

# Trans—Rotator Cuff Approach for Spinoglenoid Cysts: Tips and Traps



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**Abstract:** In this study, we introduce an arthroscopic technique for posterior-superior capsular fenestration and spinoglenoid cyst resection completely via a trans—rotator cuff approach. This approach can provide a full field of view and allow evaluation of the scope of the cyst under direct vision, which reduces the risk of recurrence and injury to the suprascapular neurovascular bundle.

Spinoglenoid cysts are ganglion cysts at the glenoid notch, which can be structurally subdivided into multiple-segmented and non-segmented cysts.<sup>1</sup> Nowadays, the pathogenesis of spinoglenoid cysts is generally considered to be closely related to the 1-way valve effect caused by a labral tear.<sup>2</sup> Spinoglenoid cysts may lead to compression of the supraspinatus nerve running along the spinoglenoid notch, thus undermining muscle strength or sensation functions. At present, mainstream therapy for spinoglenoid cysts is mainly divided into conservative treatment and operative treatment. The former mainly consists of adjustment of the motion mode, strength training of major muscles, proper rest,

physiotherapy, and anti-inflammatory drugs, whereas the latter involves open and arthroscopic surgery. It is important to note that operative treatment, especially arthroscopic surgery, exerts advantages in restricting the irreversible pathologic changes of the infraspinatus and supraspinatus muscles, such as fatty infiltration under the circumstance of muscle atrophy induced by supraspinatus nerve compression.<sup>3</sup>

In this study, we introduce an arthroscopic technique for posterosuperior capsular fenestration and cyst resection completely via a trans—rotator cuff approach. This technique is especially indicated for patients who have spinoglenoid cysts with apparent symptoms of nerve compression in whom mainstream therapy does not achieve remission within 3 to 6 months. This approach can provide a full field of view so that the operator can evaluate the scope of the cyst under direct vision, which can reduce the risk of recurrence and injury to the suprascapular nerve.

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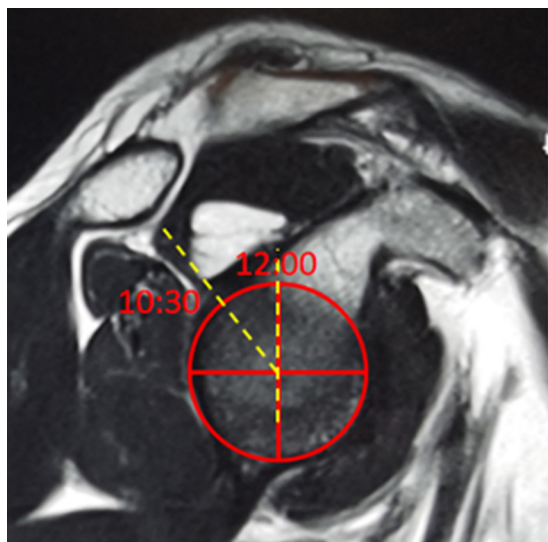
## Surgical Technique

### Preoperative Planning

Apart from a full functional assessment and clinical examination, magnetic resonance imaging (MRI) is required to determine the position of the spinoglenoid cyst by horological positioning on the en face layer of the glenoid (Fig 1).

### Patient Positioning and Anesthesia

The patient is placed in the lateral decubitus position with the affected arm fixed on a supporting device. All procedures are performed with the patient under an interscalene block. The bony landmarks are identified and marked (Video 1).



**Fig 1.** Preoperative sagittal T1-weighted magnetic resonance imaging of patient's right shoulder. On this en face view, we can identify the scapular spine, supraspinatus, and articular surface. The spinoglenoid cyst is located between the 10:30 clock-face position and the 12-o'clock position.

### Surgical Portals

Three approaches are established, including a posterior viewing portal, an anterior working portal, and a trans-rotator cuff approach (Fig 2). First, a posterior portal is established, and a 30° arthroscope is placed to perform a diagnostic exploration of the glenohumeral joint. Afterward, an 18-gauge spinal needle is used to establish an anterior portal at the rotator cuff interval using the outside-in technique, which allows an overall examination of the glenohumeral joint (Video 1). It is important to bear in mind that SLAP lesions and/or partial tears of the rotator cuff should be noted, in which swelling of local tissue may be avoided by performing excision of the cyst before repairing the SLAP lesion. According to preoperative MRI, the position of the glenoid cyst can be determined by horological positioning, thus clarifying the relation between the cyst and the footprint of the long head of the biceps tendon on the glenoid, which facilitates limited and accurate fenestration of the posterosuperior capsule during surgery (Fig 1).

