



Arthroscopic Resection of Symptomatic Bennett Lesions

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Abstract: Bennett lesions, also known as “thrower’s exostosis” of the shoulder, involve ossification of the posteroinferior glenoid and are not uncommon in overhead throwing athletes. The literature surrounding the optimal operative management of the symptomatic Bennett lesion is limited. The purpose of this article is to describe the arthroscopic surgical technique for the visualization and excision of the symptomatic extra-articular pathologic ossification involving the posteroinferior glenoid. Because many surgeons may not be familiar with this problem or procedure, we present a straightforward method that allows for identification and excision of the exostosis through an arthroscopic posterior arthrotomy.

Overhead throwing athletes are predisposed to the development of an exostosis that, when present, typically emanates off of the posteroinferior glenoid (Figs 1 and 2). This ossification, which has been named the “Bennett lesion,” is not uncommon in throwing athletes and may or may not be symptomatic.¹ The excessive use and loading of the arm, primarily with throwing, have been hypothesized to cause calcification on the posteroinferior capsule.¹ The proposed causation of symptoms associated with Bennett lesions include axillary nerve irritation by a bone spur, nonunion of fracture fragments, and associated internal impingement of the shoulder.¹⁻³ Because Bennett lesions are frequently asymptomatic and shoulder pain in the throwing athlete is quite common with multiple potential causes, there is often difficulty in determining whether symptoms are due to the Bennett lesion itself versus separate, concomitant pathology.⁴ When symptomatic, patients typically complain of posterior shoulder pain radiating into the

latissimus dorsi and teres minor and/or major region, primarily exacerbated by the act of throwing. Patients with this symptomatic exostosis often have tenderness to deep palpation directly over the posterior inferior glenoid region.

Nonoperative management is the current mainstay of treatment for the symptomatic Bennett lesion.⁵ Surgical intervention is an option for patients who do not respond to conservative management and/or who are unable to return to competition despite structured rehabilitation and treatment. There is no consensus in the literature regarding the optimal surgical management of the Bennett lesion. In addition, there is controversy over the importance of excising the Bennett lesion itself versus addressing concomitant shoulder pathology without lesion excision.²⁻⁵ Few surgical techniques have been described in the past 2 decades; those that have involve variations of lesion resection with capsulotomy.^{2,3}

The purpose of this article and Video 1 is to describe an arthroscopic surgical technique for the visualization and excision of the posteroinferior glenoid Bennett lesion via release of the posterior capsule adjacent to the typically intact labrum without subsequent capsular repair. This may be particularly helpful for surgeons who have never seen the procedure because it is relatively uncommon in the absence of experience with a large throwing population.

Technique

Diagnostic Arthroscopy

Although we have performed this procedure with the patient in the beach-chair position, the senior author

