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Percutaneous Labral Repair Using Nanoneedle in a Pediatric Baseball Player

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Abstract

Shoulder labral tears are uncommon in the pediatric population, but those that remain symptomatic after nonsurgical treatment are candidates for arthroscopy. Nano-arthroscopy has evolved from a visualization tool to enabling percutaneous repair techniques. This pediatric patient with a relatively small shoulder joint and a focus on minimizing soft tissue trauma as an overhead athlete, was felt to be an ideal clinical scenario to utilize the technology of Nano arthroscopy and its instrumentation.

Keywords: Nanoneedle labral repair pediatric shoulder

Introduction

Labral tears of the throwing shoulder are uncommon in the pediatric population but are increasing due to rising sports participation and early specialization [1,2]. While many cases respond to nonoperative management, arthroscopy is indicated for persistent symptoms [3,4]. Unfortunately, traditional arthroscopy in pediatric patients has been associated with higher complication rates and significantly lower return-to-sport outcomes compared to adults [5-9].

Over the past three decades, surgical treatment of shoulder instability and labral pathology has evolved significantly. The introduction of high-strength, low-profile suture anchors improved repair success while reducing complications. More recently, nano arthroscopy has emerged as a minimally invasive technique that reduces soft tissue trauma and improves visualization through smaller-caliber instrumentation. However, its application for completing an entire labral repair procedure has not been widely reported.

This case describes a percutaneous posterior labral repair in a preadolescent overhead athlete using the (Arthrex Inc) NanoNeedle Scope 2.0 high-res system. The patient's small joint size and the need to minimize soft tissue disruption made this an ideal scenario for nano arthroscopy.

Case Presentation

A 12-year-old competitive baseball player presented with persistent shoulder pain during throwing for several months. Despite over a year of nonoperative management—including rest, structured physical therapy, and a gradual return-to-throwing program—he remained unable to throw without pain.

Physical examination yielded the following findings:

- Full shoulder range of motion, including internal rotation
- Normal scapular posture and control
- Near-normal rotator cuff strength; no significant impingement signs
- Pain with apprehension test (without true apprehension)
- Increased posterior translation with palpable click on load-and-shift testing
- Mildly positive sulcus sign

MRI revealed a posterior labral tear with mild glenoid dysplasia and chondral metaplasia (Figure 1).
Given the patient's desire to return to overhead sports and failure of extensive conservative treatment, surgical intervention was recommended. A percutaneous posterior labral repair using nano arthroscopy was selected in an effort to minimize morbidity.

Surgical Technique

The patient was positioned in the semi–beach chair position with the arm secured in a Trumano arm positioner (Arthrex Inc.). A 2–3 mm posterior puncture was created for insertion of the Nano viewing sheath. Diagnostic arthroscopy confirmed a posterior labral tear (Figure 2A).

An anterior working sheath was placed through the rotator interval for debridement of the posterior labrum using a shaver (Figure 2B). Visualization was then switched to the anterior portal, and a nano working cannula was introduced through a posterolateral Wilmington-type portal.

The posterior glenoid was prepared, and a drill hole was created using a crown-tip sheath as a guide (Figure 3). A 1.8mm knotless suture anchor was inserted (Figure 4). Through the original posterior puncture, a 90° suture lasso was passed percutaneously (Figure 5A) to shuttle the repair suture through the posterior capsule and labrum (Figure 5B). Using the nitinol shuttle, the repair suture from the anchor was advanced through the tissue. Then the conversion suture from the anchor was used to shuttle the repair suture back through the anchor (Figure 6). The suture was tensioned to restore the labrum to the glenoid rim (Figure 7). A second anchor was placed using the same technique (Figure 8).

