CONTENTS

Section 5: Disorders of the Biceps Labral Complex

VIDEO CONTENTS

SECTION 1

Principles of the Rotator Cuff

CHAPTER 1

Clinical Anatomy of the Rotator Cuff

Akimoto Nimura, Keiichi Akita, and Hiroyuki Sugaya

INTRODUCTION

Traditional comprehension of anatomy cannot keep up with technologic progress in medicine, especially advances in shoulder surgery. The rapid pace of technologic change in arthroscopic procedures and practices and advances in imaging methods require a better comprehension of detailed arthroscopic structures that cannot be observed by human visual means. Due to the current high numbers of arthroscopic surgeries, it is critical that this covers both histologic characteristics and spatial relationships between structures. In this chapter, we show some anatomic knowledge of the muscles of the rotator cuff.

THE SUPRASPINATUS AND INFRASPINATUS MUSCLES

Both the insertion of the supraspinatus into the uppermost impression of the greater tubercle and the insertion of the infraspinatus into the middle impression of the greater tubercle have been referred to by most anatomic textbooks and also by several anatomic studies. However, the challenge to differentiate these tendons with their integrated fibers has been described by Clark and Harryman. Observance that these two tendons have overlapping areas on the greater tubercle, and that the insertion of the supraspinatus has a wider area than was known previously has also been reported by Minagawa et al.

The origin of the supraspinatus muscle runs laterally in the superior surface of the scapular spine and the supraspinatus fossa. The origin of the infraspinatus muscle runs superolaterally from both the inferior surface of the scapular spine and the infraspinatus fossa. New findings about the supraspinatus and infraspinatus footprints on the humerus have been reported by Mochizuki et al. It appears that the supraspinatus and infraspinatus fibers mix together to form a common insertion on the greater tubercle. However, after removal of the overlying connective tissues and the coracohumeral ligament on the rotator cuffs, the anteromedial margin of the infraspinatus tendon can be remarkably separated (Fig. 1.1). Moreover, the margin between the supraspinatus and infraspinatus is clearer. In comparison with the posterior border of the supraspinatus, the anterior border of the infraspinatus is slightly protuberant. The posterolateral area of the supraspinatus is covered by the anterior part of the infraspinatus.

There are generally three impressions on the upper surface of the greater tubercle: the uppermost, the middle, and the lowest. However, approximately half of the uppermost impression and the whole of the middle one are actually taken up by the humeral insertion of the infraspinatus (Fig. 1.2). The anteriormost region of the humeral insertion of the infraspinatus almost extends to the anterior border of the uppermost impression of the greater tubercle. At the anteromedial area of the uppermost impression of the greater tubercle, the supraspinatus inserts itself (Fig. 1.2). The shape of the footprint of the supraspinatus is like a triangle, which is lateral to the joint cartilage. The supraspinatus is inserted into not only the greater tubercle but also the lesser tubercle in 20% of specimens. In such cases, the superior part of the intertubercular sulcus is covered by the anteriormost portion of the supraspinatus tendon.

The greater tubercle, according to anatomic textbooks, is identified by three flat surfaces: the uppermost impression is the supraspinatus insertion, the middle impression is the infraspinatus insertion, and the lowest impression is the teres minor insertion. The shapes of these three impressions are portrayed as contiguous tetragons (Fig. 1.3). Nevertheless, in a recent study, identification of the "lateral impression" was consistent, being composed of the margin with the uppermost impression, the margin with the middle impression, and the margin with the lateral side of the greater tubercle (Fig. 1.4). Confirmation of the "lateral impression" corresponding to the anteriormost part of the infraspinatus insertion was made.

Toward the anterior tendinous portion, the majority of the muscular parts of the supraspinatus adjoin to the intramuscular tendon, which is located in the anterolateral part of the supraspinatus. Additionally, toward the medial border of the uppermost impression on the greater tubercle, the remaining muscles from the deep part run laterally. There are two parts in the supraspinatus tendon: the anterior part, which is thick and long; and the posterior part, which is thin and short. The composition of the superoanterior part of the infraspinatus consists of a long and thick tendon. A short and thin tendon that occupies the remaining infraspinatus muscle is joined by a short and thin tendon of the teres minor muscle.

Based on the direction of muscle, the infraspinatus is identified by oblique and transverse parts fibers. A fan-like muscle bundle characterizes the oblique part, and it originates from the infraspinatus fossa running superolaterally.

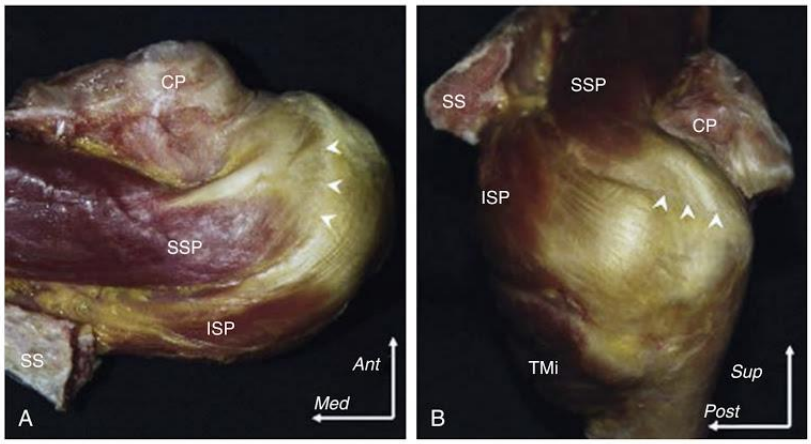

FIG. 1.1 The superior aspect of the rotator cuffs in the right shoulder (the acromion has been removed). The margin between the supraspinatus *(SSP)* and the infraspinatus *(ISP)* tendons is shown *(white arrows)*. (A) Superior aspect of the shoulder. (B) Lateral aspect of the shoulder. *CP,* Coracoid process; *SS,* scapular spine. (From Nimura A, Kato A, Yamaguchi K, et al. The superior capsule of the shoulder joint complements the insertion of the rotator cuff. *J Shoulder Elbow Surg.* 2012;21:867–872.)

