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SPONTANEOUS QUADRICEPS TENDON RUPTURE: A CASE REPORT

Raditya putra pratama suryadhi[1*], Putu Agung Wirahadi Sanjaya[2], Komang Wiswa Mitra Kenwa[3]

[1,2]Department of Surgery, Orthopedic Surgeon, Bali Mandara General Hospital, Denpasar, Bali, Indonesia

[3]General Practitioner, RS Tingkat II Udayana, Denpasar, Bali, Indonesia

[*)] Email Korespondensi : radityapp.suryadhi@gmail.com

ABSTRACT: SPONTANEOUS QUADRICEPS TENDON RUPTURE: A CASE REPORT. *Spontaneous quadriceps tendon rupture is characterized by the tear of fibrous tissue between the patella bone and quadriceps muscle. This condition is an uncommon finding that needs surgical care to prevent permanent deformity and loss of knee function. This report aimed to describe a case of quadriceps tendon rupture and its management. A 38-year-old male with a history of end stage renal disease on regular hemodialysis and hypertension presented with pain and inability to flex his right knee. There was no history of trauma. After MRI examination, the patient was diagnosed with spontaneous right quadriceps tendon rupture. The patient was scheduled for an elective quadriceps tendon repair with Codivilla techniques. After undergoing physical rehabilitation, he was discharged with no significant post-operative complications. At six-month follow-up, the patient was able to return to work. The clinical diagnosis quadriceps tendon rupture is characterized by the classic triad of anterior knee pain, the limitation in knee extension, and a palpable suprapatellar gap. Patients with spontaneous quadriceps tendon rupture should be assessed for underlying medical comorbidities. Ultrasonography and MRI are required to confirm the diagnosis. Management of complete spontaneous quadriceps tendon rupture is performed with surgical repair. Early surgical repair is needed to avoid retraction and atrophy of the quadriceps muscles. Transverse bone suture is the gold standard for the repair of acute quadriceps tendon rupture, but anchored repair technique has smaller incision and shorter surgical time.*
Keywords: *Spontaneous Rupture, Quadriceps Tendon, Case Report*

ABSTRAK : RUPTUR TENDON QUADRICEPS SPONTAN: LAPORAN KASUS. Ruptur tendon paha depan secara spontan ditandai dengan robeknya jaringan fibrosa antara tulang patela dan otot paha depan. Kondisi ini jarang terjadi sehingga memerlukan perawatan bedah untuk mencegah kelainan bentuk permanen dan hilangnya fungsi lutut. Laporan ini bertujuan untuk mendeskripsikan kasus ruptur tendon quadriceps dan penatalaksanaannya. Seorang laki-laki berusia 38 tahun dengan riwayat penyakit ginjal stadium akhir yang menjalani hemodialisis rutin dan hipertensi mengalami nyeri dan ketidakmampuan untuk melenturkan lutut kanannya. Tidak ada riwayat trauma. Setelah pemeriksaan MRI, pasien didiagnosis mengalami ruptur tendon paha depan kanan secara spontan. Pasien dijadwalkan untuk perbaikan tendon paha depan elektif dengan teknik Codivilla. Setelah menjalani rehabilitasi fisik, ia dipulangkan tanpa komplikasi pasca operasi yang berarti. Setelah enam bulan masa tindak lanjut, pasien dapat kembali bekerja. Diagnosis klinis ruptur tendon paha depan ditandai dengan trias klasik nyeri lutut anterior, keterbatasan ekstensi lutut, dan teraba celah suprapatellar. Pasien dengan ruptur tendon paha depan spontan harus dinilai untuk mengetahui penyakit penyerta medis yang mendasarinya. Ultrasonografi dan MRI diperlukan untuk memastikan diagnosis. Penatalaksanaan ruptur tendon paha depan spontan lengkap dilakukan

dengan perbaikan bedah. Perbaikan bedah dini diperlukan untuk menghindari retraksi dan atrofi otot paha depan. Jahitan tulang transversal adalah standar emas untuk perbaikan ruptur tendon paha depan akut, namun teknik perbaikan berlabuh memiliki sayatan yang lebih kecil dan waktu pembedahan yang lebih singkat.
Kata Kunci: Ruptur Spontan, Tendon Paha Depan, Laporan Kasus

