Case Report

Iliotibial band reconstruction with allograft fasciae latae tissue: Imaging aspects of a novel surgical technique

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Abstract

We describe a unique case of 43-year-old male who presented with a persistent lateral knee pain caused by impingement between a femoral surgical screw and the iliotibial band, which was treated with surgical resection of the screw debris. The patient had recurrence of the symptoms and a magnetic resonance showed a wide and unrepairable tear of the iliotibial band, which was treated with interposition of a folded fasciae latae allograft. After the procedure, the patient had excellent clinical results and imaging evaluation showed progressive allograft integration. This case highlights the imaging findings and surgical aspects of an iliotibial band reconstruction, a novel surgical procedure that could be considered in patients with an unrepairable iliotibial band injury.

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Background

Anterior cruciate ligament (ACL) injuries affect more than 200,000 people in the United States every year [1] and ACL reconstruction is among the most performed orthopedic procedures worldwide, being on the rise in both adults and adolescents [2–4]. Despite the excellent results of arthroscopic ACL reconstructions, complications do occur and include infection, arthrofibrosis and graft related complications as device fracture, impingement, and failure [5,6].

There is a wide range of graft fixation devices, including metallic and bio-absorbable materials. When mispositioned, the devices may damage the hyaline cartilage or adjacent fascia and tendons [6]. Tibial cysts related to the tibial screw are more commonly reported in literature than femoral ones. However, femoral cysts might also occur when the femoral fixation is performed with an interference screw from outside in
and those cysts may damage adjacent soft tissue structures [7].

The iliotibial band (ITB) corresponds to the distal fascial continuation of the tensor fasciae latae muscle and contributes to the anterolateral stability of the knee, functioning as a knee extensor or flexor depending on the degree of knee flexion [8-10]. There are a significant number of cases on literature reporting mechanical complications of the ITB following ACL and other ligament reconstructions, particularly caused by femoral fixation devices [11-13]. Lateral impingement with ITB friction may be more frequently seen when the femoral tunnel exit is positioned near the lateral femoral epicondyle. Prominent screws or its debris may cause symptomatic ITB impingement and induce cystic formation and bursitis, that may lead to chronic wear and tendon degeneration.

Although there are numerous surgical uses for ITB as autograft or allograft reported in literature, there are few studies approaching its surgical repair [14], all of them based on primary repair and suture [15-19]. We report the surgical and imaging aspects of a unique case of an ITB reconstruction using an allograft fascia tissue in a patient who had an ITB discontinuity due to complications related to a femoral screw after an ACL reconstruction. To our knowledge this is the first case report that addresses an allograft reconstruction of the ITB.

**Case presentation**

A 43-year-old male presented with a persistent lateral right knee pain for 4 months. He had a past history of right ACL reconstruction 18 months before. The patient denied any trauma or significant physical activity. Physical examination demonstrated a small lateral mass adjacent to the ACL femoral fixation scar, with no signs of infection.

A magnetic resonance (MR) was performed and demonstrated bursal liquid distension and a cystic image along the lateral femoral condyle, next to the femoral screw path associated with small foci of screw debris (Fig. 1). There was mild thickening and signal changes in the adjacent ITB.

The patient was elected for surgical management aiming to remove the screw debris and the lateral cystic formation. The procedure was made using a lateral incision, dissection and opening of the iliotibial tract, allowing identification and resection of the cyst along with the numerous screw debris. Curettage of the femoral tunnel was also performed and primary suture of ITB was done. After surgery patient was allowed to bear weight as tolerated and range of motion was not restricted since the first post-operative day.

Two months later, the patient presented with right knee lateral pain and swelling. No related trauma was reported. Ultrasound and MR images were requested and showed a wide discontinuity of the distal segment of the ITB with an interposed heterogeneous fluid collection that extended to the subcutaneous and deep planes (Fig. 2). At that time, as there was no trauma that could lead to the lesion, the hypothesis of non-healing of the ITB was done.

