



Complete Repair of Massive, Retracted, and “Non-Repairable” Tears of the Rotator Cuff: The Anatomic Vector Repair

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Abstract: Massive and retracted tears of the supraspinatus and infraspinatus tendons of the rotator cuff are associated with great pain and disability and may be considered “non-repairable,” depending on the extent of injury and the experience of the treating clinician. The technique of anatomic vector repair of the rotator cuff is a surgical treatment method that enables the surgeon to accurately characterize the injury pattern and successfully repair many of these debilitating injuries anatomically in a stepwise manner, often in cases that would have otherwise been treated with a less preferable surgical procedure that does not restore native anatomy.

Massive tears of the rotator cuff involving the supraspinatus and infraspinatus tendons are associated with great disability and often intense pain. When an irreparable massive rotator cuff tear is recognized, patients may be treated with techniques such as reverse total shoulder arthroplasty (rTSA), which has a high complication rate in younger patients,¹ or the newer technique of superior capsular reconstruction (SCR). SCR involves use of dermal allograft or fascia lata autograft to treat irreparable tears and does not restore native anatomy. Additionally, there is a lack of long-term clinical outcome data for this procedure.²

Importantly, the determination that a massive rotator cuff tear is not repairable is often made when the treating surgeon has not been exposed to technical methods of treatment that are capable of complete, or near-complete, surgical repair of chronic massive and

retracted tears of the supraspinatus and infraspinatus tendons. Presented in this Technical Note is a technique to completely repair chronic massive and retracted tears of the supraspinatus and infraspinatus tendons of the rotator cuff, termed anatomic vector repair. This method may be used in a stepwise manner to simplify the repair of massive tears, thereby avoiding other less preferable treatment methods that do not restore native anatomy.

Surgical Technique

Principles of Anatomic Vector Repair of the Rotator Cuff

Restoration of rotator cuff tendon anatomy is a critical aspect of repair and ensures that the tissue is repaired under appropriate anatomic tension. Massive and retracted tears of the supraspinatus and infraspinatus tendons cannot be repaired anatomically without knowledge of the displacement patterns and use of a repair technique that methodically restores the anatomic position of the displaced tissue.

Spatial vectors can be used to plan the repair sequence of massive and retracted supraspinatus and infraspinatus rotator cuff tissue, to enable complete repair of the torn tendons to the bony footprint, under appropriate tension. A vector has both magnitude and direction. Spatial vectors may be represented by a “directed line segment” that has an initial point and a terminal point (Figure 1A). The critical first step in repairing massive and retracted tears of the supraspinatus and infraspinatus is to recognize the tear pattern and accurately assess the

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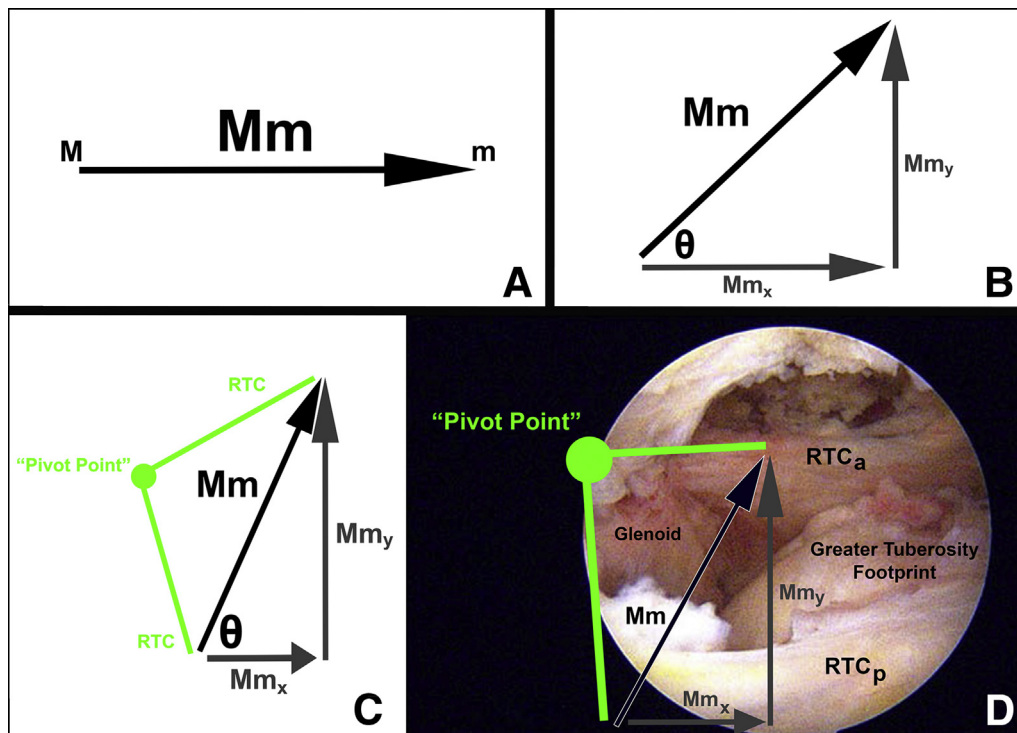


