

PAPER 75

Clinical Paper Session 13
Wrist II – Saturday, September 15, 2018 • 1:37–1:42 PM
Hand and Wrist; Practice Management

Comparison of Direct Surgical Costs for Proximal Row Carpectomy and 4-Corner Arthrodesis

Level 3 Evidence

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Hypothesis: No differences exist in surgical encounter total direct costs (TDC) for proximal row carpectomy (PRC) and scaphoidectomy with 4-corner arthrodesis (FCA).

Methods: Consecutive adult patients (≥ 18 years) treated by fellowship-trained orthopedic hand surgeons with PRC and FCA between July 2011 and May 2017 were identified by CPT code at our tertiary academic institution (PRC 25215; FCA 25820 and 25825). Retrospective chart review was performed to verify coded procedures, and to collect demographic and surgical encounter data. Patients treated with intercarpal arthrodeses other than FCA, and those undergoing additional simultaneous procedures, were excluded. Using our institution's information technology value tools, we extracted prospectively collected TDC data for each surgical encounter. Each participant's surgical encounter cost was normalized by the mean cost in the data set. TDC were compared between PRC and FCA using a Wilcoxon rank sum test, and a Kruskal-Wallis test with Tukey pairwise comparisons were used to compare TDC across FCA subgroups (screws, plating, or staples).

Results: Of 42 patients included in the analysis, all had diagnoses of SLAC or SNAC wrist besides 2 patients undergoing PRC for Kienböck disease. Mean age was similar between the 23 PRC and 19 FCA patients (51.2 versus 54.5 years, respectively; $P = .35$), however the PRC group included more females (52% versus 16%, respectively; $P = .01$). TDC were 4.3-fold greater for FCA than PRC ($P < .01$; Figure 75-1). FCA was associated with significantly greater facility utilization costs (2.3-fold; $P < .01$), supply costs (10-fold; $.01$), and operative time (121 versus 57 minutes; $.01$). Implant costs were absent for PRC, which were responsible for 55% of the TDC for FCA. Although surgical time was similar when using headless compression screws, plating, or staples for FCA ($P = .32$), TDC significantly differed between the 3 methods ($P < .01$; Figure 75-2) as did implant costs between each group ($P < .01$).

Summary Points:

- Direct surgical costs were 430% greater for FCA than PRC, despite similar clinical outcomes reported in the peer-reviewed literature (1).
- Implant costs for FCA alone were 130% greater than the entire surgical encounter for PRC.
- FCA costs differed based upon the chosen method of fixation, which was driven by implant costs.
- Database cost studies would theoretically allow for greater generalizability and larger sample sizes, but are limited by nonspecific CPT/ICD coding that prevent exclusion of non-FCA intercarpal arthrodeses (2).

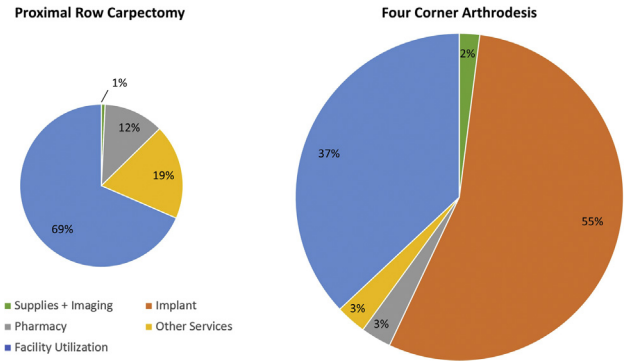


Figure 75-1: Total Direct Costs.

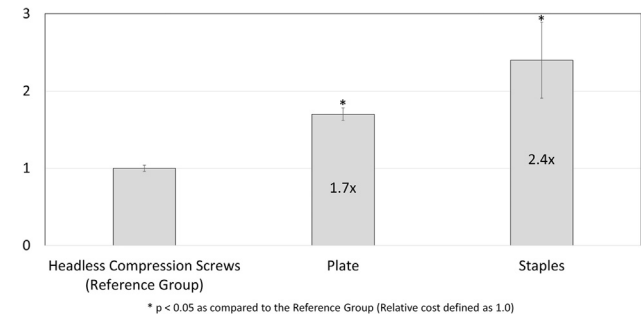


Figure 75-2: FCA Relative Total Direct Costs, by Fixation Type.