Due to persistent pain, the large volume of lateral fluid accumulation and the non-probability of spontaneous healing of the ITB, patient was referred to surgery again and during the procedure a longitudinal injury of the ITB was identified with very degenerated and friable edges, devitalized tissue and fluid accumulation below it. Cystic resection, bursectomy, and synovectomy were performed. Debridement of devitalized edges of the ITB was performed. Initially, primary repair of the ITB was attempted, but couldn’t be completed due to a degenerated and friable tissue. To cover the ITB failure, a folded fasciae latae allograft tissue was used (Fig. 3).

Patient was advised to use a knee brace for 6 weeks in order to avoid flexion-extension movements that could lead to overload of the ITB repair. The patient tolerated the procedure well without any complications and reported resolution of knee pain at his postoperative follow-up. MR control after 3 months showed the ITB repair with a graft interposition and complete closure of the previously characterized discontinuity area (Fig. 4A and B).

Subsequent postoperative MR controls were requested at 6 and 18 months (Fig. 4C-F), showing progressive graft integra-

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**Fig. 1** - Knee MR (A, coronal T1-weighted; B, coronal; and C, axial T2-weighted fat-saturated) demonstrates screw path in the lateral femoral condyle, with small debris (long arrows) and adjacent cystic formation/bursitis (arrowheads) involving the ITB, that is mildly thickened, without discontinuities.
Fig. 2 – Knee MR (A, coronal T1-weighted; B, coronal; and C, axial T2-weighted fat-saturated images) and sonography (D, long axis) demonstrates wide area of discontinuity of the distal segment of the ITB, with thickened, degenerated and irregular margins (arrows in C), associated to a heterogeneous fluid collection that extends through tendinous gap to the subcutaneous.

Fig. 3 – Intraoperative images are provided. (A) A longitudinal extension injury of the ITB was identified with very degenerated edges (B) Fasciae latae allograft tissue was used for defect coverage placement of double fascia with high resistance fixation points. After fixation, good fixation of the fasciae latae and complete coverage of the ITB defect were observed.
tion and a complete closure of the tendon defect, presenting a homogeneous low signal tissue, as well as regularization of the degenerated tendon margins and resolution of the fluid accumulation. Timeline of the events (Fig. 5).

**Discussion and conclusion**

This case showed a unique case of a ITB reconstruction using a fasciae latae tendon allograft, focusing on the surgical aspects and on the imaging findings that provided evidence of progressive allograft incorporation. To our knowledge, this is the first case report that addresses an allograft reconstruction of the ITB.

Graft fixation in ACL reconstruction must be strong enough to allow an aggressive postoperative rehabilitation, early return to function, and optimize the patient’s recovery. Anchoring the reconstructed graft to the bone may be achieved by different devices such as screws, buttons, cross pins and screw posts or a combination of these on the femoral side [20]. Bioabsorbable and metallic screws are both frequently used for femoral or tibial fixation in ALC reconstructions and a recent meta-analysis showed that although there is no difference between them in terms of subjective knee function or knee laxity, bioabsorbable screws may show more complications [21].

Bioabsorbable materials are prone to complications as device fracture and fragmentation years following placement. A fractured or fragmented bioabsorbable screw can result in synovitis, effusion, cyst and granuloma formation, which can cause injuries to adjacent soft tissues. Several cases reports have been published on literature describing fragments of bioabsorbable screws that had migrated to intra-articular space causing damage to hyaline cartilage in late follow up controls [6,22].

ITB injury following ACL and other ligament reconstructions has been described in the literature, being mainly caused by femoral graft devices [11,12,23]. Helito et al. described 6 cases of ITB friction caused by loosening of the femoral fixation material following posterolateral corner reconstructions, demanding additional corrective surgical procedures [12]. Pelfort also reported 2 cases of ITB injury after ACL repair,
caused by incorrect positioning and rupture of the femoral cross-pin fixation [11]. We described a case in which femoral screws debris caused impingement with cystic degeneration and bursitis adjacent to the ITB. The access route for the screw removal demanded an incision in the ITB, which then showed to be too degenerated to allow the usual primary repair. We hypothesize that the ITB screw debris and cystic degeneration contributed to the ITB wasting and degeneration, avoiding appropriate healing.