### Establishment of Trans-Rotator Cuff Approach

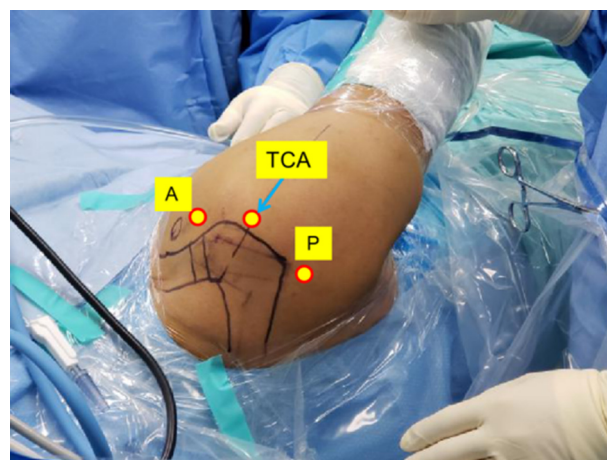
With observation through the 30° arthroscope in the posterior portal, an 18-gauge spinal needle is inserted percutaneously under the anterolateral part of the acromion, which then enters the glenohumeral joint through the rotator cuff and points toward the posterosuperior labrum (Fig 3A). In this way, the trans-rotator cuff portal is located medial to the rotator cable. Along the spinal needle, the surgical blade is

introduced parallel to the direction of the muscle fibers (Fig 3B).

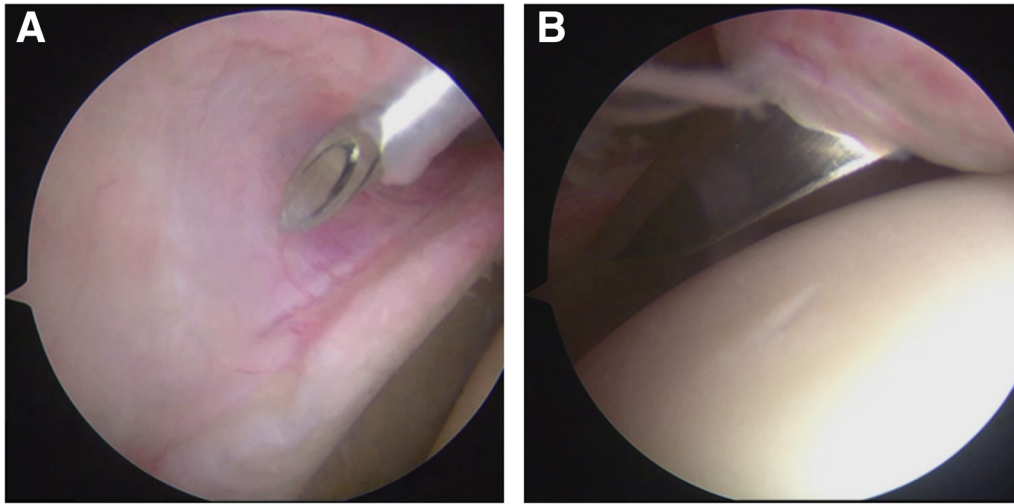
### Cyst Excision

According to preoperative MRI and intraoperative exploration, the "target area" of the posterosuperior capsule is determined. A radiofrequency device (Arthrex, Naples, FL) is introduced through the trans-rotator cuff approach to open the posterosuperior capsule close to the labrum (Fig 4A), which usually starts from the medial attachment of the long head of the biceps tendon and moves backward slowly to avoid labral injury. After incision of the capsule on the surface of the spinoglenoid cyst, excision of the external wall and decompression can be realized, and the cavity of the cyst can be observed clearly through the capsule opening (Fig 4B).

