the National AIDS Control Programme (NACP) to start treatment with ARV medication. Actual treatment started in the first quarter of 2008.

Study design

This was a cross-sectional study, with review of secondary data retrieved from the records of HIV infected patients. We reviewed data over a three year period, from January 2010 to December 2012.

Selection criteria

Initially 350 records were retrieved for the period. We excluded persons below age 15, patients infected with hepatitis B and pregnant women. Two hundred and five records met our inclusion criteria.

Data capture and analysis

Data entry sheets were used to capture the required information from the folders of patients. It was entered into SPSS version 17 and analyzed with the same software. Records were anonimized with the use of codes and stored securely in a lockable metallic cabinet. We looked at the initial WHO clinical classification of the client and compared it to the initial CD4 count results.

Results

The total number of patients selected for the study was 205. As shown in table 1, the minimum age was 15 with the maximum being 71years. The mean age was 36.7 years.

Table 1: Age Groups of Patients

Age Group	Number of Patients
15 - 19	2
20 – 24	13
25 – 29	46
30 – 34	38
35 – 39	29
40 – 44	25
45 – 49	24
50 - 54	10
55 - 59	11
60 - 64	3
65 - 69	2
70 - 74	1

The majority 142 (69.3%) were females. Eighty seven percent were Christians (178), with 9.8% Muslims (20), whilst the rest did not have any religion indicated.
The educational level of clients is shown in table 2.

Table 2: Highest Educational Level Attained by Clients

Educational Level	Number	Percentage
Tertiary	29	14.0%
Secondary	131	63.9%
Primary	18	8.8%
Nil	20	9.8%
Missing values	7	3.4%
Total	205	100%

Most of the patients (63.9%) had up to secondary level education, 14% had tertiary level whilst 8.8% had primary education. However, 9.8% had no formal

education. Almost 84% were infected with type 1 HIV, six persons (2.9%) had a mixed infection with both types 1 and 2, with one person having type 2 HIV only as depicted in table 3.

Table 3: Types of Hiv of Patients

HIV Type	Number	Percentage
1	171	83.4%
2	1	0.48%
1&2	6	2.9%
Missing value	27	10.8%
Total	205	100%

The lowest CD4 count value was 1, with the highest being 1517. The mean CD4 cell count value was 341. As in table 4, seventy percent of clients were in stage 1 or 2, whilst 30% were in stage 3 or 4 according to the WHO clinical classification.

Table 4: Who Clinical Stages of Clients

Who Stage	Number	Percentage
Stage 1	127	62.0%
Stage 2	16	7.8%
Stage 3	57	27.8%
Stage 4	5	2.4%
Total	205	100%

Sensitivity of the WHO Clinical Staging in predicting CD4 for initiating ART was low (44%) and specificity quite high (87%). Positive predictive power was 83% and Negative predictive power was 51%.

Limitations:
This study was done in a single urban ART clinic in Accra, thus the findings may not be generalized on the entire population of Ghana.

Discussions

Certain groups of patients could have little or no clinical manifestations but have very low CD4 counts (<350), indicating a very weak immune system. Using the WHO classification alone, the treatment for this group of patients will be delayed to their detriment. Such patients could therefore be staged WHO 1 & 2 and with the absence of CD4 count results, their treatment with ART will be unduly delayed. In most countries in sub-Saharan Africa, there are more females than males infected with HIV. This trend was apparent in our sample where 69.3% were females. A similar figure of 68% was found in other studies[17]. We found a mean age of 36.7 years which again was comparable to findings in other studies[17].

Seventy percent of our patients were classified as WHO 1 or 2, whilst 30% were classified as 3 or 4. Approximately the same figure was also found in Kenya[18] but these figures differ from a study in Uganda[17], where 61% were staged 1 or 2. In our study, 48.9% of those needing ARV treatment as per CD4 count were classified as WHO stage 1 or 2. This means that 48.9% or almost half of those deemed not qualified to start ARV actually needed to start on ARV. This is in agreement with a figure of 48% found in a study in Uganda[19]. Many patients who needed treatment were therefore not considered for treatment on the basis of CD4 clinical staging. Again we found that 17.2% of those that were started on treatment were not to have started on treatment based on WHO clinical staging. They were staged 3 and 4 but had CD4 cell count above 350. This was however not to their detriment as the sooner the treatment is started, the better. Our figure of 17.2% was however higher than that found in Uganda19 which was 12%.

In a similar study among women in Kenya20, out of a total of 2,915 that met the CD4 cell count criteria for starting ARV medication, only 23% had WHO stage 3 or 4. Meaning 73% would have missed out on ARV treatment using the WHO clinical staging alone. This figure is higher than what we found. Also among women who were staged 1 or 2 using the WHO clinical classification, 42% actually had to be put on treatment as per CD4 cell count results[20]. This is lower than what we found which was 48.9%. Our finding compares favourably with almost 50% found in Uganda[17].

Sensitivity was low in our study (44%), the same of which was found in other studies[17,21]. However a higher figure of 63% was found in Kenya[18]. We found specificity of 87% almost the same as 85% in other studies[21].

Conclusion

We found that almost 50% of those staged WHO 1 or 2 actually needed to be put on ART as compared to their CD4 cell counts. The start of their treatment could have been unduly delayed to their detriment. The WHO clinical staging misses a high proportion of patients that are qualified to initiate ART using CD4 of ≤ 350 as a cut – off point. when used alone without CD4 count.

Recommendation

The National AIDS control programme should ensure that there are enough CD4 machines in health facilities. Stock outs of reagents should be avoided since this also compounds the delay even when the CD4 machines are available. The programme must aim at basing the commencement of treatment solely on CD4 cell count results in the future.

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References

1. HIV & AIDS Care in Accident and Emergency Departments. Guidelines and standard Operating Procedures. July 2014, Page 1

