27 Patellar Tendinitis at Osgood–Schlatter's Lesion of a 32 Year Old

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27.1 Case Vignette

The patient is a 32-year-old male nephrologist with an active lifestyle. He had a history of Osgood–Schlatter's disease as an adolescent. Symptoms gradually improved into his late teenage years but have worsened over the past decade. He reports persistent pain and prominence over the tibial tubercle ossicle. The patient has difficulty with kneeling, running, and some daily life activities. Pain ranges from 0 to 6 out of 10. He rates his knee 60% of normal. He has tried prolonged activity modification, exercise programs, medical management, and supportive wear about the knee.

On physical exam, the patient has bilateral varus alignment and a non-antalgic gait. He is able to double and single limb squat with good symmetry but with pain over the distal patella tendon in deep flexion. Seated evaluation demonstrates focal tenderness and prominence over the tibial tubercle ossicle. There was no tenderness over the proximal patella tendon or fat pad. There was a normal Q-angle and no J-sign. Supine evaluation demonstrated no effusion, full range of motion, no apprehension or guarding with patella deviation, normal patella tilt, and stable ligaments. Pre-operative radiographs (Fig. 27.1) demonstrate large, fragmented, and prominent tibial tubercle ossicle.

Given the failure of extensive conservative management, surgery was indicated. The patient was taken to the operating room under light general anesthesia (LMA). He was positioned supine. Tourniquet was placed but not inflated. Longitudinal incision was made in the midline centered over the tibial tubercle prominence. The paratenon and distal patella tendon were split to expose the fragmented tibial tubercle ossicle. The ossicle was carefully resected along with adjacent abnormal and inflammatory tissue. The tibia posterior proximal to the tendon insertion was smoothed with a manual rasp. The region was copiously irrigated and hemostasis was obtained. Fluoroscopy demonstrated complete resection of the tibial tubercle ossicle (Fig. 27.2). The patella tendon was closed with interrupted vicryl suture with the knee in flexion. The paratenon was closed separately with absorbable suture.

The patient was allowed to weight bear as tolerated with a hinged knee brace locked in extension. Immediate range of motion was initiated. The brace was unlocked and discontinued with

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quadriceps control. Progressive functional rehabilitation protocol was utilized avoiding high impact for 3 months to protect the distal tendon insertion. After several months, the patient normalized daily life activities and was able to perform recreational sport without pain. VAS 0–2/10 and he rated his knee 95% of normal at final follow-up. He was taking no medications for pain or swelling and utilized a knee sleeve as needed for activity.

Fig. 27.1 Large tibial tubercle ossicle from refractory Osgood–Schlatter's disease in a skeletally mature knee

27.2 Background

Osgood–Schlatter disease (OSD), or tibial tuberosity traction apophysitis, is one of the most common causes of anterior knee pain in skeletally immature adolescent athletes, with an estimated prevalence of approximately 10% (11% in boys and 8% in girls) [1]. It usually affects girls between the ages of 8 and 13, and boys between the ages of 10 and 15, corresponding to their rapid phase of skeletal growth [2]. Rapid growth can result in excessive pull of the patellar tendon on the tibial tuberosity apophysis, leading to overload at the tenoperiosteal junction [3]. Shortening of the rectus femoris muscle has been associated as a risk factor [1].

27.3 Evaluation

Patients with OSD commonly complain of insidious onset of a dull ache and swelling over the patellar tendon attachment to the tibial tuberosity. Symptoms often occur in association with activi-

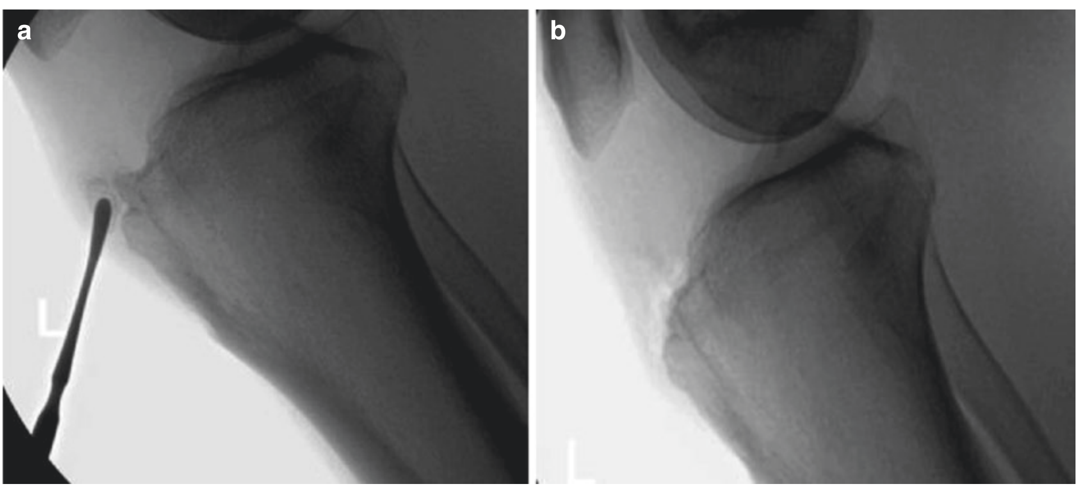

Fig. 27.2 Tibial tubercle ossicle (**a**) before and (**b**) after open surgical excision performed through a distal patella tendon split

ties such as running, jumping, and climbing stairs, and can be exacerbated with knee extension against resistance. Bilateral symptoms can be present in 20–30% of patients although symptom intensity is not often symmetric [4]. On examination, patients exhibit tenderness over the tibial tuberosity, which can have increased prominence.

