

SPONTANEOUS BILATERAL RUPTURE OF THE EXTENSOR TENDONS OF THE KNEE IN PATIENTS WITH CHRONIC KIDNEY DISEASE. CASE REPORTS

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Abstract

Introduction: Bilateral rupture of the extensor tendons of the knee (quadriceps and patella tendons) are uncommon and usually occur as a result of trauma. Spontaneous bilateral tendon ruptures are a rarer injury and has been reported to occur in patients with chronic renal disease and secondary hyperparathyroidism. Patients usually present with sudden inability to actively extend their knee and walk. Over 50% of these injuries are usually missed so a high index of suspicion is required for early diagnosis. These case reports aim to create awareness among physicians and primary care givers about the condition and ensure early diagnosis and management

Case Presentation: We report two cases of spontaneous bilateral knee extensor tendon rupture involving the

quadriceps tendon and patella tendon in a 30 year and 50-year-old males respectively. Both patients had chronic renal failure and were on chronic dialysis for a minimum 8 years and were being managed for secondary hyperparathyroidism. One patient had surgical repair and is doing well functionally but the other declined surgery.

Conclusion: Spontaneous knee extensor tendon rupture though rare, occurs in patients on chronic dialysis with secondary hyperparathyroidism. Physicians and primary care givers managing these patients must be aware and maintain a high index of suspicion in order to pick this condition since as seen in our first patient, early treatment is associated with good functional outcomes.

Keywords: spontaneous, bilateral rupture, extensor tendon, hyperparathyroidism

Introduction

Simultaneous bilateral quadriceps or patella tendon rupture occurring in patients with chronic renal failure patients undergoing haemodialysis though rare have been reported in the literature.¹⁻³ There is no consensus on the exact mechanism and pathogenesis, but it is widely believed to be a result of secondary hyperparathyroidism due to repeated dialysis.¹

Early treatment is associated with better outcomes. We present 2 cases of spontaneous quadriceps and patella tendon ruptures in patients with end-stage renal disease undergoing dialysis. Both had been diagnosed with hyperparathyroidism. One had surgical repair with an excellent outcome but the other one refused surgery. To the best of our knowledge no such case has been reported in Ghana and the West African subregion and these are the first cases from our center.

Cases Presentation

Case no.1

This involves a 30year old male with end stage renal disease who had been on haemodialysis, for the past 10years. He was stable until three weeks prior to presentation when he heard a popping sound in both knees whilst entering the doorway into his house and collapsed onto the floor. He noticed that both knees were swollen, and he could not get up to walk thereafter.

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He was seen and investigated extensively at another facility for a possible spinal injury, a cerebrovascular accident, and possible cardiac issues with negative findings. A diagnosis of his injury was not made, and he was confined to a wheelchair. He was referred to orthopaedic clinic after he complained to the general surgeon managing him for the parathyroid adenoma who after examination thought his inability to walk was most likely from an occult knee injury.

Physical examination showed a young adult male in good health sitting in a wheelchair. Both knees were swollen and tender with a palpable gap between the quadriceps tendon and the patella (Fig. 1). He could not actively extend both knees.





Figure 1a&b: Swollen left and right knees respectively with palpable gap

A diagnosis of bilateral spontaneous quadriceps tendon rupture was made. The diagnosis was confirmed with an ultrasound scan which showed a complete tear of both quadriceps' tendons at their insertion into the patella. Parathyroid hormone assay was 962.30 pg/ml (normal 16.0-65.0 pg/ml). He was then prepared for surgical repair of both quadriceps' tendons. Intra-operative findings showed the quadriceps tendons were both torn from their insertion into the patella and the tendons had retracted four centimetres (Fig. 2).