2. National AIDS/STI Control Programme Ghana 2013 Annual Report. Page 26
3. National AIDS/STI Control Programme Ghana 2013 Annual Report. Page 25
4. Goedert JJ, Biggar RJ, Melbye M, Mann DL, Wilson S, Gail MH. Effect of T4 count and cofactors on the incidence of AIDS in homosexual men infected with human immunodeficiency virus. *JAMA*, 257 (1987), pp. 331–334
5. Goedert JJ, Kessler CM, Aledort LM, Biggar RJ, Andes WA, White GC. A prospective study of human immunodeficiency virus type 1 infection and the development of AIDS in subjects with hemophilia. *N Engl J Med*, 321 (1989), pp. 1141–1148
6. Nicholson JK, Spira TJ, Aloisio CH, Jones BM, Kennedy MS, Holman RC. Serial determinations of HIV-1 titers in HIV-infected homosexual men: association of rising titers with CD4 T cell depletion and progression to AIDS. *AIDS Res Hum Retroviruses*, 5 (1989), pp. 205–215
7. Chigomezgo M, Miriam T, Paul G.G, David GL, Bertel S, Elizabeth LC, Nathan F, MacPherson P. Diagnostic accuracy of the WHO clinical staging system for defining eligibility for ART in sub-Saharan Africa: a systematic review and meta-analysis. *J Int AIDS Soc*. 2014; 17(1): 18932. Published online 2014 Jun 12. doi: 10.7448/IAS.17.1.18932 PMCID: PMC4057784
8. Munthali C, Taegtmeyer M, Garner PG, Lalloo DG, Squire SB, Corbett EL, Ford N, MacPherson P. Diagnostic accuracy of the WHO clinical staging system for defining eligibility for ART in sub-Saharan Africa: a systematic review and meta-analysis. *J Int AIDS Soc*. 2014 Jun 12;17: 18932.doi: 10.7448/IAS.17.1.18932.
9. Malamba SS, Morgan D, Clayton T, Mayanja B, Okongo M, Whitworth J. The prognostic value of the World Health Organiazation staging system for HIV infection and disease in rural Uganda. *AIDS*. 1999; 13:2555–62.
10. World Health Organization. Interim WHO clinical staging of HIV/AIDS and HIV/AIDS case definitions for surveillance: African region. Switzerland: World Health Organization; 2005
11. Zachariah R, Reid SD, Chaillet P, Massaquoi M, Schouten EJ, Harries AD. Viewpoint: why do we need a point-of-care CD4 test for low-income countries? *Trop Med Int Health*. 2011; 16:37–41.
12. Carter RJ, Dugan K, El-Sadr WM, Myer L, Otieno J, Pungpapong N, Toro PL, Abrams EJ. CD4+ cell count testing more effective than HIV disease clinical staging in identifying pregnant and postpartum women eligible for antiretroviral therapy in resource-limited settings. *J Acquir Immune Defic Syndr*. 2010 Nov; 55(3):404-10.
13. World Health Organisation: Antiretroviral therapy for HIV-infections in adults and adolescents: recommendations for a public health approach. 2006.
14. World Health Organisation: Towards Universal Access: Scaling up priority HIV/AIDS in the health sector. Progress report. 2007.
15. Jennifer L. Weinberg and Carrie L. Kovarik. The WHO Clinical Staging System for HIV/AIDS. *AMA Journal of Ethics*. March 2010, Volume 12, Number 3: 202-206.
16. MacPherson P, MacPherson EE, Mwale D, Bertel Squire S, Makombe SD, Corbett EL, et al. Barriers and facilitators to linkage to ART in primary care: a qualitative study of patients and providers in Blantyre, Malawi. *J Int AIDS Soc*. 2013; 15:18020.
17. Baveewo S, Ssali F, Karamagi C, Kalyango JN, Hahn JA, Ekoru K, Mugyenyi P, Katabira E. Validation of World Health Organisation HIV/AIDS clinical staging in predicting initiation of antiretroviral therapy and clinical predictors of low CD4 cell count in Uganda. PLoS One. 2011 May 12;6(5): e19089.doi: 10.1371/journal.pone.0019089
18. Ilovi CS, Lule GN, Obel AO, Irimu HM Correlation of WHO clinical staging with CD4 counts in adult HIV/AIDS patients at Kenyatta National Hospital, Nairobi. *East Afr Med J*. 2011 Feb;88(2):65-70
19. Kagaayi J, Makumbi F, Nakigozi G, Wawer MJ, Gray RH, Serwadda D, Reynolds SJ. WHO HIV clinical staging or CD4 cell counts for antiretroviral therapy eligibility assessment? An evaluation in rural Rakai district, Uganda. Aids. 2007; 21:1208–1210.
20. Carter RJ, Dugan K, El-Sadr WM, Myer L, Otieno J, Pungpapong N, Toro PL, Abrams EJ. CD4+ cell count testing more effective than HIV disease clinical staging in identifying pregnant and postpartum women eligible for antiretroviral therapy in resource-limited settings. *J Acquir Immune Defic Syndr*. 2010 Nov; 55(3):404-10.
21. Munthali C, Taegtmeyer M, Garner PG, Lalloo DG, Squire SB, Corbett EL, Ford N, MacPherson P. Diagnostic accuracy of the WHO clinical staging system for defining eligibility for ART in sub-Saharan Africa: a systematic review and meta-analysis. *J inter AIDS Soc*. 2014 Jun 12; 17:18932. Doi: 10.7448/IAS.17.1.18932.eCollection 2014

CASE REPORT

A RARE COMPLICATION: TRACHEAL LACERATION AFTER ROUTINE INTUBATION AT THE TAMALE TEACHING HOSPITAL

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Abstract

Patients Tracheal perforation is a rare complication of endotracheal intubation that usually presents as a linear lesion in the membranous wall of the trachea. It is more prevalent in women (because they have shorter stature and a weaker pars membranosa compared to men), patients 50 years and older and patients less than 160 cm tall. Most common clinical manifestations include subcutaneous emphysema, pneumomediastinum, pneumothorax, respiratory distress and haemoptysis. We report the case of a young male presenting with tracheal perforation after routine endotracheal intubation. This case was managed conservatively without complications. Possible causes for the injury include: over-inflation of the endotracheal tube cuff, intubation by an inexperienced anaesthetist or use of an inappropriately sized tube for the patient. Clinical suspicion must be followed by diagnostic confirmation, which was achieved by direct visualization of trachea rupture on bronchoscopy. We therefore encourage endotracheal tube cuff pressure monitoring during general anaesthesia and direct supervision of an inexperienced anaesthetists during critical events such as induction and intubation.

Key Words: Trachea, Intubation, Perforation, haemoptysis, pneumomediastinum, pneumothorax, subcutaneous emphysema

Introduction

Tracheal perforation is a rare, yet life threatening complication of endotracheal intubation[1,2]. The incidence of tracheal rupture after endotracheal intubation is approximately 0.005%[3]. A seemingly uneventful intubation can result in injury to the trachea, which often manifests as haemoptysis and subcutaneous emphysema[4]. We report the first diagnosed case of post-intubation tracheal perforation under general anaesthesia in a 42 years old male at the Tamale Teaching Hospital in Ghana, a tertiary health facility that averages approximately 3651 endotracheal intubations per year.

Case Report

A 32-year-old man weighing 65.9 kg with a height of 150 cm underwent an emergency appendectomy under general anaesthesia in our facility. The patient's medical history was unremarkable and no abnormal laboratory results were recorded. He was classified as a class IE on the American Society of Anaesthesiology (ASA) physical status classification system, with a Mallampati score of I. Induction was smooth with an easy orotracheal intubation (Cormack 1, 1st attempt) using a single lumen internal diameter 7.0 mm cuffed tracheal tube. Neither the cuff nor the quality of the tube was in question. A high-volume low-pressure cuff was employed. This was performed by an anaesthesiologist with less than one year of working experience. No stylet was employed to aid intubation. At the end of an uneventful appendectomy lasting 50 minutes, the patient responded to verbal commands and showed sufficient spontaneous respiration. The oral cavity was suctioned retrieving very scanty saliva which was not blood stained. The anaesthesia team then proceeded to extubate the patient. The cuff was deflated and the patient immediately presented with a vigorous, incessant cough with haemoptysis seen in the endotracheal tube. This was accompanied with a rapid decline in SPO2 values, tachypnea, tachycardia, diaphoresis and restlessness as well as added sounds on auscultation of the chest. We could not measure EtCO2 due to the absence of a capnography in the theatre. The cuff was then re-inflated and intravenous propofol was administered to achieve sedation for suction and bronchoscopy.

The orotracheal tube was exchanged for a 9.0 mm orotracheal tube to facilitate suction and bronchoscopy with a flexible scope. The 9.0 mm was used advisedly because one, the anaesthetist who performed the intubation confirmed the 7.0 mm tube was too small

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for him but because it was a short procedure he left it. Secondly the fibreoptic scope we had at our disposal was difficult to manipulate in a small size tube and thirdly, the exchanged tube was intubated by an experienced anaesthetist who confirmed easy intubation. Adrenaline 1:2000 was instilled via the orotracheal tube, which improved the haemoptysis and allowed visualization with a fibre optic bronchoscope. A longitudinal laceration of approximately 15 mm and erythema around the posterior part of the membranous portion of the distal third of the trachea was found. A chest X-ray revealed right pneumothorax, pneumomediastinum, diffused radio-opacity which could be aspiration of blood and subcutaneous emphysema. A follow-up chest CT-scan performed six days post-injury revealed a persistent right pneumothorax, pneumomediastinum, bilateral pulmonary haemorrhage as well as an irregularity in the posterior wall of the tracheal (Fig. 1).