BIBLIOGRAPHY

1. Saltzman BM, Frank JM, Slikker W, Fernandez JJ, Cohen MS, Wysocki RW. Clinical outcomes of proximal row carpectomy versus four-corner arthrodesis for post-traumatic wrist arthropathy: a systematic review. *J Hand Surg Eur Vol.* 2015;40(5):450–457.
2. Rahgozar P, Zhong L, Chung KC. A comparative analysis of resource utilization between proximal row carpectomy and partial wrist fusion: a population study. *J Hand Surg Am.* 2017;42(10):773–780.

PAPER 76

Clinical Paper Session 13
Wrist II – Saturday, September 15, 2018 • 1:44–1:49 PM
Hand and Wrist; Diseases and Disorders

Proximal Row Carpectomy Versus 4-Corner Fusion: Regional Differences, Incidence, and Conversion to Fusion

Level 2 Evidence

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COI: Ownership Interest: Medtronic, Zimmer Biomet, AxoGen, Stryker (Alluri)

Hypothesis: Proximal row carpectomy (PRC) and 4-corner fusion (4CF) are the 2 common salvage procedures utilized in the treatment of scaphoid nonunion (SNAC) and scapholunate advance collapse (SLAC). We hypothesized that 4CF and PRC would both have increased incidence from

2005 to 2014 across Medicare patients, and that 4CF would have higher rates of conversion to fusion and higher cost burden compared with PRC.

Methods: A total of 3,636 patients who underwent PRC and 5,047 who underwent 4CF were identified from 2005 through 2014 among Medicare enrollees. Regional distribution, demographic characteristics, annual incidence, comorbidities, and conversion to wrist fusion were compared between the 2 groups. Of the patients identified, 3,512 from each group were age and sex matched and subsequently compared for rates of converted fusion, 30- and 90-day readmission rates, and average cost.

Results: Demographically, the patients undergoing 4CF and PRC did not have statistically significant differences in age, sex, or comorbidities. The incidence of the procedures among all Medicare subscribers increased for both PRC (1.8 per 10,000 to 2.6 per 10,000) and 4CF (1.2 per 10,000 to 2.0 per 10,000) from 2005 to 2014. When comparing matched cohorts, patients who underwent 4CF had a higher rate of conversion to fusion compared with those who underwent PRC (2.67% vs 1.79%, $P < 0.0067$). Readmission rates were not significantly different at 30 or 90 days ($P = 0.07$ and 0.64 , respectively). Average cost was significantly greater for 4CF compared with PRC ($P < .0001$).

Summary Points:

- PRC and 4CF have been utilized at increasing rates in the past decade for the treatment of scaphoid nonunion and scapholunate advanced collapse.
- Regional differences may exist with a predilection toward PRC in the Northeast and 4CF in the West.
- Wrist fusion rates and average cost are higher in the 4CF group without a significant difference in readmission rates.

BIBLIOGRAPHY

1. Saltzman BM, Frank JM, Slikker W, Fernandez JJ, Cohen MS, Wysocki RW. Clinical outcomes of proximal row carpectomy versus four-corner arthrodesis for post-traumatic wrist arthropathy: a systematic review. *J Hand Surg Eur Vol.* 2015;40(5):450–457.
2. Wyrick JD, Stern PJ, Kieffhaber TR. Motion-preserving procedures in the treatment of scapholunate advanced collapse wrist: proximal row carpectomy versus four-corner arthrodesis. *J Hand Surg Am.* 1995;20(6):965–970.

PAPER 77

Clinical Paper Session 13
 Wrist II — Saturday, September 15, 2018 • 1:51–1:56 PM
 Hand and Wrist; Practice Management

Capsular Suture Versus Ulnar Fovea Bony Reattachment of the Triangular Fibrous Cartilage Complex in the Treatment of Distal Radioulnar Joint Instability: Preoperative Factors Relating to Postoperative Wrist Pain

Level 2 Evidence

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COI: There is no financial information to disclose.

