Inverted Cyclops Lesion without Extension Block

A Case Report and Literature Review

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Abstract

Cyclops lesion was previously described as a fibrous lesion with a granulation tissue core originating from the tibial insertion of the anterior cruciate ligament (ACL) graft.[1] Recently, two case reports described inverted cyclops lesions, which originated from the femoral aspect of the ACL.[2,3] Both cyclops and inverted cyclops lesions are usually associated with a block to knee extension. Here we present a case of an 18-year-old female who developed a painful inverted cyclops lesion originating from the femoral notch above hamstring autograft without restriction to knee range of motion 20 months after arthroscopically assisted ACL reconstruction. The case is followed by literature review on presentation, diagnosis, and treatment of cyclops and inverted cyclops lesions.

A fibrous lesion at the base of the ACL graft, impinging in full extension on the femoral notch, was first described by Jackson and Shaefer in 1990.[1] The investigators coined the term cyclops lesion as the lesion reminded them of an eye of a cyclops on arthroscopic examination. They described a cohort of 13 patients who underwent ACL reconstruction and later presented with extension block that on arthroscopic evaluation was found to be due to the cyclops lesion.

Multiple reports of cyclops lesions followed describing various clinical situations and new theories of cyclops lesion's origin.

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Recently a study by Rubin and coworkers described a similar fibrous lesion but at the femoral insertion site of the bone patellar tendon bone ACL autograft.[3] The investigators coined the term "inverted" cyclops lesion. Another study from UK by Kambhampati and Ware described an inverted cyclops lesion following hamstring autograft ACL reconstruction just this year.[2] Both of the patients presented with block to knee extension.

We describe here an inverted cyclops lesion in an 18-year-old female 2 years following hamstring autograft ACL reconstruction without a block to knee extension. The case is followed by a comprehensive review of the literature on presentation, diagnosis, and treatment of cyclops and inverted cyclops lesions.

Case Report

An 18-years-old, active female sustained a left knee ACL tear due to twisting knee injury while skiing 2 years prior to this presentation. She underwent arthroscopically assisted ACL reconstruction using semitendinosus and gracillis autograft within 2 weeks of her injury.

The patient had uneventful immediate postoperative recovery. She began physical therapy 2 months postoperatively and had no major issues except for noticing that exercises involving terminal extension of the knee were particularly painful to her. Six to 7 months after reconstruction, she was able to return to her regular activities, including skiing without any restrictions. At this point, she had a normal knee exam with no effusion, negative Lachman test, negative anterior and posterior drawer tests, and she was stable to varus and valgus stresses. Her pivot shift test was negative.

Three weeks prior to presentation patient danced for 4 to 5 hours and did not notice any problems with her knee. Next morning, she woke up with knee pain and effusion, and she sent a picture of her knees to our office (Fig. 1). She was not able to ambulate without severe pain. When

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Figure 1 Clinical photograph sent to our office by the patient demonstrating left knee swelling following a night of dancing.

she was finally seen in the office, her effusion had resolved but she still had difficulty ambulating. She had pain at full extension, but there was no extension block and no clunking or rubbery feel to the end of range of motion. McMurry test was negative. She had Lachman equal to the contralateral knee. There was a firm end point to the Lachman test. There was no anterior or posterior drawer, she was stable to varus and valgus stresses, and her pivot shift test was negative.

MRI demonstrated a fibrous lesion arising from the femoral portion of the ACL graft, impinging on femoral notch (Fig. 2). Following a discussion with the patient, she was offered arthroscopic debridement of the cyclops lesion.

Intraoperatively, patient was found to have patellofemoral compartment without pathology. There was a grade 1 chondral lesion on the medal femoral condyle. Both condyles were otherwise normal. Both menisci had no tears. There was a large soft tissue mass emanating from the superior part of the notch consistent with inverted cyclops lesion (Fig. 3). There was a small imprint on anterior aspect of the lesion corresponding to the area where the lesion was impinging on the femoral condyle in full extension. A small piece of bone was found within the mass during debridement. The mass was not sent for pathology. The ACL graft itself was noted to be in excellent condition and proper tension. PCL was normal. Articular surface of the tibia was without any lesions. Following debridement, patient had excellent recovery with resolution of symptoms within first few weeks post op. At this time, over a year from lesion debridement, this patient is symptom free, and she has return to all her regular activities, including skiing and dancing with no restrictions or complaints.

