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Distal Inter Phalangeal Joint Arthritis : Functional Outcome and Results of Tendon Interpositional Arthroplasty

Dr Deepak Chaudhary Assistant Professor, Deptt. of Orthopaedics, Eras Lucknow Medical College & Hospital, Lucknow (UP) India

Dr Yasir Ali Khan Assistant Professor, Deptt. of Orthopaedics, Eras Lucknow Medical College & Hospital, Lucknow (UP) India

ABSTRACT

Objective:*To evaluate the clinical outcome of managing distal inter-phalangeal joint arthritis by using excisional arthroplasties with soft-tissue interposition to provide pain-free joint with adequate range of motion and preserving the bone stock.*

Design:*Prospective clinical study with 12 months of follow-up.*

Materials and Methods:*This prospective clinical study was conducted at Eras Lucknow Medical College and Hospital , Lucknow (UP) India and included patients with distal inter-phalangeal (DIP) joint arthritis. Interpositional excisional arthroplasty was performed by using extensor retinaculum/ palmaris longus tendon in all patients. To maintain desired alignment in the reconstructed digit an axial K wire was applied for 3 weeks. After removal of K-wire a Mallet splint was applied for another 3 weeks. Active range of motion exercises were performed afterward. Clinical assessment was done at 3, 6 and 12 months postoperatively.*

Results:*Twenty digits of fifteen patients suffering from DIP arthritis were included in the study. Out of twenty digits all the 16 fingers & four thumbs, achieved good range of motion with no complication except in 1 digit i.e. 5% of digits or 6.66% of patients who needed re-exploration of finger for retained suture without any documentary infection. All patients (100%) had significant pain relief with mean visual analogue scale score of 2/10±SD at 3 months and 0/10 at 1-year follow-up. All achieved significant range of motion and satisfaction with postoperative surgical outcome.*

Conclusion: *Interpositional excisional arthroplasty provides adequate range of motion along with preservation of bone stock in patients suffering from DIP joint arthritis.*

KEYWORDS : Distal inter-phalangeal joint - DIP, Carpometacarpal joint, Arthrodesis, Excision arthroplasty, Soft tissue interposition

INTRODUCTION

Most common arthritis of hand is distal inter-phalangeal (DIP) joint arthritis while second most common is carpometacarpal (CMC) joint arthritis[1] . Activity of Daily Life (ADL) is hampered due to pain and decrease in the pinch & grip power due to arthritis. According to literature one of the reliable treatment options for osteoarthritis and post-traumatic arthritis of DIP joint is DIP Joint arthrodesis [2]. Joint arthrodesis provides significant relief of pain, improved power of pinch & grip[3]. Incidence of osteoarthritis in the adjacent joints are increased because this procedure sacrifices a finger joint movement due to which more load is transmitted to the adjacent joints of the affected finger and there are many other complications associated with this procedure[4]. According to some studies in surface joint arthroplasties of PIP and MCP joints, movement is retained with satisfactory clinical outcome[5,6]. However due to very small size of DIP joint, surface arthroplasty is a very difficult procedure. Interpositional excisional arthroplasty in the DIP joint may be an option if we want to preserve the movement. The current study was done to evaluate the functional and clinical outcome of interpositional excisional arthroplasty in management of DIP joint arthritis.

MATERIALS AND METHODS-

After approval from institutional ethical committee (IEC), clinically diagnosed twenty digits of fifteen patients suffering from DIP joint arthritis (osteoarthritis and inflammatory arthritis) were included in the study while patients with septic arthritis, previous surgery on same hand and who refused for interpositional excisional arthroplasty were excluded from study . Surgery was performed after explaining all surgical options in detail and getting written & informed consent. After excisional arthroplasty interposition was done by using extensor retinaculum/ palmaris longus. To maintain desired alignment in the reconstructed digit an axial K wire was applied for 3 weeks. After removal of K-wire a Mallet splint was applied for another 3 weeks. Active range of motion exercises were performed afterward. Clinical assessment was done at 3, 6 and 12 months postoperatively.

Age, Gender, Handedness and the Site of involvement were included in Demographic data. Functional & Clinical outcome was assessed by Visual analogue scale (VAS), pain, infection, pinch (affected finger and thumb), and grip power, angular deformity, patient's satisfaction, DIP Joint ROM + Total Active Movement (TAM = DIPJ + PIPJ + MCPJ).

STATISTICAL ANALYSIS-

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 15.0 statistical Analysis Software. The values were represented in Number (%) and Mean±SD.

RESULTS-

Table-1 Baseline data-

Demography Male/Female	6/9 Total 15
Age of patients Mean±SD	57 ±8.4 yrs, Range 39-78 yrs
Prior Treatment	0
Cured patient	15/15 (100%)
Superficial Infection Patient/ Digit	1/15 (6.66%), 1/20 (5%)
Handedness R/L	11/4 73.33%(R), 26.67% (L)
Site of involvement R/L	8/7 53.33%(R), 46.67% (L)
Finger/Thumb	16/4 80% / 20%

Out of 15 enrolled patients 6 were males (40%) and 9 were females (60%) and mean age of participants was 57 ±8.4 yrs, age of participants ranged from 39 to 78 years. None of the participants underwent prior surgery.