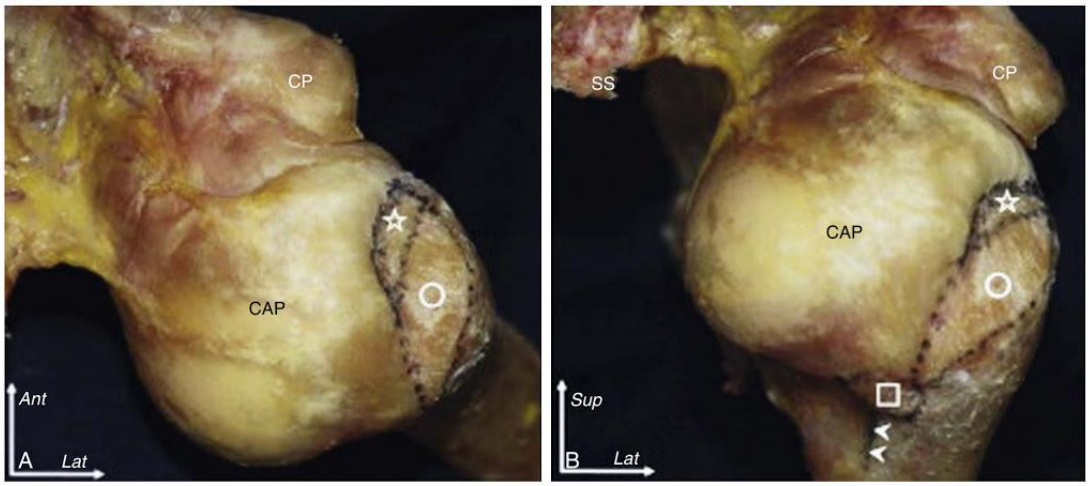

FIG. 1.2 The insertions of the supraspinatus *(open star)* and infraspinatus *(open circle)* tendons into the humerus. Note the capsule of the shoulder joint can be separated from the rotator cuff tendons. The insertion area of the tendinous and muscular portions of the teres minor are shown as open square and arrowheads, respectively. (A) Superior aspect of the humerus. (B) Posterior aspect of the humerus. *CAP,* Articular capsule of the shoulder; *CP,* coracoid process; *SS,* scapular spine. (From Nimura A, Kato A, Yamaguchi K, et al. The superior capsule of the shoulder joint complements the insertion of the rotator cuff. *J Shoulder Elbow Surg.* 2012;21:867–872.)

The origin of the transverse part is inferior to the scapular running laterally. At the middle portion of the tendinous part, the oblique and transverse parts are connected with each other. At the superior area of the muscular portions the two parts are connected; however, they are clearly seen to be separated in the distal tendinous portions. The transverse part does not extend to the tubercle even though the oblique part is inserted into the greater tubercle. Adjoined to the transverse part is the posterior surface of the tendinous portion of the oblique part. It has been suggested that a significant amount of power derived from the oblique part of the infraspinatus is able to concentrate more anteriorly. This relates to the abduction of shoulder joint. Nevertheless, during shoulder motion, the transverse part may only assist the function of the infraspinatus and stabilize the tendinous portion of the oblique part.

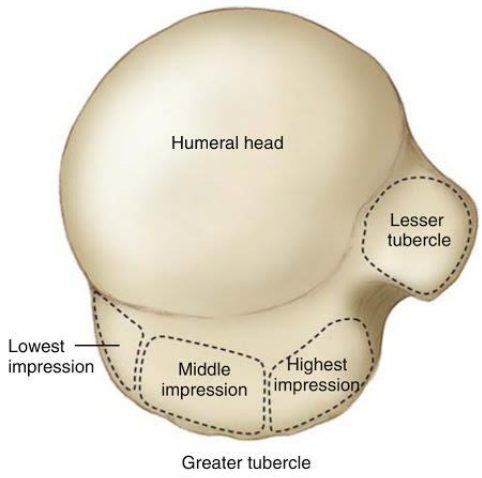

FIG. 1.3 Illustration of the greater tubercle as portrayed in conventional textbooks. The topology of impressions of the greater tubercle is simply portrayed as contiguous tetragons. (From Nozaki T, Nimura A, Fujishiro H, et al. The anatomic relationship between the morphology of the greater tubercle of the humerus and the insertion of the infraspinatus tendon. *J Shoulder Elbow Surg.* 2015;24:555–560.)

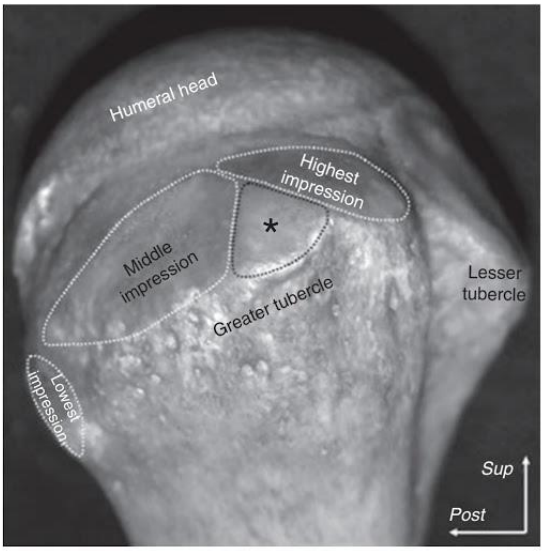

FIG. 1.4 The "lateral impression" of the greater tubercle. Another impression *(asterisk)* can be identified posterolateral to the uppermost impression, anterolateral to the middle impression, and medial to the lateral margin of the greater tubercle. (From Nozaki T, Nimura A, Fujishiro H, et al. The anatomic relationship between the morphology of the greater tubercle of the humerus and the insertion of the infraspinatus tendon. *J Shoulder Elbow Surg.* 2015;24:555–560.)

