

SPECIAL ARTICLES

EMERGENCY LAPAROSCOPIC APPENDECTOMY IN GHANA: THE 37 MILITARY HOSPITAL METHOD

Asumanu E¹, Yeboah R¹, Boadi B¹, Opae – Tetteh I², Teteyfio – Koney C²; Antwi AA²
Adiali B³, Ayebege VA³, Idan P³

¹Surgical Division 37 Military Hospital, Accra; ²Anaesthesia Division 37 Military Hospital, Accra; ³Endoscopy & Laparoscopic Unit, 37 Military Hospital, Accra

Abstract

Summary: Emergency laparoscopic appendectomy is evolving as the method of preference for the management of acute appendicitis. Appendicitis is one of the common causes of acute abdomen diagnosed in the emergency unit in Ghana and open appendectomy has been the preferred method for most surgeons. Increasing patient preference for laparoscopy in Ghana will soon require an increase in the practice of emergency laparoscopic appendectomy in many centres. The number and sizes of ports as well as the site of placement, together with the technique of appendectomy, determines the uniqueness of the method of laparoscopic appendectomy. A simplified easy to apply method of laparoscopic appendectomy is needed to encourage its use in emergency centres.

Methods: The paper describes a 3-port method of laparoscopic appendectomy which combines the principles of open appendectomy and basic laparoscopy. Patient positioning and the operative removal of the appendix is similar to what as is done in open appendectomy. Pneumoperitoneum is achieved by open access through the umbilicus. Two additional

ports are placed below the iliac crest for a good cosmetic effect. The amount of consumable used usage is comparable to that of open appendectomy.

Discussion: The question of a gold standard procedure for laparoscopic appendix still persists. The key criteria in the choice of any method should be the success rate, affordability, resource availability and suitability. The method described meets the above criteria in a low resource environment. It offers opportunity for the practice of laparoscopic appendectomy in institutions that practice open appendectomy. The sites of port placement makes the method especially suitable for population that are keloid prone. The use of the same principle for mesoappendix and appendix excision as in open appendectomy helps improve the learning curve. Modifying the 10mm port into a retrieval bag at the end of the procedure presents gives the same effect as a conventional retrieval bag without an additional risk of infection.

Conclusion: The method has an inherent easy learning curve and is expected to help scale up the conversion from open to laparoscopic appendectomy.

Key Words: Appendicitis, Laparoscopy, Appendectomy

Introduction

Laparoscopy is gradually gaining grounds as the preferred choice for surgery in many specialties¹. Emergency laparoscopy has evolved in many countries and the benefits are well documented²⁻⁴. Globally the surgical management of appendicitis has moved towards the use of laparoscopy. Patient preference for laparoscopy in Ghana has been demonstrated in elective Gynaecology and General surgeries^{5,6}. The successes of laparoscopy in elective surgery has not however been extended to benefit emergency surgery outcomes in Ghana⁷. Despite its advantage in

reducing hospital stay and observed patient preference, laparoscopic appendectomy is an uncommon procedure in Ghana.

Appendicitis as a surgical emergency has been reported as a common cause of acute abdomen in Ghana^{8,9}. The trend appears to be increasing and it is expected that laparoscopic appendectomy will soon be practiced in many centres driven by patient demand. This require a simplified and an easy to apply method that will encourage and scale up the use laparoscopy in the management of managing appendicitis in Ghana. The number of ports, the size of the ports used for instrumentation and the site of placement together with the technique of appendectomy determines the uniqueness of the method of laparoscopic appendectomy. Laparoscopic appendectomy has evolved from a three-port approach to a single port transumbilical approach though the three-port approach is widely practiced whether the appendix is perforated or not¹⁰. There are variations in the site of port

Corresponding Author: Asumanu E
Postgraduate Unit 37 Military Hospital, Accra

Email Address: easumanu@yahoo.com

Conflict of Interest: None Declared

placement in the three-port approach. The size of the ports used in the different techniques also show variation from the classical laparoscopy to the minilaparoscopy. This article describes a 3-port method of emergency laparoscopic appendectomy at the 37 Military Hospital.

Methods

Patient Selection

The patients for laparoscopic appendectomy are selected by the same criteria used for those who will undergo open appendectomy. The diagnosis of acute appendicitis was made using the Alvarado scoring system. The inclusion criteria were all adults who were diagnosed with acute appendicitis at the surgical emergency of the hospital. Patients excluded were those with complicated appendicitis such as generalized peritonitis or mass formation. The work up and preoperative preparation are similar to open appendectomy. Patients are informed about the procedure and consent is signed for both laparoscopy and for possible conversion to open appendectomy.

