

Treatment of Thumb Basal Joint Arthritis With Hematoma and Distraction Arthroplasty Compared to LRTI in a Predominantly Male Population

Stephen Y. Liu, MD
Christina F. Endress, MD
David R. Steinberg, MD

Department of Orthopaedic Surgery,
University of Pennsylvania, Philadelphia, PA

Introduction

The basal joint, also referred to as the carpometacarpal (CMC) joint, of the thumb is one of the joints most commonly affected by arthritis. CMC joint arthritis can lead to decreased grip and pinch strength and impairment of activities of daily living. The goal of surgical intervention is to relieve the arthritic pain while maintaining thumb function. Simple trapeziectomy was first described in 1949 by Gervis and again in 1960 by Murley but was abandoned due to decreased grip strength.^{1,2} Over the past three decades in the United States, a more popular procedure for thumb CMC arthritis has been ligament reconstruction with tendon interposition (LRTI). This procedure was first described by Burton in 1983, in which the flexor carpi radialis (FCR) tendon is used to reconstruct the palmar oblique ligament (POL). Upon review of his cases, with minimum of two-year follow-up, Burton showed 92% excellent results.³ Reports have shown that the majority of patients are satisfied with pain relief provided by LRTI and have improved ability to perform activities of daily living.⁴

Recent literature has questioned whether LRTI is the ideal treatment option for basal joint arthritis. Studies have shown that the LRTI procedure is not as effective in preventing proximal metacarpal migration as was once

thought, yet patient satisfaction remained high. Based on these findings, Gelberman *et al* proposed a new technique in which the ligament was reconstructed but a portion of trapezium was retained (“trapezium-retaining interposition arthroplasty”). They concluded that patients had similar satisfaction compared to LRTI and trapezium height was also maintained.⁵

Other surgeons took a different approach. In 2003, Kuhns *et al* described a technique of trapeziectomy with post-operative K-wire immobilization of the CMC joint, known as “Hematoma and distraction arthroplasty” (HDA, Figure 1). Outcomes showed a stable, pain-free thumb that had superior strength and motion compared to other more complicated procedures for CMC arthritis.⁶ Comparative studies in predominantly female patients (86-100%) over the last decade have demonstrated equivalent outcomes for trapeziectomy alone and trapezium resection with tendon interposition with or without ligament reconstruction.⁷⁻¹⁰

The purpose of our study was to compare the results of LRTI versus HDA in a predominantly male population at the Philadelphia Veterans Affairs Medical Center (PVAMC).

Methods

A retrospective review was conducted of the PVAMC database between November 2000



Figure 1. Postoperative imaging showing K-wire fixation in hematoma and distraction arthroplasty.

Corresponding author:
Stephen Y. Liu, MD
Department of Orthopaedic Surgery
University of Pennsylvania
3400 Spruce Street,
2 Silverstein Pavilion
Philadelphia, PA 19104
Stephen.Liu@uphs.upenn.edu

and October 2013. All patients who underwent CMC joint arthroplasty for radiographic evidence of basal joint arthritis and pain unresponsive to conservative measures were included in the study. For purposes of this review, patients were further stratified into LRTI and HDA groups. All surgeries were performed by the senior author (DRS). This represents a consecutive series of patients undergoing basal joint surgery. LRTI was performed in all patients in the first part of the collection period, and HDA performed in all patients presenting after July 2010. Data regarding preoperative pain, postoperative pain, postoperative radiographs, comorbidities, number of additional procedures done at the time of surgery, and complications were collected. Post-operatively, patients underwent suture removal and cast application at 1 week, cast and K-wire removal (if applicable) and the start of ROM exercises in an orthoplast splint at 4 weeks, and strength exercises at 8 weeks. Patients were discharged from routine follow-up at 12 weeks. At 12 weeks, pain scores were recorded and radiographs were evaluated for collapse by one surgeon (CFE) looking specifically at trapezial space height and trapezial space ratios. Patient outcomes included pain relief, radiographic collapse, and complications. Significance was calculated using a two sample two-tailed Student's t-test. Chi-squared analysis was used to compare discrete variables.

Results

A total of 31 CMC arthroplasties were performed during the study period, of which 28 were included in the study (25

patients). Twelve were LRTI and 16 were HDA. Eighty-two percent of the patients were male, which was statistically similar in both groups. There was no difference in age, number of additional procedures, comorbidities, pre and postoperative pain scores, and pain relief between the groups (Table 1). The LRTI patients had longer follow-up (5.69 years \pm 2.88 vs. 0.60 \pm 0.91; $p=0.003$), while the HDA group had significantly shorter tourniquet time (96.9 minutes \pm 7.3 vs. 68.9 \pm 21.5; $p=0.0001$). There was no difference radiographically between the trapezial space height/ratio on AP or lateral radiographs between the groups (Table 2). The LRTI group was complicated by one case of incisional cellulitis, which resolved with oral antibiotics. The HDA group had one suture abscess from an unrelated surgical site, that resolved with antibiotics, and one incision and drainage for hypersensitivity to gelfoam (only used in this one case) that went on to heal uneventfully.