There are variations of the origins of the branch of the suprascapular nerve that innervates the transverse portion of the infraspinatus. Branches originate from the branch that innervates the supraspinatus muscle, and/or from the main trunk of the suprascapular nerve after branching off the supraspinatus branches (Fig. 1.5). No branches are found to penetrate the transverse portion to innervate the oblique part, and vice versa. Based on its origins of the innervating branches, the transverse part might have close relevance with the supraspinatus, even though the transverse part is a part of the infraspinatus.

The Subscapularis Muscle

The subscapularis muscle insertion comprises the upper two-thirds of the tendinous part and the lower one-third insertion where the muscle inserts into the humerus relatively directly. In the superior border of the lesser tubercle, the superiormost insertion of the subscapularis tendon is wide, whereas the remaining subscapularis tendon is inserted into the anteromedial part of the lesser tubercle (Fig. 1.6). Additionally, a thin tendinous slip extends from the uppermost insertion of the subscapularis tendon, and this slip is attached to the fovea capitis of the humerus.

Observation of a number of intramuscular tendons is made possible by removing the muscular tissues. Formation of a tendinous insertion occurs due to lateral aggregation of these tendons. The superior part of the tendinous part is the origin of the uppermost insertion of the subscapularis tendon. The structure that supports the running course of the long head of the biceps tendon (LHBT) from inferior is comprised of the uppermost, lateral part of the superior tendinous part, and the tendinous slip. The running course of the LHBT is continued superomedially from the bony medial margin of the intertubercular sulcus by this structure.

The proximal part of the superior glenohumeral ligament (SGHL) can be confirmed at the anterosuperior part of the internal wall of the joint space. At this location it extends spinally and finally is attached to the superior slip of the subscapularis tendinous insertion. As a result, the SGHL forms the running course of the LHBT continuing to the intertubercular sulcus. The SGHL is attached to the surface of the superior slip of the subscapularis tendinous insertion superior to the intertubercular sulcus.

The Teres Minor Muscle

The origin of the teres minor muscle is the lateral border of the dorsal scapula, and is inferior to the infraspinatus origin. The teres minor tendon is distally inserted into the lowest impression of the greater tubercle of the humerus, and the posterior side of the surgical neck of the humerus (Fig. 1.7). The tendinous fascia separates at the boundary between the infraspinatus and the teres minor. This separation is sometimes not distinct and disappears at their insertion.

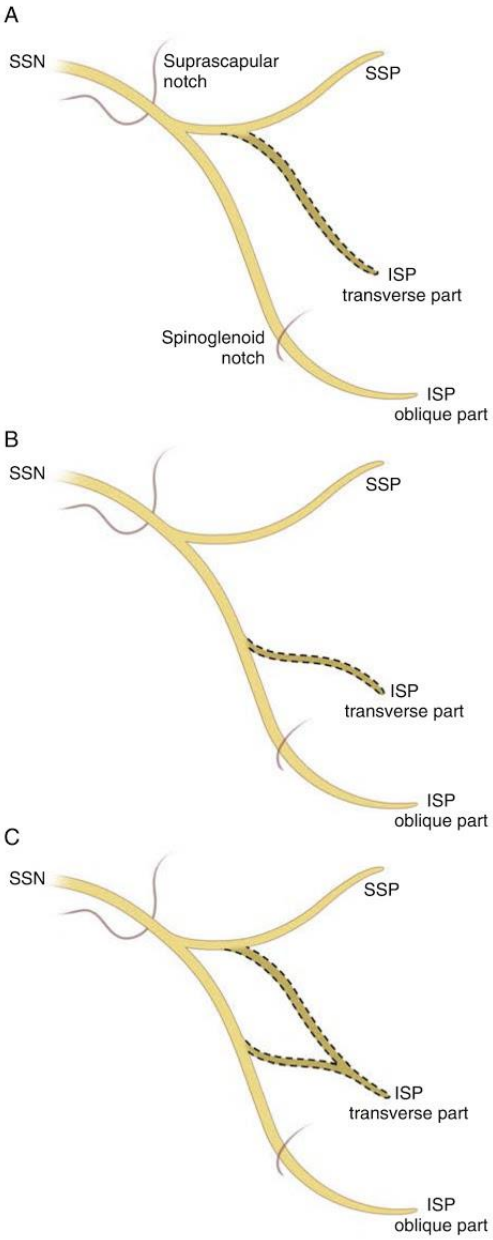

FIG. 1.5 Illustrations showing the patterns of the nerve branching from the suprascapular nerve to the transverse part of the infraspinatus. (A) A branch from branches to the supraspinatus muscle. (B) A branch from the main trunk to the infraspinatus muscle. (C) Branches from branches to both muscles. *ISP,* Infraspinatus; *SSN,* suprascapular nerve; *SSP,* supraspinatus.

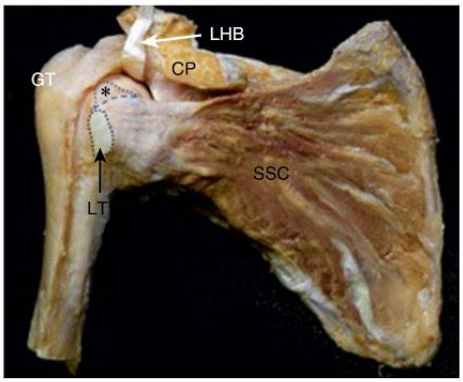

FIG. 1.6 Uppermost insertion of the subscapularis *(SSC)* tendon. The long head of the biceps tendon *(LHB)* is reflected to superior. The coracohumeral ligament is removed. The coracoid process *(CP)* is also partially removed. The superior part of the subscapularis tendon inserts superior to the cranial margin of the lesser tubercle *(LT, black dotted area)*. The uppermost insertion of the subscapularis tendon extends to the fovea capitis of the humerus as a thin tendinous slip *(purple dotted area marked with the asterisk)*. *GT,* Greater tubercle. (From Arai R, Sugaya H, Mochizuki T, et al. Subscapularis tendon tear: an anatomic and clinical investigation. *Arthroscopy.* 2008;24:997–1004.)