Patient Positioning

General anaesthesia with muscle relaxation is given with a silicon foleys urethral catheter in situ and a diathermy pad attached. Patients are placed supine with the arms placed by the sides. The right handed operating surgeon stands on the left side by the pelvis, the assistant stands cephalad on the opposite side with the scrub nurse stands on the opposite side in line with the surgeon. Standard cleaning and draping is done exposing the lower abdomen as the operating field. Fig 1



Figure 1. Position of operating team and patient

Pneumoperitoneum

Pneumoperitoneum as a first step is achieved by insuffulating the abdomen with carbon dioxide by the open method at the umbilicus in the following way: A skin incision, to accommodate a 10mm port, is made with a size 11 blade at the umbilicus and dissected down to the linea alba which is opened transversely to enter the peritoneum. A 2/0 suture is placed between the divided rectus sheath on the lateral side and left loosely on a clip. This is used at the end of the procedure as traction to close the defect. A 10mm port with a trocar is inserted under direct vision through the

umbilical opening into the abdominal cavity. This is assisted by lifting the abdominal wall on both sides with the hand. The trocar is removed and a light source is attached to confirm the presence of the port in the abdomen. Pneumoperitoneum is then achieved by attaching the carbon dioxide source to the port. The camera head is re-inserted for a diagnostic laparoscopy to confirm decision to continue with the laparoscopic appendectomy.

Port Placement

The next step of the method is the port placements. The two (2) additional ports are placed in the lower abdomen for the procedure in the following manner: Using the light source as a guide from within the abdominal cavity, a site is selected in the left iliac fossa about 3cm below the anterior superior iliac crest for a 10mm port. A stab incision with a size 11 blade into the subcutaneous fascia after which the trocar is advanced by rotating movement to enter the peritoneal cavity under direct vision from within the peritoneal cavity. This is then capped and converted to a 5mm port for instrumentation. A third port usually 5mm is inserted 1cm above the symphysis pubis and to the left of the midline in a similar fashion. The operating table is then lowered to the midhigh level of the operating surgeon. Fig 2



Figure 2. Port placement sites below iliac crest indicated by index finger (left) and scalpel (right).

Appendectomy

The method of appendectomy is done in a manner similar to open appendectomy. Dissecting forceps are advanced through the ports with the laparoscope is focused on to the caecum by following the ascending colon downwards towards the right iliac fossa. Using the forceps, the appendix is identified and mobilized by the same technique as in an open appendectomy. Using the taenia of the caecum is recommended while dissecting any adherent omentum. The mesoappendix is displayed by traction on the non-gangrenous portion of the appendix. The appendicular vessels are diathermised and excised close to the appendix from the base to the tip using the bipolar forceps or a hook diathermy. The appendix which now hangs free from the caecum is ligated at the base with vicryl 2/0. An extracorporeal knot can be used. Peritoneal suction and/or lavage is done in case of any collection.

Removal of Appendix

The free appendix is grasped at the tip with the forceps in the 10mm (converted to 5mm) port and excised above the knot. The appendix is then pulled into the sheath under direct vision. Once the appendix enters the 10mm port sheath, the port is removed from the abdomen with the appendix in situ. A final inspection of the stump may be undertaken at the and the gas is then expelled by removing the remaining 2 ports. The entry wounds are closed with vicryl 2/0 to the fascia and skin. Local anaesthetic agent is used at the port site as part of post-operative pain management. Fig 3

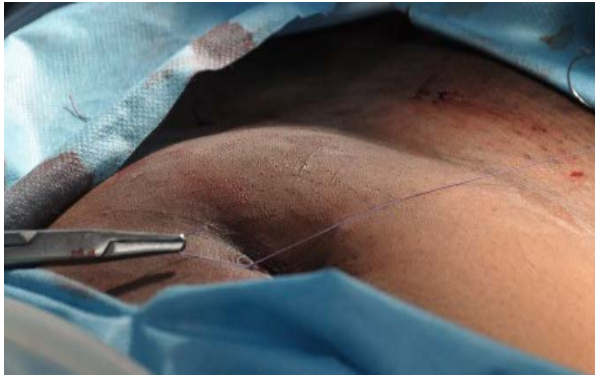


Figure 3. Appearance of Abdomen at final port site closure

Discussion

Appendicitis is a common diagnosis made in the surgical emergency room in Ghana. This has added to the burden of patients attending the surgical emergency in Ghana with attendant increase in morbidity and mortality⁹. Reducing hospital stay through laparoscopic surgery will improve overall access to surgical emergency care. Another advantage of emergency laparoscopic appendectomy is the opportunity to establish a diagnosis and offer appropriate treatment at the same setting³. This might result in non-operative intervention and reduce the rate of negative laparotomy.