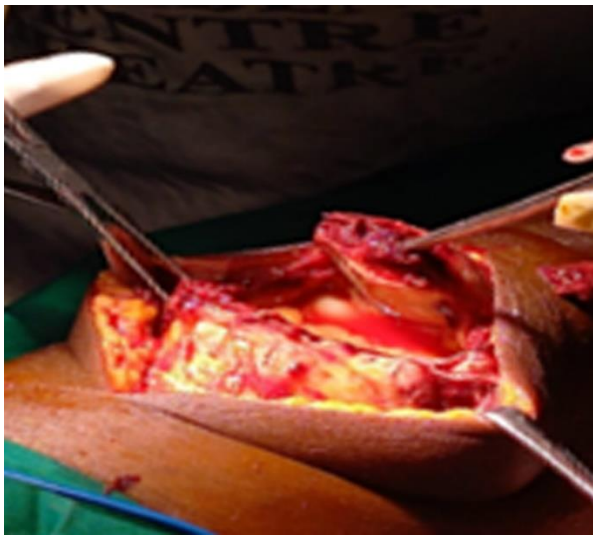


Figure 2: Torn and retracted quadriceps tendon

Under spinal anaesthesia and with the patient in supine position an 8cm longitudinal incision was made over the right quadriceps tendon to the tibial tuberosity. Sharp dissection was done to expose the ruptured quadriceps tendon. Findings were noted and a biopsy taken from the margin of the torn tendon. The quadriceps tendon was repaired by whipstitching of the tendon with a size 5 fibrewire braided non-absorbable suture, tunnelling the sutures through the substance of the patella, and tied over a bony bridge at the distal pole

of the patella (Fig 3a-b-c). The integrity of the fixation was tested by flexing the knee, and it was found to be safe to flex to 70 degrees. The wound was then closed, and the same procedure was repeated for the left knee.



Figure 3: quadriceps tendon whipstitched with sutures (a) and sutures passed through drilled tunnels in the patella (b) and tied over the distal pole of the patella (c)

Post operatively both knees were immobilized in extension with a post-operative brace for two weeks. The knees were examined after two weeks, and wounds seen to have healed after which the skin stitches removed. He was then placed in a hinge brace which was set to 0 to 70 degrees of flexion and was allowed to bear

weight as tolerable with a Zimmer frame for 8 weeks. He then started muscle strengthening and knee range of motion physiotherapy

Twelve weeks post repair he walked without any aid and the knee range of motion was 0 to 110 degrees on the left and 0 to 100 degrees on the right. He had regained varied strength in the quadriceps and was able to straighten both knees and raise them up to 45 degrees on the right and 90 degrees on the left (Fig 4a-b).



Figure 4-a: right knee extension quadriceps strength



Figure 4-b: left knee extension and quadriceps strength

A biopsy taken from the quadriceps tendon for histopathology was reported as “fragments of fibrocollagenous tissue with areas of haemorrhage and necrosis. There was a cup of reactive round cells in a chondromyxoid matrix with bony trabeculae in areas. There was no evidence of malignancy seen”. Histological Diagnosis was reactive/chronic inflammatory changes at the tendon.

Case No. 2

This involved a 50-year-old male with End Stage Renal Disease on haemodialysis for 12 years. Two years prior to presentation, he was descending a flight of stairs when he felt a snapping sound in both knees. He fell

down and was unable to walk afterwards. He was seen at a peripheral facility, went through several ‘tests’ which all came out negative. The diagnosis of bilateral knee tendon injuries was missed, and he was left dependent on a pair of crutches to walk. He had also developed secondary hyperparathyroidism with a parathyroid adenoma and was referred to the General Surgeons who subsequently referred to us on account of a possible knee injury.

On Examination he was unable to walk without aid, his quadriceps muscles were atrophied and unable to extend both knees and raise his legs. The patella was riding high with a gap between the patella and patella tendon on both sides (Fig 5 a-b).



Figure 5-a: 1. Right knee with a palpable gap between the patella and patella tendon



Figure 5-b: Left knee with a palpable gap between the patella and tendon

An ultrasound scan done showed a complete patella tendon tear from its insertion on the distal pole of the patella on both sides. The parathyroid hormone assay done at the time of seeing the patient was 3177pg/ml (normal 16-65pg/ml). He consented to have surgical

repair of patella tendon after the parathyroid surgery. He however suffered a cardiac arrest intra-operatively during the parathyroid surgery and was successfully resuscitated. He subsequently declined surgery on the knees.