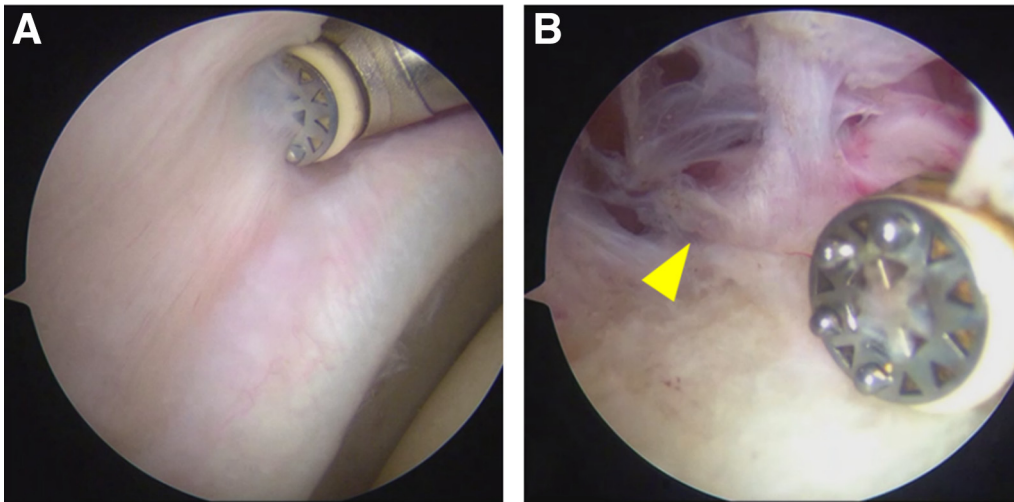
The surgeon then continues to release the cyst until it is 1.5 cm from the medial side of the labrum. Next, the inferior wall of the spinoglenoid cyst is bluntly separated from the underlying suprascapular neurovascular bundle (Fig 5A), after which the cyst tissue can be thoroughly excised by a shaver (Arthrex) (Video 1). Generally, the suprascapular nerve and artery are located deeply under the cyst, adjacent to the lateral edge of the glenoid notch (Fig 5B), and about 2 cm from the superior margin of the glenoid. To avoid iatrogenic injury during cyst removal, the shaver should be faced towards the cyst wall and weaken suction power manually (Fig 6). The open capsule does not need to be repaired. Finally, the SLAP lesion should be fixed with anchors if necessary. Pearls and pitfalls of the described technique are listed in Table 1.



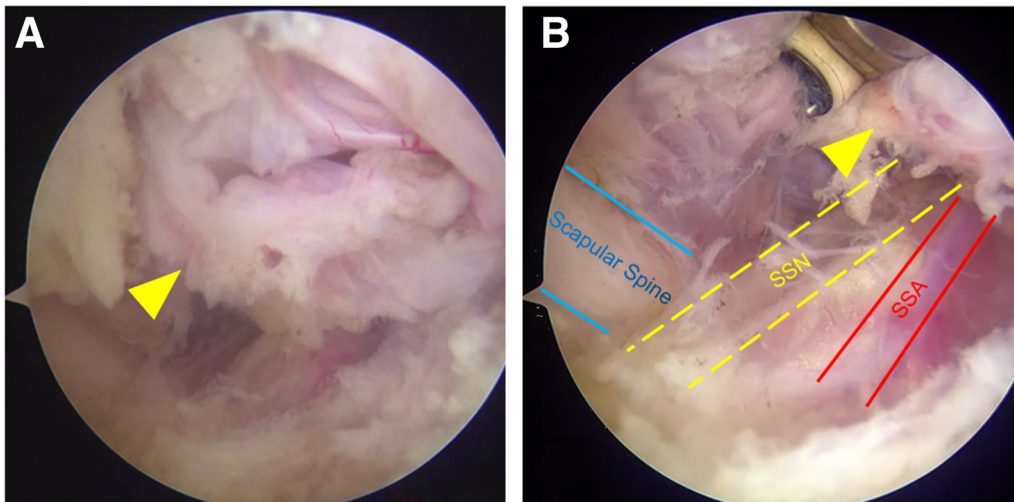
**Fig 2.** In a patient with a spinoglenoid cyst in the right shoulder, 3 portals are marked with the patient in the lateral decubitus position: anterior portal (A), established by outside-in technique; trans-rotator cuff approach (TCA), 2 cm lateral to the acromion; and posterior portal (P), 1 cm medial and 2 cm inferior to the posterolateral angle of the acromion.