Fig 1. (A) Spatial vector depicting anatomic repair vector of a margin convergence suture (Mm), with initial point (M) and terminal point (m). (B) Magnitude of the repair vector (Mm) depicted in the anterior-posterior plane (Mm_y) and the medial-lateral plane (Mm_x), with direction depicted by the angle θ . Anatomic spatial vectors depicted as viewed from a posterior portal within the subacromial space of a right shoulder: (C) Margin convergence anatomic repair vector (Mm) shown in relation to the pivot point. The pivot point is the medial extent to the split in the rotator cuff tendon and is not truly retracted tissue. (D) Massive and retracted tear of the supraspinatus and infraspinatus tendons, with the intact anterior tissue (RTC_a) and intact posterior tissue (RTC_p). The initial margin convergence repair vector is depicted (Mm).

displacement vectors of the torn tissue. Only after this is appreciated can margin convergence sutures be used to restore the anatomic relationship between the torn tendons. These massive tears are almost invariably some version of an L-type tear, with a deep split that travels to the level of the glenoid or even more medial. The configuration of this L pattern will often become more distorted as the tear size increases. The anterior component to the intact rotator cuff tendinous tissue (RTC_a) will commonly consist of some portion of the supraspinatus tendon, while the posterior component to the intact rotator cuff tendinous tissue (RTC_p) will commonly be composed of tissue from both the supraspinatus and infraspinatus tendons. Even when there is only a small remnant of intact tissue anteriorly, this tissue plays a crucial role in the repair, as this anterior tissue will be used to secure the RTC_p with margin convergence sutures in anatomic position. Posteriorly, the RTC_p tissue must be examined in its entirety, from the medial to lateral extents. It must be recognized that this posterior tissue displaces primarily in the posterior direction, and secondarily medially.

The goal with margin convergence is to systematically decrease the magnitude of vectors required to complete

the repair, as the repair procedure progresses. The surgeon must be able to visualize and accurately assess displacement vectors to determine placement of margin convergence sutures. The margin convergence repair vector Mm has a y component that represents the displacement in the anterior-posterior plane and an x component that represents displacement in the medial-lateral plane. The magnitude of the vector is represented by the notation $|Mm|$, which is calculated using the equation: $|Mm| = \sqrt{(Mm_x^2 + Mm_y^2)}$. The direction of the repair vector is represented by the angle theta (θ) (Figure 1B). The surgeon must recognize that the Mm_y component is typically of significantly greater magnitude than the Mm_x component. Failure to successfully repair a massive tear commonly results from the treating surgeon underestimating the θ angle. Underestimating the magnitude of posterior displacement will lead to calculation of an incorrectly low value of θ that prevents anatomic repair and the ability to mobilize tissue appropriately to restore footprint attachment. If the Mm vector for the planned margin convergence suture has an Mm_x magnitude that is greater than the Mm_y magnitude, reassess, as this is almost assuredly incorrect. Proper positioning of the margin convergence

sutures through the displaced tendinous tissue is required to restore the anatomic relationship between the supraspinatus and infraspinatus tendons, and complete repair to the anatomic footprint can be successful only after this is accomplished. Incorrect positioning of the suture passage point at either the RTC_p or RTC_a end of the margin convergence suture will “lock” tissue in a position that will make complete anatomic repair not possible.

Complete repair requires the understanding that the most medial extent of the torn supraspinatus/infraspinatus tendons of the rotator cuff is not truly retracted. This is typically the most medial extent of the split within the distorted L-type configuration of the massive tear pattern. With massive and retracted rotator cuff tears, attempted repair of the torn tissue solely in the medial-lateral plane will fail, as this does not address the displacement vectors of the torn tissue, and this tissue cannot be brought a significant distance laterally, irrespective of the force applied. This must be recognized by the surgeon. With the anatomic vector repair technique, the most medial extent of the torn RCT is considered to be the “pivot point” (Figure 1C). This is the point about which the margin convergence sutures will restore the anatomic position of the torn tendinous tissue, and this will be primarily in the posterior to anterior direction and secondarily in the medial to lateral direction, corresponding to an Mm_y value of significantly greater magnitude than the Mm_x value (Figure 1D).

Patient Positioning and Diagnostic Arthroscopy

The patient is positioned for arthroscopic anatomic vector repair of the rotator cuff in the lateral or beach chair position. The author’s preferred position is lateral. Anesthesia typical for standard shoulder arthroscopy is provided, with regional or general anesthesia administered.

A standard posterior portal is created, and a diagnostic arthroscopy of the glenohumeral compartment is performed to examine the tear pattern and identify associated injuries that require surgical treatment. Concomitant procedures to treat labral or other injury are performed before rotator cuff repair, with the exception of certain long head of biceps tenodesis procedures, such as subpectoral tenodesis, which are performed at the conclusion of the procedure. The articular cartilage is examined, and the chondral injury is graded. Anatomic vector repair of massive and retracted tears of the supraspinatus and infraspinatus tendons may proceed irrespective of severity of chondral injury, with the exception of certain cases in which passive joint motion is severely limited secondary to extensive degenerative changes.

