Strength Changes Associated with Elongation After Distal Biceps Repair

Kelechi R Okoroha MD, Nathan E Marshall MD, Robert Keller MD, John-Michael Guest MS, Stephanie Muh MD, Vasilios (Bill) Moutzouros MD
Department of Orthopaedic Surgery, Henry Ford Health System, Detroit, Michigan

Objectives

- Advances in surgical fixation of distal biceps ruptures have led to more aggressive post operative therapy
- Some studies have recommended for early ROM and activities of daily living.
- However, No standard exists, as much of the literature is based on initial fixation strength which does not evaluate lengthening over time
- The purpose of our study was To evaluate the correlation between tendon elongation and biceps strength after distal biceps repair.

Methods

- We recruited 11 patients with acute distal biceps ruptures
- Surgery was performed using a single incision technique with a krackow construct and cortical button for fixation
- 2 tantalum beads were implanted:
  - Bead 1: tendon/radius interface
  - Bead 2: 1 cm proximal to the first bead
- Lengthening evaluation:
  - CT and x-ray at time 0, x rays at 4 and 8 weeks
  - Final CT and x ray at 16 weeks.
- 7 pts able to return for strength testing at 9 months using a biodex machine.
- Compared supination and flexion strength in the operative arm to the non-operative arm
- Strength measurements were correlated with overall tendon lengthening and lengthening during separate time intervals using correlation coefficients

Results

- On average, flexion strength was 87.7% on the operative side compared to the non-operative side.
- Supination strength was an averaged 77.9% when compared to the non-operative side.
- When compared to tendon lengthening, there appeared to be a decrease in strength as the tendon elongates.
- The greatest correlation we noted was in the early post operative period, where supination strength decreased with the amount of lengthening between 0-4 weeks.
- There was also a correlation with increased supination strength with elongation from 8-16 weeks.

Discussion

- The greatest decreases in supination strength showed the strongest correlation with the amount of lengthening in the early post-operative period from 0-4 weeks.
- More supination deficits occur if lengthening occurred primarily in the early post-operative period (0-4 weeks) as compared to the lengthening occurring in the late recovery phase (8-16 weeks), which preserved supination strength.
- Surgical decision making may need a stronger focus on preventing lengthening after distal biceps tendon repair, especially in the early post operative period.
- Tendons may need to be repaired at a greater degree of flexion and even immobilize at this greater degree of flexion
- Additionally, a period of immobilization post-operatively and a delay in physical therapy may aid in reducing early lengthening and also the amount of functional strength loss after distal biceps tendon repair.
- Risk of elbow stiffness, however, must be weighed when deciding to prolong immobilization or repair at severe flexion

Conclusion

- This study’s findings suggest that all patients undergoing distal biceps tendon repair have significant lengthening after surgery.
- Most of the lengthening was noted in the early post-operative period, in which the greater amount of lengthening correlated with a greater loss of supination strength.
- Further studies will focus on post-operative protocols as they may have an impact on early tendon lengthening and could be adjusted to minimize this consequence on long-term supination strength.