Discussion

In 1990, Jackson and Shaefer first coined the term cyclops lesion based on the similarity of the fibrous lesions they found in ACL reconstructed knees to the eye of the cyclops. The investigators postulated that these lesions originated from "flap of tissue and/or cartilage overhang anterior and lateral to the tibial drill hole. Some of the drilling debris of the subchondral bone and articular surface may remain attached…and may present attached to the graft on the tibial surface." They reported in their study that this complication can be minimized by properly debriding anterior and lateral tibial tunnel and described that following these recommendations lowered the incidence of cyclops lesions from initial 5% to 1%. The lesion they observed was invariably associated with loss of extension, and arthroscopy was curative in seven patients, while six required additional procedures. The time between ACL reconstruction and development of the lesion was on average 8 to 36 weeks. Patients in this study

Figure 2 T2-weighted MRI image of the left knee showing a fibrous lesion arising from the femoral notch portion of the patent ACL graft. Intraarticular effusion is also present.

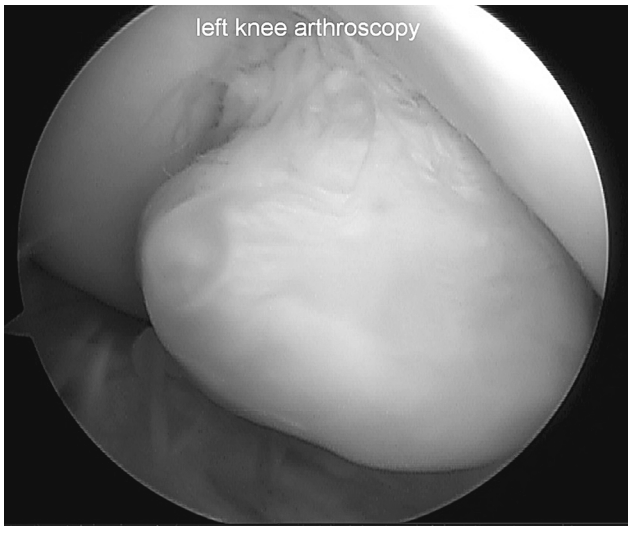

Figure 3 Intraoperative arthroscopic image of the inverted cyclops lesion arising from the femoral intercondylar notch portion of the ACL graft.

underwent arthroscopic debridement of the lesion, and all grafts were found intact following debridement.[1]

Multiple reports followed throughout the years and added further details to the clinical picture of cyclops lesions.

In 1995, Watanabe and associates suggested that cyclops lesions arise from injury to the graft caused by either intraoperative manipulation or improper placement of the tunnels causing impingement.[4]

Delince and colleagues suggested that the nodules arise from either the drilling debris, remnant of the ACL stump, or from broken graft fibers often caused by impinging on the graft secondary to malpositioning of the tunnels. They suggested using drills of increasing diameters to minimize large debris fragments, meticulous attention to tunnel positioning, and enlargement of the notch when future impingement is predicted or found on second look arthroscopy.[5]

Two studies presented a large series of patients who underwent second look arthroscopy for removal of graft fixation devices.[6,7] They noticed that only small percentage of these patients with cyclops lesions found on second look arthroscopy were symptomatic.

Two other reports described cases of cyclops lesions presenting outside the typical first 2 years after the ACL reconstruction; these reports demonstrate the need for vigilance in suspecting this syndrome and prompt evaluation even 4 years after the ACL reconstruction.[8,9]

Two reports presented fibrous lesions following ACL raptures,[10,11] and another described an interesting series of patients with partial ACL tears who developed fibrous nodules overlying the remnants of their ACLs.[12] These reports add strength to the hypothesis that the lesion may arise from a damaged portion of ACL graft.

MRI is a golden standard for diagnosis of cyclops lesions. Most of the investigators who over the years discussed fibrous lesions recommended MRI evaluation of the affected knee. MRI can assess tunnel positioning and sometimes diagnose impingement as grafts that are impinging on the bone often have increased signal intensity. Meniscal lesions can also be assessed, ruling out meniscal etiology as a source of pain.[13] Olson and coworkers and Recht and associates described typical appearance of the cyclops lesion on MRI in a single patient. They provided a classical description of "a mass of mixed signal in a region of tibial spines. The ACL graft is bowed posteriorly and has some apparent lengthening."[14]

The sensitivity, specificity, and accuracy of MRI in detecting cyclops lesions was found to be 85%, 84.6%, and 84.8%, respectively.[15]

Inverted Cyclops Lesions

Only very recently, a study by Rubin and colleagues described a fibrous lesion at the femoral insertion site of the bone patellar tendon bone ACL autograft.[3] The investigators coined the term "inverted" cyclops lesion to separate it from a classic cyclops lesion arising from the tibia. In their case, a manual laborer with ACL reconstruction presented with gradual loss of extension during 3 months of physical therapy. Similarly to a traditional cyclops lesion, this fibrous nodule was resected providing the patient with almost immediate relief of symptoms. Another study from UK by Kambhampati and Ware described an inverted cyclops lesion following hamstring autograft ACL reconstruction.[2] This patient also presented with a block to knee extension and knee pain, both of which were relieved by debridement.

