

Excision of a Knee Cyclops Lesion Using a Needle Arthroscope



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Abstract: After anterior cruciate ligament (ACL) reconstruction surgery, achieving full range of motion and strength of the postoperative knee is critical for optimal surgical outcomes. Abnormal tissue growth and scar formation in the postoperative knee can create a block to terminal extension of the knee. Cyclops lesions are areas of granulation tissue with neovascularization and fibrous tissue formation peripherally, most commonly at the anterolateral aspect of the tibial graft site after ACL reconstruction. When these lesions block terminal extension and cause mechanical symptoms, cyclops syndrome is diagnosed, and secondary knee arthroscopy is often performed to remove this tissue to allow for full range of motion. This Technical Note describes a minimally invasive approach with the NanoScope. The NanoScope allows for decreased postoperative pain and swelling with a likely quicker recovery back to normal postoperative therapy.

A cyclops lesion, also known as localized anterior arthrofibrosis, is a known complication after anterior cruciate ligament (ACL) reconstruction. It was first described in 1990 by Jackson and Schaefer and has become known as a cyclops lesion because arthroscopically the granulation tissue with overlying vessels gives it a cyclops eye appearance.¹ Cyclops syndrome is a patient with a cyclops lesion with loss of extension and possible audible “pop.” Other findings include initial full range of motion that is subsequently lost, rebound into flexion when forced into terminal extension, and “rubbery” endpoint in full extension.² It is the second most common cause of restricted knee extension after ACL reconstruction (after graft impingement), and it has also been seen in patients

after total knee arthroplasty with cruciate-retaining implants.

Cyclops lesions form most commonly on the anterolateral aspect of the tibial insertion site of the ACL. It has peripheral fibrous tissue with central granulation tissue, whereas symptomatic cyclops lesions are more likely to contain bone or cartilaginous tissue as well.³ The incidence of cyclops lesions is widely variable, ranging from 1% to 10%. More recent magnetic resonance imaging (MRI) studies have shown that the incidence ranges from 33% to 46.8% on imaging, but symptomatic cyclops lesions persist at 2% to 10% of ACL reconstructions.² Risk factors associated with development of cyclops lesion are related to increased volume of graft compared to the intercondylar notch, including female sex due to an on average narrower intercondylar notch, double bundle ACL reconstruction, and bony avulsions of the ACL.⁴ There are other variations of cyclops lesions apart from the most common anterolateral position. Atypical cyclops lesions arise from the midsubstance of the ACL graft, and inverted cyclops lesions arise instead of a femoral notch.

Cyclops lesions are diagnosed with loss of terminal extension, discomfort with walking, running, or laying supine. The bounce test by Marzo et al.⁵ has also been described to diagnose cyclops lesions. The bounce test is noticing a rubbery feel at full extension, with the leg then bouncing back into flexion.⁵ Asymptomatic cyclops lesions are often found incidentally on MRI scans, and early MRI scans have a sensitivity and specificity of 85.0 and 84.6, respectively.² MRI findings

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The authors report the following potential conflict of interest or source of funding: C.L. Reports other from Arthrex. M.B. reports other from Arthrex. Full ICMJE author disclosure forms are available for this article online, as supplementary material.

Received October 24, 2021; accepted December 10, 2021.

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2212-6287/211519

<https://doi.org/10.1016/j.eats.2021.12.008>



Fig 1. View of the right knee from outside of the joint with a nano-scopic cannula in the medial joint space.

include a circumscribed soft tissue nodule anterior to the ACL graft with isointense signal intensity to muscle on T1- and T2-weighted sequences.⁶ Ultrasound scanning has also been proposed as an imaging modality to detect cyclops lesions, because it can detect the neovascularity of the fibrovascular cyclops lesion tissue within the intercondylar notch, with heterogeneous hypoechogenicity compared to surrounding tissue.⁷

General consensus for management of cyclops lesions is conservative management for asymptomatic lesions. However, if the patient develops cyclops syndrome, intervention should be performed to restore normal gait mechanics and symptom relief. Tonin et al.⁸ report good results after excision if done within 12 weeks. After careful arthroscopic excision the knee should be taken through range of motion to look for any impingements, followed by a notchplasty if necessary.⁸