Radiographs of the affected knee may demonstrate distal tendon thickening, a superficial ossicle at the patellar tendon insertion, and soft tissue swelling anterior to the tibial tuberosity. In chronic cases, tibial tuberosity overgrowth or fragmentation of the tibial tuberosity apophysis can be observed. While advanced imaging is not necessary for diagnosis, ultrasound and MRI can assist with staging and prognosis of clinical course. MRI may also assist in excluding additional diagnoses in the differential such as patellar tendinitis, tumor, and infection.

27.4 Nonsurgical Treatment

OSD typically resolves with skeletal maturity as the tibial tuberosity apophysis closes. Symptomatic management includes the use of non-steroidal anti-inflammatory medication, cryotherapy, infrapatellar padding, and a brief period of immobilization in a brace. Activity modification with rest or participation in non-impact sports, such as cycling and swimming, is recommended. A period of physical therapy with emphasis in hamstring and quadriceps stretching and strengthening can help accelerate return to activities. Some authors advocate the use of analgesic injections, such as dextrose and lidocaine, in those with recalcitrant symptoms [5]. The use of steroid injections has mostly been abandoned given concerns for ensuing patellar tendon atrophy and rupture [6].

27.5 Surgical Treatment

Although the natural history of OSD is that of gradual symptom resolution, up to 10% of patients may continue to experience symptoms into adulthood [7–10]. A comparative study assessing disability levels in college-aged athletes with a history of OSD compared to a healthy cohort demonstrated greater disability levels with sports and activities of daily life in the affected group [11]. Additionally, some studies have reported that in patients reporting no activity limitations, 40% can still experience some discomfort with kneeling [12]. Surgical treatment is indicated in patients with debilitating symptoms not responding to conservative management and in those with persistent symptoms after achieving skeletal maturity. Surgical options include open, arthroscopic, and bursoscopic excision of loose bony fragments and debridement of the tibial tuberosity. Excision of the loose bony fragments and resection of the tibial tuberosity prominence was first described through an open approach [10, 13–16]. The procedure is performed through a longitudinal infrapatellar midline incision to expose the tibial tuberosity. The patellar tendon is identified, and the medial and lateral expansions are released. The tendon is then elevated with care to preserve its distal insertion. Any osseocartilaginous material in the undersurface of the tendon is thoroughly debrided. Occasionally, a longitudinal split in the distal portion of the tendon may be necessary in order to excise intratendinous ossicles. Resection of the tibial tuberosity prominence is accomplished with osteotomes or a saw.

In recent years, minimally invasive arthroscopic debridement techniques have been described [17, 18]. This approach avoids an incision directly over the patellar tendon which can become symptomatic and also allows the surgeon to address possible concomitant intra-articular pathology. Debridement is performed through standard inferomedial and inferolateral parapatellar portals. These portals can be raised slightly if needed for improved visualization of the anterior interval. A motorized shaver and radiofrequency (RF) ablation device are used to perform and anterior interval release with care to preserve the anterior meniscal horns and intermeniscal ligament. With the knee in extension to facilitate visualization, the surgeon works down the anterior tibial slope to debride all bony lesions.

Retrievers are used to remove loose bony fragments, and an arthroscopic burr can be utilized to shell out larger bony fragments.

As an alternative to arthroscopic debridement, excision of bony lesions can be accomplished through a soft tissue tunnel into the bursal space [19]. This can be accomplished with low anterolateral (L-AL) and anteromedial (L-AM) portals created separately after performing standard diagnostic arthroscopy. This technique has the proposed advantage of preserving the infrapatellar fat pad which can be violated during standard arthroscopic debridement. To create the L-AL portal, the soft spot between the lateral border of the patellar tendon and Gerdy's tuberosity is incised and a straight mosquito clamp is used to create a soft tissue tunnel into the bursal space. An arthroscopic sheath with a blunt trocar is introduced and then the trocar exchanged for the arthroscope. The L-AM portal is created either with trans-illumination technique or under direct visualization using a spinal needle. With the knee in extension, a working space is created with resection of the bursal tissue using a motorized shaver. Using a combination of the arthroscopic shaver, RF ablator, burr, curettes, and retrievers, excision of bony fragments and resection of bony lesions are accomplished.

