THE MID-DELTOID PORTAL: ANALYSIS OF A NEW ARTHROSCOPIC APPROACH RELATIVE TO THE AXILLARY NERVE

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PURPOSE: Our objective was to evaluate a new arthroscopic portal for rotator cuff repair and its relationship to the axillary nerve. Various methods of antegrade suture passage through torn rotator cuff tendons are available, yet currently allow for the use of only monofilament suture. The mid-deltoid portal provides 90-degree passage of a braided suture; however, the skin portal is distal enough to create concern about the axillary nerve.

METHODS: Nineteen embalmed human cadavers were used to measure the relationships of the mid-deltoid arthroscopic shoulder portal to its surrounding structures. The average age of the cadavers was 75.3 years (range, 53-90 years). An arthroscopic portal was created at a point in the midportion of the deltoid muscle that would allow for placement of a 45° Bird Beak™ (Arthrex, Inc.; Naples, FL) which is used in arthroscopic rotator cuff repair. An 18-gauge spinal needle was placed through the deltoid onto the greater tuberosity at a 45-degree angle to the humeral shaft. An anterior deltopectoral approach was then performed with the shoulder in neutral position to identify the path of the needle and its relation to the greater tuberosity, the axillary nerve, and the lateral aspect of the acromion. The needle was then replaced through the deltoid at an angle that purposely transected the axillary nerve.

RESULTS: The average distance from the portal to the axillary nerve was 2.5 cm (range, 1.6-3.5 cm). The average distance from the portal to the lateral acromial edge was 4.4 cm (range, 3.6-5.0 cm). The average distance from the acromion to the axillary nerve was 6.9 cm (range, 5.4-8.5 cm). The 45-degree angle to the greater tuberosity was achieved in all specimens. The average angle that transected the axillary nerve using the mid-deltoid approach was 14.9 degrees to the humeral shaft (range, 6-20 degrees). This more distal portal placement placed the axillary nerve in the portal pathway.

DISCUSSION AND CONCLUSIONS: Arthroscopic rotator cuff repair is a relatively new technique with significant advantages compared with open surgery. The degree of difficulty inherent in the technique has necessitated the development of new methods that will facilitate its success. The mid-deltoid portal provides a new approach to arthroscopic rotator cuff repair, yet it dares to challenge the notion that placement of an incision in the mid-deltoid area is fraught with peril. The 45° rostral angle of approach provides the margin of safety to make this a reasonable portal.

The prevalence of nerve injury in rotator cuff surgery is relatively low, ranging from 1% to 2.6% of patients; however, the resultant damage can be permanent. McIlveen et al. in a study of isolated nerve lesions of the shoulder found that the worst prognosis for nerve recovery was in the patients who had intraoperative nerve damage and recommended early operative intervention for this group. Abbott et al., in their 1949 review, warned against extended deltoid-splitting incisions for fear of axillary nerve damage. Various references suggest that the axillary nerve runs between 3-7 cm from the lateral acromion edge and is at risk with an anterolateral incision. Our results indicate that the average distance from the acromion to the axillary nerve is 6.9 cm with a range of 5.4-8.5 cm. More importantly, in our study the average distance from the mid-deltoid portal to the axillary nerve was 2.5 cm.

The modified Nevisier portal has been very useful in the surgical technique of the senior author, who performs arthroscopic shoulder surgery in the lateral decubitus position. Due to positioning, this portal can usually be used without significant difficulty; however, there are instances that can limit its use, such as swelling of the shoulder and neck. The commonly used beach-chair position may also put the surgeon at a disadvantage when attempting to use the modified Nevisier portal due to the limited space between the neck and shoulder. The mid-deltoid portal for arthroscopic rotator cuff repair has been valuable in circumstances where other portals could not provide the appropriate angle of approach. When inserted at an angle of 45 degrees to the humeral shaft towards the greater tuberosity, there appears to be minimal danger of damage to the axillary nerve. No instances of axillary nerve complications have been found with the use of this portal by the senior author (SSB). The surgeon should be aware to avoid the “axillary nerve” angle of twenty degrees to the humeral shaft when making this portal.

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