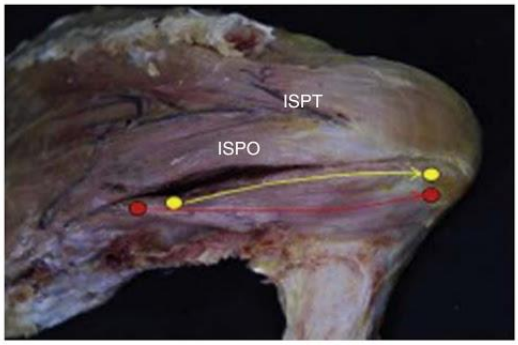

FIG. 1.7 Posterior aspect of the infraspinatus and the teres minor muscles of the right shoulder. The deltoid muscle is detached from the scapula spine. The *yellow arrow* indicates the running course of the superior bundle of the teres minor. The *red arrow* indicates the running course of the inferior bundle. *ISPO,* Oblique part of the infraspinatus muscle; *ISPT,* transverse part of the infraspinatus muscle. (From Hamada J, Nimura A, Yoshizaki K, et al. Anatomic study and electromyographic analysis of the teres minor muscle. *J Shoulder Elbow Surg.* 2017;26:870–877.)

The superior and inferior bundle can be separated at the musculotendinous junction of the teres minor muscle. The origin of the superior bundle at its insertion is the lateral border of the dorsal scapula, and inserted into the lowest impression as an ellipsoidal shape (Fig. 1.8). Contrary to this, the inferior bundle at its insertion primarily has its origin in

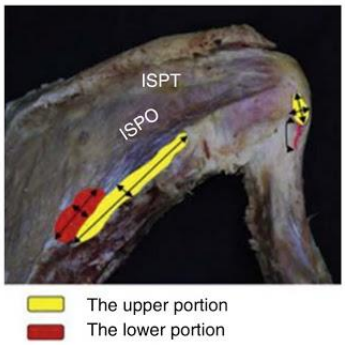

FIG. 1.8 Origins and insertions of the teres minor muscle. The origins and insertions of the superior and inferior bundles of the teres minor *(yellow and red areas, respectively)* are shown. *ISPT,* transverse part of the infraspinatus muscle; *ISPO,* oblique part of the infraspinatus muscle. (From Hamada J, Nimura A, Yoshizaki K, et al. Anatomic study and electromyographic analysis of the teres minor muscle. *J Shoulder Elbow Surg.* 2017;26:870–877.)

the tendinous fascia. This fascia plays a role as the border between the infraspinatus and the teres minor. The inferior bundle partially has its origin in the lateral border of the dorsal scapula. Running dorsal to the superior bundle is the inferior bundle of the teres minor, which is inserted distal to the lowest impression as a line shape. The superior and inferior bundles cannot be separated in their insertions where the teres minor has its origin. The branch of the axillary nerve, which innervates both the superior and inferior bundles, runs dorsal or inferior to the teres minor muscle, not ventral to it.

BIBLIOGRAPHY

Arai R, Mochizuki T, Yamaguchi K, et al. Functional anatomy of the superior glenohumeral and coracohumeral ligaments and the subscapularis tendon in view of stabilization of the long head of the biceps tendon. *J Shoulder Elbow Surg*. 2010;19:58–64.

Arai R, Sugaya H, Mochizuki T, et al. Subscapularis tendon tear: an anatomic and clinical investigation. *Arthroscopy*. 2008;24:997–1004.

Clark JM, Harryman DT 2nd. Tendons, ligaments, and capsule of the rotator cuff. Gross and microscopic anatomy. *J Bone Joint Surg Am*. 1992;74:713–725.

Clemente CD. Osteology, and muscles and fasciae of the upper limb. In: *Gray's Anatomy 30th American Edition*. Philadelphia: Lea & Febiger; 1985:233–234.

Hamada J, Nimura A, Yoshizaki K, et al. Anatomic study and electromyographic analysis of the teres minor muscle. *J Shoulder Elbow Surg*. 2017;26:870–877.

Kato A, Nimura A, Yamaguchi K, et al. An anatomical study of the transverse part of the infraspinatus muscle that is closely related with the supraspinatus muscle. *Surg Radiol Anat*. 2012;34:257–265.

Minagawa H, Itoi E, Konno N, et al. Humeral attachment of the supraspinatus and infraspinatus tendons: an anatomic study. *Arthroscopy*. 1998;14:302–306.

Mochizuki T, Sugaya H, Uomizu M, et al. Humeral insertion of the supraspinatus and infraspinatus. New anatomical findings regarding the footprint of the rotator cuff. *J Bone Joint Surg Am*. 2008;90:962–969.

Nimura A, Kato A, Yamaguchi K, et al. The superior capsule of the shoulder joint complements the insertion of the rotator cuff. *J Shoulder Elbow Surg*. 2012;21:867–872.

Nozaki T, Nimura A, Fujishiro H, et al. The anatomic relationship between the morphology of the greater tubercle of the humerus and the insertion of the infraspinatus tendon. *J Shoulder Elbow Surg*. 2015;24:555–560.

CHAPTER 2

Arthroscopic Anatomy of the Shoulder and Cuff

George Sanchez, Marcio B. Ferrari, Jason T. Hamamoto, John Daley Higgins, and Rachel M. Frank

INTRODUCTION

Recent advances in arthroscopic techniques, instrumentation, and implants have revolutionized the management of rotator cuff pathology. For nearly all rotator cuff tear types, arthroscopic repair has been repeatedly demonstrated to be safe and effective when compared with equivalent open surgical procedures. Among many other advantages, arthroscopy allows for outstanding visualization of the rotator cuff tissue and surrounding intraarticular structures. An appreciation of the arthroscopic anatomy of the shoulder joint (Fig. 2.1), including the rotator cuff, is essential to performing successful arthroscopic procedures. The purpose of this chapter is to review the arthroscopic anatomy of the rotator cuff and surrounding intraarticular structures.