27.6 Post-surgical Rehabilitation

Following open or arthroscopic/bursoscopic surgery, patients are able to resume full weight bearing with assistance of mobility aids as needed. The patient may resume immediate unrestricted passive motion, except in cases in which there is concern for weakening of the patellar tendon insertion on the tibial tuberosity. Post-operative immobilization is not necessary, but a hinged knee brace locked in full extension may be considered for ambulation in cases of quadriceps weakness or to allow the patellar tendon to heal. Quadriceps strengthening exercises can be started immediately and advanced as tolerated. A formal course of physical therapy is not required and is recommended on a case to case basis in those not able to progress with the program. Return to unrestricted activity is expected at 6 weeks for most patients and 12 weeks in those requiring tendon to bone healing.

27.7 Outcomes

Open surgical management of OSD has yielded successful results, with >80% of patients reporting good to excellent results in various short to mid-term studies [10, 13–16, 20, 21]. A long-term study by Pihlamajaki et al. in 178 consecutive military recruits found that 87% of patients reported no restrictions with activities of daily life and 75% were able to return to pre-operative athletic activities at a median duration of follow-up of 10 years [22]. In this study, patients with persistent symptoms longer than 4 years affecting participation in military training or service, and who had radiographic evidence of OSD were treated with open surgical debridement. Despite achieving good functional results after surgery, 62% of patients in the cohort reported at least some discomfort with kneeling, 32% reported at least some discomfort with squatting, and 16% reported moderate to severe pain with activities. The rates of post-operative tenderness with kneeling were superior in this cohort to those reported with conservative treatment of OSD in prior studies [12]. Additionally, one third of patients were found to have persistent or new radiographic ossicles at final follow-up. Yet, the presence of these ossicles was not correlated with post-operative symptoms. Re-operation rate was low, with only 1% of patient requiring additional procedures for persistent symptoms.

Persistent pain with kneeling has been associated with the surgical scar resulting from an open approach. Alternative incisions, including a vertical anterolateral and a transverse incision 1 cm proximal to the tibial tuberosity, have been proposed in order to avoid this issue [20, 22]. Yet, although these alternative open approaches have been reported to be safe and successful, it remains unclear whether they are effective in avoiding peri-incisional scarring and tenderness.

Arthroscopic debridement techniques have been proposed to address some of the described limitations of the open approach and also to offer a better cosmetic appearance [17, 18, 23]. A study by Circi and Beyzadeoglu reported satisfactory functional outcomes and pain relief in 11 skeletally mature athletes at a mean of 66 months post-operatively after arthroscopic debridement for unresolved OSD. All patients were able to return to the same pre-operative level of athletic competition. The study reported no post-operative complications or re-operations. The arthroscopic technique has the additional advantage of allowing the surgeon to address concomitant intra-articular pathology, such as an intra-articular ossicle associated with OSD [24]. Despite these promising results, larger long-term studies and comparative outcome studies are needed in order to assess the proposed advantages of the arthroscopic technique over open surgical debridement.

More recently, the direct bursoscopic technique has been described as an alternative to standard arthroscopy in order to address the technical challenges of performing a thorough debridement while avoiding injury to critical intra-articular structures. During the anterior interval release necessary with standard arthroscopic portals, the anterior horn of the menisci and the intermeniscal ligament can be damaged. Additionally, resection of the infrapatellar fat pad could lead to scarring and post-operative discomfort. A study by Eun et al. reported satisfactory outcomes in a cohort of 18 military recruits treated with bursoscopic ossicle excision at a mean follow-up of 45 months [19]. However, 21% of the patients were unable to return to their duty and 21% had persistent difficulties with kneeling after surgery. One third of the patients reported persistent tibial tuberosity prominence. There were no re-operations reported. A proposed limitation of the bursoscopic approach is its limited working space and visualization which could result in incomplete debulking of the tibial tuberosity prominence as evidenced in this study. Although this technique was found to be safe and effective, there is paucity of data on its long-term outcomes and proposed superiority over other techniques.

27.8 Complications

The overall complication rate after surgical debridement has been reported to be as high as 5% [22]. Reported complications include infection, hematoma, and deep venous thrombosis (DVT). Some authors have also reported persistent post-operative scar tenderness after 3 months in 10% of patients treated with open debridement using a midline incision [16]. In the skeletally immature, care should be taken to avoid injury to the tibial tuberosity apophysis which could result in early closure. Tibial tuberosity internal fixation, bone grafting, or drilling of the apophysis is not recommended in skeletally immature patients given concerns for premature fusion of the anterior proximal tibial physis, which could result in genu recurvatum [25, 26]. Moreover, comparative studies have found these techniques to produce inferior results compared to standard open or arthroscopic debridement [13, 16].

27.9 Conclusion

OSD is a common cause of anterior knee pain in the growing adolescent athlete. Most patients responding well to conservative management and have resolution of symptoms after physeal closure. In patients in whom conservative management fails or symptoms persist or recur in adulthood, surgical resection can be considered. Arthroscopic and bursoscopic debridement techniques have been proposed as safe and effective alternatives to open debridement in order to minimize the risk of post-operative scarring and peri-incisional tenderness with kneeling. Future studies are needed to further refine the indications and techniques for surgical management and to identify factors prognostic of successful outcomes.

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