INTRODUCTION

Spontaneous quadriceps tendon rupture is characterized by the tear of fibrous tissue between the patella bone and quadriceps muscle. This condition is an uncommon finding that needs surgical care to prevent permanent deformity and loss of knee function. The reported incidence of spontaneous quadriceps tendon rupture is 1.37 per population annually and mostly occurs in individuals aged 50 years old or above (Agu, 2017). The case of spontaneous quadriceps tendon rupture in young individual is uncommon. This injury is typically related to a chronic medical condition such as diabetes mellitus, hyperparathyroidism, vitamin D deficiency, renal disease, autoimmune, or rheumatologic diseases. The rupture of the quadriceps tendon may result in aberrant knee extension and gait abnormality. Timely diagnosis is needed for suitable care and the best possible clinical results (Zhang et al., 2020). This report aimed to describe a case of quadriceps tendon rupture and its management.

CASE REPORT

A 38-year-old Asian male with a history of end stage renal disease on regular hemodialysis and hypertension presented with pain and inability to flex his right knee. The pain visual analogue scale (VAS) was eight out of ten. There was no history of trauma. The vital signs of the patient were stable. Physical examination of the right knee revealed no swelling or deformity. The right knee's range of motion (ROM) was limited in both flexion and extension due to pain. The popliteal pulse and dorsalis pedis pulses were intact. There was a visible gap in the quadriceps tendon about 4-5 cm above the patella. Radiographic images of the left leg were taken, demonstrating inferior patella displacement with low-riding patella or patellar baja. Patient get further examination with MRI and get a region of disruption in the continuity of the hypointense tendon, which is filled with hemorrhage and edema and appears as a hyperintense signal intensity in T2. A diagnosis of spontaneous quadriceps tendon rupture was made. The patient was scheduled for an elective quadriceps tendon repair using Codivilla Techniques (Figure 1). After undergoing physical rehabilitation for one week, he was discharged with no significant post-operative complications. At six-month follow-up, the patient was able to return to work.

