Technical Note

In-Office Needle Arthroscopy of the Knee With Lateral Parapatellar Retinacular Release

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Abstract: The lateral patellofemoral joint, composed of multiple soft-tissue structures, balances the knee by aiding patella tracking, stability, and force distribution. Arthroscopic lateral release is a well-described procedure that addresses patellofemoral knee pain and, in cases with patellar instability, may be combined with medial stabilization. In-office needle arthroscopy is an up-trending technique that simultaneously diagnoses and treats patellofemoral pathology in the office, leading to a quicker patient recovery, reduced cost, and improved patient satisfaction. The purpose of this Technical Note is to describe in-office needle arthroscopy technique to address patellofemoral pain and lateral patellar mal-tracking, with special consideration for achieving adequate local anesthesia, proper indications, adequate visualization, and the advantages of performing these procedures in the office rather than the operating room.

Orthopaedic surgeons are commonly consulted for anterior knee pain with associated swelling and mechanical symptoms. The differential remains broad, including tight lateral parapatellar soft-tissue structures causing excessive loading of the patellofemoral joint and possible patellar mal-tracking.[1-5] In 1970, Wilner first performed the lateral retinacular release as an isolated procedure for recurrent patellar dislocation.[2,6] Since, indications and technique have expanded to include open, percutaneous, arthroscopic, and combined open/arthroscopic approaches.[2,6-8] Patients with persistent patellofemoral pain following nonoperative management are indicated for arthroscopic evaluation of the patellofemoral joint and its surrounding soft-tissue envelope, one of today's most common orthopaedic procedures.[9] Valuable information regarding the parapatellar envelope can be gained, and this procedure can be diagnostic as well as therapeutic if the proper pathology is addressed.

With advances in in-office needle arthroscopy (IONA), treatment of patellofemoral and lateral parapatellar tightness is now possible in the wide-awake patient without the need for either an operating room or an anesthesiologist. Improving on previous IONA designs, a needle arthroscopic system with a 1.9-mm diameter provides a semiflexible, minimally invasive option for diagnostic as well as therapeutic treatments. The camera is positioned at the tip of the needle arthroscope with a 0° viewing angle. The image quality, similar to conventional arthroscopy, allows for manual bending of the arthroscope up to 15°. Current IONA technology also includes various nanoarthroscopic instruments, such as 2.0-mm shavers, burrs, smaller probes, graspers, scissors, and various angled ablators to permit minimally invasive procedures to be performed on identified pathology. Indications and contraindications for needle arthroscopy can be found in Table 1.

The purpose of this Technical Note is to describe in-office needle arthroscopy with lateral parapatellar retinacular release in the treatment of lateral parapatellar

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Table 1. Advantages and Disadvantages of Proposed Technique

Advantages	Disadvantages
Real-time diagnosis of underlying knee pathology and correlation with symptoms	Pain and discomfort if inadequate local anesthesia is administered
Reduced operating room cost and avoidance of complications associated with general anesthesia	Learning curve: wide-awake patient present and 0° camera
Real-time patient education, shared decision-making, and individual patient ownership of care	
Faster recovery	

tightness, with special consideration for obtaining adequate anesthesia, proper indications, visualization tips, and the advantages of performing these procedures in the office rather than in the operating room. We have provided a step-by-step guide to performing the technique, which in conjunction with the video (Video 1), we hope to make reproducible for other surgeons (Table 2 and Table 3).

Table 3. Step-by-step Guide to Performing the Proposed Technique

Step 1: Position the patient supine with operative knee flexed over the table (Fig 1). Mark out relevant surface anatomy and anticipated portals (Fig 2).
Step 2: Administer anteromedial and anterolateral portal local anesthesia and through these portals, the intra-articular block to minimize patient discomfort. Wait 10 minutes.
Step 3: Establish anterolateral portal, approximately 0.5 cm superolateral to standard arthroscopic portal.
Step 4: Perform diagnostic scope of the knee and visualize lesion (Fig 3).
Step 5: Under direct visualization, create anteromedial portal with standard arthroscopic technique. However, recommend single stab through skin and capsule without cutting superiorly/inferiorly or blunt spreading.
Step 6: Switch portals as needed (Place needle scope into medial portal; 90° ablator into lateral portal).
Step 7: Beginning at superior aspect of trochlea, in tandem move both instruments over anterior aspect of lateral femoral condyle to visualize lateral parapatellar soft-tissue envelope (Fig 4).
Step 8: Use ablation in an anterior-to-posterior fashion to release envelope from deep to superficial, with care taken to not violate capsule or encounter geniculate vessels (Fig 5).
Step 9: Suction out the joint fully.
Step 10: Apply wound closure (Steri-Strips) and soft dressing.