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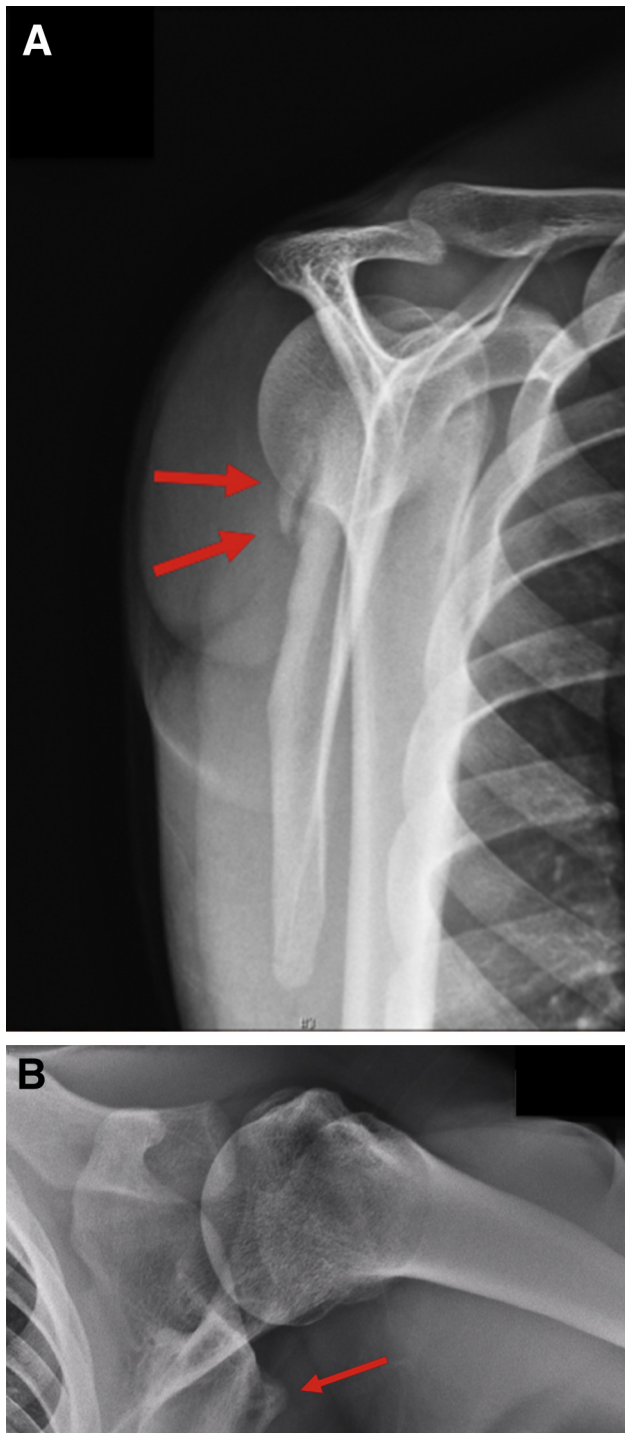


Fig 1. Radiographic images of a Bennett lesion in the left shoulder of a high school pitcher. (A) Lateral view of Bennett lesion in posteroinferior region of glenoid (arrows). (B) An axillary view reveals the posterior exostosis (arrow).

(K.F.B.) prefers lateral decubitus positioning for this procedure. A regional interscalene block is administered prior to induction of general anesthesia. An examination under anesthesia is performed to assess for associated glenohumeral internal rotation deficit or

signs of excessive laxity or instability. Posterior instability should not be present in these patients if the preoperative diagnosis of a symptomatic Bennett lesion is correct. If anything, the posterior capsule may be tighter than expected in a young athlete. Once a standard posterior viewing portal is created, an anterior working portal is established in the rotator interval with the aid of a spinal needle. Initially, a thorough diagnostic arthroscopy is performed with particular attention to potential concomitant pathology frequently encountered in the throwing athlete (Fig 3A). Special attention should also be paid to determine the status of the posterior labrum and articular cartilage because the primary complaint in these throwing athletes is posterior pain. However, it is not uncommon for the Bennett lesion to be a relatively isolated problem.

Once the surgeon is ready to address the Bennett lesion, the arthroscope is placed in the anterior portal, which will typically serve as the primary viewing portal (viewing posterior). A cannula is inserted into the previously established posterior portal. It is critical for the working posterior portal to allow optimal access to the posterior and posterior-inferior capsule adjacent to the labrum. It is not uncommon for the initial posterior portal to not be optimal for access to this region, and we do not hesitate to create a more optimal accessory working portal with the aid of a spinal needle. This optimized accessory portal is often more lateral than the initial posterior viewing portal. One should remember that the exostosis lesion is