SURGICAL ANATOMY

- Long head of the biceps tendon (LHBT) (Fig. 2.2): the LHBT originates from the supraglenoid tubercle of the glenoid and superior labrum, and extends distally into the bicipital groove along the proximal humerus. The tendon is stabilized within the groove by the overlying transverse humeral ligament. A normal and healthy LHBT typically has a smooth appearance and is white in color. During arthroscopic evaluation, the portion of the tendon within the bicipital groove should be pulled into the joint space using a probe to inspect for signs of inflammation, fraying, or tearing. The "lipstick sign," an increased erythema visualized in the intertubercular part of the tendon when retracted to the intraarticular cavity, indicates bicipital tendonitis. The proximal 4 cm of the LHBT is intraarticular and easily evaluated. However, the degenerative portion of the tendon may be situated extraarticularly. Therefore, using a nerve hook or probe through the anterior portal, the tendon can be displaced inferiorly, thereby exposing an additional 3 to 5 cm of the tendon for arthroscopic visualization. The proximal attachment site of the tendon at the level of the superior labrum should also be inspected for presence of superior labrum pathology, including a possible superior labrum anterior to posterior (SLAP) lesion. The surgeon must be aware of SLAP variants, including sublabral recess (sulcus), sublabral hole, and Buford complex. This can be accomplished by moving the arm from an adducted position in neutral rotation to 90 degrees of abduction and fully externally rotated to 90 degrees. The LHBT and superior labral complex should be inspected through the anterior portal for presence of a SLAP lesion. Abduction and external rotation of the arm helps evaluate if the superior labrum is elevated from its glenoid attachment. Arthroscopic pathology should always be evaluated in conjunction with clinical findings, as often, abnormal tissue, even if present, is not pathologic but simply incidental in nature.
- Superior glenohumeral ligament (SGHL) (Figs. 2.3, 2.4): the SGHL is contained within the triangular space known as the rotator interval. The superior aspect of the SGHL originates from the supraglenoid tubercle near the anterior portion of the LHBT and inserts into the fovea capitis humeri and on the anterior margin of the bicipital groove. The SGHL serves as a check-rein to inferior humeral head

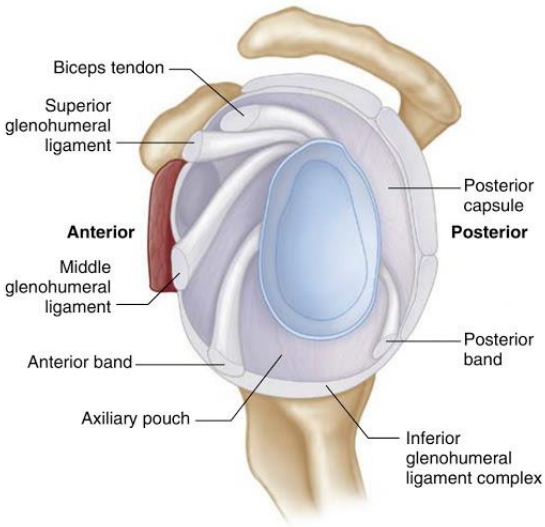

FIG. 2.1 Soft tissue stabilizers including the glenoid labrum, glenohumeral ligaments, and the glenohumeral joint capsule. (From Provencher MT, Romeo AA. *Shoulder Instability: A Comprehensive Approach*. Philadelphia: Saunders; 2012.)