Surgical Technique (With Video Illustration)

Preoperative Planning/Positioning

On a standard examination table, the patient is positioned supine with the operative knee hanging over the edge of the bed (Fig 1), allowing gravity to open the joint space. To avoid patient discomfort, no tourniquet is placed. Standard arthroscopic landmarks are marked: distal pole of the patella, patellar tendon, in addition to the anterolateral and anteromedial arthroscopic portal sites (Fig 2). Before incision, the anterolateral and anteromedial arthroscopy portal sites are injected with 10 cc of 1% lidocaine per portal (20 cc in total). After 10 minutes, an additional 20 cc mixture of 1% lidocaine and 0.5% ropivacaine (1:1 ratio) is injected into the knee joint through the anterolateral portal, both for anesthesia as well as to confirm that the portal position allows adequate access to the knee joint. The skin is prepped with a mixture of chlorhexidine gluconate with isopropyl alcohol, and then the extremity is draped in a sterile manner. A preprocedure time-out is performed while visualizing the surgeon's initials on the affected extremity.

Table 2. Pearls and Pitfalls of the Proposed Technique

Pearls	Pitfalls
Block office time (30-60 minutes) in a dedicated IONA procedure room	Not having all available assistants, instruments, implants ready at beginning of procedure
Office staff must be familiar and efficient with workflow (set-up, equipment, turnover)	Poor patient selection (unreasonable expectations, unable to tolerate wide-awake procedure)
Thorough preprocedure discussion: the patient must understand expectations and goals of procedure in addition to mental preparedness for being wide awake	Inadequate time between local anesthetic and incision
10-minute window between initial local anesthetic (10 cc per portal) and final joint load (20 cc) immediately before incision	Poor portal placement given 0° needle scope
Instrumentation must be performed from viewing portal opposite the lesion (i.e., needle arthroscope in anterolateral portal for medial sided procedures)	
Epinephrine in saline for hemostasis and visualization	

IONA, in-office needle arthroscopy.

Portal Placement

The standard anterolateral arthroscopic portal is made using a number 11-blade. Using just the width of the blade, a 2-mm stab incision is made toward the intercondylar notch to accommodate the 1.9-mm 0° viewing needle arthroscope (NanoScope, Arthrex, Naples, FL). It is helpful to make the anterolateral portal 0.5 cm more superolateral to the standard portal placement adjacent to the lateral edge of the patellar tendon, given the 0° scope. To prevent discomfort to the patient as well as extravasation of fluid through the portal, no undercutting of the capsule or spreading with a blunt clamp should be performed.

Fig 1. Knee set-up for in-office needle arthroscopy. On a standard examination table, the patient is positioned supine with the operative leg (right) hanging off to allow for gravity to open the joint. The is knee prepped and draped in usual sterile fashion.

Operative Technique

In standard fashion with the knee in extension, the joint is entered with a blunt trochar under the patella into the suprapatellar pouch. The camera is exchanged over the trocar and connected to the integrated inflow and outflow fluid management system at a pressure of 35 mm Hg (DualWave; Arthrex). In the senior author's experience, fluid inflow consisting of 1.0 liter of 0.9% normal saline mixed with 5.0 cc of epinephrine provides the optimal combination of flow and hemostasis. A diagnostic arthroscopy is performed in the standard manner (suprapatellar pouch, patellofemoral joint, lateral and medial gutters, medial compartment, notch, and lateral compartment) (Fig 3). Next, under direct arthroscopic visualization, the anteromedial portal is created using a spinal needle followed by an 11-blade using the aforementioned technique of single stab incision without undercutting or blunt spreading. The needle arthroscope and a probe are placed into their respective portals and switched as necessary to ensure adequate visualization and the ability to instrument the lateral retinaculum. For optimal visualization, debridement of inflamed synovium or loose body removal may be performed with a 2.0-mm shaver or nano-grasper (Arthrex), respectively.