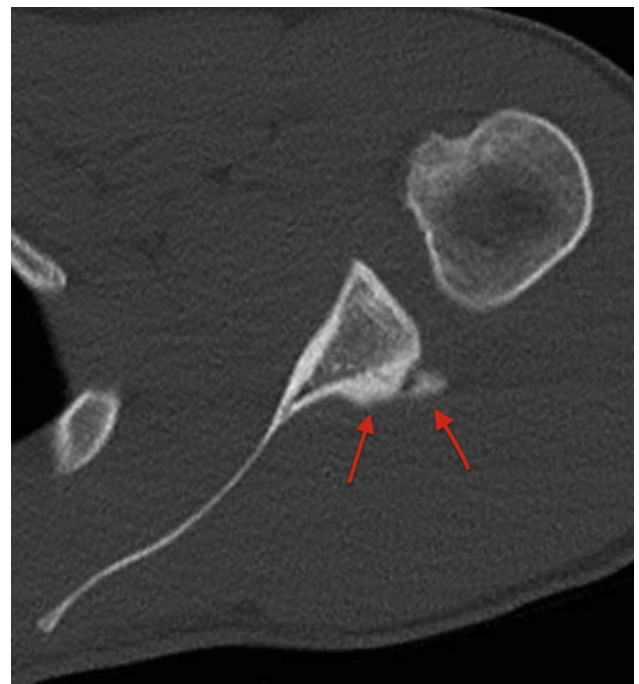
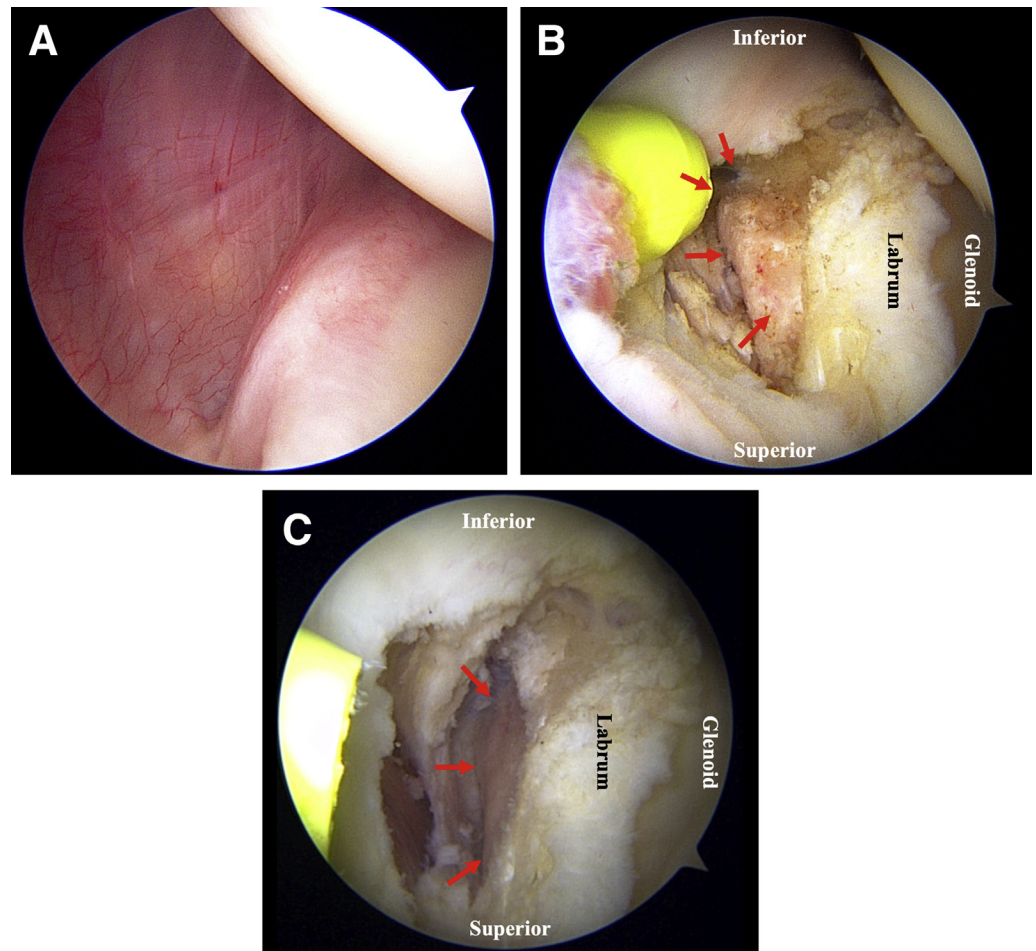