Macroscopic signs of ITB wear may be seen as a friable, thinned and irregular tissue, that in histological examination usually exhibits an intense chronic inflammatory cells infiltration, with hyperplastic synovial lining [17]. ITB injuries are usually a result of a knee friction syndrome and are treated conservatively with rest and non-steroidal anti-inflammatory drugs to reduce inflammation and potentially allow the bursa to heal [24].

Surgical treatment for ITB syndrome is rarely needed and is reserved for cases of unsuccessful conservative treatment, with persistent pain. Many different surgical techniques have been described [16–19, 25, 26]. Z-plasty lengthening of the ITB was first described by Richards et al. [19] and also used Barber et al. [26] with good results, consisting in a lengthening of the ITB through transverse and longitudinal incisions, followed by a ITB suture. Droget reported excellent satisfaction levels and function gain after performing transection of the posterior half of the ITB at the level of the lateral epicondyly, with or without an associated bursectomy [18]. Similarly, Noble reported good results of a posterior release of ITB fibers at the level of the lateral femoral epicondyle [16]. Sangkaew described a technique based on tension-release of the ITB through multiple incisions made across the tendon fibers, with punctured wounds (mesh appearance) [25].

In our case, the ITB was transfixed in its distal segment and the fibers’ wear and degeneration did not enable a primary su- ture. A fasciae latae allograft tissue was used to cover the ITB defect. Tendon allografts have an important role in tendon reconstruction in a number of anatomical sites, being able to overcome the obstacles of poor tissue quality and availability of autologous tissue besides avoiding the donor site morbidity associated with autologous grafts [27, 28]. They have become increasingly popular for a variety of tendon repairs, especially when there is a deficient, scarred, and retracted tendon, preventing a primary repair [29–31]. Besides, allografts provide a sufficiently long tendon length that allows various methods of fixation and suture [32].

The biology of tendon grafts incorporation, whether autogenous or allogenic, is based in a similar process that includes 3 main phases: an inflammatory stage, a reparative stage with collagen production and, finally, a remodeling or maturation stage. The graft undergoes necrosis, revascularization, cell repopulation and remodeling [33, 34]. MR imaging evaluation of the tendon graft reflects the phases of graft integration and provides important information regarding general morphology, tendon structure, integration and grade of vascularity. Based on papers regarding Achilles tendon integration following graft repair, it is known that there is initially thinning and a high signal intensity area on fluid sensitive sequences along the tendon graft, representing active scar tissue, that seems to correlate with the healing response, usually decreasing after 6 months. After that, the tendon graft slowly demonstrates integration signs with a homogeneous low signal intensity on proton-density (PD) and T2-weighted image [35]. Gadolinium-based contrast agent injection initially shows intratendineous signal enhancement, corresponding to revascularization and healing progress that persists until avascular scar formation occur, usually decreasing over time and not being encountered after the 2-year MR follow-up [30, 32, 36–38].

We reported an ITB reconstruction using a fasciae latae tendon allograft following ITB chronic wear caused by screw debris of a previous ALC reconstruction. Post-surgery MR showed complete allograft integration and patient reported
completed improvement of clinical complaints. We suggest this technic should be considered in the specific group of patients who present ITB injury with an excessive degenerated tissue condition that forbids a primary tendon suture. The imaging aspects of the allograft integration are shown and liquid reabsorption and a progressive homogeneous low signal along the tendon graft is expected.

Patient consent

A signed consent for the report publication was acquired from the patient.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi: 10.1016/j.radcr.2022.11.003.

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