Postoperative Protocol:

- Sling immobilization with early gentle active motion after nerve block resolution
- Physical therapy initiated at 1 week: scapular stabilization, isometrics, and pain-free active motion
- No passive stretching or capsular mobilization initially

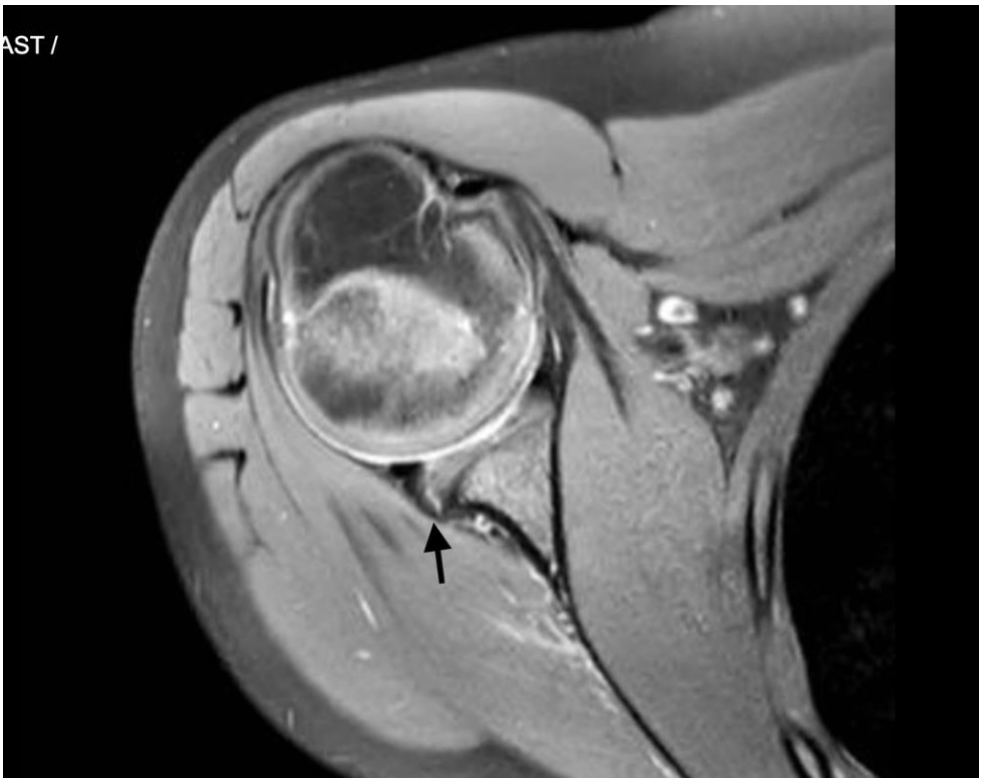
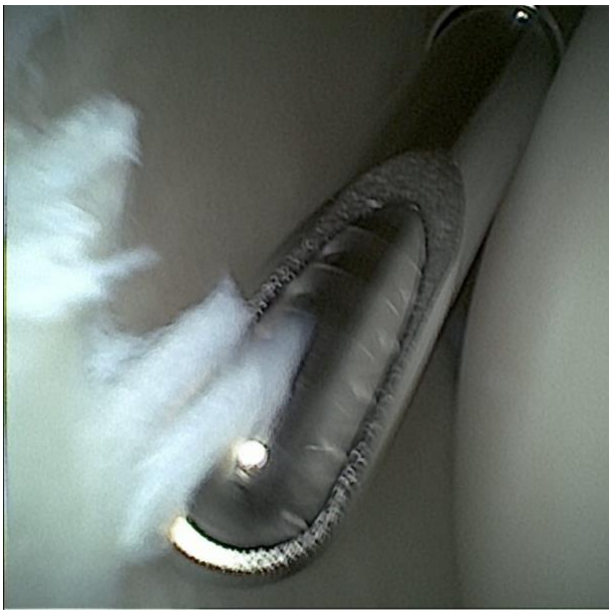


Figure 1: Axial MRI image of a right shoulder showing a posterior labral tear. (arrow) Adjacent to the tear, there is also mild glenoid dysplasia with mild chondral metaplasia.

2A



2B

Figure 2A and B: Arthroscopic view of right shoulder from a posterior viewing sheath showing a posterior labral tear (A) and debridement of the tear using a shaver (B) through an anterior working sheath.

Figure 3: Arthroscopic view of right shoulder from an anterior viewing sheath showing a crown-tip sheath is used a drill guide through a posterolateral working sheath to place an anchor onto the posterior rim of the glenoid.