The condition of the subscapularis tendon must be carefully examined, and a repair is performed as

indicated. Even in the case of chronic subscapularis tendon injury with retraction from the footprint insertion, complete or near-complete arthroscopic repair is typically successful in the author’s experience, and this is performed before commencing anatomic vector repair of the massively torn supraspinatus and infraspinatus tendons.

Anatomic Vector Repair Procedure

After completing examination of the glenohumeral compartment and performing indicated concomitant procedures, the arthroscope is positioned within the subacromial space via the posterior portal. A burr or shaver is used to recontour the acromion as needed to decompress areas of bony impingement.

The supraspinatus and infraspinatus tissues are examined and the intact components are clearly delineated anteriorly (RTC_a) and posteriorly (RTC_p). In the vast majority of cases, there will be intact tissue anteriorly, even if only a thin remnant remains. Posteriorly and posteromedially, an arthroscopic ablator and elevator are used to thoroughly release adhesions and mobilize the intact rotator cuff tissue. This must be done in meticulous fashion, as inadequate release posteriorly and posteromedially will hinder mobility of the intact tissue along the anatomic vectors of repair. Extensive release anteriorly is not required. It is the posterior intact tissue that is mobilized anteriorly and anterolaterally and then is secured to the intact tissue anteriorly.

The intact RCT anteriorly and posteriorly is examined to determine the locations for passage of the first margin convergence suture. Use of a cuff grasper will assist in assessing the mobility of the intact tissue and determine the ideal positioning for the margin convergence sutures. The anatomic vectors of repair are determined, and the repair proceeds with placement of the first margin convergence suture to converge the intact tissue about the pivot point (Figure 2A). The magnitude of the Mm_y vector component will be significantly larger than the magnitude of the Mm_x component (Figure 2C). The first suture is passed through the RTC_p tissue posteromedially (Figure 2D) and then passed through a more lateral location through the RTC_a tissue (Figure 2E). The pass point posteromedially is posterior and slightly lateral to the pivot point. The first margin convergence suture is tied (Figure 2G). The author prefers flattened nonabsorbable suture, such as SutureTape (Arthrex, Naples, FL), for margin convergence sutures because of the favorable pull-through characteristics that lessen tissue trauma, and the low-profile knots when tied. The first margin convergence suture will often restore an impressive proportion of the supraspinatus and infraspinatus tendon anatomy if properly positioned (Figure 2H). If the tissue does not reapproximate