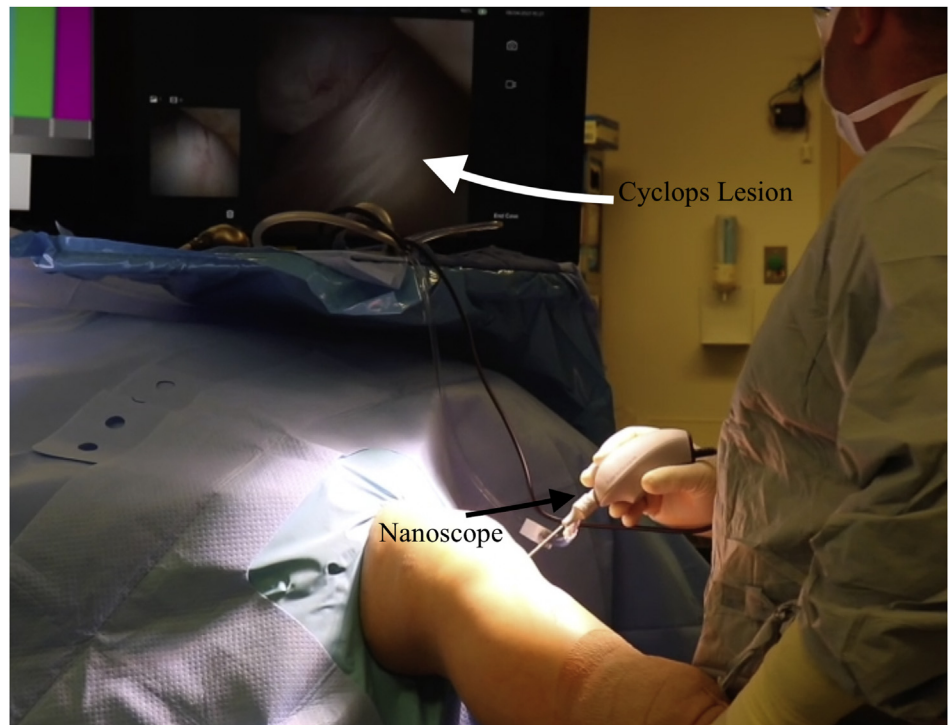


Fig 2. View from outside the joint shows the NanoScope placed into the medial joint space.



Fig 3. Viewing the right knee from the medial portal with the 0° NanoScope showing the attachment of the cyclops lesion.

Standard knee arthroscopy is frequently used for excision; however, this article describes using a minimally invasive technique for removal of a cyclops lesion using the NanoScope (Arthrex Naples, FL) to promote healing and early range of motion by limiting postsurgical pain.

Surgical Technique

Patient Setup

Patient is placed supine with the operative knee in a leg holder and the nonoperative knee over a well-padded pillow. A tourniquet is placed along the

operative thigh. The operative extremity is exsanguinated, and the tourniquet is inflated ([Video 1](#)).

Medial Portal Creation

A spinal needle is placed in the medial joint space. Next, a nitinol wire is placed through the spinal needle, and a curved high flow sheath Nanoscopic cannula is placed over the wire. Inflow is placed into the cannula, and the NanoScope (Arthrex) is inserted ([Figs 1 and 2](#)).

Diagnostic Arthroscopy

Standard diagnostic arthroscopy is then performed with viewing of the patellofemoral, medial and lateral

Fig 4. Viewing the right knee from outside the knee showing the NanoScope in the lateral joint space.



