

Use of Novel Radiofrequency Wand for the Application of the Biceps Tenotomy and Subacromionical Bursectomy



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Abstract: Rotator cuff tears in patients can lead to a surgical intervention to relieve the pain and improve the function of the shoulder joint. In the majority of cases, the rotator cuff repair is completed arthroscopically and requires the ability for soft-tissue resection and visualization to restore the anatomic structures to their native state. With the advent of a radiofrequency wand, the technical aspects of a biceps tenotomy from the insertion point on the glenoid can be completed, along with the ability to resect, ablate, and coagulate tissue, using a single instrument. Although bone resection is completed with a bone cutting shaver and/or burr, the soft-tissue dissection can be completed in a precise and efficient manner.

Introduction (With Video Illustration)

Rotator cuff tears increase with age, with full-thickness tears having prevalence rates of approximately 30% in those age ≥ 60 years and 80% in those ≥ 80 years.¹ Between 2004 and 2014, the rate of rotator cuff repair surgeries in the Medicare population significantly increased by 41%, indicating a rising interest in this procedure.² Surgeons are therefore increasingly tasked with adopting the operative techniques that provide the optimal conditions for visualization, repair, and eventual postoperative recovery and restoration of function.

The subacromial bursa is contained within the subacromial space superiorly with the coracoid,

coracoacromial ligament, and proximal deltoid and inferiorly by the supraspinatus muscle. A bursectomy is completed for visualization of the rotator cuff and adjacent structures, which may be causing the pathology associated with the shoulder surgery. Bleeding from the thoracoacromial artery and the posterior circumflex humeral artery can present a challenge within the subacromial space during the treatment of the biceps tendon.

Using a radiofrequency (RF) wand for the biceps tenodesis or tenotomy and/or subacromial bursectomy may reduce postoperative swelling and pain, improve outcomes and patient satisfaction, and lead to a more-efficient use of surgical time. An RF bipolar wand allows a surgeon to coagulate and ablate tissue to treat the pathology while minimizing instrument exchange. In addition, treating the long head of the biceps (LHB) with a bipolar wand can preserve the tissue structures and cartilage, and minimize discoloration while treating the pathology. This report introduces our preferred approach to addressing biceps pathology, whether a tenodesis or tenotomy are performed, and a subacromial bursectomy performed using an RF wand (Video 1).

Indications

A biceps tenodesis or tenotomy may be indicated for patients who may have continued shoulder pain with certain movements within the shoulder. Often, a biceps procedure is completed in conjunction with a rotator cuff repair. The patient's symptoms should be

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Fig 1. Radiofrequency device and wand (Werewolf FLOW 90 COBLATION WAND; Smith & Nephew, Andover, MA).

correlated with the patient's physical examination, imaging, and intraoperative findings to confirm the patient findings to benefit from the procedure.

Patient Evaluation

Before any surgical intervention, the physical examination findings must demonstrate findings of biceps involvements. In addition, imaging is often helpful to address concomitant shoulder pathology during a surgery such as rotator cuff tears, acromioclavicular joint arthritis, and cartilage lesions within the glenohumeral space.

Imaging

In the majority of cases, magnetic resonance imaging is used to identify subsequent injuries within the shoulder joint. Other modalities for determining the pathology are ultrasonography, needle arthroscopy, and, less commonly used, the computed tomography scan.

Surgical Technique

The patient is given an interscalene block in the preoperative holding area by the regional anesthesia team and then brought to the operating room. After induction of general anesthesia with the patient in a supine position, the patient is placed into a beach chair position with a sterile arm positioner. The patient is given a routine examination under anesthesia to assess the range of motion, instability, and crepitus before the surgical procedure.

Following a time out, a standard posterior portal is established to assess the LHB tendon, the labral, glenoid and humeral head cartilage, subscapularis, and rotator cuff tendon attachment from the articular surface. An anterior portal is established just lateral to the coracoid, with direct visualization of the glenohumeral joint with an 18-gauge spinal needle. Making a 1-cm incision through the rotator interval and using a switching stick,

we complete insertion of a cannula (SportPort; Cannula Flow, Fremont, CA) into the intra-articular space.³

The biceps tendon is evaluated, and a probe is used to manipulate the biceps tendon and the anchor onto the glenoid for a potential superior labral anterior posterior lesion. If the biceps tendon is noted to be pathologic, the tendon is released off the origin, depending on the fixation location. If a biceps tenotomy or subpectoral biceps tenodesis is planned, the LHB tendon is tenotomized at its origin at the supraglenoid tubercle. If any sutures are planned within the biceps tendon, we complete the tenotomy of the LHB 1 cm from the suture passage. To control the location and protect the circumferential labrum and cartilage of the glenoid, an RF wand (Werewolf FLOW 90 COBLATION WAND; Smith & Nephew, Andover, MA; Figs 1 and 2) is employed that uses bipolar technology with a chemical reaction to regulate the effects of adjacent structures.