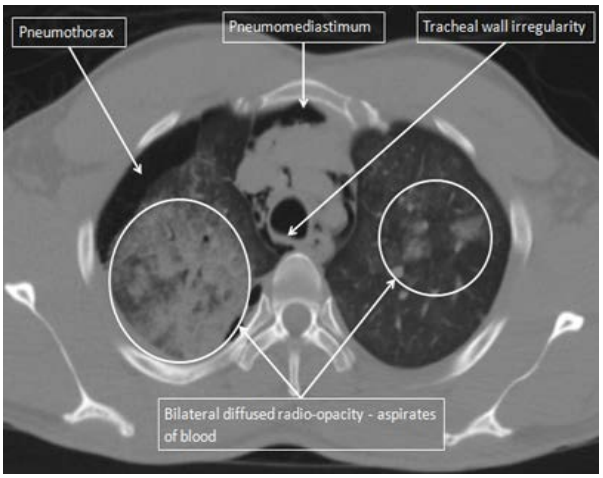

Figure 1. Chest CT scan demonstrating right pneumothorax, pneumomediastinum, bilateral pulmonary haemorrhage and an irregularity in the posterior wall of the tracheal

The patient was nursed in the critical care ward and conservative management continued. Treatment consisted of positioning the tracheal tube cuff distal to the lesion i.e., a bridging manoeuvre (in order to keep the lesion under zero pressure and prevent widening of the injury during inspiration), continuous airway humidification, broad-spectrum antibiotics, sedation, cough suppression, parenteral nutrition as the patient was nil-per-os for seven days and chest physiotherapy. Management also included serial bronchoalveolar lavage to suction secretions and to determine the tube position as well as daily chest X-rays to monitor the progress of the pneumothorax. We also maintained a cuff pressure between 25 to 30 mm Hg by regular monitoring of the pressure with a manometer. On the six day the patient was successfully extubated under fibre optic bronchoscopy guidance which visualized a healed tracheal mucosa. He was transferred to the ward the seventh day and was discharged on the fourteenth postoperative day with significant improvements on the chest X-ray findings. Monthly follow-up for three months showed complete resolution of the injury and chest signs.

Discussion

There are a series of risk factors that contribute to post-intubation tracheal perforation, which may be divided into mechanical or anatomical factors. Mechanical factors include multiple forced attempts at intubation, inexperience of the health professional, endotracheal tube introducers that protrude beyond the tip of the tube, over inflation of the cuff (diffusion of nitrous oxide into the cuff), incorrect position of the tip of the tube, repositioning of the tube without deflation of the cuff, inappropriate size of tube, significant cough, and movements of the head and neck while the patient is intubated. The anatomical factors include congenital tracheal abnormalities, weakness of the pars membranosa of the trachea, chronic obstructive pulmonary disease and other inflammatory lesions of the tracheobronchial tree, diseases that alter the position of the trachea (mediastinal collections, lymph nodes, or tumours), chronic use of steroids, advanced age, and female sex[2,5,6]. In this case, we suspect that the cause of the tracheal injury was over-inflation of the cuff because intubation was relatively easy without the need of a stylet. There were no identifiable congenital or anatomical factors that could have contributed to the injury. Post-intubation tracheal rupture is more frequent in the female sex and patients above 50 years of age. However our patient is a young man of a short stature, which is a risk factor for post-intubation tracheal rupture[2,6].

Moreover, tracheal injury by stylet damages the anterior mucosal layers of the trachea as the stylet is curved anteriorly[6]. However, in the presented case, as confirmed by fibre optic bronchoscopy, longitudinal rupture of the posterior membranous wall of the trachea was observed. Additionally, manual palpation of the pilot balloon was the technique employed to measure the cuff pressure. However previous studies have suggested that cuff pressure is usually under-estimated by manual palpation[7]. Subcutaneous emphysema is the most common clinical manifestation of tracheal perforation followed by pneumomediastinum, pneumothorax, dyspnoea/respiratory distress, and haemoptysis. Less common symptoms include pneumopericardium, angina, hypotension, and shock. Usually, these symptoms appear during surgery or in the immediate postoperative period[2,5,6]. In this case, the patient presented with haemoptysis and a cough that led us to perform bronchoscopy, a chest X-ray and a chest CT to confirm suspicion of a tracheal laceration.

Bronchoscopy was used to confirm the diagnosis of tracheal rupture and provide direct visualization of the lesion. This procedure provides evidence of the exact

site and extension of the lesion, helps to plan the therapeutic approach, and can be used to reposition the tube or allow reintubation with correct positioning of the tube if this is necessary. Tracheal rupture is usually longitudinal and is most frequently located in the pars membranosa, the posterior part of the trachea that lacks cartilaginous support[2,5]. Although a chest CT can provide valuable information[2,5] we did not find it provided any additional information from what was revealed by bronchoscopy and the chest X-ray except for the irregularity in the posterior wall of the trachea. A CT scan was performed on the sixth day after the event because the only scan in the hospital and for that matter the region was undergoing repairs work and was successfully fixed on that day. The objective was to rule out any additional injury not revealed by the chest x-rays and bronchoscopy. Presently there is no consensus on the treatment modality of tracheal perforation or laceration, although it appears that a conservative approach is associated with a better outcome. A publication by Minambres E et al, which have looked at more cases showed that a conservative approach showed improved results as compared to a more aggressive surgical intervention[2,4,5]. Moreover, some series have demonstrated that surgical repair in critically ill patients is associated with a mortality rate of 71%[2]. Conservative management was our choice for this case because the rupture was small (15 mm), none progressive pneumothorax, pneumomediastinum and subcutaneous emphysema, non-progressive symptoms, stable vital signs and an absence of sepsis. These are the criteria cited by researchers as indications for conservative management[2,4,8].

Airway management is an essential skill for anaesthesia providers. The anaesthesia provider should have a comprehensive knowledge of intubation complications, techniques to minimize the risks, an ability to identify complications and treatment modalities should a complication occur. This complication could have been avoided had the anaesthetist used a bigger (>7.5 mm) orotracheal tube with a low pressure cuff. Though a tube of high volume low pressure was used, 7.0 mm was too small for him requiring high volume to make a good seal. This, coupled with the absence of a manometer to measure the pressure may have contributed to this injury. (The manual palpation of pilot balloon was probably underestimated).

Supervision from experienced colleagues and measurement of the cuff pressure could also have prevented this injury.

We also recommend the use of bronchoscopy and a chest X-ray as the first line investigation method for diagnosis of tracheal injuries in low resource countries.

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References

1. Austin RD Thoracotomy for tracheal disruption after traumatic intubation: a case report. *Aana j* 2010 Oct; 78(5): 400-4.
2. Minambres E, Buron J, Ballesteros MA, et al. Tracheal rupture after endotracheal intubation: a literature systematic review. *Eur J Cardiothorac Surg* 2009 Jun; 35(6): 1056-62.
3. Borasio P, Ardissone F, Chiampo G Post-intubation tracheal rupture. A report on ten cases. *Eur J Cardiothorac Surg* 1997 Jul; 12(1): 98-100.
4. Fong PA, Seder CW, Chmielewski GW, Welsh RJ Nonoperative management of postintubation tracheal injuries. *Ann Thorac Surg* 2010 Apr; 89(4): 1265-6.
5. Kim KH, Kim MH, Choi JB, et al. Postintubation Tracheal Ruptures - A case report. *Korean J Thorac Cardiovasc Surg* 2011 Jun; 44(3): 260-5.
6. Lim H, Kim JH, Kim D, et al. Tracheal rupture after endotracheal intubation - A report of three cases. *Korean J Anesthesiol* 2012 Mar; 62(3): 277-80.
7. Braz JR, Navarro LH, Takata IH, Nascimento Junior P Endotracheal tube cuff pressure: need for precise measurement. *Sao Paulo Med J* 1999 Nov; 117(6): 243-7.
8. Conti M, Pougeoise M, Wurtz A, et al. Management of postintubation tracheobronchial ruptures. *Chest* 2006 Aug; 130(2): 412-8.