Fig 2. Computed tomography image of a Bennett lesion in the left shoulder of a high school pitcher. An axial view shows the Bennett lesion in the posteroinferior aspect of the glenoid (arrows).

Fig 3. Arthroscopic images of a Bennett lesion excision in the left shoulder of a high school baseball pitcher. A 70° scope is within the anterior portal viewing posterior with the scope angled inferior. (A) Arthroscopic image of capsule adjacent to posterior and posteroinferior labrum prior to arthrotomy. (B) After capsulotomy, the glenoid neck exostosis is exposed, with the normal contour of the glenoid neck identified by arrows. (C) On completion of lesion dissection or excision, the contour of the glenoid neck (arrows) is restored.



extra-articular and cannot be visualized within the joint. In fact, the intra-articular structures often appear completely normal. However, if the Bennett lesion is large, it may potentially be palpated under the posteroinferior glenohumeral ligament and capsule region.

Capsulotomy

To achieve visualization of the extra-articular Bennett lesion, the capsule needs to be released just adjacent to the posterior and posteroinferior labrum. We prefer to use a hooked electrocautery device (Smith & Nephew, Andover, MA) to at least initiate the capsulotomy. Care is taken to go just through the capsule. For a standard Bennett lesion, the posterior arthrotomy typically goes from the 2- or 3-o'clock position to the 5:30-clock face position or 6-o'clock position in a left shoulder. The arthrotomy should be extensive enough so that the capsule does not limit one's visualization or ability to place instruments extra-articularly along the neck of the glenoid. If not adequate, it should be extended. An arthroscopic scissor-type instrument may also be useful to extend the capsular release once initiated with the cautery device. Both 30° and 70° arthroscopes are routinely used to optimize visualization in this case. Special care is taken to ensure the labrum is left intact

and not damaged. Even if there is damage to the labrum to the point it needs to be repaired (which should be extremely unlikely assuming the correct preoperative diagnosis), the capsule is still released in the same region.

Glenoid Neck Exostosis Dissection and Exposure

Once the posterior capsulotomy is completed, dissection is carried down along the neck of the glenoid. Blunt instruments such as a trocar may be helpful to sweep away the capsule and soft tissue from the glenoid. A small 3.5-mm shaver (Smith & Nephew) is often used to carefully debride soft tissue, being mindful to minimize suction when extra-articular inferiorly to avoid inadvertent neurovascular injury (i.e. branches of the axillary nerve directly below the inferior capsule). An arthroscopic elevator, curette, and radiofrequency device (Smith & Nephew) are very useful in dissecting along the glenoid and exposing the Bennett lesion. One should try to essentially stay on the bone as one elevates the soft tissue off the glenoid neck and gradually exposes the exostosis. The exostosis may be more medial and inferior than one would expect based on the computed tomography and radiographic imaging. However, the pathologic exostosis should become apparent as one exposes the glenoid neck