What is the gold standard method of laparoscopic appendectomy? There are varied methods of laparoscopic appendectomy described based on surgeon and institutional preferences^{3,11-18}. The single port laparoscopic appendectomy has its appeal in the better cosmetic effect¹¹. The steep learning curve and high cost of single port equipment makes it not suitable for institutions seeking to change from open to laparoscopic appendectomy. The two-port laparoscopy has a challenge of limited visualization of the abdominal cavity but offers an easier learning for junior residents¹². The key criteria in the choice of any method should be the success rate, affordability, resource availability and suitability. The procedure for appendectomy continues to evolve with different set objectives¹⁶. The method described meets the criteria above and offers an opportunity to introduce

laparoscopic appendectomy wherever open appendectomy can be done. Patient selection is as important in laparoscopic as in open appendectomy. Patients who are overweight, symptom duration of more than 3 days and an abscess formation have been found to prolong the duration of laparoscopic surgery¹⁹. Our method had a selection of patients with uncomplicated appendicitis and who were fit for surgery. This encourages acceptability of the method by staff and allows for easy performance of the procedure. Patient position and access to the peritoneum can be achieved in many ways depending on the resources available and the skill of the operating surgeon. We have used the supine position without any tilt in our method. The use of the umbilicus as our entry point allows for conversion to a laparotomy in the early learning period of laparoscopic appendectomy. The practice of a closed peritoneal access using the Veres needle provides safety and is good in the early learning curve. Our procedure uses the open approach which reduces the operating time and risk of injury. The presence of the umbilical stay suture in our method prevents any port site leakage of gas.

The number and placement of port continue to evolve in laparoscopic surgery¹³⁻¹⁵. The relatively high risk of hypertrophic scars among our patient population informed our choice of port placement sites. The umbilicus is a naturally occurring scar which blends with the operation scar. We have our additional ports placed to be hidden in the underwear to improve cosmetic effect. The position of the ports and the surgeon allows for good ergonomics without modifying patient position similar to what pertains to open surgery.

The technique of appendectomy requires division of the mesoappendix and excision of the appendix. There are various techniques for detaching the mesoappendix during laparoscopy²⁰. Our technique requires that the mesoappendix is coagulated and detached close to the appendix. This has advantage of allowing smaller size vessels to be coagulated and reducing the volume of tissue attached to the appendix to be removed. The vessels are branches of the main appendicular artery and therefore are smaller in diameter. This is in contrast to open appendectomy where the appendicular artery may be ligated close to the base of the mesoappendix. The use of clips for the occlusion of the appendix before division is common place in laparoscopic surgery. In our centre, division of the appendix was done after ligating the base as practiced in open surgery using vicryl 2/0. An extracorporeal knot is recommended in the early stages of practice. There are no proximal sutures placed and the appendix stump is also left non-buried as in our open surgery. With this modification, the concern about the availability of clips or its cost will not hamper the performance of laparoscopic appendectomies. Any aspiration or lavage is done before the appendix is removed. In most laparoscopic centres, the removal of

the appendix is done using a retrieval bag. The purpose is to minimize spillage and surgical site infections. Our technique removes the appendix through a 10mm port. This achieves the same objective as the retrieval bag by avoiding contact with the entry wound. By this approach, the use of extraction bags is avoided which in turn reduces the cost of the procedure. This approach has been practiced in the subregion for laparoscopic appendectomy²¹. Once the appendix enters the sheath, the 10mm port is removed en masse with the appendix. It is for this reason that a 10mm port capped to a 5mm is used for instrumentation during the procedure. Because our second 10mm port lies beneath the underwear line the scar is nonvisible and cosmetically acceptable to patients.

Conclusion

The method is a simple easy to learn three port approach in performing emergency laparoscopy appendectomy.