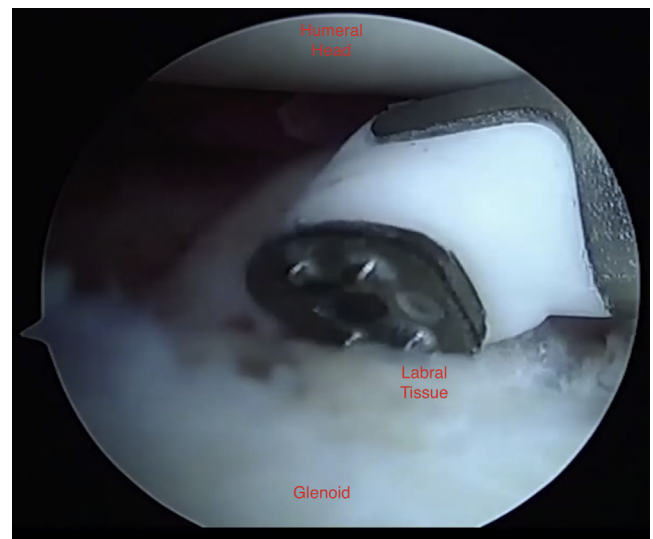


Fig 2. Treatment of labral tissue with the radiofrequency device.

Table 1. Pearls and Pitfalls

Pearls	Pitfalls
<ul style="list-style-type: none"> • The biceps tendon can be tenotomized within one tissue plane for a clean release from the insertion point • Protecting the cartilage of the glenoid during the biceps tendon release 	<ul style="list-style-type: none"> • Care needs to be taken to understand the radio-frequency settings • Ensure the sutures that tag the biceps tendon are separated from the biceps tenotomy in the joint

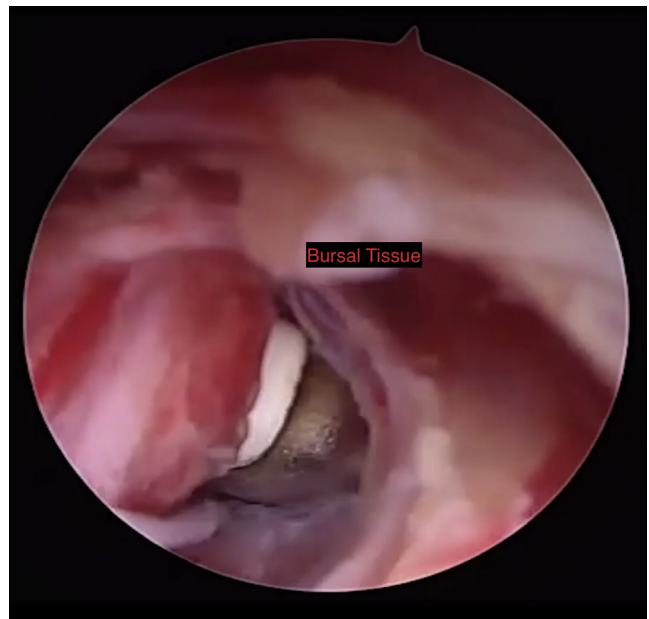
The biceps tenotomy is completed with the RF wand, and the desired fixation method can be applied.

Next, the subacromial space is addressed (Tables 1 and 2). The arthroscope is placed in the subacromial space and the establishment of a lateral working portal is created with direct visualization with an 18-gauge spinal needle. A 1-cm incision is created and a switching stick is placed into the subacromial space and a cannula (SportPort; Cannula Flow) is inserted into the space as a working portal. A thorough subacromial bursectomy is completed with the achievement of hemostasis and subperiosteal exposure of the undersurface of the acromion. To increase the efficiency of the resection and ablation for the bursa and minimize bleeding, the RF wand is used in VAC mode (the button on the Werewolf which allows soft tissue resection, suction and ablation at the same tissue) and coagulation-plus mode (Figs 3-5). The RF wand works synergistically with tissue suction and ablation to expedite the visualization within the subacromial space. This obviates the need to move the shaver and RF wand in and out through the lateral portal. In addition, the efficiency can lead to decreased fluid extraction from changes within the pump pressure when visualization becomes difficult with bleeding. Lastly, using a shaver and or burr, the undersurface of the acromion and removal any anterolateral osteophytes can be completed prior to the desired rotator cuff repair.

Table 2. Advantages and Disadvantages

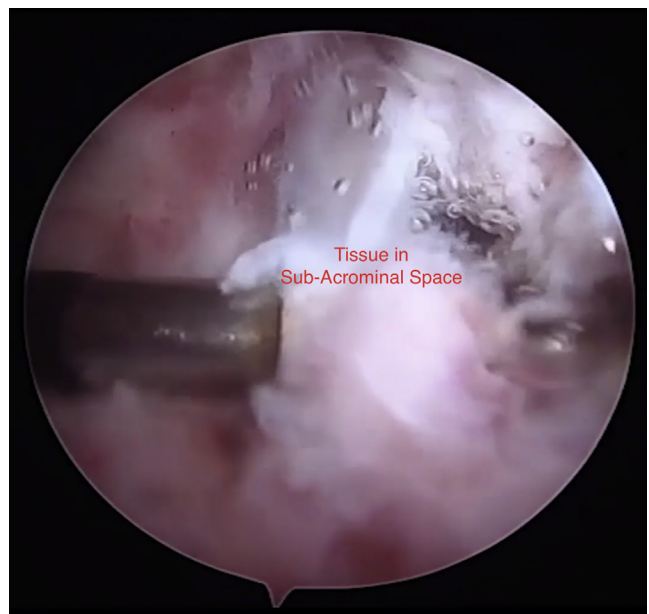
Advantages	Disadvantages
<ul style="list-style-type: none"> • Safety profile for the biceps tendon release from the glenoid at the insertion site • Able to address the cartilage lesions within the glenohumeral joint • Able to perform an efficient and safe soft-tissue removal within the subacromial space 	<ul style="list-style-type: none"> • Learning the RF settings • Learning curve associated with the RF wand for a biceps tendon release instead of a biter and or shaver

