Case Series

A short series of rolled tendon arthroplasty in carpo-metacarpal joint arthritis of thumb

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Abstract

Introduction: Trapeziometacarpal joint arthritis is the commonest of arthritis in hand. It occurs more in females after age of 40 years (post menopausal women). Pain appears in all thumb movements which incapacitates them to do their daily household work. There are various methods of treating this disease like conservative methods including NSAIDS and hot water fomentation; surgical methods like trapeziectomy, stabilizing ligamentoplasty, prosthetic replacement (silicon implants, stefee prosthesis etc, fusion of trapeziometacarpal joint and trapeziectomy with tendon interposition arthroplasty. Non surgical measures forms the first line of treatment with aim of preventing progression of disease, however, surgery becomes an option when symptoms are refractory to nonsurgical methods.

Aim: To evaluate the outcomes of trapeziectomy with free rolled tendon palmaris longus interposition arthroplasty for moderate to severe osteoarthritis of trapeziometacarpal joint.

Material and methods: We evaluated 10 patients (mean age 50, Eaton Littler stage 3 and 4) who underwent trapeziectomy and palmaris longus interposition arthroplasty for end stage osteoarthritis of

thumb carpometacarpal joint. Clinical outcome parameters were determined preoperatively and at 3, 6, and 12 months postoperatively.

**Results:** We have got excellent in 7 cases (9 thumbs), good in 2 cases, poor in 1 case.

**Conclusion:** Rolled tendon arthroplasty using free rolled palmaris longus tendon with trapeziectomy is able to provide high quality results in moderate to severe osteoarthritis of trapezio metacarpal joint.

**Key words**
Osteoarthritis of thumb, Trapeziometacarpal joint arthritis, Trapeziectomy, Rolled tendon arthroplasty, Females.

**Introduction**
The thumb meta-carpal articulates with the Trapezium forming the unique saddle joint which imparts wide range of mobility to the thumb which is not a feature of rest of the digits [1].

Trapeziometacarpal joint arthritis is the commonest of arthritis in hand. It occurs more in females after the age of 40 years (post menopausal women) [2]. Pain appears in all thumb movements which incapacitates them to do their daily household work.

**Causes**
- Post Traumatic
- Mal United Bennet’s fracture and Rolando’s Fracture
- Subluxation and dislocation of CMC joint
- Osteoarthritis (commonest)
- Rheumatoid Arthritis

**Pathogenesis**
Simple joint space narrowing with joint subluxation

↓
Trapezium flattens, calcification and loose bodies appear

↓
Involvement of base of first metacarpal and trapezio metacarpal joint

↓
Protuberance formed by an osteophyte on lateral side

↓
First column sliding laterally

Osteophyte formation between first and second metacarpal pushing the first column laterally and preventing its reduction

There are various classifications given by different authors but we have considered eaton littler classification.

Based on a lateral radiograph.

**Stage 1:** No joint destruction
- Joint space widened if effusion present
- Less than one third subluxation

**Stage 2:** Slight decrease in joint space
- Marginal osteophytes <2 mm
- May be one third of subluxation

**Stage 3:** Significant joint destruction with cysts and sclerosis
- Osteophytes >2 mm
- Greater than one third subluxation

**Stage 4:** Involvement of multiple joint surfaces

**Symptoms**
- severe pain in affected thumb
- swelling at the base of 1st metacarpal
- decreased strength and range of motion
- It is difficult to do simple house hold tasks such as turning door knobs and opening jars.

**Examination**
- Lump at the base of 1st metacarpal
- 1st metacarpal appears subluxated
- Hyperextension at the MP joint
- Movements at MP joint may or may not be painful
Axial compression and gentle adduction leads to the instability and capitation appreciated.

Grinding maneuver of the thumb CMC joint is positive.

Herberden’s node may be present

**Investigation**
AP and Lateral radiographs suffices for the diagnoses of the CMC joint arthritis.

**Treatment**

**Conservative method includes**
- Anti-inflammatory and analgesics
- Hot water fomentation/ paraffin wax bath
- Thumb splits
- Sometimes steroid injection in the lesion (non diabetic)

**Surgical methods** [4]
- Trapeziectomy
- Stabilizing ligamentoplasty
- Prosthetic replacement (silicon implants, stffee prosthesis etc.)
- Fusion of trapezio metacarpal joint
- Tapeziectomy with tendon interposition arthroplasty.

Non surgical measures forms the first line of treatment with aim of preventing progression of disease, however, surgery becomes an option when symptoms are refractory to nonsurgical methods.

