Lateral Meniscal Allograft Interposition combined with Proximal Row Carpectomy Provides Motion-Sparing Treatment Option in those with Severe Wrist Arthritis

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Introduction: Proximal row carpectomy (PRC) has traditionally been an effective surgical option that maximizes wrist range of motion while minimizing pain in those with debilitating wrist degeneration. PRC is contraindicated in those with pre-existing proximal capitate or lunate fossa arthritis as this procedure increases peak pressures and decreases contact areas within the radiolunate fossa. But in 2009, Nanavati et al. demonstrated that the interposition of a meniscal allograft in the radiocapitate articulation restored pressures and contact areas to those of a normal wrist. The purpose of this study was to determine whether use of a lateral meniscal allograft interposition (LMAI) combined with proximal row carpectomy (PRC) would be a valid motion-sparing treatment option for those patients who are contraindicated in having a PRC alone. Goals of surgery are similar to those of PRC; decreasing pain and improving function while avoiding a motion-sacrificing surgery such as arthrodesis. Very little research has been performed on the topic of LMAI. The authors of this study hypothesized that patients having LMAI with PRC would have equivalent results to those having PRC alone.

Methods: Nine patients underwent proximal row carpectomy with meniscal allograft interposition for severe wrist degeneration between 2006 and 2012. Seven of nine patients agreed to participate in the follow-up portion of the study. In conjunction with the principal procedure, 6 of these patients had a PIN neurectomy and 4 had a radial styloidectomy. All patients had radiographic evidence of arthritis affecting the proximal capitate or the lunate fossa of the radius. Retrospective chart review was conducted to gather patient demographics, surgical indications, complications and graft failure rate. After an average of 3.7 years, a physical examination by an independent medical examiner was performed to assess range of motion (ROM) and grip strength. Questionnaires were also utilized at this time to assess return to work status, current pain medication use, pain level, and Disabilities of the Arm Shoulder and Hand (DASH) score. A DASH score is a validated outcomes questionnaire that assesses physical function and symptoms. It is scored from 0 to 100, greater scores representing greater disability. Radiographs at time of follow-up as well as post surgical radiographs were analyzed to objectively compare radiocapitate space.

Results: Average age at time of surgery was 66 years. Etiology of wrist arthritis included SLAC wrist and Kienbock’s disease. One patient (11%) had graft failure 14 months after surgery. One other patient had a return to OR for drainage of hematoma. Of the grafts that did not fail, the average current pain was rated as 4.1 out of 10 on a pain scale. At time of follow-up, six patients (86%) were not requiring narcotic pain medications and 0 (0%) patients went on to require wrist arthrodesis. DASH scores ranged from 9 to 60, with an average of 33. Six patients (86%) were able to return to their previous job and activities. One patient (14%) was able to return to a different line of work. The average postoperative wrist range of motion (figure 1) was 83% and the average maximal grip strength was 68% of the opposite extremity, respectively. Flexion and extension were significantly less in the operative extremity at time of follow-up (p=0.001 and 0.024 respectively). There was no difference in supination and pronation (p=0.2 and 1.00 respectively). Average radiocapitate joint space in the first post operative radiograph was 2.5 mm (figure 2) compared with 1.7 mm at time of follow-up (figure 3).

Discussion: Results were comparable to those published in the literature where PRC was performed alone in regards to ROM, grip strength, and return to work status. Tomaino et al. found that after an average of 6 year follow-up patients with PRC alone had grip strength of 77% and flexion-extension arc of 64% compared with the contralateral side. These numbers are comparable to our findings of 68% and 67% respectively. Some authors such as Wyrick et al. have reported grip strength as great as 94% of the opposite side. Didonna et al. found a group of 22 wrists to have an average DASH score of 9 following PRC after 10 years compared to our average finding of 33. However, this paper reported on a younger patient population, 38 years versus 66 years. Jebson et al. found that 90% percent of a 20 patient group were able to return to their previous occupation following a PRC. Our group of patients performed similarly. This group of authors had a 10% arthrodesis rate after an average of 13.1 year follow-up. None of our patients went on to require wrist arthrodesis during our shorter study period. As with Didonna’s study, our results
demonstrated that at least partial loss of radiocapitate space was common. However, there does not seem to be a correlation between radiographic changes with subjective and objective outcome. Limitations of this study include its small sample size and lack of a control group. More prospective research on this topic is needed.

**Significance:** In advanced wrist arthritis, motion-sacrificing procedures such as arthrodesis are commonly used in patients who have degeneration of the proximal capitate or lunate fossa. This study demonstrates that the use of lateral meniscal interposition allograft combined with proximal row carpectomy is an option for motion-preserving procedure that is successful in reducing pain and improving function.

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**References:**
Figure 2: First follow-up radiograph demonstrating radiocapitate space immediately after LMIA

Figure 3: Lateral radiograph in the same patient demonstrating partial narrowing of radiocapitate space five years following LMIA