Discussion

The extensor mechanism of the knee comprises the quadriceps muscle and its tendon, the patella, the patella tendon, and the tibial tuberosity. Disruption of this mechanism impairs knee extension hence making standing and walking difficult. Disruption of this mechanism is usually caused by trauma with a patella fracture being the most frequent injury.^{1,4} Spontaneous Quadriceps tendon rupture has a low incidence and tends to occur in older people above the age of 50 years.⁵ Simultaneous bilateral rupture is even rarer with a reported incidence of less than 5% of all quadriceps ruptures.^{6,7} Bilateral quadriceps tendon rupture occurs 5 times more than patella rupture.⁸ It usually occurs in patients with chronic systemic conditions such as Systemic lupus erythematosus (SLE), chronic renal disease (CKD), hyperparathyroidism, diabetes mellitus, rheumatoid arthritis and psoriasis.^{1,3,9,10} Since Steiner and Palmer reported the first case of simultaneous bilateral quadriceps tendons rupture in a patient with chronic renal failure in 1949, several other cases have been reported.^{1,7,10,11}

In a study by Tao et al over an 18-month period, 7 out of 126 patients they saw with Quadriceps or patella tendon rupture had chronic renal failure and were undergoing long term haemodialysis.⁸ Two out of these 126 patients had simultaneous bilateral quadriceps or patellar tendons rupture, and both had undergone long term haemodialysis.⁸ This makes the incidence of simultaneous bilateral quadriceps or patellar tendon rupture 1.59% (2/126) among patients with quadriceps/patellar tendon rupture. This rate increases to 28.57% (2/7) in patients with chronic kidney disease undergoing long-term haemodialysis.⁸

In a systematic review by Camadaa et al in 2017 which studied 44 patients with bilateral extensor mechanism disruption, 29% were traumatic and 71% were spontaneous with the average age being 53 years.⁹ Thirty-seven patients (84%) had bilateral quadriceps Injury, 6 patients (14%) had bilateral patellar injury and 1 patient (2%) had simultaneous quadriceps and contralateral patella injury. Renal disease was found to be the commonest associated medical condition with 61% of the patients having the condition.⁹

Nial Jones et al also reported that 65% of tendon ruptures in chronic haemodialysis patients involve the quadriceps tendon with 11% involving the Achilles tendon and only 8% involving the patella tendon.¹²

The exact pathophysiology is unknown, but most investigators agree that secondary hyperparathyroidism resulting from repeated dialysis plays a major role.^{2,11} Other proposed mechanisms include chronic acidosis from renal failure and dialysis related amyloidosis.¹²

Histopathology of our first case showed fibro collagenous degeneration with chronic inflammatory changes.

Diagnosis of extensor mechanism rupture is clinical. Up to 50% of bilateral quadriceps rupture may be misdiagnosed^{3,5,13} as happened in both of our patients. It is therefore important to have a high index of suspicion in patients with acute knee pain and inability to extend the knee especially in patients with chronic renal failure⁷. For a complete rupture there is palpable gap proximal to the patella. Ultrasound scan was used to confirm the diagnosis of both of our patients. It is quick and cheaper and in experienced hands has a sensitivity and specificity of over 97%.¹⁴ In doubtful cases, an MRI is helpful in making a diagnosis.^{1,3} X-rays may be done to rule out fractures and to determine the position of the patella.³

Surgical repair is recommended for acute complete quadriceps tendon rupture. This when done within two weeks followed by functional physiotherapy gives excellent results.^{4-6,8,15} Our first patient had surgery at 3 weeks post injury and has very good function. The commonest used repair technique is braided non absorbable sutures tied over bony a bridge.^{1,16} Suture anchors can also be used.¹⁶

Post operatively, the knee joint is immobilized for 4-6 weeks in extension after which physiotherapy is done to improve quadriceps strength and range of motion.³ This has been associated with good function.³

Secondary hyperparathyroidism is estimated to occur in about 90% of chronic renal failure by the time they initiate haemodialysis.^{1,17} Evidence has shown a strong association between hyperparathyroidism and spontaneous rupture of the extensor mechanism.¹² Patients on long term haemodialysis usually experience calcium-phosphorus metabolic disturbances which results in secondary hyperparathyroidism⁸. Excessive amounts of parathormone leads to degeneration of tendon tissue.⁸ Metabolic acidosis also causes collagen synthesis disorder.⁸ Early treatment of hyperparathyroidism reduces the risk of quadriceps and patella tendon ruptures.¹²

Conclusions

We report two cases of spontaneous bilateral knee extensor tendon disruption; one with quadriceps tendon rupture whose diagnosis though missed earlier presented early and had surgery with good outcome. The second case with patella tendon rupture presented late and declined surgery. A high index of suspicion is needed to clinch an early diagnosis and management since it is associated with better outcomes.

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