NEONATAL TETANUS IN NORTHERN REGION, GHANA – A CASE REPORT

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Abstract

Maternal and Neonatal Tetanus (MNT) has become a rare disease in Ghana following the intensive immunization campaigns over the last few decades. The country was certified as MNT-free by the World Health Organization (WHO) in 2013.We report on 2 cases of Neonatal Tetanus (NT) seen in the Northern Region of Ghana. Although the mothers of both patients attended antenatal clinics, they were not vaccinated against tetanus. Both patients were successfully managed and discharged from the hospital. These cases call for practitioners to be mindful of sporadic cases of NT that may present to our facilities.

Key Words: Neonatal Tetanus, Tetanus toxoid, Tamale Teaching Hospital

Introduction

Neonatal tetanus (NT) is a potentially fatal bacterial infection caused by Clostridium tetani and is attributed to unhygienic practices during birth and early neonatal period. In 2000, when the World Health Organization (WHO) and other partners initiated the Maternal and Neonatal Tetanus (MNT) elimination initiative, > 500,000 babies died annually due to NT and most of these deaths occurred in developing countries[1]. About 15 years later mortality from NT has been reduced by more than 90% with 24 out of the original 59 countries, mostly in Sub-Saharan Africa and South East Asia, yet to be certified as MNT-free [2].

In line with global trends, NT in Ghana has moved from being a major cause of mortality to becoming a very rare disease[3,4]. The country was certified as MNT-free by WHO in 2013 after validation studies in two of the poor performing districts[4]. This massive success has been possible due to the introduction of the tetanus toxoid for pregnant women, intensive immunization campaigns, improved delivery practices and active case surveillance[5].

We report on 2 cases of NT who were managed successfully in the Tamale Teaching Hospital (TTH).

The aim of this report is to remind practitioners to be on the look-out for possible new cases of NT.

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Case 1: A 14 days old neonate was referred from the Savelugu Municipal Hospital on account of poor suckling and fever for 4 days and generalized body spasms for 1 day .

The baby was a home delivery at term, the umbilical cord was tied with a used thread, and she was not seen by a health care professional until the onset of symptoms. Her mother reported using shea butter for daily cord dressing. She was first treated for unspecified infection at a local health center but was subsequently referred after 2 days when there was no improvement.

The mother was a 20 year old G2P2A2 who attended antenatal clinics twice in each pregnancy at a community health center. She was not offered tetanus toxoid (TT) in any of the visits.

On physical examination, the weight was 2640 Grams, axillary temperature 38.2oC, respiratory rate 58/minute, Heart rate 143 beat/minute and SPO2 95 % on room air. The baby was generally hypertonic with extended limbs (decerebrate posture), foaming from the mouth and had trismus (figure 1). She had generalized spasms which increased with sound and contact. The abdomen was tense with a reducible umbilical hernia.

She was diagnosed as a case of NT and admitted to the Neonatal Intensive Care Unit (NICU) of the TTH for management.

She was given single doses of Anti-tetanus serum (ATS) 5000 IU and TT and put on intravenous (IV) crystalline penicillin and gentamicin. She was also started on phenobarbital IV 5mg/kg/day twice daily and diazepam IV 0.3 mg/kg/day trice daily to control the spasms. She was given maintenance IV fluids appropriate for age for the first 5 days as initial attempts to pass nasogastric (NG) tube for feeding was not successful.

Figure 1: Patient with generalized hypertonia, spasms and trismus on admission

Feeding was initiated with expressed breast milk given through NG tube after day 5 on admission. She tolerated feeds well and IV fluids were stopped on day 14 of admission after full enteral feeding with NG tube was established. The mother started feeding by breast as patient's suck reflex returned slowly from day 15 of admission.

The blood culture sent at admission reported no pathogenic growth. IV Crystalline penicillin and gentamicin were given for a total of 14 days. The IV diazepam treatment was stopped after 9 days with improvement of spasms. She received phenobarbital for the entire duration of admission.

On day 17 of admission, she was completely free of any spasms but remained hypertonic and regular breast feeding was established by the mother. She was successfully discharged on day 20 of admission with oral phenobarbital 5mg/kg/day with a plan to review at the NICU clinic after 1 week. The family did not return for the review.

Case 2: A 16 days old male neonate was referred from the Tamale Central Hospital with fever and general body spasms for 5 days. He was delivered at home, the immediate postpartum period was uneventful and he was well until the onset of symptoms. He had poor feeding and difficulty in breathing. The mother reported using shea butter for daily cord dressing.

The mother was a G1P1A1 and, the pregnancy was carried to term. She attended antenatal clinics twice at a community health center but received no TT vaccine.

On physical examination, the weight was 2100 Grams, axillary temperature was 38.80C, and SPO2 was 93% on room air . He appeared very sick, he was opistotonic with pustular rashes on head, face and neck. He had lower chest in-drawing. He was generally hypertonic with spontaneous spasms.

He was diagnosed of NT, and admitted to the NICU for management.

He was started on IV metronidazole because crystalline penicillin was out of stock. IV ceftriaxone was added to the treatment for suspected coexisting sepsis.

Single doses of TT and anti-tetanus serum were given. The spasms were managed with intravenous phenobarbital and chlorpromazine.

Maintenance IV fluids appropriate for age was given while NG tube feeding with expressed breast milk was initiated 1 day after admission. The mother was also given her first dose of TT.

The antibiotics were given for 10 days .Cup feeding with breast milk was started slowly as muscle spasms improved.

On day 18 of admission, his general condition had markedly improved with further reduction in spasms and increased mobility in all joints. Breastfeeding and top up feeds by cup could then be given. Physiotherapy was started while on admission.

On day 24 of admission he was completely free of spasms, was generally well and all medications had been stopped. He was discharged to continue physiotherapy on out-patient basis. He was also scheduled for regular NICU clinic reviews but family never showed up. The disease control officers of TTH visited the family in the community and reported back that he was doing well.

Discussion

NT can be effectively prevented and eliminated by routine vaccination of pregnant women with TT and adherence to clean delivery practices but many neonates still die from this condition annually[6]. As observed in the cases presented here, the main reasons for NT is unprotected pregnancy and the use of unapproved substances for cord care during the early neonatal period[7]. In the first case, a non-sterile thread was used to tie the cord after cutting it. Shea butter, which is common in Northern Ghana, was used for daily cord care in both cases.

The mothers in both cases did not receive a single dose of TT although they attended antenatal clinics in the second and third trimesters of pregnancy. A pregnant woman needs to receive at least 3 doses of TT for a pregnancy to be completely protected against MNT[8] .Therefore, in both cases, the pregnancies were not protected against this serious condition .Although majority of pregnant women attend antenatal care at least twice during pregnancy, the content and quality of care provided can differ by type and level of facility[9]. Post- discharge follow-up of both cases revealed that both facilities were short of supplies when these mothers attended the clinics.

Case fatality in NT is almost 100% without treatment and it's still very high even with treatment in resource poor settings that bears the brunt of the disease[6,10.]

In a number of studies, low birth weight, early onset of symptoms and delay in presentation has been found to be linked with poor prognosis[11,12]. Although one of our cases weighed 2.1 Kg at birth, both cases presented after day 7 of life and before the onset of spasms.

These prognostic factors coupled with very close monitoring, nursing and timely administration of medications for spasms could have mitigated for good outcomes in both patients.

It is important to follow up patients with NT after discharge from hospital for possible long term complications but both patients did not return for outpatient reviews.

Conclusion

Sporadic cases of NT are likely to present to health care facilities although Ghana has been certified as MNT-free. Health care providers need to maintain a high index of suspicion in order not to miss these cases. Advocating and adhering to clean delivery practices and cord care, maintaining high TT uptake and active case surveillance will ensure the country sustains this hard earned status.