Following diagnostic arthroscopy and creation of the medial portal, the needle arthroscope is placed into the medial portal for viewing and the 90° ablator (ApolloRF MP90 aspirating ablator; Arthrex) is inserted into the lateral portal. With the knee in full extension and starting from the superior aspect of the trochlea, both instruments in tandem are moved laterally over the anterior edge of the lateral femoral condyle (Fig 4). This provides excellent visualization of the lateral parapatellar soft-tissue envelope. Using the ablation setting, the deep layers (i.e., lateral patellofemoral ligament, quadriceps aponeurosis) are incised in an anterior-to-posterior fashion sequentially moving more superficial, layer by layer (Fig 5). Care must be taken to avoid electrocautery of the superior and inferior lateral genicular arteries, which traverse the lateral retinaculum and can be encountered when performing lateral soft-tissue procedures. It is in the senior authors experience to avoid electrocautery too superficial, as to violate the joint capsule.

Following completion of lateral retinacular release, the knee joint is suctioned out using a Fraser tip suction (8 French ~ 2.7 mm size). Portals can be sealed primarily using adhesive wound closure strips (Steri-Strip; 3M, Saint Paul, MN) or with simple nylon sutures if the surgeon feels they are necessary. A dry, sterile dressing is applied that facilitates early knee range of motion.

Postoperative Protocol

Postoperatively, the patient is allowed to mobilize with full weight-bearing as tolerated. The patient is instructed to perform straight leg raises, knee extension, and flexion exercises every hour for 5 minutes for the first 24 hours in addition to ice therapy and elevation when not ambulating for the first 24 to 72 hours.

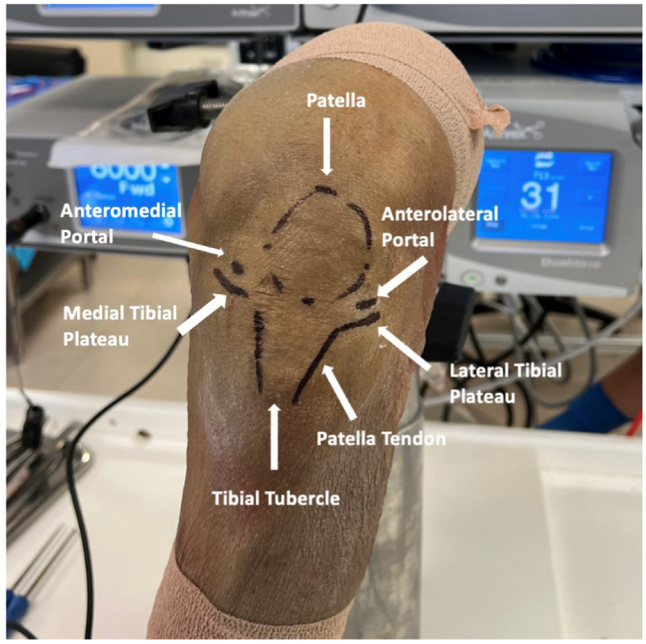

Fig 2. Views via anterolateral and anteromedial portals during in-office needle arthroscopy. Relevant surface anatomy markings, including the anterior joint line and portal locations, are shown on a left knee. A slightly more superolateral entry point of the standard anterolateral portal is helpful for the 0° scope to be able to view the medial portal under direct visualization. Surface anatomy landmarks are labeled including the patella, patella tendon, tibial plateaus, and tibial tubercle.

Fig 3. The trochlear groove of the left knee via the anterolateral portal during needle arthroscopy.

No deep-vein thrombosis prophylaxis or antibiotics are required. Acetaminophen and anti-inflammatories are sufficient for postoperative pain control. The patient returns on postprocedure day 5 and formal physical therapy is begun.