RF, radiofrequency.

**Fig 3.** Subacromial bursal tissue.

Postoperative Management and Rehabilitation

The procedure was performed in an outpatient manner. The patient is placed in a sling for 6 weeks and non-weight-bearing precautions are taken during this time frame. Passive motion and Codman exercises are started within the first 2 weeks. Active and active assisted range of motion is begun around 4 weeks. The goal is full range of motion by 3 months and strength training and clearance by 16 to 24 weeks.

**Fig 4.** Bursectomy with the radiofrequency wand in an efficient manner with VAC and ablation mode.

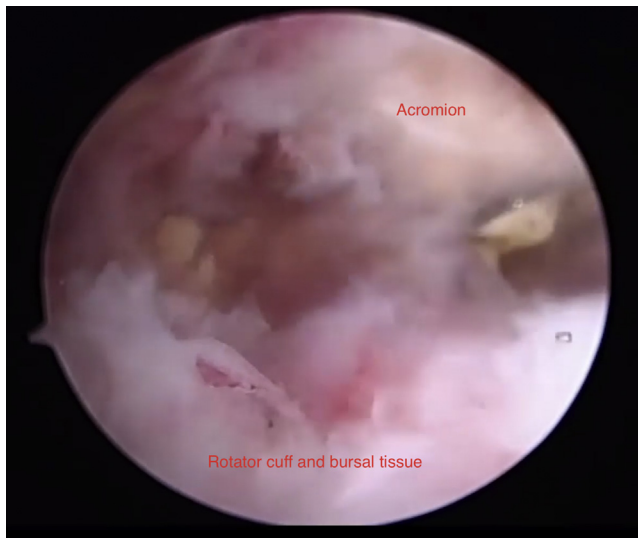


Fig 5. Use the radiofrequency wand in a VAC setting to remove soft tissue underneath the acromion.

Discussion

With the prevalence and incidence of shoulder arthroscopy increasing in the United States, it is important to preserve the soft tissue around the biceps tendon attachment and increase the efficiency within the subacromial space.⁴ It is advantageous to tenotomize the LHB tendon with an RF wand to avoid the circumferential labral fibers when the wand is placed in a direction away from the superior labrum. The use of the RF wand avoids any iatrogenic cartilage injury associated with a shaver and or arthroscopic biter on the glenoid and or humeral head and inadvertent cartilage lesions from the shaver and or biter during the entry into the joint. Using an RF wand from the superior portion of the tendon allows the surgeon to understand the anatomic length–tension relationship for fixation purposed, if a suprapectoral is desired by the surgeon.⁵ Lastly, this technique allows the subacromial bursectomy to be completed with the RF wand to minimize alternating between the shaver and RF wand throughout the bursectomy.

It is critical to understand the blood supply to the cranial and caudal parts of the subacromial bursa and the vascularity of the rotator cuff tendons on the bursal side. The plasma field of the RF wand allows coagulation without direct contact to the rotator cuff, thus minimizing possible iatrogenic damage to the rotator cuff tendon during the bursectomy. In addition, using anatomic landmarks, techniques of a complete bursectomy, systematically performing the bursectomy from the superior, anterior, lateral, and posterior gutter, can

be completed with a wand. The advantages of having an RF wand with the capabilities for ablation, coagulation, and tissue resection are that it allows the bursectomy to be completed with a single instruction throughout the procedure and expedites the efficiency and visualization throughout the case. For example, if a vascular lesion is noted, the surgeon typically will shuttle the RF wand with a shaver to visualize the subacromial space; however, with this RF wand, the surgeon is able to control bleeders and resect tissue with a single instrument. In addition, when using a shaver, compared with a wand, often the loss of fluid dissipation during suctioning to remove the soft tissue leads to fluctuations in the fluid levels within the subacromial space from the pump, which can lead to soft-tissue retention and rare complications such as skin necrosis, neuropraxia, and respiratory compromise.⁶

When optimizing visualization during a shoulder arthroscopy, it is important to minimize blood pressure, arm traction devices, and the use of dilute epinephrine in the saline irrigation fluid independent of the patient position. The goal of the procedure is to establish visualization, restore the anatomy to the preinjury state, and perform the desired repair while expediting the visualization with improved optics by use of the RF wand for the bursectomy in the rotator cuff repair.

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