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References

1. Vandelaer J, Birmingham M, Gasse F, Kurian M,Shaw C, Garnier S. Tetanus in developing countries: an update on the maternal and neonatal tetanus elimination initiative. Vaccine. 2003;21:3442-3445.
2. World Health Organization. Maternal and Neonatal Tetanus elimination (MNT). Available from: http://www.who.int/immunization/diseases/MNTE_initiative [Accessed 3rd May 2015].
3. Blankson JM. The problems of neonatal tetanus as seen in Ghana. *Afr J Med* Sci.1977;1: 1-6.
4. World Health Organization. Validation of maternal and neonatal tetanus elimination in Ghana Available from: http://www.who.int/wer/2012/wer8715/en [Accessed 3rd May 2015].
5. Ministry of Health/Ghana Health Service, Ghana. Revised immunization program, multi-year plan.Available from: http://www.nationalplanningcycles.org/sites/default/files/country_docs/Ghana/revised [Accessed 3rd May 2015].
6. Alhaji MA, Bello MA,Elechi HA, Akuhwa RT, Bukar FL, Ibrahim HA. A review of neonatal tetanus in University of Maiduguri Teaching Hospital, North-eastern Nigeria. *Niger Med J*. 2013; 54:398-410.
7. Saaka M,Iddrisu M. Patterns and determinants of essential newborn care practices in rural areas of Northern Ghana. *Int. J pop Res*.2014.
8. World Health Organization. Tetanus vaccine, WHO position paper. Available from: http://www.who.int/wer/2006/wer8120/en/. [Accessed 3rd May 2015].
9. Ghana Statistical Service and Ghana Health Service. Ghana Demographic and Health Survey (GDHS) 2014, key indicators. Available from: http://www.statsghana.gov.gh/docfiles/publications/Ghana%20DHS [Accessed 28th April 2015].
10. Dey AC, Saha L, Shahidullah M. Risk factors, morbidity and mortality of neonatal tetanus. *Mymensingh Med J*. 2011;1:54-8.
11. Lam PK, Trieu HT, Inke ND, Huynh TL, Tran TT, Wills B et al. Prognosis of neonatal tetanus in the modern management era: an observational study in 107 Vietnamese infants. *Int J Inf Dis*. 2015;33 :7-11.
12. Lambo JA, Anokye EA. Prognostic factors for mortality in neonatal tetanus: a systematic review and meta-analysis. *Int J Inf Dis*. 2013;17:1100-1110.

ECTOPIC PREGNANCY IN A 28-YEAR-OLD WOMAN WITH Cut IUCD IN SITU – A CASE REPORT

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Abstract

Background: There is a 3–4 percent chance of all pregnancies being ectopic in location. The risk of ectopic pregnancy to a woman using an Intrauterine Contraceptive Device (IUCD) is lower than that in a woman using no form of birth control. However if a woman gets pregnant whiles using the IUCD, the chances of having ectopic is more than 4 percent.

Data on the occurrence of ectopic gestation with IUCD in situ is scanty, with no report of any such case in Ghana or West Africa.

The objective of this report is therefore to contribute to knowledge on the subject with the view to bring it to attention among clinicians.

Case: A 28year old woman (G3P1A+1) who has had copper IUCD in situ for over two years, reported to a health facility in Accra after missing her period for two weeks. She had performed a home-based urine pregnancy test on three separate occasions, and they were all positive. A trans-vaginal ultrasound scan showed a small cystic lesion in the right adnexa with moderate fluid in the pouch of Douglas. A right tubal abortion was found at laparotomy.

Conclusion: Ectopic pregnancy in women with an IUCD is an important major potential complication that can be life-threatening.

Adequate counselling by clinicians would create awareness among clients for early reporting of amenorhoea and prompt intervention for desirable outcome.

Key Words: Ectopic, Pregnancy, Intrauterine, contraceptive, device

Introduction

An ectopic gestation is a pregnancy complication in which the embryo gets implanted outside the uterine cavity[1]. Most ectopic pregnancies occur in the Fallopian tubes, termed tubal pregnancies, but implantation may also occur in the cervix, ovaries and abdomen. The condition is a potentially life-threatening gynaecological emergency and a major cause of maternal morbidity and mortality in many developing countries[2].

In a typical ectopic pregnancy, the embryo adheres to the lining of the fallopian tube and burrows into the tubal lining; commonly invading vessels to cause bleeding[9]. This intratubal bleeding (haematosalpinx) expels the implantation out of the tubal end as a tubal abortion. Tubal abortion is a common type of miscarriage. There is no inflammation of the tube and the pain is caused by prostaglandins released at the implantation site, and from irritation by free blood in the peritoneal cavity[9]

In some cases the bleeding may be heavy and life threatening when diagnosis is made late or if implantation is in the proximal tube as this may invade the nearby Sampson artery of the round ligament.

There are a number of risk factors for ectopic pregnancies, but in as high as up to 50% of cases, no risk factors can be identified.[3] Risk factors include pelvic inflammatory disease (PID), assisted reproductive technology (ART), use of intrauterine contraceptive device (IUCD), previous ectopic, tubal surgery, intrauterine surgery and smoking[3,5].

The history of IUCD dates back to 1900s, and there were over 180million users worldwide as of 2007[4, 5]. IUCDs primarily work by preventing fertilization. The progestogen released from the hormonal IUCDs may partially suppress ovulation in addition to thickening the cervical mucus so that sperm cannot reach the fallopian tubes. The copper IUCDs cause the uterus and fallopian tubes to produce secretions containing white blood cells, copper ions, enzymes, and prostaglandins, a combination that is toxic to spermatozoa[5] and unfavourable to fertilization or implantation.

IUDs have many adverse effects such as expulsion, perforation, infection, cramping, heavier periods, irregular bleeding and spotting, string problems and pregnancy.

Approximately 50% of pregnancies in women using IUCDs will be located outside of the uterus. However, the total number of women becoming pregnant while using IUCDs is as low as 0.5 per 100 users in 5-year cumulative. Therefore, the overall number of ectopic pregnancies related to IUDs is very low[6].

Data on the occurrence of ectopic gestation with IUCD in situ is scanty, with no report of any such case in Ghana or West Africa. The objective of this report is

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therefore to contribute to knowledge on the subject with the view to bring it to attention among clinicians.

Case Presentation

A 28year old woman (G3P1+1) with a previous spontaneous miscarriage presented at a health facility in Accra on 30/11/2013 with six weeks amenorrhoea (LMP 18/10/13), having had three consecutive positive readings on a self-conducted Urine Prognosticon Test (UPT).

Being very much aware of the implications of a confirmed pregnancy with the Intra-Uterine Contraceptive Device (IUCD), she requested a serum beta human chorionic gonadotropin (β-HCG) by herself and was awaiting the results. A pelvic ultrasound scan done prior to presentation had detected no abnormality.

She attained menarche at 9 years, and has had regular monthly cycles during which she bleeds for five days. She had a Spontaneous Vaginal Delivery two years earlier with no other significant medical or surgical history.

On examination, the young 54kilogram woman appeared anxious. She was fully conscious, alert and well oriented, afebrile, not pale, and not dehydrated.

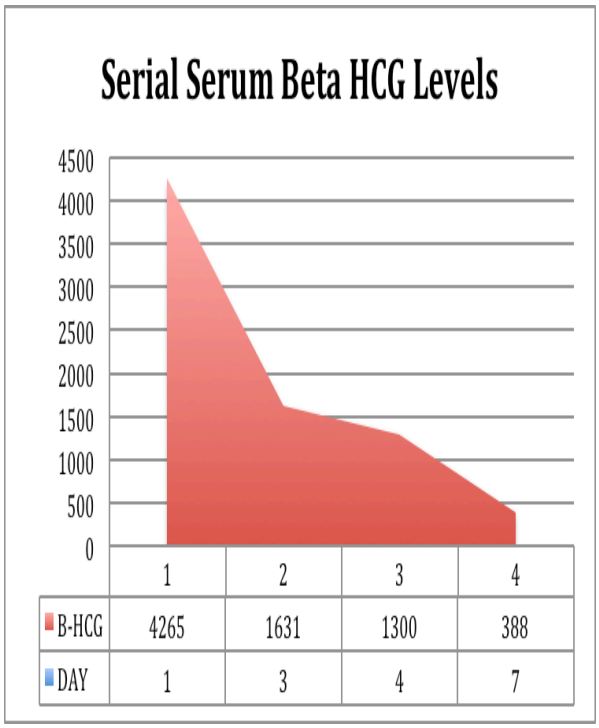
Her pulse was 80 beats per minute with regular and a good volume; blood pressure was 112/60mmHg. Her abdomen was flat, moved with respiration, had no masses palpable but mild tenderness in the right iliac fossa region. Other systems were normal.

