Box-Loop Ligament Reconstruction of the Elbow for Medial and Lateral Instability

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INTRODUCTION: Elbow instability that involves both the MCL and LCL ligaments is a challenging surgical problem. The senior author has developed a novel method to reconstruct both the MCL and LCL using one graft. This technique utilizes a “box-loop” design where the donor tendon is passed through the humerus and ulna and tied back to itself creating a loop.

METHODS: The “Box Loop” technique involves approach to the MCL and LCL via medial and lateral incisions. The Kocher interval is used laterally while the medial approach varies depending on whether or not an ulnar nerve decompression or transposition is planned. The humeral tunnel is made using a drill guide between the medial and lateral isometric points. The ulnar tunnel is made from the sublime tubercle medially to the tubercle of the supinator crest laterally. Typically, a 3.2 mm drill is used. An allograft (most commonly plantaris) is then prepared using a No. 2-0 Ethibond Krackow stitch on each end. It is passed through the humerus, looped through the ulna, and again through the humerus and ulna once again. The direction of passing and number of passes varies depending on which side (medial or lateral) is most unstable such that more passes occur on the more unstable side (Fig. 1A). The number of passes is also somewhat dependent on the length of the graft. Most commonly, the graft is passed first through the humeral tunnel from lateral to medial. After all passes have been completed, the capsule and residual ligamentous tissue are then closed followed by tensioning and tying of the graft (Fig. 1B). The elbow is then examined to confirm stability in all planes. Fourteen cases with mean follow up of 64 months were reviewed. Nine patients returned to clinic and were evaluated both clinically and radiographically. An additional five patients participated via phone questionnaire. Of those five, one patient was able to send photographs documenting range of motion.

RESULTS: No patients had further instability or required repeat surgery for instability. All patients were stable on physical examination including the posterolateral rotatory drawer test. Range of motion was improved in eight patients, the same in two patients, with no patients having a decrease in range of motion. The mean ASES score was 81 (range, 36-100) with eight of 14 patients reporting a self-satisfaction rating of 10 out of 10. The mean QuickDASH score was 13 (range, 0-64) and mean MEPI score was 88 (range, 60-100) with four excellent, three good, three fair results, and no poor results. All but one patient felt their elbow was improved by surgery. Radiographs showed arthritic changes in six of nine elbows (67%), which were graded as mild (2/9), moderate (2/9) or severe (2/9). There was one delayed onset ulnar neuropathy requiring ulnar nerve transposition on postoperative day 12.

DISCUSSION AND CONCLUSION: This technique was found to have excellent mid-term results. Compared to separate medial and lateral sided reconstructions, this procedure can be performed with one graft instead of two, and with less surgical dissection. This has become our preferred method in treating
elbows requiring combined medial and lateral ligament