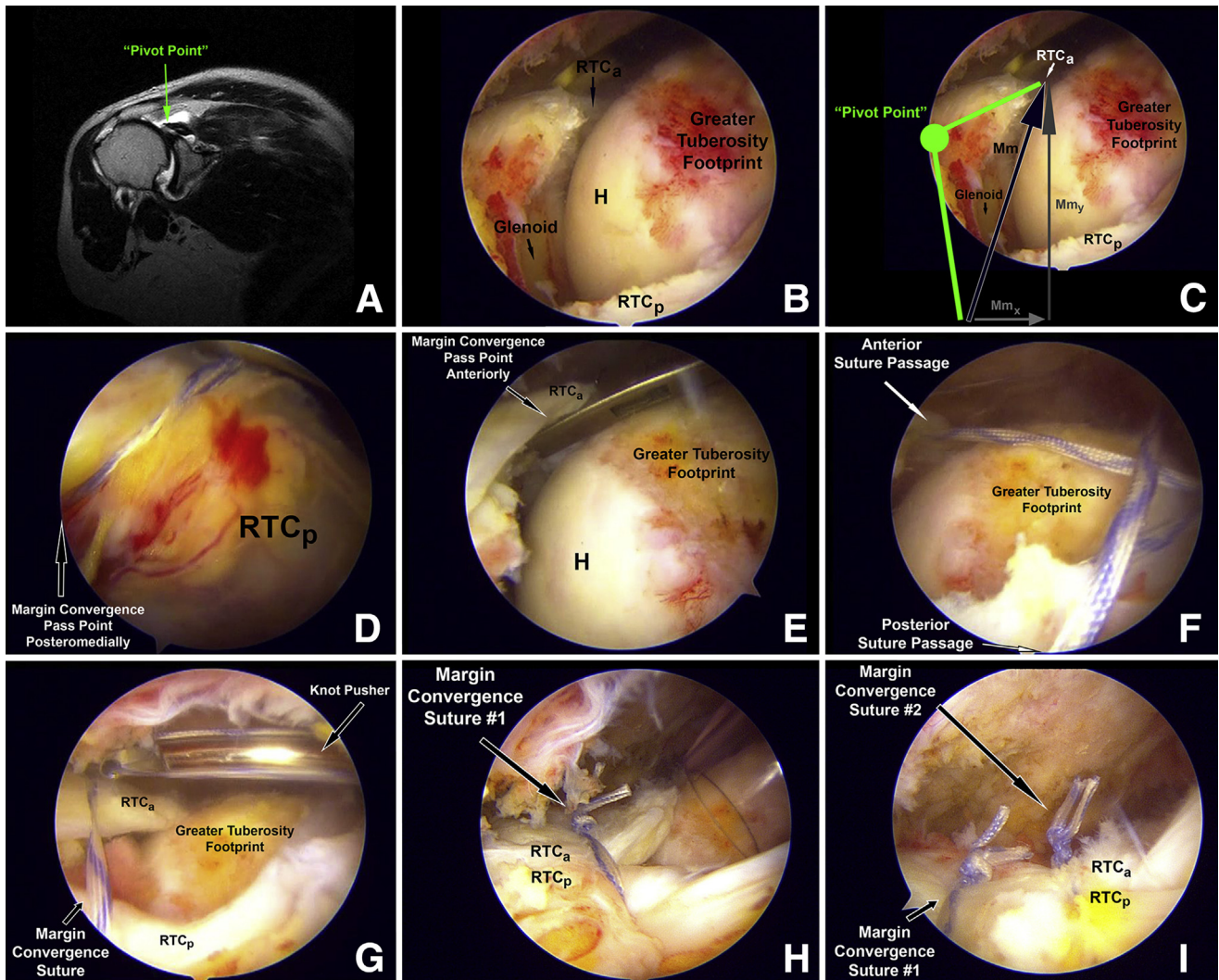


Fig 2. . Anatomic repair vectors and sequence of margin convergence of a right shoulder massive and retracted tear involving the supraspinatus and infraspinatus tendons of the rotator cuff. (A) Coronal magnetic resonance imaging (MRI) slice depicting the most medial extent of the tear pattern, labeled as the pivot point. (B) View from the posterior portal within the subacromial space of a massive and retracted tear of the supraspinatus and infraspinatus tendons. The anterior intact tissue (RTC_a), posterior intact tissue (RTC_p), humeral head (H), glenoid, and exposed greater tuberosity bony footprint are identified. (C) Pivot point and associated anatomic repair vector for the first margin convergence suture is depicted. (D) Placement of the first margin convergence suture passage-point posteromedially. (E) Suture passage-point anteriorly for the first margin convergence suture. (F) First margin convergence suture passed anteriorly and posteriorly, with exposed tuberosity footprint identified. (F) Tying of the first margin convergence suture. (G) Apposition of the torn anterior and posterior rotator cuff tendons depicted after tying of the first margin convergence suture. (I) Apposition of the torn anterior and posterior rotator cuff tendons depicted after placement of 2 margin convergence sutures.

ideally, this suture must be removed and repositioned, as a complete repair will not be successful if the margin convergence sutures are positioned incorrectly. The anatomic vectors required to restore the anatomy of the rotator cuff tendons are then reassessed as subsequent margin convergence sutures are sequentially passed and tied (Figure 2I). At least 2 or 3 margin convergence sutures are placed before anchor insertion at the greater tuberosity footprint.

After margin convergence is complete, suture anchors are inserted at the medial aspect of the greater tuberosity footprint via an accessory portal. Vectors of repair toward the anterior medial row anchor are more prominently medial to lateral in direction, whereas vectors of repair toward the posterior medial row anchor become more prominently posterior to anterior in direction as the suture passage proceeds posteriorly (Figure 3A). A massive and retracted tear of the