Hypothesis: The hypotheses were (1) that outcomes would be better for ulnar fovea bony reattachment (BR) of the triangular fibrous cartilage complex (TFCC) than for capsular suture (CS) in patients with ulnar side tear of the TFCC, and (2) that postoperative wrist pain would be related to preoperative DRUJ instability.

Methods: This was a prospective randomized study of 46 patients reporting ulnar wrist pain with DRUJ instability in only one hand and no other pathological condition in either arm. Patients aged 16 years and those having irreversible distal radioulnar joint (DRUJ) dislocation or subluxation were excluded. Arthroscopic CS and BR were performed alternately according to the order scheduled for surgery. Patients were followed up for greater than 2 years. In the CS group (n = 26), 2-6 and 2-0 absorbable nylon sutures were placed on the TFCC ulnar margin. In the BR group (n = 20), the ulnar TFCC was reattached to the ulnar fovea using a 2-0 polyester thread passed through a bone tunnel created through the distal ulna.¹ Arcs of wrist extension-flexion, radioulnar deviation, supination-pronation, grip strength, instability of the DRUJ, and DASH and VAS scores were assessed before and 24 months after surgery. Instability of the DRUJ was assessed by applying manual force to the ulnar head in the supinated and pronated positions.² DRUJ instability is expressed here as the sum of the volar and dorsal instabilities as: 0, no instability; 1, instability similar to or less than that in the opposite wrist; 2, greater instability than the opposite wrist with the end point; and 3, greater instability than the opposite wrist with no end point. A t test or Mann–Whitney U test was used to compare CS and BR groups. A Wilcoxon test was used to compare the preoperative and 2-year postoperative values for each measure. Spearman’s correlation coefficients were calculated between the postoperative VAS score and the 2-year value for each measure.

Results: The outcomes were similar in the CS and RB groups (Table 77-1). Greater postoperative pain was related to a smaller radioulnar deviation arc and greater preoperative VAS and DASH scores (Table 77-2).

Summary Points:

- Restricted radioulnar deviation arc, greater preoperative pain, and functional impairment of the wrist may be predictors of pain after arthroscopic TFCC repair.
- The outcomes were similar in the CS and RB groups.

Table 77-1: Comparison between the CS and BR groups before and 2 years after surgery

	Before Surgery		2 Years After Surgery	
	CS Group	BR Group	CS Group	BR Group
Age (Y)	30+13.3 (25.0-35.7)	33+13.5 (26.5-39.0)	-	-
Sex	M/F : 11/15	M/F : 10/10	-	-
Onset of Wrist Pain	U/K : 9/17	U/K : 7/13	-	-
Onset–Operation Interval (M)	3.8+2.0 (3.1-4.7)	4.7+2.6 (3.5-5.9)	-	-
Extension-Flexion Arc(%)	91.9+16.0 (85.5-98.4)	93+9.1 (88.7-97.3)	96.2+7.8 (93.1-99.4)	96+6.5 (93.0-99.0)
Radial-Ulnar Arc (%)	86.8+17.4 (79.8-93.8)	86.1+16.2 (78.5-93.6)	91.1+15.2 (85.0-97.2)	93.3+14.3 (86.6-99.9)
Pronation-Supination Arc (%)	95.5+8.1 (92.2-98.8)	92.8+14.1 (86.1-99.4)	98.2+3.4 (96.9-99.6)	96.7+4.9 (94.4-98.9)
Grip Strength (%)	74.7+16.5 (68.0-81.4)	80.2+18.7 (71.4-89.0)	88.5+14.2 (82.8-94.3)	89.5+10.0 (84.8-92.7)
DRUJ Instability	4	4	1	1
VAS Score	52.7+13.3 (35.3-46.1)	56.3+17.4 (48.1-64.4)	11.6+12.7 (6.5-16.7)	12.1+10.7 (7.1-17.1)
DASH Score	33.6+16.5 (27.0-40.3)	36.8+23.1 (26.0-47.6)	7.5+9.0 (3.9-11.2)	5.6+6.8 (2.5-8.8)

Note: M; male, F; female, U; unknown onset, K; known onset.

Mean + standard deviation, except the DRUJ instability.

Median values are expressed in the DRUJ instability. Values in parentheses mean the 95% CIs. No significant difference was found in any assessments between CS and BR groups before and 2 years after surgery.