References

- Alexander Buia, Florian Stockhausen, Ernst Hansich Laparoscopic surgery: A qualified systemic review. *World J Methodology*. 2015, 26: 5: 238-254.
- Matteo Mandrioli, Kenji Inaba, Salomone Di Saverio. Advances in laparoscopy for acute surgery and trauma. *World J Gastroenterol* 2016. 14; 22: 666-680.
- Cesare Ruffolo, Alain Fiorot, et al. Acute Appendicitis: what is the gold standard of treatment ?. *World J Gastroenterol*. 2013 21: 19: 8799-8807.
- Chien-Che Wang, Chao-Chaing Tu, Po-Li Wei. Outcome Comparison between laparoscopic and Open Appendectomy: Evidence from a Nationwide Population-Based Study. *Plos One*. 2013; 8: e68662.
- Nkyekyer K. Day –Case laparoscopy in a Ghanaian teaching hospital: the patients perspective. *Trop. Doct*. 1996; 26: 147-50.
- A. Gyedu, Setri Fugar, Raymond Price et al. Patient perceptions about laparoscopy at Komfo Anokye Teaching Hospital, Ghana. *Pan African Medical Journal*: 2015; 20; 20:422.
- Joe Nat A Clegg Lamptey, Gladys Amponsah. Laparoscopic Cholecystectomy at Korle Bu Teaching Hospital, Accra: An initial report. *West Afr J Med* 2011; 29: 113-116
- Naaeder SB, Archampong EQ. Clinical Spectrum of Acute Abdominal pain in Accra, Ghana. *West Afr J Med*. 1999; 18: 13-16.
- Debrah SA, Diallo A. Clinical Spectrum of Acute Abdomen in Cape Coast. *WebmedCentral GENERAL SURGERY* 2012; 3: WMC003209
- Heng-Fu Lin, Hong-Shiee Lai, I-Rui Lai. Laparoscopic Treatment of Perforated Appendicitis. *World J Gastroenterol* 2014. 20; 14338 – 14347.
- Nereo Vetteretto, Vincenzo Mandata. Single Port Laparoscopic Appendectomy: are we pursuing real advantages? *World J Emerg Surg* 2011; 6: 25
- Martin Salo, Emil Jabur, Mette Hambraeus et al. Two-trocar appendectomy in children-description of technique and comparison with conventional laparoscopic appendectomy. *BMC Surg* v.16 2016.
- Asumanu E, Richardson R. Improving emergency attendance and mortality: the case for unit separation. *West Afr J Med* 2009; 28: 28-32.
- Turgut Donmez, Oguzhan Sunamak, Adnan Hut. Two- port laparoscopic appendectomy with the help of a needle grasper: better cosmetic results and fewer trocars than conventional laparoscopic appendectomy. *Widechir Inne Tech Maloinwazyine*. 2016; 11: 105-110.
- Byung Hee Kang, Kyung Chul Yoon, Hyung Soon Lee. Feasibility of single-incision laparoscopic appendectomy in a small hospital. *Annals of Surgical Treatment and Research*. 2016; 91: 74-79.
- Benjamin A. Hagendorf, Jason G. Liao, Randall S. Burd. Evaluation of Race and Insurance Status as Predictors of Undergoing Laparoscopic Appendectomy in Children. *Ann Surg*. 2007; 245:118-125.
- Yu-Long Cai, Xai –Ze Xiong, Nan –Sheng Cheng et al. Single –incision laparoscopic appendectomy vs conventional laparoscopic appendectomy: systematic review and meta –analysis. *World J Gastroenrol*. 2013; 21: 19: 5166-5173.
- Carlos Eduardo Domene, Paula Volpe, Almeida Heitor. Three port laparoscopic appendectomy technique with low cost and aesthetic advantage. *ABCD, arq.bras.cir.dig.vpl 27.supl.1 Sao Paulo* 2014.
- Jeon BG, Kim HJ, Jung KH et al. Prolonged operative time in laparoscopic appendectomy: Predictive factors and outcomes. *Int J Surg*. 2016; 36(Pt A): 225-232.
- Jun Suh Lee, Tae Ho Hong. Comparison of various Methods of Mesoappendix Dissection in Laparoscopic Appendectomy. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2014, vpl 24: 28- 31.
- Adewale O, Adisa, Oladejo O. Lawal . Laparoscopic Appendectomy in a Nigerian Teaching Hospital. *J Soc Laparoscopic Surg* 2012; 16: 576 -580.