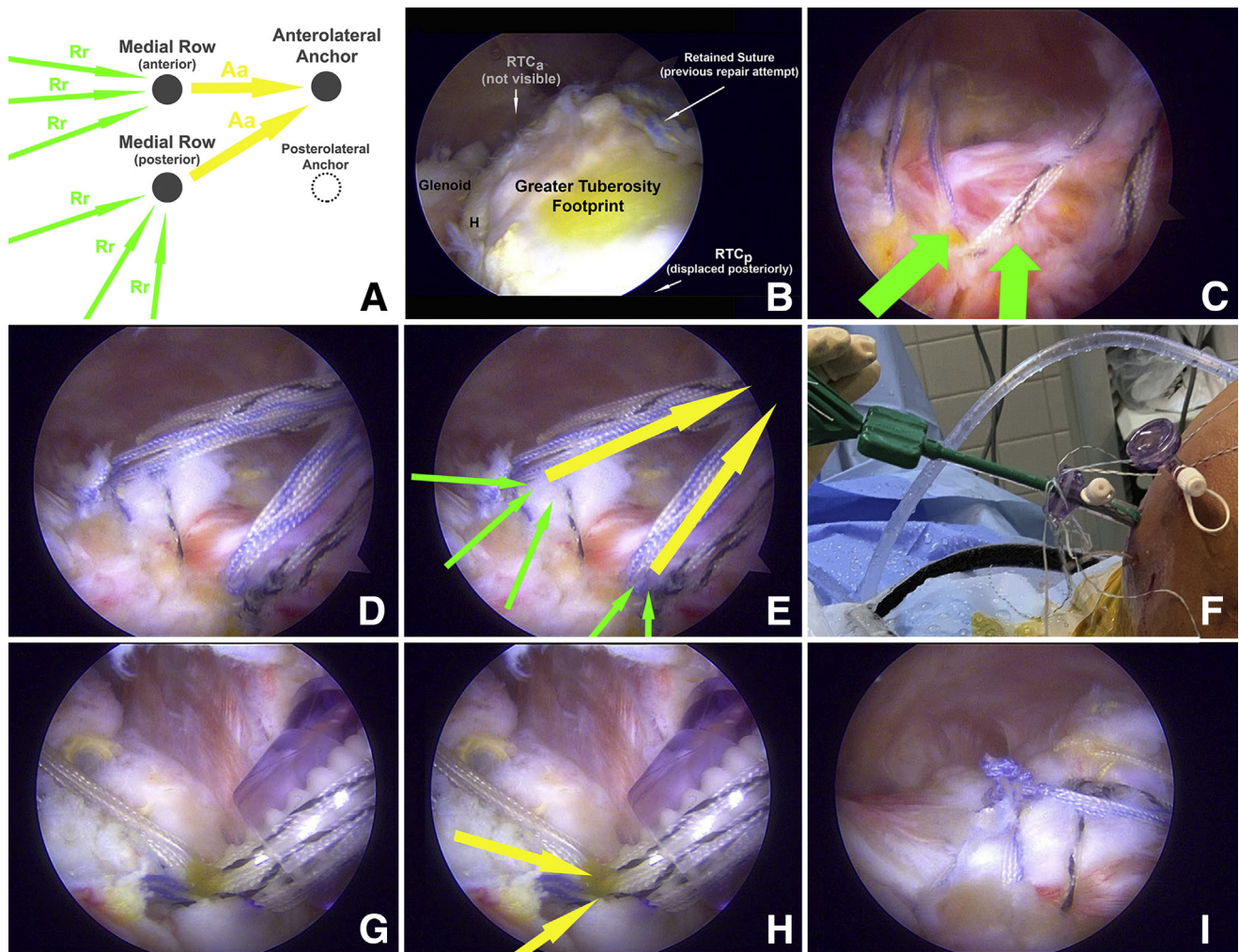


Fig 3. Anatomic vector repair suture anchor placement and sequence of repair after completing margin convergence depicted for a right shoulder massive and retracted tear involving the supraspinatus and infraspinatus that underwent 3 prior repair attempts at other institutions. Arthroscopic views from the subacromial space via a posterior portal. (A) Anatomic vectors depicted for the tied sutures from the sutured tendon to the medial row (Rr) and the vectors from the medial row sutures to the anterolateral suture anchor (Aa) after completing margin convergence. (B) Depiction of relevant anatomy for the massive and retracted rotator cuff tear. The anterior intact tissue (RTC_a), posterior intact tissue (RTC_p), humeral head (H), glenoid, exposed greater tuberosity bony footprint, and retained suture from previous unsuccessful repair are identified. (C) Passage of the final posterior sutures associated with the posterior medial row anchor is performed directly posteriorly. (D) All SutureTapes associated with the anterior and posterior medial row anchors are tied. (E) Repair vectors are depicted toward the medial row anchors (green arrows) and from the medial row anchors toward the single anterolateral anchor (yellow arrows). (F–H) 10 SutureTapes are individually tensioned within a single anterolaterally placed 4.75-mm Arthrex SwiveLock suture anchor (F) and then secured (G and H). (I) View from the posterior portal depicting complete repair of the massive and retracted tear of the supraspinatus and infraspinatus tendons.

supraspinatus and infraspinatus that underwent 3 prior attempts at repair at different outside facilities is depicted in Figure 3B. Figure 3C through 3I depicts repair of this massive tear after margin convergence was completed according to the anatomic vector repair as described. After margin convergence has restored much of the rotator cuff tendon anatomy, suture anchors are required to complete the repair, fixing and securing the tendons across the surface area of the

greater tuberosity footprint. A combination of triple- or double-loaded suture anchors is used, depending on the pattern of repair. Multiple sutures are used because a prominent mode of failure is the tendon–suture interface.³ The medial row anchors should have adequate pull-out strength while minimizing footprint occupation to maximize bony surface area at the greater tuberosity for healing of the repaired rotator cuff tendons. The author prefers use of a triple-loaded

Table 1. Pearls and Pitfalls of Anatomic Vector Repair for Massive and Retracted Rotator Cuff Tears of the Supraspinatus and Infraspinatus Tendons

Pearls	<ul style="list-style-type: none"> • The medial extent of the “retracted” tendon tissue is not truly retracted; this is considered the pivot point, and the repair proceeds about this point • Meticulous mobilization of retracted tissue is prioritized posteromedially and posteriorly • The anatomic spatial vectors of repair for the margin convergence sutures typically have a significantly greater y component compared with x • As margin sutures are sequentially placed, the magnitude of the repair vectors will progressively decrease
Pitfalls	<ul style="list-style-type: none"> • Attempting repair of tissue in primarily the medial to lateral plane will not restore the native tendon anatomy in massive tear patterns, and such a repair attempt is expected to be unsuccessful • If the θ angles for the margin convergence anatomic repair vectors are not $>45^\circ$, reassess (angles are often 60° to 90°)

suture anchor at the anterior medial row anchor site in combination with either a double- or triple-loaded suture anchor at the posterior medial row anchor site.