A trans-vaginal ultrasound scan (TVS) performed revealed a normal size anteverted uterus with IUCD visualized but no intrauterine gestation sac noted. The left ovary was seen and appeared normal, but the right ovary was not visualized, neither was there any fluid in the rectouterine space. The initial clinical assessment was a most likely extra-uterine gestation with IUCD in situ. A β-HCG was requested, to repeat after 48 hours.

The patient developed sudden onset of severe lower abdominal pains after 16 hours with no associated spotting per vaginam. Her pulse was 94bpm, BP 130/60mmHg and there was marked tenderness and guarding in the right iliac fossa region. A repeat TVS showed a small cystic lesion in the right adnexa with moderate amount of fluid in the pouch of Douglas. A diagnosis of leaking ectopic gestation was finally made and the patient was admitted and prepared for theatre.

A single portal diagnostic laparoscopy was initially performed under general anaesthesia and found moderate haemoperitoneum that obscured good view of the Fallopian tubes. A minilaparotomy was then performed, at which 100mls blood clots were evacuated to see both tubes and ovaries clearly. These looked normal except for some bleeding from the fimbria end of the right tube. The bleeding was stopped and haemostasis achieved with the application of pressure using gauze swab-on-stick for a few minutes. The intra-operative diagnosis of tubal abortion was made. Abdomen was cleaned and closed in layers.

The patient remained stable post operatively with haemoblobin level of 10.7g/dl and a satisfactory wound healing. A follow-up transabdominal ultrasound scan showed a normal size anteverted uterus, clean and empty endometrium, with no fluid noted in the pouch of Douglas nor any adnexal masses.



The surgery was done on day-1, and patient was subsequently discharged on the third day and scheduled a review with day 10 and day 14 serum beta HCG results.

Discussion

The risk of ectopic gestation in women using IUDs is related to the duration of IUCD use; the longer the duration of use, the higher the risk of extra-uterine gestation[7]. The ectopic pregnancy rates were found to be higher after 2 years of use. The patient in the case above was at a relatively higher risk because she has used the IUCD for a little over two years[11]

The risk of ectopic pregnancy to a woman using an IUCD is lower than the risk of ectopic pregnancy to a woman using no form of birth control. However, 50% of pregnancies that do occur during IUCD use are ectopic[9]. The prevalence of ectopic gestation or tubal pregnancies are therefore higher when a pregnancy occurs in a woman with the device in situ[8].

The patient's presentation of missed period for two weeks, positive pregnancy test, as well as the sudden onset of lower abdominal pain on the second visit clearly demonstrates this phenomenon. The intra-operative findings of haemoperitoneum with oozing from the right fimbria end then confirmed tubal abortion.

The limited available literature and research publications on the relationship between IUCD and ectopic gestations have significant levels of inconsistencies.

The findings from case-control studies on the relationship between IUCD use and the risk of ectopic pregnancies also were not consistent[11] A meta-analysis of published literature from 1977 to 1994 reviewed 19 publications regarding 16 studies of ectopic pregnancy and IUCD use[11]

The risk of tubal ectopic pregnancy has also been found to be lowest among copper IUD and highest among the progesterone-releasing IUCD users[9]. The patient in this case was using the copper IUCD.

Hers was a tubal pregnancy which aborted, indicating to some extent that indeed the presence of the devices offers some protection against interstitial pregnancies, which are usually the most difficult to manage[10, 11]

Medical treatment of ectopic pregnancies commonly uses Methotrexate and this has reduced the need for surgery; but surgical intervention is still required in cases where the Fallopian tube has ruptured or is in danger of doing so. This patient may have benefitted from medical treatment if the diagnosis was confirmed earlier with laparoscopy. Surgery may be laparoscopic or a laparotomy. The patient needed laparoscopy because she presented in acute pain and the findings of haemoperitoneum necessitated the minilaparotomy enabled a full visualization appropriate intervention.

Intrauterine pregnancies occurring with the IUCD in place carry a higher risk of miscarriage[12]. This patient had a tubal abortion. Should the pregnancy attain viability, there tends to be preterm delivery.

Conclusion

Ectopic pregnancy in women with an IUCD remains an important major potential complication that can be life threatening.

Clinical suspicion would be necessary for thorough investigation to confirm cases for appropriate treatment. Adequately counseling recipients about this risk especially at insertion would create the necessary awareness among users.

Ethical Issues

An informed consent was obtained from the client whose case is reported here before writing up for publication.

Acknowledgements

We are very grateful to all staff of Lister Hospital and Fertility Center for their support and invaluable contribution

References

1. Bouyer J. Sites of ectopic pregnancy: a 10 year population-based study of 1800 cases. Hum Reprod [Internet]. 2002 Dec 1 [cited 2014 Jul 21];17(12):3224–30. Available from: http://humrep.oxfordjournals.org/cgi/content/long/17/12/3224
2. Lawani OL, Anozie OB EP. Ectopic pregnancy: a life-threatening gynecological emergency. *Int J Womens Heal*. August 2013; 5:515–21. doi:10.2147/IJWH.S49672.
3. Farquhar CM. Ectopic pregnancy. Lancet. August 2005;366(9485):583–91. doi:10.1016/S0140-6736(05)67103-6.
4. Majhi AK, Roy N, Karmakar KS BP. Ectopic pregnancy--an analysis of 180 cases. *J Indian Med Assoc*. July 2007;105(6): 308,310,312 passim.
5. NHS Choices. "IUD (intrauterine device)". Contraception guide. NHS Choices. Retrieved 2 March 2014. "the intrauterine device, or IUD (sometimes called a coil)."
6. Thiery M. Pioneers of the intrauterine device. *Eur J Contracept Reprod Heal Care*. March 1997;2(1):15–23. doi:10.1080/13625189709049930.
7. Darney, Leon Speroff PD. A clinical guide for contraception. 5th ed. Philadelphia, Pa.: Lippincott Williams & Wilkins; 2010:242–243.
8. Backman T, Rauramo I, Huhtala S, Koskenvuo M. Pregnancy during the use of levonorgestrel intrauterine system. *Am J Obstet Gynecol*. January 2004;190(1):50–4. doi: 10.1016/j.ajog.2003.07.021.
9. W Treiman K, Liskin L, Kols A, Rinehart W. IUDs -- an update. TT - Les DIU - etat recent des informations.; Em dia com o DIU.; Los DIU al dia. Popul Reports Ser B Intrauter Devices [Internet]. December 1995;(6):1–35. Available from: http://www.k4health.org/toolkits/info-publications/iuds-update1995;(6):1–35.
10. Parazzini F, Ferraroni M, Tozzi L, Benzi G, Rossi G, La Vecchia C. Past contraceptive method use and risk of ectopic pregnancy. TT -. Contraception. December 1995;52(2):93–8.
11. Rossing MA, Daling JR, Voigt LF, Stergachis AS, Weiss NS. Current Use of an Intrauterine Device and Risk of Tubal Pregnancy. Epidemiology. May 1993;4(3). Available at: http://journals.lww.com/epidem/Fulltext/1993/05000/Current_Use_of_an_Intrauterine_Device_and_Risk_of.9.aspx.
12. Edelman DA, Porter CW. The intrauterine device and ectopic pregnancy. Contraception. July 1987;36(1):85–96. doi:10.1016/0010-7824(87)90062-X.

