Case report

Quadriceps tendon repair using double row suture anchor fixation: Case reports and review of the literature

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ARTICLE INFO

Keywords:
Rupture of the quadriceps tendon
Anchor
Functional results

ABSTRACT

Introduction: Traumatic rupture of the quadriceps tendon is rare and disabling. The traditional repair technique involving transpatellar tunnels is still relevant, but this technique seems to be superseded for the technique using anchors. This study aimed to present the place of the anchors in quadriceps tendon tears, and assess the functional results after a mean follow-up of 18.66 months.

Case reports: We report 03 cases of acute rupture of the quadriceps tendon collected in the Trauma Surgery and Orthopaedics Department. The average age was 53.66 years, all patients were male, the rupture occurred after a sporting accident in one case, and in 2 cases concerning minimal trauma from a fall in 2 patients followed for renal failure. The average consultation time was 48 h. The right knee was affected in 2. The clinical presentation was identical in all patients with the deficit of active extension of the leg. All patients were treated surgically with the use of double row anchors. The technique used consisted of insertion of two 5.0 mm anchors at the base of the patella, and the proximal part of the quadriceps tendon was sutured with heavy absorbable sutures using Krackow suture.

Results: At a mean follow-up of 18.66 months, no infectious complications were noted, no active extension deficit and the active flexion average was 123.33°.

Conclusion: The rupture of the quadriceps tendon is a rare injury. Surgical treatment by double row anchors gives excellent results with a satisfactory medium-term functional recovery and allow early rehabilitation.

1. Introduction

Quadriceps tendon ruptures are rare and compromise the knee's extension mechanism, resulting in an inability to perform a straight leg raise [1–3]. Therefore, the vast majority of quadriceps tendon ruptures require surgical repair, and the traditional approach consisting of transpatellar bone tunnels remains relevant but appears to be superseded biomechanically and functionally by techniques using one or double row anchor repair [4–8]. The diagnosis is essentially clinical. The complementary exams, specifically magnetic resonance imaging is useful to determine the size of the tear and evaluate the state of the tendon and its enthesis. We report 03 cases of quadriceps tendon rupture treated surgically with double row anchors, share our experience and assess the functional results after a mean follow-up of 18.66 months. This study aimed to present the place of the anchors in quadriceps tendon tears. This manuscript has been reported in line with SCARE's 2020 Criteria [9].

2. Patients and methods

We report 03 cases of acute tear quadriceps tendon collected in the Trauma Surgery and Orthopaedics Department in Ibn Rochd University Hospital Center of Casablanca over 3 years, all treated surgically with the use of double row anchors without reinforcement plastic surgery with a mean follow-up of 18.66 months.

The average age was 53.66 years (48–58 years), all patients were male in all 3 cases. The rupture occurred during a sporting accident with sudden bending of the knee when starting in the 48-year-old patient, and the trauma was at low kinetics, by simple fall from its height in 2 patients followed for more than 10 years for renal failure on haemodialysis. The average consultation time was 48 h (24 h–72 h). The right knee was affected in 2 and the left in 1 case. The clinical presentation was identical in all patients with notable pain in the knee with major functional impairment of the lower limb, oedema and a suprapatellar notch (Fig. 1), contraction of the limb showed the ascension of the proximal
fragment, the deficit extension active of the leg on the thigh without a sensory-motor deficit in the 3 patients.

The lateral X-ray of the knee revealed a Baja patella in 2 cases with a Caton and Deschamps Index of 0.44 and 0.56 respectively (Fig. 2), and in 1 case the patella height was normal. Ultrasound of the knee was requested in all 03 patients, confirming the tear of the quadricipital tendon at its termination. MRI was performed in one of the patients, showing a discontinuity of the left quadricipital tendon with a T2 hypersignal area, with a liquid tone, interposed between the two tendon fragments, which were hyposignal and frayed, the expansions of the vastus lateralis and medialis muscles were tears (Fig. 3).

The average time to care was 72 h. The patients were informed and adhered to the treatment planned by the surgeon. The 3 patients were operated on by a senior surgeon from the Trauma Surgery and Orthopedics Department of the Ibn Rochd University Hospital Center. Surgery was performed under spinal anaesthesia in all patients, applying an anterior midline approach. The rupture was transcorporeal in all 3 cases. The technique utilised consisted of preparation of the base of the patella, placement of two parallel holes at the base of the patella with a 2.7 mm drill bit, and implantation of two 5.0 mm anchors were inserted at each hole; and the proximal part of the quadricipital tendon stitched with heavy absorbable sutures using Krakow stitches, fulfilled by suturing of different strands of sutures and closing of the vastus lateralis and medialis muscles and reinforced with an uninterrupted suture at the 2 tendons ends (Figs. 4, 5).