The case of the 18-year-old female in this study is different in that it presented without a block to knee extension. It is possible that it was caught before the lesion became large enough or hard enough to cause block to extension since it was found due to acute onset of pain after vigorous activity.

Conclusions

Cyclops and inverted cyclops lesions are serious complications of ACL reconstruction. Those that are symptomatic cause enough morbidity that they require repeated arthroscopy for debridement, which in most cases is curative. The etiology of these lesions is attributed to the remnants of the drilling debris taken out from the tibial tunnel by the progression of the graft or the remnants of the ACL stump or to impingement-injured ACL graft itself. The prevention of this phenomenon as first delineated by Jackson and expanded by others includes attention to tunnel positioning and notchplasty to avoid impingement, debridement of the tibial tunnel before the graft is advanced, and removal of osteocartilagenous fragments.

While it became a standard of practice to pay close attention to debridement of the tibial tunnel, it is now clear that equal attention to the femoral tunnel and the notch is warranted by the recent series of articles describing lesions arising from the femoral insertion of the ACL. Our patient likely developed her lesion before her symptoms occurred—asymptomatic cyclops lesions have been described in literature in the past.[6,7] She became symptomatic, possibly due to a prolonged and strenuous physical activity, which coincided with her lesion reaching the size big enough to cause mechanical symptoms. There is precedence in literature for operative treatment of symptomatic cyclops lesions. Since it is a mechanical disease process unlikely to resolve on its own, in presence of symptoms, such as pain or mechanical block to motion, conservative treatment is not recommended and rarely preferred by the patients.

Disclosure Statement

None of the authors have a financial or proprietary interest in the subject matter or materials discussed, including, but not limited to, employment, consultancies, stock ownership, honoraria, and paid expert testimony.

References

1. Jackson DW, Schaefer RK. Cyclops syndrome: loss of extension following intra-articular anterior cruciate ligament reconstruction. Arthroscopy. 1990;6(3):171-8.

2. Kambhampati S, Ware H. Inverted cyclops lesion after anterior cruciate ligament reconstruction. Ann R Coll Surg Engl. 2012 Mar;94(2):e99-100.
3. Rubin LE, Yeh PC, Medvecky MJ. Extension loss secondary to femoral-sided inverted cyclops lesion after anterior cruciate ligament reconstruction. J Knee Surg. 2009 Oct;22(4):360-3.
4. Watanabe BM, Howell SM. Arthroscopic findings associated with roof impingement of an anterior cruciate ligament graft. Am J Sports Med. 1995 Sep-Oct;23(5):616-25.
5. Delince P, Krallis P, Descamps PY, et al. Different aspects of the cyclops lesion following anterior cruciate ligament reconstruction: a multifactorial etiopathogenesis. Arthroscopy. 1998 Nov-Dec;14(8):869-76.
6. Ahn JH, Yoo JC, Yang HS, et al. Second-look arthroscopic findings of 208 patients after ACL reconstruction. Knee Surg Sports Traumatol Arthrosc. 2007 Mar;15(3):242-8.
7. Wang J, Ao Y. Analysis of different kinds of cyclops lesions with or without extension loss. Arthroscopy. 2009 Jun;25(6):626-31.
8. Nuccion SL, Hame SL. A symptomatic cyclops lesion 4 years after anterior cruciate ligament reconstruction. Arthroscopy. 2001 Feb;17(2):E8.
9. Balcarek P, Sawallich T, Walde TA, et al. [Influence of cyclops syndrome after anterior cruciate ligament reconstruction on the functional outcome]. Sportverletz Sportschaden. 2008 Dec;22(4):220-4.
10. McMahon PJ, Dettling JR, Yocum LA, Glousman RE. The cyclops lesion: a cause of diminished knee extension after rupture of the anterior cruciate ligament. Arthroscopy. 1999 Oct;15(7):757-61.
11. Sheldon PJ, Forrester DM, Learch TJ. Imaging of intraarticular masses. Radiographics. 2005 Jan-Feb;25(1):105-19.
12. Tonin M, Saciri V, Veselko M, Rotter A. Progressive loss of knee extension after injury. Cyclops syndrome due to a lesion of the anterior cruciate ligament. Am J Sports Med. 2001 Sep-Oct;29(5):545-9.
13. Olson PN, Rud P, Griffiths HJ. Cyclops lesion. Orthopedics. 1995 Oct;18(10):1041, 1044-5.
14. Recht MP, Piraino DW, Cohen MA, et al. Localized anterior arthrofibrosis (cyclops lesion) after reconstruction of the anterior cruciate ligament: MR imaging findings. AJR Am J Roentgenol. 1995 Aug;165(2):383-5.
15. Bradley DM, Bergman AG, Dillingham MF. MR imaging of cyclops lesions. AJR Am J Roentgenol. 2000 Mar;174(3):719-26.