The anterior medial row suture anchor is implanted first. Sutures are passed beginning anteriorly and progressing posteriorly. Sutures are not yet tied. The posterior medial row anchor is implanted, and the sutures are passed through the rotator cuff tendons, progressing anterior to posterior. After all sutures have been passed, sutures are tied beginning from the most posterior suture and progressing anteriorly. The most posterior suture is tied first to ensure that the posterior tissue is adequately mobilized anteriorly to the anatomic position. The most posterior suture associated with the posterior medial row anchor is passed directly or near-directly posterior (Figure 3C). After all sutures associated with the medial row suture anchors are passed and

tied, much of the greater tuberosity footprint should be covered by repaired rotator cuff tendons (Figure 3D). Sutures are then brought anterolaterally to secure the final repair, covering the footprint in its entirety (Figure 3E). This does not typically require both an anterior lateral and posterior lateral anchor. When proper anatomic restoration of the displaced tendinous tissue has been accomplished with margin convergence and medial row fixation according to the anatomic vector repair technique, a single lateral row anchor placed anterolaterally will secure the entire repair over the anatomic footprint. Figure 3F depicts 10 SutureTape tails that have been passed using an anterior medial row triple-loaded suture anchor and a double-loaded posterior medial row suture anchor. All 10 sutures are tensioned under direct arthroscopic visualization to ensure appropriate tension of the repaired tendons. The anterolateral suture anchor fixation is depicted in Figure 3G. Vectors of repair from the medial anchors to the anterolateral anchor are depicted in Figure 3H. 10 SutureTape tails can fit comfortably through a single Arthrex 4.75-mm SwiveLock suture anchor, and up to 12 may be passed if needed, if the tails are carefully and systematically arranged through the anchor islet. A posterior lateral row anchor may be used if this is required to provide additional suture compression of the repair configuration, or if the type of anchor used anterolaterally does not allow for a sufficient number of sutures to be secured using a single anchor. Final rotator cuff repair of the supraspinatus and infraspinatus tendons is depicted in Figure 3I. Complete repair of 3 separate cases of massive and retracted tears of the supraspinatus and infraspinatus tendons using anatomic vector repair are shown in Video 1. Pearls and pitfalls of the technique of anatomic vector repair are summarized in Table 1. Advantages and disadvantages/limitations of the technique are highlighted in Table 2.

Table 2. Advantages and Disadvantages/Limitations of Anatomic Vector Repair for Massive and Retracted Rotator Cuff Tears of the Supraspinatus and Infraspinatus Tendons

Advantages	<ul style="list-style-type: none"> • Enables complete or near-complete repair of massive and retracted tears that are otherwise considered Irreparable • Understanding the magnitude and direction of spatial vectors used in the anatomic vector repair sequence improves surgeon appreciation of the displacement patterns in massive and retracted tears • Displaced rotator cuff tendinous tissue is repaired anatomicallly, optimizing function of the remaining intact muscular tissue, even in cases of significant muscle atrophy • A single anterolateral anchor can be combined with the 2 medial row anchors when the margin convergence sutures are optimally placed, thereby avoiding unnecessary bone removal and hardware placement at the posterolateral greater tuberosity • Numerous sutures Incorporated into the anatomic vector repair construct may improve integrity of the repair, given that a prominent mode of repair failure is the tendon–suture interface
Disadvantages/limitations	<ul style="list-style-type: none"> • Improper positioning of the initial or terminal points of the margin convergence repair vectors will “lock” the rotator cuff tendons in a position that will not allow complete anatomic repair • A multitude of sutures are tied as a component of the anatomic vector repair technique; therefore, the surgeon must be skilled and efficient in arthroscopic knot tying • Given the number of sutures used in the medial row and the recommended sequence of knot tying, the surgeon must be sufficiently experienced with arthroscopic suture management to avoid excessive operative time