All three patients were immobilised with a brace for 6 weeks, the active and passive range of motion rehabilitation starting at 2 weeks depending on the pain. At a means follow-up of 18.66 months (14–26 months), all the patients declared to have been satisfied with the results of the intervention, no infectious complications were noted and without extension deficit, and the active flexion was 140° in the 48-year-old sportsman, and 110° and 120° in the two renal failure patients aged 55 and 58 respectively.

3. Discussion

Traumatic ruptures of the quadricipital tendon are rare and incapacitating, they occur preferentially in subjects over 40 years of age, following an indirect trauma in sportsmen and women or an ordinary trauma in sedentary people on pre-existing tendinopathy [3,4,10]. Most often treated surgically, rupture of the quadriceps tendon is rare and constitutes a disabling injury because of the role of the knee extensor mechanism in maintaining the body in an erect position and has an antigravity action [3,10,11]. Thus, its tear would generally result from a hyperflexion mechanism with violent contraction of the quadriceps to avoid a fall. Rupture frequently occurs in subjects with the systemic disease as observed in two of the cases in our series who had renal failure, and other risk factors such as diabetes, rheumatoid arthritis, hyperparathyroidism, connective tissue disorders, systemic lupus erythematosus, and obesity; the use of long-term corticosteroid therapy and sports activities are also likely to weaken the tendon either at the level of its body or its enthesis and have been noted in the literature, the search for these factors makes it possible to prevent the risk of recurrence [3,4,10]. The rupture is most often total and appears in the body of the tendon in 60% of cases or a simple quadricipital dislocation at the upper edge of the patella in 40% of cases.
Fig. 3. T1 and T2 MRI: a T2 hypersignal area, with a fluid tone, is located between the two tendon fragments (orange arrow) which are hyposignal, more or less frayed.
Fig. 4. A: Intraoperative image of a transcorporeal patellar tendon rupture, with tearing of the vastus lateralis and vastus medialis expansions; B: placement of two 4-strand anchors each at the base of the patella; C: Krakow stitch lacing of the proximal part of the quadricipital tendon; D: bringing the strands together and closing the vastus medialis and lateralis muscles with uninterrupted suture.
The treatment of these injuries is surgical and consists of reimplantation and strengthening of the quadricipital tendon. The traditional technique consisted to reinsert quadricipital tendon by transosseous stitches at the proximal pole of the patella with reinforcement plastic in some cases, with satisfactory outcomes in terms of clinical and functional recovery, but repair with suture anchors has been shown to have decreased gap formation and increase ultimate loads to failure.

Currently, there are a few cases published in the literature highlighting the role of anchors to repair quadriceps tendon ruptures with excellent biomechanical outcomes in long-term, early rehabilitation and return to activity, but there are few articles outside biomechanical cadaveric studies that demonstrate the superiority of the anchor approach compared to conventional transosseous tunnel surgery. Kim et al. reported 3 cases of quadricipital tendon rupture in the knee arthroplasty treated by anchoring with excellent functional outcomes [1,5,6,11].

Numerous cadaveric biomechanical studies have shown the superiority of the single or double anchor method. Apart from the limited number of cases in our study, the use of double row anchors in the treatment of acute quadricipital tendon ruptures seems to be an attractive technique with excellent medium-term results noted in our study, so a larger sample with consequent hindsight will make it possible to confirm the place of this technique in this pathology [1,4,8,12–14].

4. Conclusion

The rupture of the quadricipital tendon is a rare injury with a good prognosis if cured early. The repair of the quadriceps tendon tear by anchors constitutes a good alternative to the empirical technique. Our experience of about 3 cases leads us to conclude that the surgical approach using double row anchors sutures with a postoperative immobilisation of at least 6 weeks associated and early range of motion gives excellent results with a satisfactory medium-term functional recovery.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Sources of funding

None.

Ethical approval

N/A.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Research registration number

NA.

Author contribution

Francis Zifa ZENGUE: designed the study, wrote the protocol and the first draft of the manuscript.
Oussama El Adaouia: managed the analyses, and the correction of the manuscript.
Mohamed Fargouch: managed the analyses, and the correction of the manuscript.
Bienvenu J.C Okouango: managed the analyses, and the correction of the manuscript.
Yassir El Andaloussi: managed the analyses, and the correction of the manuscript.
Mustapha Fadili: managed the analyses, and the correction of the manuscript.
All authors read and approved the final manuscript.

Guarantor

ZENGUE Francis Zifa.

Declaration of competing interest

None.
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