Figure 1. Incision Marking

Figure 2. Dissection

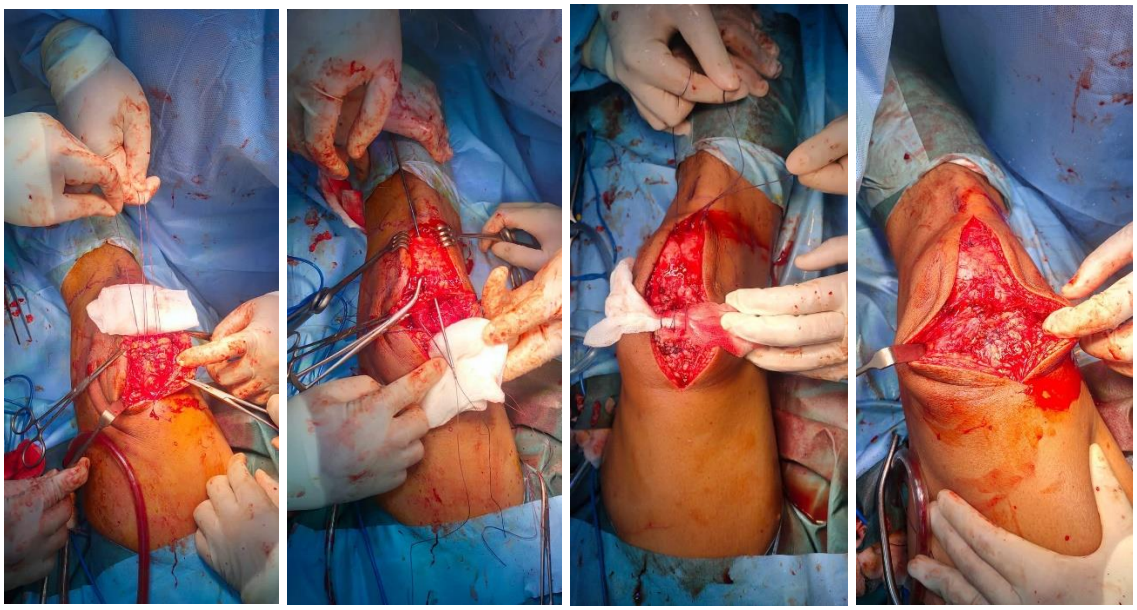

Figure 3. Tendon repair with Codivilla Techniques

DISCUSSION

The quadriceps tendon connects patella bone and quadriceps muscle, which is a group of four muscles in the front of the thigh. Quadriceps muscle consist of the rectus femoris, vastus lateralis, vastus medialis, and vastus intermedius. The quadriceps tendon is essential for knee extensor mechanism. Normally, the quadriceps tendon can bear high stress without causing major structural or biomechanical change. However, 1-2 cm above the patella is a zone that is often hypovascular, making it more vulnerable to damage (Nori, 2018).

Spontaneous quadriceps tendon rupture is a rare injury with an estimated

incidence of 1.37 per 100,000 people. This condition mostly occurs in individuals aged 50 years old and in male, with a ratio of 4.2:1. In younger individuals, quadriceps tendon rupture typically occurs due to a high-energy trauma, while spontaneous quadriceps tendon rupture is typically associated with chronic medical condition. Most spontaneous quadriceps tendon ruptures occur unilaterally, but bilateral cases also have been reported (Agu, 2017; Loose et al., 2023).

The risk factors for spontan-eous quadriceps tendon rupture are advanced age, chronic microtrauma (tendinopathy), systemic diseases including diabetes mellitus, chronic renal failure, gout, hyper-parathyroidism, pseudogout, auto-immune diseases such as systemic lupus erythematosus (SLE) and rheumatoid arthritis, severe vitamin D deficiency, and medication side effects (long term steroid use, fluoroquinolones) (Hartono et al., 2021; Vemuri et al., 2018; Wu et al., 2019; Zhang et al., 2020). In this patient, the risk factor is chronic kidney disease (CKD) on regular hemodialysis. Patient CKD may have impairment in the activation of vitamin D in the kidneys, leads to hypocalcemia and hyperphosphat-emia, which resulting in a compensatory increase in parathyroid hormone production and causing secondary hyperparathyroidism. Hyperparathyroidism was correlated with weaker bones and tendon that can be the cause of spontaneous tendon rupture (Gao et al., 2017; Habas et al., 2021; Vemuri et al., 2018; Wu et al., 2019).

The diagnosis of spontaneous quadriceps tendon rupture is made based on history, clinical examination, and imaging. The main clinical manifestations of quadriceps tendon rupture are knee pain, the limitation of knee extension, and a palpable suprapatellar gap—also referred to as the sulcus sign or gap test. Diffuse swelling around the knee, the absence of patellar reflexes, and a mobile, free-floating patella are other physical indicators but not specific to quadriceps tendon rupture. Physical examination also may be limited by both discomfort and edema. As spontaneous quadriceps tendon rupture is usually related to a chronic medical condition, several laboratory tests are recommended to determine the underlying diseases. The measurements of serum electrolytes, blood urea nitrogen, creatinine, blood glucose, thyroid function, uric acid, alkaline phosphatase, calcium, phosphorus, and antinuclear antibodies can be performed (Agu, 2017; Alkhatatba et al., 2023; Hartono et al., 2021; Onuoha et al., 2020; Zhang et al., 2020).