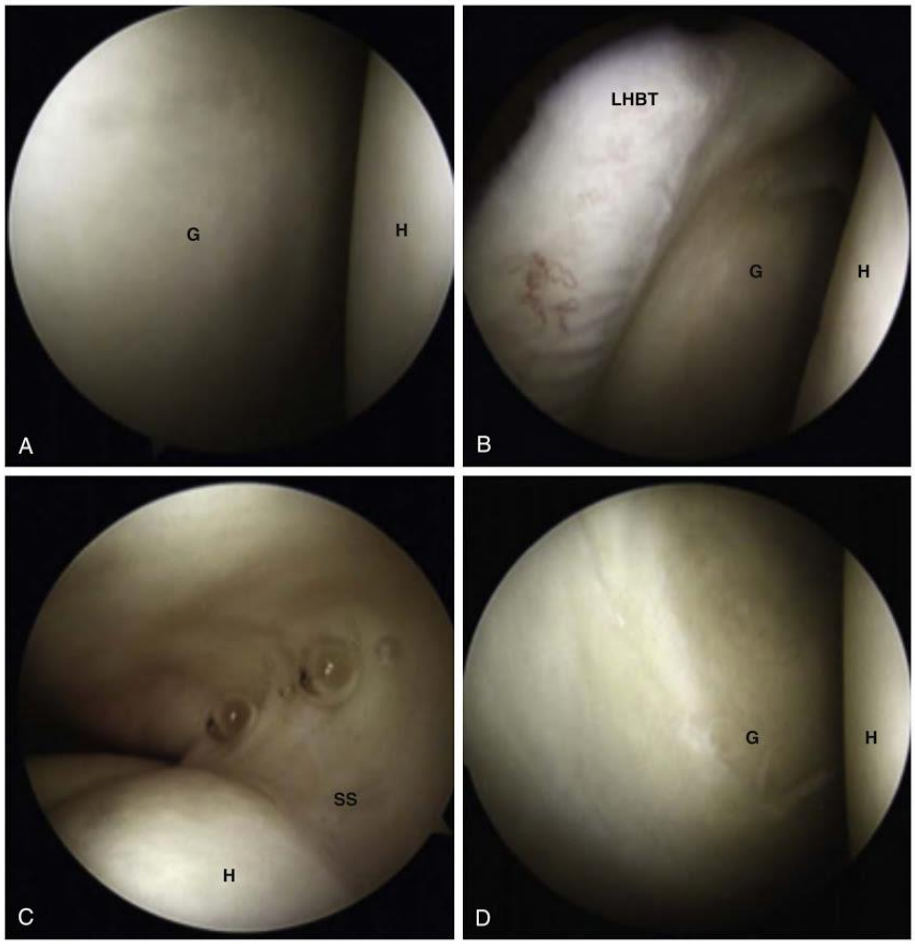

FIG. 2.2 (A) The right glenohumeral joint viewed from the posterior portal. The glenoid *(G)* is on the left and the humeral head *(H)* is on the right. (B) Looking just superior to A, the insertion of the long head of the biceps tendon *(LHBT)* into the superior labrum is seen. (C) The biceps is followed from the mid left portion of the picture as it exits the glenohumeral joint. An intact supraspinatus *(SS)* is seen as it inserts at the articular margin of the humeral head *(H)*. (D) An intact inferior labrum and glenohumeral ligament are visualized at the inferior aspect of the figure. (From Miller MD, Thompson SR. *DeLee & Drez's Orthopaedic Sports Medicine*. Philadelphia: Saunders; 2012.)

translation over the glenoid fossa at 0 degrees of abduction. In patients with anterior and/or inferior instability, the SGHL and middle glenohumeral ligament (MGHL) may be torn or attenuated.

- Middle glenohumeral ligament (MGHL) (Fig. 2.5): the MGHL originates from the supraglenoid tubercle and superior labrum and continues over the subscapularis tendon. This ligament resists anterior and posterior translation of the humeral head between 0 and 45 degrees of abduction in external rotation (ABER position). The surgeon must be aware of an important anatomic variation that may exist regarding the MGHL: the Buford complex (Fig. 2.6). A Buford complex is a congenital glenoid labrum anatomic variant in which the anterosuperior labrum is not present and the MGHL inserts directly into the LHBT. This should not be confused with a labral tear, and arthroscopic findings must be correlated with clinical and imaging findings to determine which arthroscopic findings are truly clinically relevant and which are simply incidental in nature. In patients with adhesive capsulitis, the SGHL and MGHL may be significantly scarred or diffusely inflamed.

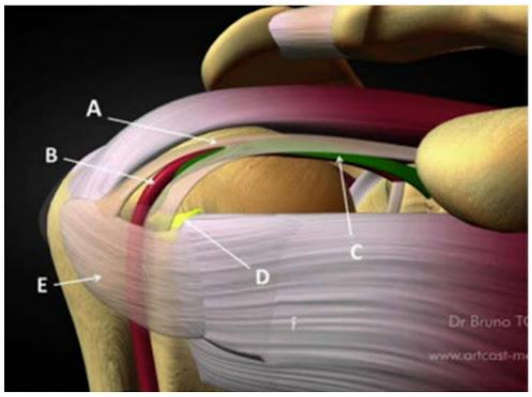

FIG. 2.3 Drawing of the rotator interval in a right shoulder. *A*, Coracohumeral ligament; *B*, long head of biceps tendon *(red)*; *C*, superior glenohumeral ligament *(green)*; *D*, tendinous slip *(yellow)*; *E*, transverse humeral ligament *(beige)*; *F*, subscapularis muscle. (From Toussaint B, Barth J, Charousset C, et al. New endoscopic classification for subscapularis lesions. *Orthop Traumatol Surg Res.* 2012;98(8):S186–S192.)

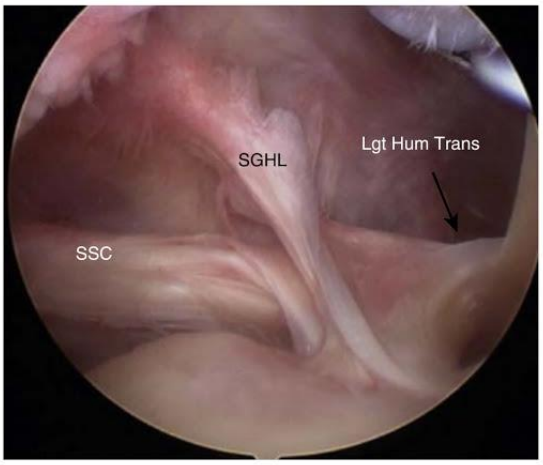

FIG. 2.4 Arthroscopic view of the rotator interval. *SGHL*, Superior glenohumeral ligament; *Lgt Hum Trans*, transverse humeral ligament; *SSC*, subscapularis tendon. (From Toussaint B, Barth J, Charousset C, et al. New endoscopic classification for subscapularis lesions. *Orthop Traumatol Surg Res.* 2012;98(8):S186–S192.)

- Subscapularis tendon: the subscapularis tendon (Fig. 2.4) serves as an anatomic landmark during arthroscopic evaluation and defines the inferior border of the rotator interval. The subscapularis originates from the subscapular fossa of the scapula and inserts into the lesser tuberosity of the humerus, which can be visualized intraoperatively. To improve visualization of the humeral insertion, the arm should be moved into forward flexion and internal rotation. The LHBT may subluxate out of the bicipital groove and continue inferiorly in the presence of a subscapularis tear. A tear in the subscapularis is best seen with internal and external rotation of the arm. In the setting of a chronic, retracted subscapularis tear, an arc may be formed by the SGHL and coracohumeral ligament complex, which serves as a marker of the superolateral corner of the chronic subscapularis tear (Fig. 2.7). The MGHL and the subscapularis are in close contact, with the MGHL situated posterior to the superior margin of the subscapularis muscle. The mean subscapularis insertion area on the lesser tuberosity is 2.41 cm^2 while the mean medial-to-lateral insertion length is 1.79 cm and the mean anterior-to-inferior length is 2.43 cm.

