

The outcome of suspension arthroplasty in Thumb Carpometacarpal joint arthritis

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Abstract

The trapeziometacarpal joint is most often affected by primary osteoarthritis or post-traumatic arthritis. The aims and objectives of the study was to evaluate the subjective and objective results of thumb carpometacarpal arthritis treated with Suspension arthroplasty and comparison of the results at our institution with those mentioned in the literature. This is the study of 10 patients who were treated with suspension arthroplasty and followed up postoperatively at six months or more, the average being 14.2 months. The test of significance applied was Wilcoxon signed-rank test. A p-value of < 0.05 was considered as significant. The patients were evaluated after surgery in the terms of Mayo's wrist score, grip strength, pinch strength and pain.

Results: There were 8 females and 2 males, 8 right handed (dominant) and 2 left handed. The average age was 56 yrs with SD of 4.7 yrs. The preoperative Mayo's wrist score was 44 which increased to 74.5 at the time of the longest follow up. The difference was statistically significant (p-value of < 0.05). The increase in grip strength was impressive and statistically significant. It increased from a preoperative mean of 42% of the opposite hand to 69%. The increase in pinch strength although was less impressive as compared to the grip strength as reflected in the Mayo's wrist score. It increased from a mean of 45.8% of the opposite hand to 54.7%. VAS scores reduced from mean of 4.8 to 0.2 showing significant reduction in pain at the base of the thumb.

Conclusion: Our study highlights the importance of diagnosing and identifying this potentially treatable common condition which is often confused with other differential diagnoses. Ligament reconstruction and tendon interposition is an easy and reproducible technique to restore function and relieve pain in the joint.

Keywords: Thumb, Arthritis, Carpometacarpal, Suspension, Arthroplasty.

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carpometacarpal arthritis treated with Suspension arthroplasty. The objectives were comparison of the results at our institution with those mentioned in the literature, evaluation of grip and pinch strength of the hand postoperatively and the subjective outcome of the procedure i.e. the patient's satisfaction, pain relief and return to normal lifestyle.

Introduction

The thumb joints affected by osteoarthritis are the trapeziometacarpal, metacarpophalangeal, and distal interphalangeal joints. The trapeziometacarpal joint is most often affected by primary osteoarthritis or post-traumatic arthritis.¹ Thumb carpometacarpal arthritis is a common degenerative joint disease in the hand, more common in females older than fifty years of age.² The first carpometacarpal joint is a reciprocally concavo-convex saddle joint that results in the involved ligaments and capsule primarily responsible and under strain to provide stability.³ Pelligrini's studies of trapeziometacarpal osteoarthritis supports the concept of trapeziometacarpal translational instability as a major factor in trapeziometacarpal joint osteoarthritis. The operative techniques available for the treatment of arthritic thumb deformities include synovectomy, soft-tissue reconstructions, arthroplasty, and arthrodesis¹. The term "suspension arthroplasty" has been used in the literature synonymously to mean Ligament Reconstruction with Tendon Interposition Arthroplasty^{4,5}. Aim of this study was to evaluate the subjective and objective results of thumb

Materials and Methods

The inclusion criteria were patients with Eaton stage III and IV thumb carpometacarpal arthritis and above 18 yrs of age. Exclusion criteria were recent history of trauma, history or evidence of infection in surrounding area, paralytic hand, and bilateral affection with rheumatoid arthritis. We identified fifteen patients with thumb carpometacarpal joint arthritis. Two of them refused to undergo surgery and continued conservative treatment. One of them was excluded owing to the disease stage being Eaton II. Remaining two had bilateral affection with rheumatoid arthritis with other small joints severely involved. So a total of 10 patients with Thumb Carpometacarpal arthritis underwent Suspension Arthroplasty i.e. ligament reconstruction and tendon interposition, from May 2012 to May 2014 and were followed up postoperatively in the study and evaluated. All patients were evaluated with regard to grip and pinch strength. Grip strength and pinch strength were assessed objectively and subjectively and staging was done using Eaton Classification Systems of Thumb Carpometacarpal Arthrosis. Objective measurements were done using a Jamar dynamometer and Key pinch

strength was measured using pinch gauge. They have been expressed as percentage of the opposite side owing to wide strength variations in normal population. Digital and wrist motion were measured using standard goniometer and distances with the palm of the opposite side. Radial abduction and palmar abduction were measured using a standard goniometer. Abduction, extension and opposition of the TMJ were measured by the distance between the thumb and palmar crease.