Figure 4: Arthroscopic view of a right shoulder from an anterior viewing sheath showing a 1.8mm knotless suture anchor placed onto the posterior edge of the glenoid.

5A

5B

Figure 5A and B: While viewing the right shoulder from an anterior viewing sheath, a 90-degree suture lasso is passed percutaneously (A) to pass a nitinol suture shuttle through the posterior capsule and labrum (B).

Figure 6: Arthroscopic view of right shoulder through an anterior viewing sheath showing a grasper retrieving the blue repair suture from the anchor along with the white conversion suture loop which is used to shuttle the repair suture back through the anchor.

Figure 7: While viewing the right shoulder through an anterior viewing sheath, the posterior repair suture is tightened bringing the posterior capsule and labrum onto the posterior glenoid.

Figure 8: Arthroscopic view of right shoulder from an anterior viewing sheath shows the addition of a second posterior suture anchor and completed repair.

Discussion

This case demonstrates that percutaneous labral repair using nano arthroscopy is a feasible and effective technique in pediatric patients. The smaller-caliber instrumentation minimizes soft tissue trauma, which is particularly advantageous in young overhead athletes with smaller joint anatomy. Additionally, this approach may reduce postoperative pain and facilitate faster rehabilitation.

While nano arthroscopy has been described for diagnostic purposes and limited interventions [10,11], its application for complete labral repair in the pediatric population has not been previously reported. This technique leverages familiar arthroscopic principles and implants, making it an adaptable option for surgeons experienced in shoulder arthroscopy.

Further studies are needed to evaluate long-term outcomes, complication rates, and return-to-sport metrics compared to conventional arthroscopy.

Conclusion

• Nano arthroscopy offers a minimally invasive alternative for labral repair in pediatric athletes.

• With the Arthrex NanoNeedle Scope 2.0, the image performance is now more equivalent to the traditional arthroscopes in quality of image.

• Percutaneous portals and small-caliber instrumentation reduce soft tissue disruption.

• This technique may represent an ideal solution for young overhead athletes requiring surgical stabilization.

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REFERENCES

1. Lear A, Zeller AM, McNulty S, et al. Results of a National survey on sport specialization behavior and throwing arm injury in youth softball players. Sports Health. 2024; 16: 327-332.
2. Siparsky PN, Kocher MS. Current concepts in pediatric and adolescent arthroscopy. Arthroscopy. 2009; 25: 1453-1469.
3. Burkhart SS, Morgan CD. The peel-back mechanism: Its role in producing and extending posterior type II SLAP lesions and its effect on SLAP repair rehabilitation. Arthroscopy. 1998; 14: 637-640.
4. Wooten CJ, Krych AJ, Schleck CD, et al. Arthroscopic capsulolabral reconstruction for posterior shoulder instability in patients 18 years old or younger. J Pediatr Orthop. 2015; 35: 462-466.
5. Gorantla K, Gill C, Wright RW. The outcome of type II SLAP repair: a systematic review. Arthroscopy. 2010; 26: 537-545.
6. Asturias AM, Bastrom TP, Pennock AT, et al. Posterior Shoulder Instability: Surgical Outcomes and Risk of Failure in Adolescence. Am J Sports Med. 2020; 48: 1200-1206.
7. Pandya NK, Namdari S. Shoulder arthroscopy in children and adolescents. J Am Acad Orthop Surg. 2013; 21: 389-397.

8. Edmonds EW, Lewallen LW, Murphy M, et al. Peri-operative complications in pediatric and adolescent shoulder arthroscopy. J Child Orthop. 2014; 8: 341-344.
9. Castagna A, Delle Rose G, Borroni M, et al. Arthroscopic stabilization of the shoulder in adolescent athletes participating in overhead or contact sports. Arthroscopy. 2012; 28: 309-315.
10. Lavender C, Lycans D, Kopiec A. Nanoscopic Single-Incision Anterior Labrum Repair. Arthrosc Tech. 2020; 9: 297-e301.
11. Anderson K. Labral Repair with Capsulorrhaphy Completed via Needle Arthroscopy. Arthrosc Tech. 2025; 14: 103834.