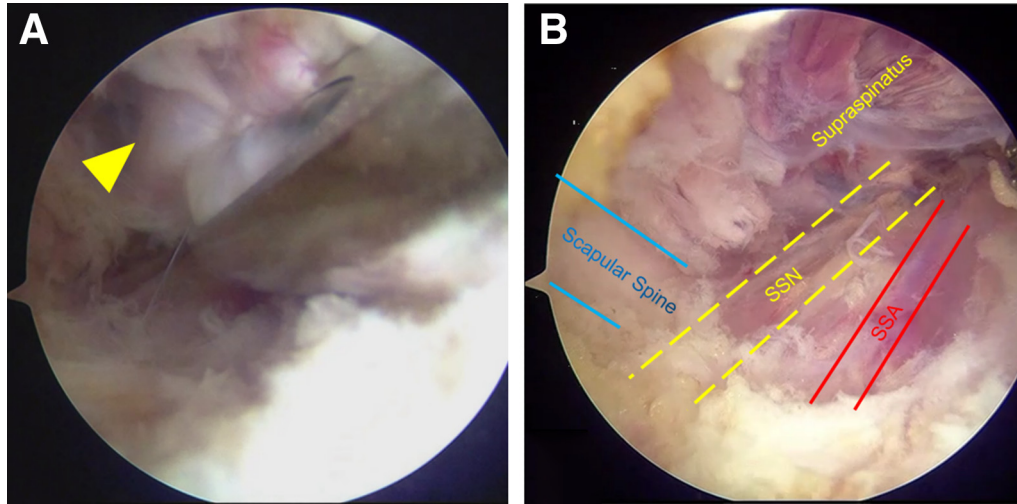
**Fig 3.** Establishment of TCA in right shoulder. (A) An 18-gauge spinal needle is inserted into the glenohumeral joint by the TCA and pointed toward the posterosuperior labrum with the scope in the posterior portal. (B) Along the spinal needle, the surgical blade is introduced parallel to the direction of the muscle fibers to establish the TCA. (TCA, transrotator cuff approach.)



**Fig 4.** (A) A radiofrequency device is used to open the posterosuperior capsule through the trans-rotator cuff approach, as viewed from the posterior portal in the right shoulder. (B) The cyst has been partially excised (arrowhead).



**Fig 5.** (A) The inferior wall of the spinoglenoid cyst (arrowhead) is bluntly separated from the underlying suprascapular neurovascular bundle through the trans-rotator cuff approach. (B) The suprascapular nerve (SSN) and suprascapular artery (SSA) are located deeply under the cyst (arrowhead), adjacent to the lateral edge of the glenoid notch, as viewed from the posterior portal in the right shoulder.



**Fig 6.** (A) To avoid iatrogenic injury during cyst removal, the shaver should be faced towards the cyst (arrowhead) wall and weakened suction power manually, as viewed from the posterior portal in the right shoulder. (B) Complete excision of the cyst has been achieved. (SSA, suprascapular artery; SSN, suprascapular nerve.)

### Postoperative Management

Sling immobilization is necessary for 4 to 6 weeks postoperatively, and forward flexion should reach 90°

**Table 1.** Pearls and Pitfalls

#### Pearls

- The position of the spinoglenoid cyst should be determined by a horological positioning method on the en face layer of the glenoid on T2 MRI.
- To guide the trans-rotator cuff approach precisely, penetration of the needle should be performed close to the glenoid and the needle should be pointed toward the cyst.
- A knife should be used to cut beside the needle in the same direction as the muscle fibers.
- A limited fenestration should be made, accurately considering the size and location of the cyst.
- Blunt dissection is recommended to separate the cyst within the range of 1.5 cm medial to the glenoid.
- The shaver should be placed above the suprascapular neurovascular bundle via the trans-rotator cuff approach and should face toward the wall of the cyst, weakening the power of suction for resection.