ABSTRACTS

45TH SCIENTIFIC MEETING OF GHANA SURGICAL RESEARCH SOCIETY IN COLLABORATION WITH THE WEST AFRICAN COLLEGE OF SURGEONS (GHANA CHAPTER)

THEME: "INFECTIONS IN SURGERY"

SURGICAL SITE INFECTION IN GENERAL SURGERY

[1]Bugri J., [2]Bandoh D., [1]Obeng G., [1]Kpangkpari S., [1]Abanga F., [1]Jenli E., [1]Tabiri S.

[1]Department of Surgery, School of Medicine, University for Development Studies and Tamale Teaching Hospital, Tamale, [2]Department of Surgery School of Medical Sciences, Kwame Nkrumah University of Science and Technology and Komofo-Anokye Teaching Hospital

Abstract

Introduction *:* Surgical site infections (SSI) are a significant cause of post-surgical morbidity and mortality and can be an indicator of surgical quality. The objectives of this study were to measure after general surgical operation SSI at Tamale Teaching Hospital (TTH) and to describe the associated risk factors in order to reduce it.

Methods : This study included data from emergency and elective surgical procedures performed at the General surgery unit of TTH from January 2010 to December 2014. Post-operative SSI data were prospectively collected. Logistic regression was used to identify SSI risk factors.

Results : A total of 1014 patients underwent general surgical procedures. The incidence of SSI was 94 (9.3%); Superficial SSI occurred in 60 (5.9%) while deep SSI was present in 34 (3.4%). The median length of hospital stay for patients without SSI was 10 days (range 2 to 10 days) compared to 35 days (range 20 to 35 days) in those with SSI ($p < 0.001$). Eighty-five percent of SSI occurred after emergency abdominal surgeries. Multivariate analysis identified late presentation, blood transfusion and type of surgery as associated with an increased risk of SSI

Conclusions : Surgical site infection causes significant morbidity and long hospital stay. Multicenter study will assist healthcare facilities with monitoring and evaluation as well as quality control assurance of surgical programs in Ghana.

SURGICAL OUTREACH SERVICES IN GHANA – IS THERE A NEED FOR A NATIONAL POLICY ?

Peter Donkor

Kwame Nkrumah University of Science and Technology & Komfo Anokye Teaching Hospital, Kumasi

Abstract

Introduction *:* Surgical disease accounts for 11% of the total burden of disease worldwide, and yet access to surgical services in Low & Middle Income Countries (LMICs) is mostly concentrated in the more urbanized parts of these countries. This is largely due to the lack of adequate manpower and appropriate facilities. One of the more common solutions is for teams of experts from urban health facilities to travel to remote communities for different lengths of time to provide surgical treatments. The purpose of this presentation is to provoke a discussion on safe, effective and efficient approaches to providing surgical outreach services in Ghana.

Methods : A review of the different approaches to providing surgical outreach services in Ghana will be outlined and comparisons made. Similar practices in other LMICs will be reviewed and compared with the situation in Ghana. The main findings will be outlined and inferences made.

Results/Discussion : The merits and demerits of the approaches will be discussed and recommendations for a national policy made.

Conclusion : In order to assure efficacious, high quality and safe surgery for remote rural communities in Ghana, a national policy on outreach services is required.

QUALITY OF REFERRALS FOR ELECTIVE SURGERY AT A TERTIARY CARE HOSPITAL IN A DEVELOPING COUNTRY : AN OPPORTUNITY FOR IMPROVING TIMELY ACCESS TO AND COST-EFFECTIVENESS OF SURGICAL CARE

[1,2] Gyedu A, [2]Gyasi Baah E, [2]Boakye G, [3]Ohene-Yeboah M, [4]Otupiri E, [5]Stewart B T

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Abstract

Introduction : Due to deficiencies in surgical capacity, a disproportionate number of persons needing surgery are referred to tertiary facilities in developing countries.

Objectives : To assess the quality of referrals for surgery to a tertiary hospital in Ghana and identify interventions for improving the referral process.

Methodology : Two months of consecutive referrals for elective surgery to Komfo Anokye Teaching Hospital were assessed. Seven essential items in a referral were recorded as present or absent. The proportion of missing information was evaluated between facility and referring clinician type. Also, the proportion of missing information was quantified from referrals that did not use a structured form and those that did.

Results : A total of 643 referrals for surgery were assessed. Of these, none recorded all of the essential information. The median number of missing items was 4 (range 1 – 7). Clinicians that did not use a form missed 5 or more essential items 50% of the time, compared with 8% when a structured form was used (p=0.001). However, even with the use of a structured form, 1 or 2 items were not recorded for 10% of referrals and up to 3 items for 45% of referrals. There was no evidence for a difference between facility or clinician type and number of missing items (p>0.05).

Conclusion : Referrals using structured forms contain less missing essential information and may be further improved by referrer feedback or electronic referral systems. Though often overlooked, referral process improvements may reduce waiting times and duplication of scare resources.

PENILE CANCERS IN KUMASI – A FIVE YEAR REVIEW

[1]Appiah K A A *, [1,2]Gyasi-Sarpong CK, [1]Azorliade R, [1,2]Aboah K, [1]Nyamekye K B, [1]Otu-Boateng K, [1]Maison P O M, [1]Arthur D, [1]Frimpong-Twumasi B, [1]Antwi I O, [1]G Amoah, [3]Yenli E M

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Abstract

Introduction : Penile cancers are rare. The aim of this study was to describe the clinicopathological presentation and the mode of treatment of penile cancers in our setting.

Methods : This was a retrospective study of histologically confirmed cases of penile cancers seen at KATH from January 2009 to December 2014. Information gathered included age, the clinicopathological features and mode of treatment using a structured proforma.

Results : There were 13 cases of histologically confirmed penile cancers over the period. The age range was from 32-91 years with a median age of 62 years.

In 4 patients, the lesion was restricted to the glans penis ; it involved the distal penis in 3, midshaft in 2, proximal penis in 1 and base of the penis in 2. One of last two patients had auto amputation of the penis. All were squamous cell carcinomas with majority being moderately well differentiated (80%). Seven had ulcerative lesions and 6 were cauliflower-like. Majority were advanced (T4) involving the corpora (69%). Eleven patients (84.6%) had lymph node involvement and two had distant metastasis at presentation.

Only one patient had a penile sparing surgery with 10 of them having partial penectomy. One had total penectomy with suprapubic urinary diversion whiles the one with auto amputation had radiotherapy as the primary treatment. Eleven of the patients had lymph node dissection. Four had adjuvant radiotherapy.

Conclusion : Most patients present with advanced disease making effective treatment difficult. Further education is needed to ensure early detection and treatment

NATIONAL PERIPHERAL ARTERY DISEASE RISK AND ASSESSMENT OF VASCULAR CARE CAPACITY IN GHANA : A LOOK TO THE FUTURE

[1,2]Gyedu A, [1,3]Stewart B T, [4]Nakua E, [1,2]Donkor P, [3, 5,6] Mock C, [7]Mark Hardy, [8,9] Yangni-Angate KH

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Abstract

Introduction : The burden of peripheral vascular disease (PVD) in low- and middle-income countries (LMICs) is increasing and will fall on health systems least equipped to provide necessary care.

Objectives : To estimate the number of Ghanaians at risk of PVD, quantify national vascular care capacity and identify factors contributing to item non-availability.

Methodology : Prevalence of PVD risk factors from WHO's Study on Global Ageing Health (SAGE) Ghana were described. Risk factors included : hypertension, diabetes, obesity, and cardiovascular disease diagnosis or treatment, smoking, and advanced age. In addition, a nation-wide assessment of vascular care capacity was performed. Direct inspection and structured interviews with hospital staff were used to assess item availability at 40 district, regional and tertiary hospitals in Ghana. Factors contributing to item non-availability were also assessed.