Discussion

One of the most common indications for knee arthroscopy is anterior knee pain secondary to overloading the patellofemoral joint due to a tight parapatellar soft-tissue envelope.[2,3,6] Arthroscopic lateral retinacular release has been a well described and successful procedure in treating this pathology. In a cohort of 53 patients undergoing isolated lateral release for knee pain, Aderinto and Cobb[10] found that 80% of patients reported a reduction in pain at an average of 31 months' follow-up. Furthermore, Felli et al.[11] reported a significant improvement in pain and outcome scores when using lateral release for anterior knee pain in athletes with type III bipartite patella at 70 months follow up. Similar results were found in studies by Douiri et al.[12] and Tan et al.[13]

Fig 4. The lateral parapatellar soft-tissue envelope is visualized during needle arthroscopy of the left knee via the anteromedial portal. Releases are performed using ablation, in an anterior-to-posterior fashion.

Fig 5. The lateral parapatellar soft-tissue envelope is visualized during needle arthroscopy of the left knee via the anteromedial portal. Releases are performed using ablation, in an anterior-to-posterior fashion, as well as deep to superficial, with care taken to not violate capsule or encounter geniculate vessels.

With proper patient selection, the ability to perform in-office procedures using needle arthroscopy provides the orthopaedic surgeon with a versatile tool in the diagnosis and treatment of knee pathology. Bypassing the operating room as well as the associated risks of general anesthesia decreases morbidity and improves recovery. In addition, this unique and innovative set-up fosters patient ownership, understanding and accountability in their care, allowing them be an active participant in their procedure. It provides surgeons the opportunity to give real-time intra-operative feedback that correlates to imaging and clinical symptoms which ultimately improves patient satisfaction and strengthens the doctor–patient relationship.

This Technical Note describes how to perform wide-awake lateral parapatellar retinacular release via

IONA to address tight soft-tissue envelopes causing excessive loading of the patellofemoral joint and patellar mal tracking. Needle arthroscopy is an up-trending technique with innovative technology that surgeons are using throughout the body with encouraging results. In wide-awake local anesthesia and no tourniquet foot and ankle surgery, IONA has been applied from posterior hindfoot to peroneal tendoscopy and debridement.[14-18] Colasanti et al.[15,16] reported that in 31 patients, nearly 16 months postoperative from IONA for anterior ankle impingement, 91% (n = 29) noted they would undergo the same procedure. Additionally, considering the Foot and Ankle Outcome Score (FAOS), minimal clinically important difference was achieved by 84% of patients for pain, 77% for symptoms, 75% for quality of life, 74% for sports, 65% for Patient-Reported Outcome Measurement Information System Pain Interference, and 61% for FAOS activities of daily living.[15,16] In 10 patients at mean follow-up 13.3 months postoperative IONA for posterior ankle impingement, Mercer et al.[18] reported significant improvements in FAOS symptoms, pain, activities of daily living, sports activities, and quality of life; all patients returned to sport at a median time of 4.1 weeks and work at a median of 3.4 days.

Finally, IONA has found to be a cost-saving alternative to advanced imaging. In a retrospective review of 200 patients, of who 175 underwent knee IONA and 25 underwent shoulder IONA, McMillan et al.[19] compared reimbursements for IONA versus the cost of noncontrast magnetic resonance imaging for diagnosis and found minimum savings of $418/patient for knees and $554.62/patient for shoulders when using independent imaging centers, which doubled within hospital-based facilities.

Conclusions

IONA is a patient-friendly method of providing simultaneous diagnostic and therapeutic treatment of knee pathology. The real-time experience of watching an arthroscopic procedure with immediate surgeon feedback correlating with symptoms encourages patient participation and improves patient understanding, ownership of their management, and ultimately rapport and satisfaction. Furthermore, IONA is a cost-effective model that if widely incorporated can decrease hospital costs by bypassing the operating room, anesthesia and all associated expenditures and complications. The ability to diagnose and treat lateral parapatellar retinacular tightness in-office provides a unique tool for the orthopedic surgeon and patient alike.

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