Discussion

Recent comparative studies have demonstrated similar outcomes for different thumb basal joint surgeries, including trapeziectomy, tendon interposition, and ligament reconstruction. All have been in predominantly female populations (86–100%).^{7,9-10}

Our results further support the concept of simple trapeziectomy as a viable treatment option for thumb basal joint arthritis. We found that patients are satisfied with the HDA procedure and have similar pain relief and function compared

Table 1. Demographic data of the study groups, LRTI and HDA. There were significant differences in follow-up (longer in LRTI) and tourniquet time (shorter in HDA).

	LRTI (mean \pm SD)	HDA (mean \pm SD)	P-value
Age (yr)	61.75 \pm 7.20	63.56 \pm 6.61	0.5
Male (%)	83.3	81.2	0.89
Follow-up (yr)	5.69 \pm 2.88	0.60 \pm 0.91	<0.05
# Comorbidities	3.25 \pm 2.86	4.31 \pm 3.11	0.36
# Extra procedures	0.42 \pm 0.67	0.31 \pm 0.79	0.71
Tourniquet time (min)	96.91 \pm 7.33	68.88 \pm 21.50	<0.05
Preoperative pain	7.77 \pm 0.65	8.13 \pm 1.02	0.28
Postoperative pain	1.45 \pm 1.69	1.06 \pm 1.06	0.51

Table 2. Postoperative pain relief and radiographic measurements for the LRTI and HDA groups. There were no significant differences found between groups for any of these measurements.

	LRTI (mean \pm SD)	HDA (mean \pm SD)	P-value
Pain relief (pain score difference)	6.32 \pm 1.75	7.06 \pm 1.36	0.25
Trapezial space height AP (mm)	7.13 \pm 2.01	8.22 \pm 2.26	0.28
Trapezial space height lateral (mm)	6.17 \pm 1.55	5.71 \pm 1.78	0.55
Trapezial space ratio AP	0.21 \pm 0.05	0.26 \pm 0.08	0.10
Trapezial space ratio lateral	0.20 \pm 0.05	0.20 \pm 0.06	0.96

to patients who underwent the more complex LRTI. There was no statistical difference in pain relief between the two groups. Men undergoing this procedure can expect results similar to those reported in the literature for predominantly female patients.

There was no statistical difference in metacarpal subsidence between the two groups as determined by the trapezial height ratio. This is an important finding, as one justification for performing the LRTI procedure is that it was thought to provide greater joint stability and less subsidence of the thumb metacarpal.

Limitations of our study include its retrospective nature. The hematoma arthroplasty group had very short-term Xray follow-up. Many of the patients did not have further imaging after their K-wires were removed, as they were clinically doing well. Currently these patients are being reevaluated to document longer-term clinical and radiographic outcomes.

Conclusion

HDA is a reasonable alternative to LRTI for surgical treatment of thumb basal joint arthritis. It is a simpler procedure with less potential complications and requires less tourniquet time. HDA provides equivalent pain relief and function compared to LRTI in a predominantly male population. Men undergoing

this procedure can expect results similar to those reported in the literature for predominantly female patients.

References

1. **Gervis WH.** Excision of the trapezium for osteoarthritis of the trapezio-metacarpal joint. *J Bone Joint Surg* 1949; 31B: 537-539.
2. **Murley AHG.** Excision of the trapezium in osteoarthritis of the first carpo metacarpal joint. *J Bone Joint Surg* 1960; 42B: 502-7.
3. **Burton RI, Pellegrini VD.** Surgical management of basal joint arthritis of the thumb. Part II. Ligament reconstruction with tendon interposition arthroplasty. *J Hand Surg* 1986; 11: 324-332.
4. **Lins RE, Gelberman RH, McKeown L, et al.** Basal joint arthritis: trapeziectomy with ligament reconstruction and tendon interposition arthroplasty. *J Hand Surg* 1996; 21: 202-9.
5. **Mo JH, Gelberman RH.** Ligament reconstruction with trapezium retention arthroplasty for carpometacarpal arthritis. *J Hand Surg Am* 2004; 29: 240-46.
6. **Kuhns CA, Emerson ET, Meals RA.** Hematoma and distraction arthroplasty for thumb basal joint osteoarthritis: A prospective, single-surgeon study including outcomes measures. *J Hand Surg* 2003; 28: 381-89.
7. **Belcher H, Nicholl J.** A comparison of trapeziectomy with and without ligament reconstruction tendon interposition. *J Hand Surg* 2000; 25B: 350-56.
8. **Bhat M, Davis TRC, Bannerjee A.** Trapezial space height measurement after trapeziectomy. *J Hand Surg* 2003; 28A: 390-96.
9. **Field J, Buchanan D.** To suspend or not to suspend: a randomized single blind trial of simple trapeziectomy versus trapeziectomy and FCR suspension. *J Hand Surg* 2007; 32E: 462-66.
10. **Gangopadhyay S, McKenna H, Burke FD, et al.** Five- to 18-year follow-up for treatment of trapeziometacarpal osteoarthritis: a prospective comparison of excision, tendon interposition, and ligament reconstruction and tendon interposition. *J Hand Surg* 2012; 37A:411-17.