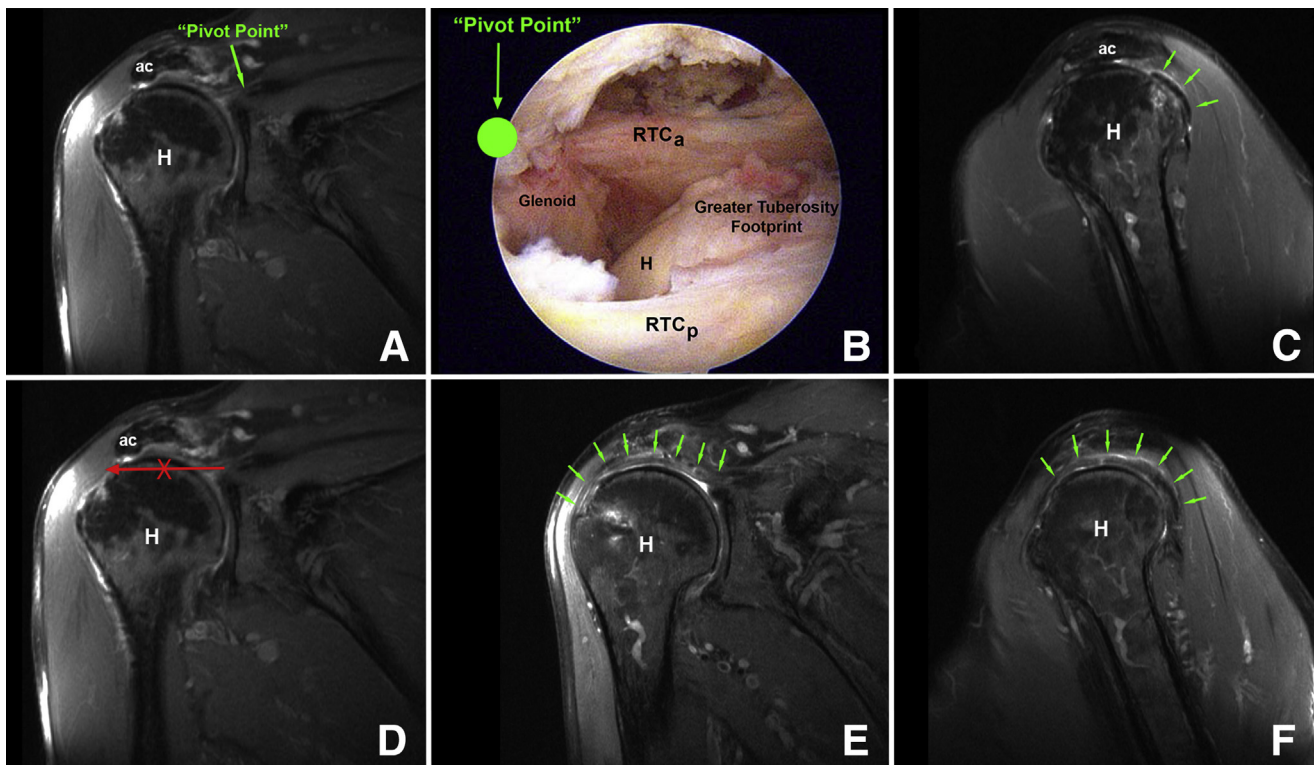


Fig 4. Preoperative and postoperative magnetic resonance imaging (MRI) slices in a right shoulder revision arthroscopy case depicting complete anatomic repair of a massive and retracted tear of the supraspinatus and infraspinatus using anatomic vector repair technique. (A) Preoperative coronal MRI slice depicting the most medial extent of the torn rotator cuff tendons, which is considered the pivot point for repair. Humeral head (H) and acromion (ac) are identified. (B) Arthroscopic view from the posterior portal depicting the pivot point, intact anterior rotator cuff tendon (RTC_a), intact posterior rotator cuff tendon (RTC_p), the humeral head (H), and the exposed greater tuberosity footprint. (C) Sagittal MRI slice depicting the massive tear and the intact rotator cuff tendon displaced posteriorly (green arrows). (D) Red arrow depicting incorrect repair direction for the torn rotator cuff tendons. (E) Coronal MRI slice performed 5 months postoperatively depicting completely intact rotator cuff tendon and associated footprint attachment at the greater tuberosity. (F) Sagittal MRI slice performed 5 months postoperatively depicting completely intact supraspinatus and infraspinatus tendons.

Discussion

Anatomic vector repair of chronic massive and retracted tears of the supraspinatus and infraspinatus tendons of the rotator cuff is a technique that enables complete repair of rotator cuff injury that is often considered irreparable. Tear patterns of massive rotator cuff tendon injury can be difficult to appreciate, and it is critical that the treating surgeon has an understanding of these patterns to strategize repair of such injury. This technique provides a simple method to evaluate the displacement of the torn tendinous tissue and to plan for restoration of the rotator cuff anatomy by properly assessing the spatial vectors for repair of this displaced tissue and considering the magnitude of displacement and the direction of the relevant vectors. Although this technique can be successfully used for complete repair of the rotator cuff tendons over the tendinous footprint of the greater tuberosity, even when repair is accomplished with incomplete footprint coverage, patients can achieve significant clinical

improvement without progression of fatty atrophy of the rotator cuff musculature.⁴

The tear pattern must be completely examined and appreciated. It is most often the case that these massive tears of the supraspinatus and infraspinatus occur in some variation of an L-type pattern. Because of the tissue displacement vectors becoming increasingly large as the tear expands, this pattern may become distorted, and the anatomic repair vectors should be carefully considered to avoid malpositioned margin convergence sutures. Incorrect positioning of a single margin convergence suture will lock the tissue in a nonanatomic position, making complete repair not possible. A common reason that massive tears are categorized as nonreparable is that the tear pattern has been misjudged, often mistakenly characterized as a crescent-type. The most medially “retracted” tendon is typically the extent of the split in the rotator cuff tendons that tracks medially. This tissue has not been retracted medially from the footprint. Recreation of the tendon

anatomy must occur about this pivot point, primarily in the posterior to anterior plane.