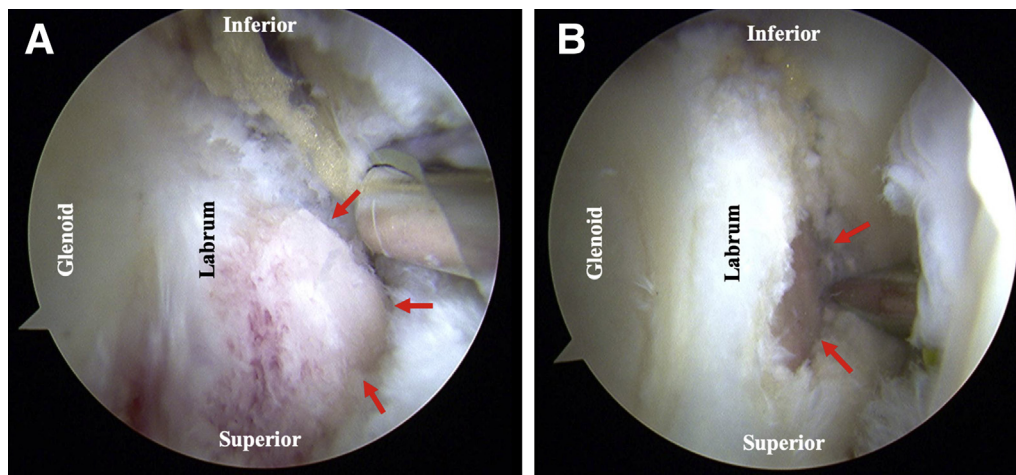


Fig 4. Bennett lesion in the right shoulder of a collegiate baseball player. (A) Isolation of Bennett lesion (arrows) after arthrotomy. (B) Posteroinferior glenoid after completed resection of symptomatic Bennett lesion (arrows).

approximately 8 to 12 mm medial to the labrum (Figs 3B and 4A). The goal of this step is to dissect over the peak (medial and inferior) of the exostosis and down the other side. Although it is important to be cautious and this dissection may take a little time, by staying on bone this should be quite safe.

Lesion Debridement and Excision

Once the Bennett lesion has been adequately exposed, a combination of instruments can be used to remove the exostosis. Although one can consider an arthroscopic osteotome, we have found small arthroscopic bone shavers and curettes to be most useful. Care is taken to keep the open shaver pointed away from the axilla (toward the joint), stay directly on bone, and use minimal suction when extra-articular along the glenoid neck. The goal is to excise the large exostosis and restore the contour of the glenoid (Figs 3C and 4B).

If a labral tear deemed to require repair is identified, it is repaired without incorporating a capsular repair. However, this is typically not the case. We have not repaired the posterior capsule after exostosis excision and have not seen any cases of postoperative instability. However, it is paramount to make sure the patient does not have symptomatic preoperative posterior instability and labral pathology as the actual cause of pain. Obviously, releasing a pathologically loose capsule would only exacerbate the problem and worsen the patient's condition.

Discussion

The treatment of a symptomatic Bennett lesion has been largely debated because of the present controversy regarding symptom etiology. In high-level throwing athletes, the development of Bennett lesions is not uncommon; this process is likely associated with excessive overhead throwing and resultant strain on the posteroinferior glenoid.^{1,5} A Bennett lesion is often an asymptomatic radiographic finding, but certainly it should remain in the differential diagnosis of posterior

shoulder pain in the overhead throwing athlete.^{1,3,5} Assuming an accurate diagnosis of a symptomatic exostosis, patients experiencing persistent posterior shoulder pain despite conservative management may benefit from surgical intervention. We have seen athletes who have been symptomatic for years and on the verge of quitting their sport and were able to return to competitive play without pain within 3 months. In our review of the literature in print and online, we found no surgical technique articles or video techniques published in the past 15 years describing or illustrating an arthroscopic technique to address the symptomatic Bennett lesion. Because of the relatively rare surgical indications for this procedure, we believe our technique description with video illustration may be useful for surgeons who have not seen or performed the technique.

In 1977, Lombardo et al.⁶ described their open approach to posterior shoulder lesions in throwing athletes by splitting the deltoid and performing a longitudinal capsulotomy and subsequent lesion excision through the interval of the infraspinatus and teres minor. At the time, they did not specifically identify the lesions described as Bennett lesions. However, the pathology of the reported lesions was consistent with that of Bennett lesions because they were found to be localized within the posteroinferior joint capsule and have characteristics of chronic inflammation and new bone formation.⁶ This method has since given way to less invasive arthroscopic approaches to achieving access to the posterior glenoid.