The imaging of spontaneous quadriceps tendon rupture can be performed by plain radiography, ultrasonography, or magnetic resonance imaging (MRI). Common but nonspecific radiographic findings include the obliteration of the quadriceps shadow, a suprapatellar soft tissue mass from the retracted tendon, and an osseous avulsion fragment from the proximal pole of the patella. A low-riding patella, also known as a patellar baja (Insall-Salvati score is less than 0.8) is another indicator of quadriceps tendon rupture. However, radiograph alone is insufficient to provide an accurate diagnosis. Ultrasonography can provide a better description of tendon rupture than radiography. The drawbacks of USG are operator-dependent and difficult to evaluate suprapatellar defect in the condition of hemorrhage, obesity, and scar tissue. If available, MRI is the best imaging that can determine the rupture's position, site, concurrent osteotendinous damage, and preoperative planning. On MRI T2-weighted sequences, the ruptured tendon will appear as a hypointense signal that is filled with hyperintense signal from hemorrhage and edema (Agu, 2017; Alkhatatba et al., 2023; Allata et al., 2023; Hartono et al., 2021; Onuoha et al., 2020; Zhang et al., 2020).

Partially ruptured tendon injuries with intact extensor mechanisms can be managed conservatively, by an excavation of the hemarthrosis followed by rest, ice, compression, elevation and analgesic, followed by an immobilizer and physical therapy. If the conservative measure fails, a surgical repair need to

be performed. Complete ruptures are treated surgically. The principle of surgery is suturing the tendon to the patella. The timing of the surgical repair has been attributed to optimal outcomes rather than a particular surgical approach. Surgical repair is optimal within the first 48 to 72 hours to avoid retraction and atrophy of the quadriceps muscles (Agu, 2017; Alkhatatba et al., 2023; Allata et al., 2023; Hartono et al., 2021; Onuoha et al., 2020; Zhang et al., 2020).

Transverse bone suture is still considered the gold standard for the repair of acute quadriceps tendon rupture. Anchored repair technique has gained popularity recently, due to smaller incision and shorter surgical time. Drilling holes is not necessary in suture anchors. End-to-end direct sutures were used for mid-substance tears. Patellar drill holes were often employed for rupture around or at the level of the tendinous-osseous junction (Rocha de Faria et al., 2019).

Codivilla technique or V-Y plasty is recommended for chronic tears in which the tendon margins cannot be forced apart. In Codivilla technique, we make a full thickness inverted V flap that end 1.5 cm above the rupture. Heavy sutures are used to repair the tendon margins. The proximal portion of the inverted V is closed down (coverting it to a verticle line) (Paez and Rebolledo, 2020).

After surgery, rehabilitation is mandatory for optimal clinical outcomes. Rehabilitation consists of the combination of physical therapy and progressive weight-bearing exercises. Former protocols recommend at least six weeks of limited flexion or weight bearing. Recently, it has been discovered that initiating passive motion early may enhance the healing process. More rigorous protocols have been reported, which permitted early active knee flexion up to 55° a few days after surgery and allowed full weight bearing in a brace locked in extension for six weeks. The protocol allowed passive and active knee flexion with a hinge knee brace. The brace was set to 30° for 2 weeks, then increased to 60° for weeks 2–4, and then to 90° for weeks 4–6 postoperatively, with immediate full weight bearing. Those protocols were proven to be as safe as the more restricted procedures but with enhanced recovery (Alkhatatba et al., 2023).

CONCLUSION

Spontaneous quadriceps tendon rupture is a rare injury that is typically accompanied by a chronic medical condition and occurs in elderly. The clinical diagnosis quadriceps tendon rupture is characterized by the classic triad of anterior knee pain, the limitation in knee extension, and a palpable suprapatellar gap. Patients with spontaneous quadriceps tendon rupture should be assessed for underlying medical comorbidities. Ultrasonography and MRI are required to confirm the diagnosis. Management of complete spontaneous quadriceps tendon rupture is performed with surgical repair. Transverse bone suture is the gold standard for the repair of acute quadriceps tendon rupture, but anchored repair technique has smaller incision and shorter surgical time.

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