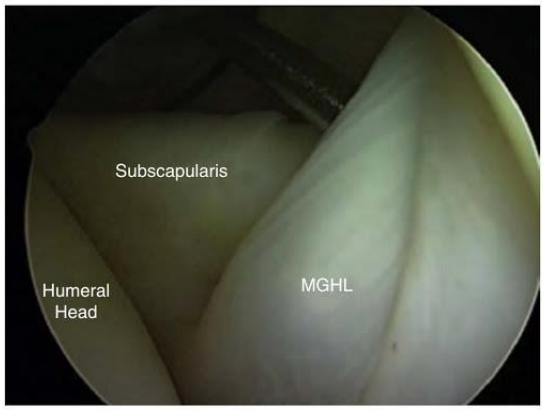

FIG. 2.5 Arthroscopic view of left shoulder from the posterior portal showing the middle glenohumeral ligament *(MGHL)* draping over the subscapularis tendon. (From Nguyen D. Anatomy, examination, and imaging of the shoulder. *Oper Tech Orthop.* 2008;18(1):2–8.)

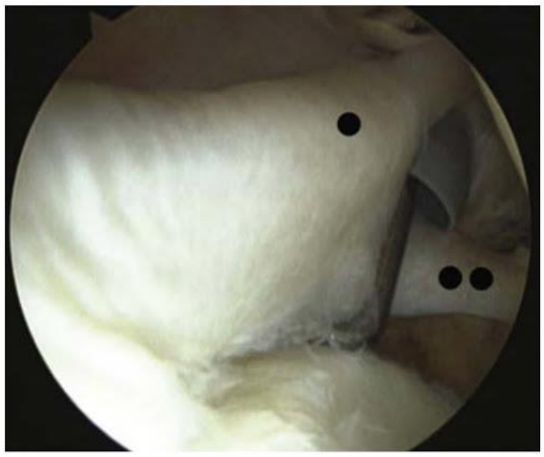

FIG. 2.6 Example of a Buford complex with a cord-like middle glenohumeral ligament *(double dots)* underneath the probe attaching to the anterior biceps *(single dot)* and a sublabral foramen inferior to the middle glenohumeral ligament. (From Rockwood CA, Matsen FA, Wirth MA, Lippitt SB, Fehringer EV, Sperling JW. *Rockwood and Matsen's The Shoulder.* 5th ed. Philadelphia: Elsevier; 2017.)

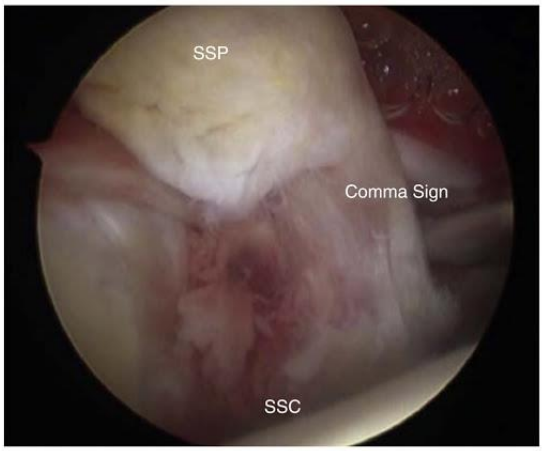

FIG. 2.7 Arthroscopic view of the comma sign. *SSP,* supraspinatus tendon; *SSC,* subscapularis tendon. (From Toussaint B, Barth J, Charousset C, et al. New endoscopic classification for subscapularis lesions. *Orthop Traumatol Surg Res.* 2012;98(8):S186–S192.)

- Glenoid labrum: the labrum is a fibrocartilaginous structure that surrounds the glenoid rim to deepen the glenoid fossa for enhanced glenohumeral stability (Fig. 2.8). The labrum is circumferentially divided into six "sectors." The labrum serves as an attachment site for the glenohumeral ligaments, long head of the biceps brachii muscle, and surrounding capsule. The standard posterior portal and posterolateral accessory portal (7 o'clock portal) and multiple anterior portals (standard midglenoid portal, trans-subscapularis portal, etc.) can be used to conduct a 360-degree assessment of the labrum. The anterior portals are especially helpful as viewing portals when evaluating suspected posterior labral pathology (Fig. 2.9). The anteroinferior labrum must be meticulously inspected for the presence of avulsion injury of the glenoid rim, known as a Bankart lesion (Fig. 2.10), which is the critical lesion in patients with anterior shoulder instability. The anterior glenoid rim can also be evaluated, which may reveal evidence of attritional bone loss in the setting of chronic and/or recurrent instability. When the surrounding periosteum peels off from the glenoid, an anterior labral periosteal sleeve avulsion (ALPSA) injury is then present (Fig. 2.11).

- Inferior glenohumeral ligament (IGHL): the IGHL is divided into anterior, posterior, and superior segments. The anterior IGHL (AIGHL) originates from the 2 and 4 o'clock position (based on a right shoulder) on the glenoid and functions as the most important restraint to anterior and inferior translation of the humeral head on the glenoid when the shoulder is in 90 degrees abduction and full external rotation. The AIGHL anchors into the anterior labrum and forms a connection susceptible to attenuation with potential tearing in the event of an anterior shoulder subluxation or dislocation. The posterior IGHL originates from the 7 to 9 o'clock position (based on a right shoulder), and is the most important check-rein to posterior subluxation at 90 degrees of flexion and internal rotation. The superior IGHL is particularly essential for static

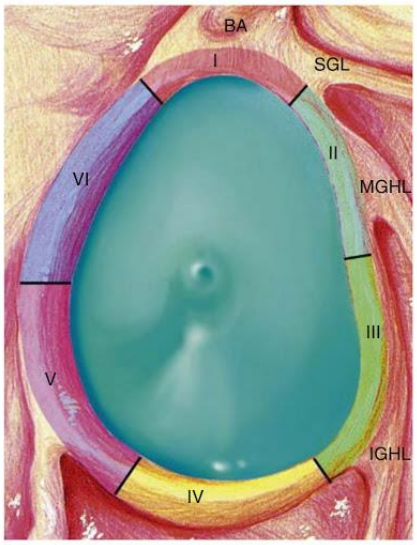

FIG. 2.8 Labral "sectors": *I,* superior; *II,* anterior superior; *III,* anterior inferior; *IV,* inferior; *V,* posterior inferior; and *VI,* posterior superior. *BA,* biceps anchor; *SGL,* superior glenohumeral ligament; *MGHL,* middle glenohumeral ligament; *IGHL,* inferior glenohumeral ligament. (From Zlatkin MB, Sanders TG. Magnetic resonance imaging of the glenoid labrum. *Radiol Clin North Am.* 2013;51(2):279–297.)