Table 1 : Mayo's Wrist Score

Category	Findings
Pain (25 points)	
25	No pain
20	Mild pain with vigorous activities
20	Pain only with weather changes
15	Moderate pain with vigorous activities
10	Mild pain with activities of daily living
5	Moderate pain with activities of daily living
0	Pain at rest
Satisfaction (25 points)	
25	Very satisfied
20	Moderately satisfied
10	No satisfied, but working
0	No satisfied, unable to work
Range of motion (25 points)	
25	100 %: percentage of normal
20	75%-99%: percentage of normal
10	50%-74%: percentage of normal
5	25%-49%: percentage of normal
0	0%-24%: percentage of normal
Grip strength (25 points)	
25	100%: percentage of normal
20	75%-99%: percentage of normal
10	50%-74%: percentage of normal
5	25%-49%: percentage of normal
0	0%-24%: percentage of normal
Final Result (Total Score)	
90-100	Excellent
80-89	Good
65-79	Fair
<65	Poor

Visual Analogue Score (VAS) was used to assess pain. Mayo Wrist Score (Table 1) was calculated before and after surgery. The radiographs were also assessed preoperatively and after the surgery.

Operative procedure

The operative procedure that we performed was modification of the one described by Burton and Pelligrini¹. With the patient under satisfactory anesthesia and a tourniquet inflated, the trapeziometacarpal joint is

exposed with a dorsoradial incision in line with the 2nd metacarpal, extending proximally across the trapeziometacarpal joint. The thenar muscles are elevated extraperiosteally, the trapezium exposed.(Fig. 1)



Fig. 1: Intraoperative picture of the exposure

Abductor pollicis longus is reflected palmarwards. Half of the trapezium (Hemi-trapezectomy) or pan-trapezectomy is done depending on trapeziometacarpal and scaphotrapezoidal joint arthrosis. Flexor Carpi Radialis Slip is harvested from the distal insertion. The tendon is then wound around the abductor pollicis longus to tighten the lax ligaments and capsules. The remaining length of the tendon is folded in the trapezoid fossa. A K-wire may be passed from the first to the second metacarpal for temporary stabilization until the surrounding lax structures undergo healing by fibrosis and tighten up (Fig. 2).



Fig. 2: Postop Radiograph of Kwire fixation

A postoperative thumb spica cast is given for six weeks. (Fig. 4)



Fig. 3: Radiograph after six weeks of spica cast

Results

Our study includes a series of ten patients operated between May 2012 and May 2014 with a mean follow up of 14.2 months. The work was carried out in Department of Orthopaedic Surgery at a renowned medical college and hospital. The test of significance applied was Wilcoxon signed-rank test. A p-value of < 0.05 was considered as significant. All patients were in their fifth decade of age or beyond. The number of patients between the age group of 50-60 years was 7 and 60-70 years was 3. The mean age was 56 years with a standard deviation of 4.7 years. Out of ten patients, 80% were females. Eight out of the ten patients had symptoms on the right side (also dominant) and the other two had symptoms in the non-dominant left side. Pain at the basal joint at thumb was the most frequent symptom and present in 100% of the patients. Swelling ($n=5/10$), stiffness ($n=5/10$) and deformity ($n=4/10$) were other less common complaints. Out of the ten patients who underwent the surgery, 5 had Eaton III grade and 5 had Eaton IV grade trapeziometacarpal arthritis. The evaluation at the longest postoperative follow up was taken into account. The evaluation of hand function was done by Mayo's Wrist Score (MWS) which is inclusive of grip strength and subjective outcome of the surgery as stated by the patient. The preoperative score was 44 which increased to 74.5 at the time of the longest follow up. The post-operative Mayo's Wrist Score was statistically significant (p-value of < 0.05). The increase in grip strength was impressive and statistically significant. It increased from a preoperative mean of 42% of the opposite hand to 69%. The increase in pinch strength although was less impressive as compared to the grip strength reflected in the Mayo's wrist score. It increased from a mean of 45.8% of the opposite hand to 54.7%. VAS scores reduced from mean of 4.8 to 0.2 showing significant reduction in pain at the base of the thumb.

Conclusions

Ligament reconstruction and tendon interposition is an easy and reproducible technique to restore function and relieve pain in the joint even at units not specifically devoted to hand surgeries. Although a number of variants of suspension arthroplasty, first elaborated and described by Burton and Pelligrini⁶, have been published in studies^{7,8,9}; the principles remain the same viz. excision trapezium, reconstruction of the ligaments and interposition of a tendon. The outcome and reproducibility of ligament reconstruction and tendon interposition arthroplasty procedures^{9,10,11,12} have withstood the test of time, and the resulted in excellent functional outcomes. Our study and results support the already described results of the procedure. Furthermore, surgeries done yielded comparable results to the already established international studies of Nylen et al¹³, Varitimidis et al¹⁰ and Tomaino et al¹¹. Our study highlights the importance of diagnosing and identifying this potentially treatable common condition which is often confused with other differential diagnoses like De Quervain's disease, Flexor carpi radialis tenosynovitis, Trigger thumb, Sub-sesamoid arthritis, Scaphoid fracture (distal pole).⁷ The consistent good results in our setup signifies the ease and reproducibility of the outcome of the procedure even in units not otherwise fully dedicated to hand surgery.

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