Results : There were 4,305 respondents aged ≥50 years with data to estimate PVD risk representing 2, 879,318 Ghanaians. Of these, 57% were at moderate to high risk of PVD (≥3 risk factors ; 1, 654,557 persons). Vascular care capacity assessment demonstrated deficiencies in diagnostics (i.e. duplex ultrasonography, angiography), and perioperative (i.e. airway equipment, electronic cardiac monitoring) and surgical care (i.e. anastomosis, graft material). Deficiencies were most often due to equipment absence, lack of training and technology breakage.

Conclusion : PVD risk factors are highly prevalent in Ghana, which also has critical vascular care capacity deficiencies. Given these deficiencies were often the result of a lack of training and technology breakage, attention to training relevant manpower in LMICs will be increasingly important as the burden of PVD increases

PROSTATE CANCERS IN KUMASI – A TWO YEAR REVIEW

[1]Appiah K A A*, [1,2]Gyasi-Sarpong CK, [1]Azorliade R, [1,2]Aboah K, [1]Nyamekye K B, [1]K Otu-Boateng, [1]Maison P O M, [1]Arthur D, [1]Frimpong-Twumasi B, [1]Antwi I O, [1]Amoah G, [3]Yenli EM

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Abstract

Introduction *:* Prostate cancer is the leading genitourinary malignancy in Ghana. The objectives of the study are to describe the clinico-pathologic characteristics and the treatment modalities employed for prostate cancer patients in Kumasi.

Methods*:* We prospectively obtained data on patients diagnosed of prostate cancer over a period of two years (Jan 2013 – Dec 2014) using structured questionnaire. Data obtained include the clinical stage on presentation, histo-pathological characteristics and the treatment modality employed. Data was edited and transferred onto SPSS 16.0 for descriptive analysis.

Results: Over the period, 120 cases were seen. The age range was from 43 to 83years with a mean of 68years. Common presentations were waist pains in 90 (75%); retention of urine in 58 (48.3%), hematuria in 42 (35%), anemia in 23 (19.2%), erectile dysfunction in 23 (19.2%) and paraplegia 20 (16.7%). Majority (46%) had PSA levels ranging from 20-50ng/ml and 30% of them had PSA levels above 100ng/ml.

All the patients had adenocarcinoma of the prostate. Twenty (16.7%) of the patients had organ confined prostate cancer and thirty (25%) had locally advanced disease with 58.3% having metastatic disease.

Sixty two patients had surgical castration, 29 had medical castration, 10 had active surveillance and 11 had radiotherapy whiles 8 had radical prostatectomy.

Conclusion: Most of our patients present late with unfavorable tumor characteristics. Public health education and screening programs will ensure early detection of prostate cancer and curative treatment for patients who require it.

SURGERY FOR CONDITIONS OF INFECTIOUS ETIOLOGY IN RESOURCE-LIMITED COUNTRIES AFFECTED BY CRISIS : THE MÉDECINS SANS FRONTIÈRES OPERATIONS CENTRE BRUSSELS EXPERIENCE

[1]Stewart B, [2]Sharma D, [2]Hayman K, [3]Dominguez L, [3]Trelles M, [3,4]Saqeb S, [3,5]Kasonga C, [3,6]Hangi T K, [3,7]J Mupenda, [3,8]Naseer A, [9]Wong E, [2,10]Kushner A

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Abstract

Introduction *:* Surgery for infection represents a substantial, though undefined, disease burden in low- and middle-income countries (LMICs). Médecins Sans Frontières – Operations Centre Brussels (MSF-OCB) provides surgical care in LMICs and collects data useful for describing operative epidemiology of surgical need otherwise unmet by national health services. This study aimed to describe the experience of MSF-OCB surgery for infections in LMICs. By doing so, the results might aid effective resource allocation and preparation of future humanitarian staff.

Methods : Procedures performed in operating theatres at facilities run by MSF-OCB from July 2008 through June 2014 were reviewed. Projects providing only specialty care were excluded. Procedures for infection were described and related to demographics and reason for humanitarian response.

Results : A total of 96,239 operations were performed at 27 MSF-OCB sites in 15 countries between 2008 and 2014. Of the 61,177 general operations, 7,762 (13%) were for infections. Operations for skin and soft tissue infections were the most common (64%), followed by intra-abdominal (26%), orthopaedic (6%) and tropical infections (3%). The proportion of operations for skin and soft tissue infections was highest during natural disaster missions ($p<0.001$), intra-abdominal infections during hospital support missions ($p<0.001$) and orthopaedic infections during conflict missions ($p<0.001$).

Conclusion : Surgical infections are common causes for operation in LMICs, particularly during crisis. This study identified that infections require greater than expected surgical inputs given frequent need for serial operations to overcome contextual challenges and those associated with limited resources in other areas (e.g. ward care). Further, these results demonstrate that the pattern of operations for infections is related to nature of the crisis. Incorporating training into humanitarian preparation (e.g. surgical sepsis care, ultrasound-guided drainage procedures) and ensuring adequate resources for the care of surgical infections are necessary components for providing essential surgical care during crisis.

KWAME NKRUMAH

Kwame Nkrumah, Ghana's first Prime Minister

He expanded access to health facilities throughout Ghana by building on success of the Medical Field Units and opening health centers countrywide.

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Easmon
First President

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Dr. F. T Sai
First Secretary

The Ghana Medical Association (GMA) was launched by Ghana's first Prime Minister, Dr. Kwame Nkrumah, on 4th January 1958 at the Arden hall of the Ambassador Hotel in Accra.

Until the launch, there was the Gold Coast Branch of the British Medical Association, which was confronted with the dilemma of what to do to rectify its anomalous nature as a branch of the British Medical Association in an independent Ghana.

The move to establish the association, which would be recognized by the government and be the mouthpiece of the profession in the country, was made by Dr. J. A. Shandorf. The co-sponsors of the meeting to launch the association were Dr. C. E. Reindorf and Dr. W.A.C. Nanka-Bruce. Also present at the ceremony were the Chief Medical Officer, Dr. Eustace Akwei, Dr. C.O. Easmon, the African Surgeon in Korle Bu, Dr. Silas Dodu and Dr. M. A. Barnor.

Dr. C.O. Easmon was elected President of the newly formed association and Dr. F. T. Sai the secretary

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Article
McLendon WW. A historical perspective as a compass for the future of Pathology. Arch Pathol Lab Med 1986; 110: 284-288.

Book
Talbot CH. Medicine in Medieval England.Oldbourne, London. 1926 p 120-136.

Book Chapter
Philips SJ, Whisnan JP. Hypertension and stroke. In: Laragh JH, Bremner BM, editors, Hypertension: pathophysiology, diagnosis and management. 2nd Ed. New York: Raven Press, 1995, p465-478.

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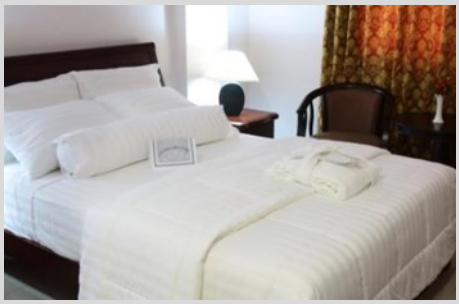

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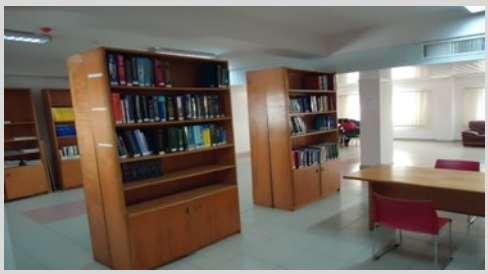

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