**Post operative protocol**
- For the first two weeks – immobilization in below elbow POP slab with wrist in 15-20 degree of dorsiflexion and thumb in abduction
- From 2 to 4 weeks – thumb abduction spint
- After 4 weeks physiotherapy involving all thumb movements

**Material and methods**
We have done trapeziectomy with interposition graft in 10 patients where 2 of them were bilateral cases. Mean age is 45 years, male female ratio being 4:1, Eaton Littlers classification stage 3 and 4 included in the study.

**Main steps**
- Palmaris longus tendon harvested from the same hand using tendon stripper through two small incisions (one at its insertion in palmar fascia and another at the musculo tendinous junction). (Figure - 1)
- Trapezi metacarpal joint exposed using dorsal approach (Figure - 2)
- Space created by excising trapezium and osteophytes preserving the ligaments.
- Findings confirmed under image intensifier after excising trapezi (Figure - 3)
- Tendon ball prepared using harvested palmaris longus tendon. Wrapping it around small piece of bone and suturing it with polypropylene suture material. (Figure - 4)
- Tendon ball kept as a spacer in the space created by removing trapezium and sutured with the base of first metacarpal after making 2 holes in the base of it. (Figure - 5)

**Figure - 1:** Palmaris Longus Tendon Harvested Using Tendon Stripper.

**Results**

Our result was analyzed based on the following criteria and score as per Table – 1.  
Maximum score 12  
Excellent if 8 to 12

Good if 4 to 8  
Poor if less than 4

We have got excellent in 7 cases (9 thumbs), good in 2 cases, poor in 1 case.  
**Note:** Opposite thumb movements and grip considered at the time of deciding score wherever possible.

*Figure - 2:* Removal of Trapeziun.

*Figure - 3:* Confirmation under Image Intensifier after Removal of Trapeziun and Osteophytes from the Joint.

*Figure - 4:* Palmaris Tendon Ball.

*Figure - 5:* Free Palmaris Longus Tendon Ball Used as a Spacer and Fixed to The Base of 1st Metacarpal.

*Figure - 6:* Preoperative X-Ray of a Patient with CMC Joint Arthritis.

*Figure - 7A, 7B, 7C, 7D, 7E* show the preoperative X-ray and post operative movements of the patient respectively.

**Discussion**

Although prosthetic arthroplasty has been for many years the treatment of choice, recently the prosthetic devices have fallen into discrepute and been replaced by interposition arthroplasty. However, the long term results are assessed of

prosthetic and non prosthetic arthroplasty, there is not much difference [5]. The main difficulty in prosthetic replacement is stabilization. The technical aspects of the ligament reconstruction are fundamental [5]. The main problem with silicone implants is that dislocation rate is very high reaching up to 40% [6].

**Figure – 7A, 7B, 7C, 7D, 7E:** Post Operative Movements.

<table>
<thead>
<tr>
<th>Table – 1: Score.</th>
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<tbody>
<tr>
<td><strong>1. Range of movements</strong></td>
</tr>
<tr>
<td>Full range of movements with full strength</td>
</tr>
<tr>
<td>Full range movements with mild weakness</td>
</tr>
<tr>
<td>Limited movements and weak</td>
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<tr>
<td><strong>2. Relief of pain</strong></td>
</tr>
<tr>
<td>No pain</td>
</tr>
<tr>
<td>Occasional pain</td>
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<tr>
<td>Pain at every movements</td>
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<tr>
<td><strong>3. Improvement in grip</strong></td>
</tr>
<tr>
<td>Complete improvement in grip</td>
</tr>
<tr>
<td>Partial improvement in grip</td>
</tr>
<tr>
<td>Weakness</td>
</tr>
<tr>
<td><strong>4. Patient satisfaction</strong></td>
</tr>
<tr>
<td>Fully satisfied</td>
</tr>
<tr>
<td>Partially satisfied</td>
</tr>
<tr>
<td>Unsatisfied</td>
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</tbody>
</table>

This is a simplified way of doing arthroplasty where we are using tendon ball as a spacer made from same side palmaris longus tendon. It has
advantage over procedure using abductor pollicis longus as this procedure may lead to weak and thinned out abductor tendon and may sometimes lead to rupture of the tendon.

Our method of rolled tendon arthroplasty is giving good results and is very cost effective.

**Conclusion**

Rolled tendon arthroplasty using free palmaris longus tendon with trapeziectomy is able to provide high quality results in moderate to severe osteoarthritis of trapezio metacarpal joint with cost effectiveness.

**References**