Biceps Brachii Tendon Distal Rupture

Surgical Indications and Considerations

Anatomical Considerations: The two heads of the biceps merge to form the biceps tendon, which rotates through an arc of approximately 90 degrees to insert on the tuberosity of the radius. Contraction of the biceps brachii muscle produces both flexion and supination of the radius.

Pathogenesis: Possible predisposing mechanical, degenerative and vascular factors for distal rupture of the biceps tendon exist. The space available for the biceps tendon between the radial tuberosity and the ulna is significantly decreased in pronation and may squeeze and injure the tendon with forearm rotation. There is a possibility for degeneration in the form of hypertrophic lipping of the radial tuberosity that can be a possible mechanism for shearing of the tendon at its insertion site, which may also predispose it to rupture. There has been identified an area of hypovascularity near the insertion site of the biceps tendon which may limit the natural tendon repair mechanisms. Aside from all of the predisposing factors for biceps tendon repair, the usual cause is as a result of a sudden acute episode.

Epidemiology: Complete rupture of the tendon origin of the long head of the biceps is seen much more frequently than distal rupture (96% versus 3%). Rupture is felt to occur as a result of high-energy rapid eccentric overload. Distal biceps tendon rupture is typically seen in males between the age of 40 and 60 years old who are participating in manual labor, athletic endeavors or weight lifting, with the dominant arm being more commonly affected. This age group is susceptible to tendon ruptures because age is correlated with tendon rupture in that tensile properties of connective tissue decrease as age increases. It has been reported that between 30% and 70% of distal biceps tendon ruptures occur in patients during work related accidents and a vast majority of the ruptures are as a result of an extended arm being overstretched by and outside force such as eccentric tension.

Diagnosis:

- There is generally a report of a sudden and unexpected forceful extension against a flexed elbow, or a pop is felt during heavy lifting
- Flexion and supination of the elbow are reported to be painful and strength is noticed to be decreased in the affected extremity
- Flexion may be decreased mildly when compared to the unaffected side; however supination power is usually markedly decreased
- Magnetic resonance imaging (MRI) is not necessary for a complete tendon rupture, but may be a helpful diagnostic tool for the diagnosis of a partial tendon rupture

Partial Tendon Ruptures: Partial ruptures are not commonly diagnosed clinically and therefore, are rarely treated surgically. Incomplete ruptures or sprains to the biceps tendon that are clinically diagnosed are typically treated with three weeks of immobilization, three weeks of flexion, assisted brace, and activity modification for an additional three weeks. If nonoperative treatment fails, anatomic reattachment to the radial tuberosity through surgery is necessary to regain function.

Nonoperative management: Nonoperative management of the distal tendon has been shown to result in approximately a 50% decrease in supination endurance and strength and a 20% to 30% loss in flexion strength. Conservative treatment of distal biceps tendon ruptures results in decreased functional recovery.

Surgical Procedure: If surgical intervention is indicated for a patient with a distal biceps tendon rupture, surgical reattachment is most easily performed within the first 2 weeks after injury. Beyond two weeks, scarring and retraction of the biceps tendon may make the procedure much more difficult. The surgical repair involves direct reattachment of the tendon to the radial tuberosity, which is the anatomic insertion point for the biceps tendon. Reattachment of the tendon may be accomplished through a single anterior incision or by a two-incision method with tendon retrieval by way of the anterior incision and reattachment through the posterior incision. Overall the two-incision method is the most widely used for surgical exposure of the radial tuberosity; however the single incision approach is being seen more frequently. Suture anchors are becoming the popular method for attachment of the tendon to the cortical bone of the radial tuberosity.

Postoperative Rehabilitation: A near normal return of supination and flexion power and endurance has been noted in patients who have undergone tendon repair using a two-incision technique. Postoperative activities are dictated by the strength of the initial repair and tendon to bone healing. Results post-surgery are typically excellent, with near full recovery of both strength and function to the patient

POSTOPERATIVE REHABILITATION

Phase I; Weeks 1-3

Goals: Protect the surgical reattachment
Control pain

Intervention:

- After surgery, the arm is generally placed in an adjustable hinged brace that is immobilized at 90 degrees of elbow flexion with the forearm in neutral pronation-supination for 2-3 weeks.
- Two to three weeks after surgery passive range of motion is started over a full arc of flexion to 90 degrees and is advanced by 10-15 degrees a week. At this point in time, active elbow extension is begun with the elbow being returned to flexion passively by the patient or therapist.
- Passive pronation and supination range of motion are begun at 3 weeks as well and is advanced by 5-10 degrees per week.

Phase II: Weeks 4-6

Goals: Maintain protection of the reattachment
Gradually restore passive range of motion of the affected joints
Maintain range of motion in the joints above and below the affected elbow
Limit scar tissue adhesions

Intervention:

- At 4 weeks passive wrist and shoulder exercises are begun taking caution not to place stress across the repaired tissue
- Light scar tissue mobilization taking care not to disrupt the surgical repair

Phase III: Weeks 6-8

Goals: Increase active range of motion in the affected elbow
Increase strength
Maintain optimal scar and tissue mobility

Intervention:

- Active flexion and supination are avoided until a point 6 weeks after the reattachment, at which point the patient is progressed to sub maximal isotonic exercised for elbow flexion and extension as well as pronation and supination.
- From 8 weeks following surgery onward, the patient is allowed to progress strengthening exercises as tolerated
- Scar and soft tissue mobilization to maintain proper mobility in tissues surrounding the surgical site

Phase IV: 3-6 Months

Goals: Return to presurgical level of strength and range of motion
Begin sport or activity specific training

Intervention:

- Aggressive strengthening and high level plyometrics are advised to be avoided until 3-6 months after surgery
- Return to jogging for cardiovascular exercise is allowed at 3 to 4 months with return to contact sports or other unrestricted upper extremity activities being limited to 6 months or longer

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