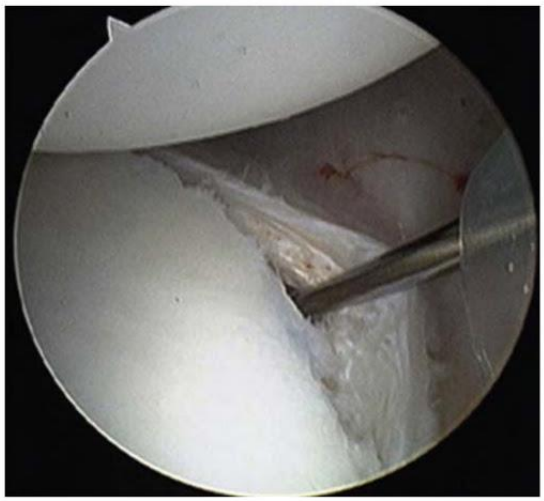

FIG. 2.9 Posterior labral tear from the glenoid (right shoulder, viewed from the anterior portal). (From Provencher MT, Romeo AA. *Shoulder Instability: A Comprehensive Approach.* Philadelphia: Saunders; 2012.)

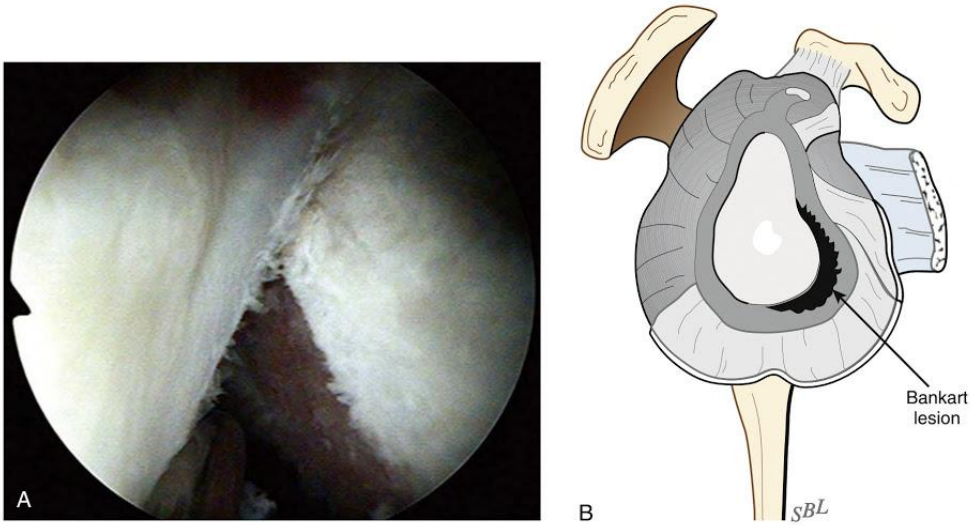

FIG. 2.10 (A) Typical Bankart lesion viewed from anterosuperior portal in a right shoulder. (B) The capsulolabral detachment typical of traumatic instability. (From Provencher MT, Romeo AA. *Shoulder Instability: A Comprehensive Approach.* Philadelphia: Saunders; 2012.)

FIG. 2.11 Intraoperative photo of anterior labral periosteal sleeve avulsion lesion (view from anterior-superior portal). (From Donegan RP, Namdari S, Galatz LM. Arthroscopic management of anterior capsulolabral lesions: how and why. *Oper Tech Sports Med.* 2013;21(4):214–219.)

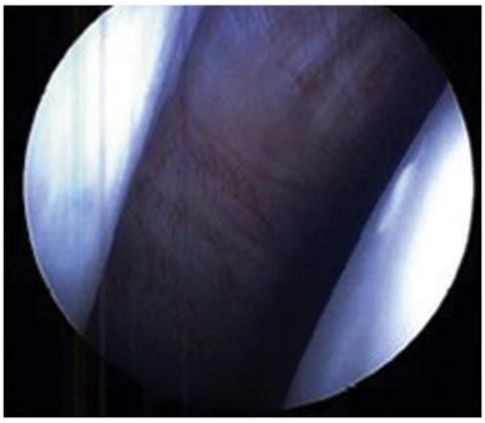

FIG. 2.12 Positive "drive through" sign on arthroscopy indicative of shoulder laxity. (From Reider B, Davies GJ, Provencher MT. *Orthopaedic Rehabilitation of the Athlete.* Philadelphia: Saunders; 2015.)

stabilization of the shoulder joint and usually injured at its proximal attachment following dislocation. Injury to the inferior capsular structures can occur in isolation or in combination with labral tears leading to instability of the shoulder joint. As a result, the surgeon may appreciate decreased soft tissue constraint and a positive "drive through" sign intraoperatively (Fig. 2.12). The glenohumeral ligament site of origin on the labrum and site of insertion in the humerus should be thoroughly inspected during the arthroscopic examination. Avulsion injuries can occur at the humeral head. These are referred to as *humeral avulsion of the glenohumeral ligament (HAGL)* (Fig. 2.13) and *reverse humeral avulsion of the glenohumeral ligament (RHAGL)*, and may be subtle.

- Axillary recess (Fig. 2.14): the axillary recess is a space at the bottom of the joint capsule that is a common site for loose bodies to collect and is usually altered in patients with adhesive capsulitis of the shoulder. This recess should always be inspected during arthroscopic examination.
- Articulating surfaces of the glenoid and humeral head (Fig. 2.2A): the chondral surfaces of both the glenoid and humeral head should be inspected and probed for