Out of the 15 cases included in this study, 11 (73.33%) were right handed while 4 (26.67%) were left handed. Right sided digits were involved in 8(53.33%) patients while in 7 (46.67%) left side was involved. Out of 20 digits included in study 16 (80%) were fingers while 4 (20%) were thumbs. All 15 patients (100%) were cured and patient satisfaction score was 100%. Post operative infection occurred in 1 patient i.e.6.66% of patients or 5% of digits treated.

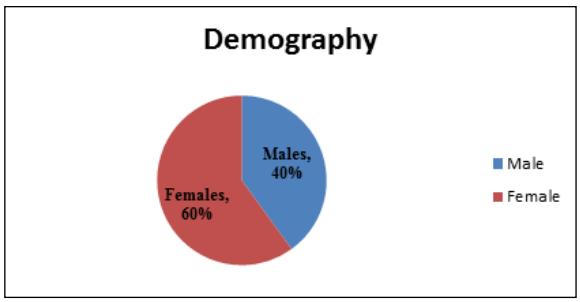
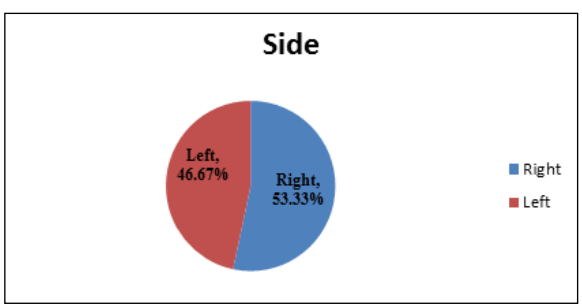


Table-2 Data at 12 Months-

MCP Joint ROM	0-85 ± 5.3°
PIP Joint ROM	0-87±4.6°
DIP Joint ROM	5-31±3.2°
Pinch strength (Pound)	16.8±4.1
Grip strength (Pound)	96.8±29.6
VAS Scale	0
Patient satisfaction	15/15 (100%)



VAS score improved from 2/100 at 3 months post operatively to 2/10 at 12 months post operative follow up. At 12 months post operation mean MCP Joint ROM was 0-85 ± 5.3°, PIP Joint ROM 0-87±4.6° , DIP Joint ROM 5-31±3.2°, mean pinch strength (Pound) 16.8±4.1, mean grip strength (Pound) 96.8±29.6. None of the cases had complaint of the restriction of function.

DISCUSSION-

Most common arthritis of hand is distal inter-phalangeal (DIP) joint arthritis while second most common is carpometacarpal (CMC) joint arthritis[1] . Numerous surgical treatments available for DIP Joint arthritis are arthrodesis and total joint replacement. As per literature no surgery is superior to the other as all are associated with complications. In patients treated with arthrodesis incidence of osteoarthritis in the adjacent joints is increased because this procedure sacrifices a finger joint movement due to which more load is transmitted to the adjacent joints of the affected finger. Some other complications associated with arthrodesis are non-union, malunion and skin necrosis and limitation of the joint movement which is less tolerated in young patients. After arthrodesis, finger flexion depends only on flexor digitorum sublimus and compromises the fine control which is more important in young patients, especially in index and middle fingers for tripod pinch. In silicon arthroplasty movement at DIP joint is preserved[7] and it also provides stability and better ROM[8] but it is associated with mean extensor lag of 12 degrees[9] , average 10% complication rate , delayed union and non-union ranging from 0-20%.[10,11] . Limitation of our study is few number of cases (15) and digits (20) with short follow-up of 1 year. So we recommend more randomised controlled trials to establish interpositional excisional arthroplasty as a preferred method of treatment in DIP joint arthritis.

CONCLUSION-

We suggest that patients treated with Interpositional excisional arthroplasty have adequate post operative ROM along with preservation of bone stock. Since spacer is an autologous tissue so it has minimum chance of body reaction and infection.

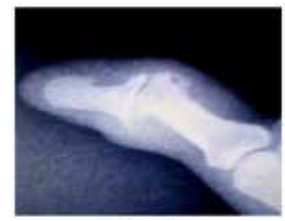


Figure-1

Figure-2

Figure-3

Figure-4

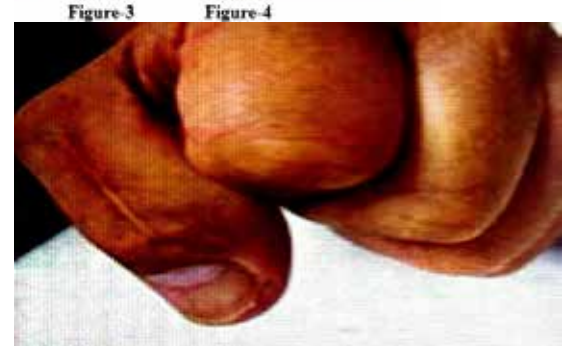


Figure-5

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