#### Pitfalls

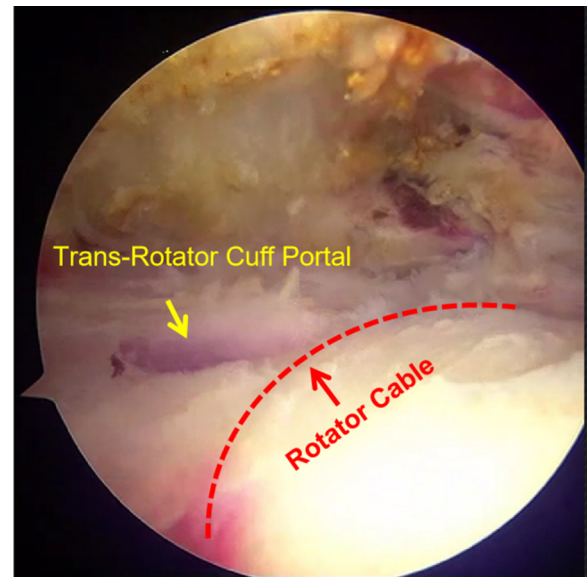
- The fenestration can be unsatisfactory without accurate positioning of the cyst preoperatively, which can have a negative effect on the following operations.
- The approach may go through the rotator cuff tendon and damage the rotator cable or tendons when the needle is placed far from the glenoid.
- The knife cannot reach the ideal location and will cause injury to the muscle if the needle is pulled out.
- Unnecessary expansion of the fenestration could aggravate damage and swelling.
- Operations exceeding 1.5 cm medial to glenoid have a high risk of SSA and SSN injuries.
- Excessive suction and an incorrect orientation of the shaver may lead to iatrogenic injury to the SSA.

MRI, magnetic resonance imaging; SSA, suprascapular artery; SSN, suprascapular nerve.

in 1 week. Passive motion is permitted 1 month later, and advanced strengthening including muscular strengthening is allowed after 12 weeks. A gradual return to sporting activities is acceptable after 6 months.

### Discussion

The trans-rotator cuff approach was first described by Warner and applied in the repair of SLAP injury and posterior instability.<sup>4</sup> Over the years, satisfactory clinical



**Fig 7.** After complete excision of the spinoglenoid cyst, the 30° arthroscope is reinserted from the posterior portal to the subacromial space in the right shoulder. The trans-rotator cuff approach (yellow arrow) is located at the supraspinatus muscle medially to the rotator cable (red arrow) with a diameter of about 2 cm.

**Table 2.** Advantages and Disadvantages

Advantages
The TCA is located medial to the rotator cable to keep the biomechanical structure complete.
The fenestration can be performed more accurately in combination with preoperative MRI.
A good view can be obtained for observation of the cyst without stripping the posterior-superior labrum, especially when the superior labrum is complete.
A complete resection can be performed with a low risk of recurrence, especially in cases of multiple-segmented cysts.
Injury to the SSN and SSA is avoided.
Disadvantages
Damage to the posterosuperior capsule can occur.
More effort is required to achieve blunt separation of cysts.
There is a risk of hematoma.

MRI, magnetic resonance imaging; SSA, suprascapular artery; SSN, suprascapular nerve; TCA, trans-rotator cuff approach.

results with few complications have been reported in that aspect.<sup>5,6</sup> We use the trans-rotator cuff approach to release and remove spinoglenoid cysts by opening the posterosuperior capsule and find that this technique has the following advantages: It is a minimally invasive technique for excising spinoglenoid cysts without additional release of the labrum either damaging the rotator cable (Fig 7). This approach provides a clear view of the cyst and complete removal of the cyst could be achieved. (Table 2). This approach is suitable not only for multiple-segmented spinoglenoid cysts but also for non-segmented cysts without labral injury found during an operation, thus avoiding incomplete decompression and reducing the risk of recurrence.<sup>1,7</sup>

MRI is indispensable in the diagnosis of paralabral cysts and preoperative planning. By use of a T2 oblique sagittal MRI scan, the position of a spinoglenoid cyst can be preliminarily evaluated by horological positioning on the en face layer of the glenoid cavity, which is conducive to the establishment of an appropriate trans-rotator cuff approach.

Anatomic studies have shown that the suprascapular nerve of the glenoid notch is approximately 1.8 to 2.1 cm from the glenoid edge,<sup>8</sup> which is usually located below the glenoid cyst and adjacent to the spinoglenoid notch. We suggest using blunt dissection<sup>9</sup> as much as possible to avoid iatrogenic injury to the suprascapular

artery and nerve after posterosuperior capsular fenestration within the range of 1.5 cm medial to the glenoid. Decompression of cysts with repair of SLAP injuries through a trans-rotator cuff approach is observed to be safe and reliable; through this approach, we can not only realize complete excision of spinoglenoid cysts but also repair labral tears or other complicated injuries at the same time.

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