The initial margin convergence suture is of crucial importance in the repair sequence. The magnitude and direction of this repair vector most commonly has a y component that is significantly greater than the x component, and therefore, the corresponding θ angle is expected to be large. If the correct anatomic repair vector is determined, it is expected that the θ angle will be $> 45^\circ$ and is most often 60° to 90° . A common error is to misjudge the magnitude of the x component of the margin convergence repair vectors, with the inexperienced surgeon incorrectly assuming that an anatomic tendon repair will occur primarily in the medial to lateral plane, as opposed to the correct plane, which is posterior to anterior.

When the repair has progressed as expected, with anatomic repositioning of the torn tendinous tissue and medial row anchor placement, a single anterolaterally placed anchor in the lateral row is all that is necessary to completely secure the repaired tendons over the entire footprint. Much of the torn tissue is brought anteriorly, and if this is performed in the described stepwise manner, a posterior anchor in the lateral row will not be required. Additionally, as the posterior sutures from the posterior anchor in the medial row are passed directly or near-directly posteriorly, this is done from an anterolateral portal, which is then used to secure all medial row sutures within a single anchor anterolaterally. Double-row fixation in rotator cuff repair has been shown to decrease gap formation and increase the ultimate failure load.⁵ Additionally, there is concern that rotator cuff tendon delamination worsens as tear size increases and that delamination is associated with greater risk of repair failure when a single-row technique is used.⁶ Placement of this anterolateral anchor is an important final step in the repair of massive tears according to the anatomic vector repair technique.

It is notable that this technique requires the passage and tying of many sutures that are associated with the medial row anchors. The tendon–suture interface has been identified in clinical literature as the primary mode of failure at the time of revision surgery in cases of rotator cuff repair using suture anchor fixation.³ Although use of this many sutures as described in this Technical Note may seem cumbersome to the treating surgeon, it is believed that this will provide greater security of repair, particularly in these cases of massive and retracted tear injury. Additionally, although 10 or more suture tails are associated with the medial row anchors, depending on the combination of double- and triple-loaded anchors, these tails can be passed and secured through a single anterolaterally placed anchor.

A massive tear of the rotator cuff is often described as a tear of 2 or more tendons with greater than 5 cm of retraction, or retraction to the level of the glenoid,

although there is variability in the literature regarding the categorization of massive tears.⁷ This type of massive tear is frequently described as non-repairable by the treating clinician, and as a result, treatment options alternative to repair are often undertaken. The most concerning failure from a health care perspective is the inability to recognize which tear patterns are truly not repairable. The technique of anatomic vector repair is simple to perform by the experienced shoulder arthroscopist; however, undertaking this type of repair requires that the treating clinician thoroughly evaluate the pattern of injury and follow the technical steps as described. Other techniques to treat massive and retracted tears include rTSA and SCR. The technique of rTSA, while capable of providing impressive functional recovery in cases of patients suffering from degenerative arthritis with associated rotator cuff injury, is being used with increasing frequency in cases with intact articular cartilage to improve function when there is extensive rotator cuff injury. When there is not significant articular cartilage injury, repair of the native tendon anatomy is much preferable when possible, as opposed to arthroplasty.

The technique of SCR uses facia lata autograft or dermal allograft tissue to treat massive and retracted tears of the supraspinatus or infraspinatus.⁸ Regarding the technique of SCR, long-term clinical outcome studies are lacking, which is a concern given the avascular nature of the tissues used in this reconstructive procedure. Regarding the biomechanical benefits of SCR in cases of massive tear injury involving the supraspinatus and infraspinatus, complete or partial repair of massive rotator cuff tears is likely to provide similar or superior clinical benefit compared with SCR, even in cases of less-robust repair tissue. Poor-quality tendinous tissue of the supraspinatus and infraspinatus that can withstand suture repair is at least as robust as the 4-mm-thick dermal allograft that is used when performing SCR. Successful clinical outcomes are expected in cases of rotator cuff repair, even in cases of partial repair.⁷ The technique of anatomic vector repair of massive rotator cuff tears can be used to achieve repair in cases when alternative, less preferable techniques may be used, such as rTSA or SCR.

Appreciation of the tendon displacement pattern and understanding of the anatomic vector repair technique will enable the treating surgeon to provide complete or near-complete rotator cuff repair in many challenging cases of massive rotator cuff injury (Figure 4).

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