Since first described by Meister et al.³ in 1999, arthroscopic excision of the posterior Bennett lesion has consisted of variations on capsulotomy, soft-tissue debridement for the purpose of visualization, removal of the posterior glenoid exostosis, and contouring of the glenoid rim. In 2002, when reporting on their arthroscopic "Bennett-plasty," Yoneda et al.² recommended the need for capsular repair to accelerate postoperative range-of-motion therapy after lesion excision. Although

they reported an 88% satisfaction rate in a series of 16 patients, with 69% of their patients being able to return to baseball at their preinjury level, no differences in clinical outcomes were shown between patients who underwent capsular repair and those who did not. In contrast, Meister et al. did not repair the posterior capsule after lesion excision and reported satisfactory results in all 11 patients. Meister et al. and other authors (including the senior author) prefer to intentionally leave the posterior capsule released to address the potential concomitant contracture of the posterior capsule. Yoneda et al.⁷ in 2006 found that among 16 patients with a posterior capsular contracture and loss of internal rotation who underwent capsular release, all 16 had improved and 14 had complete resolution of symptoms. Certainly, it is controversial as to how much the capsular release effect may contribute to the patient's postoperative improvement versus the actual excision of the Bennett lesion. However, because clinical success has also been shown when the capsule is repaired, which theoretically could make it tighter, the beneficial effects were likely a result of exostosis excision.³ Outcome data after surgical management of Bennett lesions are lacking, and there is currently no consensus in the literature as to the optimal management of the capsule once the exostosis has been excised.

Pearls and pitfalls of this procedure are summarized in [Table 1](#). The first step, and perhaps often the most challenging, is accurate diagnosis of the cause of the throwing athlete's posterior shoulder pain. A symptomatic Bennett lesion may often be a diagnosis of exclusion because it is a common finding in asymptomatic throwing athletes as well. When the surgeon is performing the capsulotomy, emphasis should be placed on cutting just adjacent to the intact labrum to maintain its integrity. This assumes the labrum is intact, which is typically the case. Our experience is consistent with the recent study by Karcich et al.,⁸ who concluded that symptomatic overhead athletes with Bennett lesions may not have an increased frequency of labral pathology or findings of internal impingement. One potential major complication of this procedure could be inadvertent injury to the neurovascular structures, most at risk being the branches of the axillary nerve. This should be avoided with careful dissection and use of a shaver and electrocautery when extra-articular. Moreover, inadequate resection of the lesion could lead to persistent symptoms and failure. Finally, there is the concern of potential iatrogenic postoperative posterior instability when the capsulotomy is left unrepaired, which is our current practice. Fortunately, we have not seen any reports nor have we experienced any cases of postoperative iatrogenic posterior instability after

Table 1. Pearls and Pitfalls

Pearls	
Accurate diagnosis is imperative; the surgeon must ascertain that the Bennett lesion is symptomatic.	
The capsulotomy should be performed just adjacent to the posterior and posteroinferior labrum.	
The surgeon should stay along the bone just medial to the posterior labral attachment as he or she dissects along the glenoid neck.	
The exostosis may be more medial than expected.	
Pitfalls	
Releasing a pathologically loose capsule will worsen the patient's condition if posterior instability is the cause of pain in a young athlete.	
Injury to the labrum or deeper structures can occur during capsulotomy.	
Overzealous suctioning with the shaver when extra-articular can potentially cause neurovascular injury.	

capsulotomy without repair when performed for this indication. As a result, this is our preferred technique because it will allow for a faster recovery and may address a concomitantly tight posterior capsule.

On the basis of our experience, the described arthroscopic technique can be performed in a safe and effective manner to address symptomatic Bennett lesions. The main objective of this technique article was to describe a relatively rare procedure but one that can likely be performed with success by most shoulder arthroscopists.

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