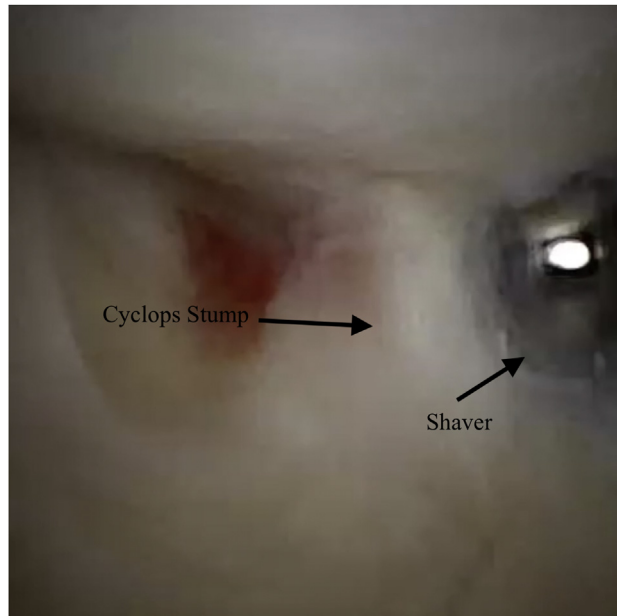


Fig 5. Viewing the right knee from the lateral portal with the 0° NanoScope showing the shaver coming in percutaneously from medially and excising the cyclops lesion.

joint spaces. The cyclops lesion can be viewed from the medial portal (Fig 3). It may be helpful to probe the cyclops lesion to approximate its attachments.

Lateral Portal Creation

A spinal needle is placed in the lateral joint space. Next, a nitinol wire is placed through the spinal needle and a curved high flow sheath Nanoscopic cannula is placed over the wire (Fig 4).

Excision

A 3.5 mm shaver is then brought in from medial percutaneously to detach the anterior medial attachment of the cyclops lesion. It is important to keep the shaver pointed away from the ACL graft during this portion of the case. The viewing portal can then be switched if necessary (Figs 5-7). A GraftNet (Arthrex) is attached to the shaver to provide a biopsy specimen of the lesion. This is then sent to pathology (Fig 8).



Fig 6. Viewing the right knee from the medial portal with the 0° NanoScope showing the shaver coming in percutaneously from laterally and excising the cyclops lesions.

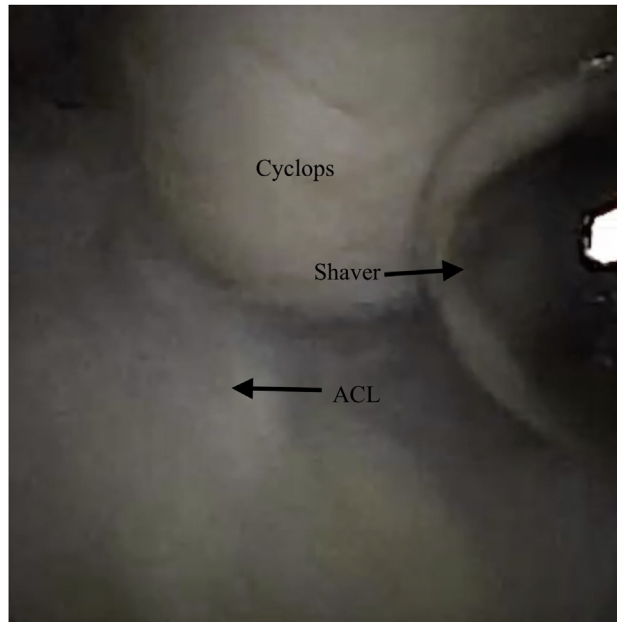


Fig 7. Viewing the right knee from the lateral portal with the 0° NanoScope showing the shaver coming in percutaneously from medially and excising the cyclops lesion with the anterior cruciate ligament graft visible.

Discussion

As mentioned previously patients generally have a good prognosis following excision of symptomatic cyclops lesion. Tonin et al.⁸ reported that full range of motion was restored in all but 2 patients after arthroscopic excision. No patients had pain at terminal extension or instability, and all were able to resume previous activities at their final follow-up.⁸ Van Dijck et al.,⁹ however, reported on 16 patients who required reoperation after ACL reconstruction for a cyclops lesion, and although all patients improved after arthroscopic resection, only 3 of the 16 patients regained full extension.

Using the NanoScope for arthroscopic excision of a cyclops lesion has many theoretical advantages to standard arthroscopy, especially in the setting of patients who have exuberant scar formation at sites of surgical intervention, such as with the typical bony and soft tissue debris at the tibial tunnel. Lavender et al.¹⁰ have previously presented surgical techniques using the as opposed to standard arthroscopy. Pearls of this technique include using a 3.5 mm shaver percutaneously also identifying the attachment of the cyclops lesion (Table 1). Using the allows for smaller incisions and portals, ; decreased fluid and swelling, leading to a theoretical decrease in pain

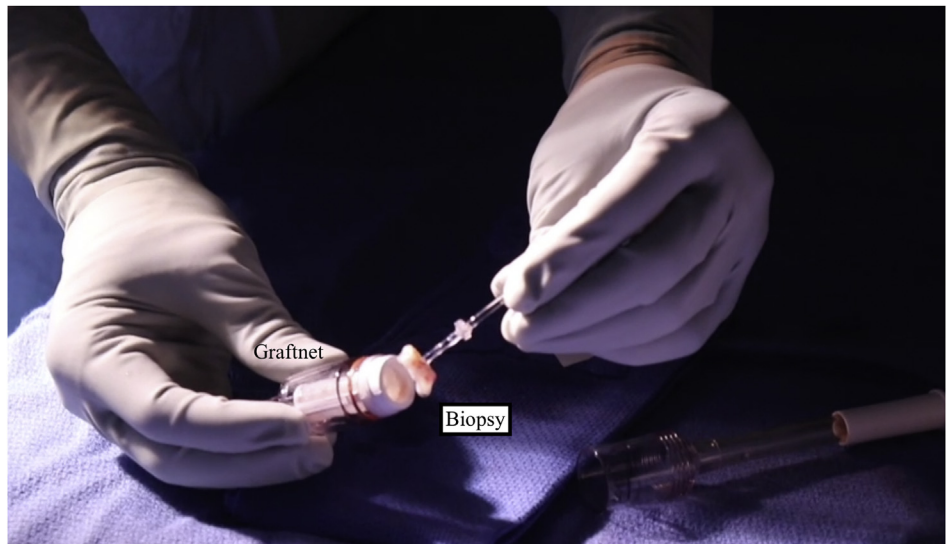


Fig 8. The biopsy specimen can be seen after removal from the GraftNet.

Table 1. Pearls and Pitfalls

Use shaver's suction intermittently to prevent emptying of the joint
The 3.5 mm shaver can be used percutaneously
High flow sheath allows for increased flow
Identify the Cyclops attachment

after the procedure; decreased complications; and a quicker recovery (Table 2). By reducing pain, patients may be able to more fully participate in early physical therapy to promote full recovery of range of motion. Disadvantages of using the NanoScope as previously reported are the increased technical difficulty and decreased visualization because of poor inflow. Bony components within the cyclops lesion may limit the use of the NanoScope and incisionless portals. The nanoscopic technique is also technically demanding, because visualization with a 0° scope requires experience.

Overall, nanoscopic treatment of cyclops lesions after ACL surgery shows promise. Nanoscopic techniques could lead to limited pain and postoperative swelling but also have other possible advantages. Given the limited size of the incisions and the advancements in regional blocks and use of local anesthetics, in-office procedures on minimally sedated patients like that seen in hand and upper extremity surgery becomes a possibility. By using minimally invasive techniques for diagnosis and treatment, speed, efficiency, and cost may be optimized in treating athletes and non-athletes alike, allowing for quicker return to sport and other activities. There has been a growing trend to needle arthroscopy and techniques in the recent literature.^{11,12} Ultimately, indications for nanoscopic procedures are evolving, and this Technical Note demonstrates successful treatment of a cyclops lesion using this technology.

Table 2. Advantages and Disadvantages of Direct Approach Using NanoScope

Advantages
Less morbidity
Less fluid
Less risk of additional scar formation in the postoperative period
Disadvantages
Additional cost of NanoScope
More technically demanding

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