

# Excisional Arthroplasty for Isolated Scaphotrapeziotrapezoidal Arthritis with the Use of Palmaris Longus Tendon

Konstantinos RAPTIS<sup>a, b</sup>, Christos KOUTSERIMPAS<sup>b</sup>, Aikaterini BAVELOU<sup>a</sup>,  
Emmanouil FANDRIDIS<sup>a</sup>, Sarantis SPYRIDONOS<sup>a</sup>

<sup>a</sup>Hand-Upper Limb-Microsurgery Department, General Hospital KAT, Athens, Greece

<sup>b</sup>Department of Orthopaedics and Traumatology,  
"251" Hellenic Air Force General Hospital of Athens, Greece

## ABSTRACT

**Background:** Introduction: Isolated scaphotrapeziotrapezoidal (STT) joint osteoarthritis (OA) is a relatively common condition. Scaphotrapeziotrapezoidal arthrodesis is the traditional treatment, while excisional arthroplasty with the use of flexor carpi radialis (FCR) or polycarbon implants represents a promising alternative surgical management. The present study aims to assess a novel alternative technique of excisional arthroplasty with the use of palmaris longus (PL) tendon as interposition material.

**Materials:** The present research is a retrospective observational study. Patients suffering from symptomatic isolated STT OA, without midcarpal instability and treated with excisional arthroplasty with the use of PL tendon as interposition material, were evaluated. Five patients (two males and three females) with mean age of 63.8 years [standard deviation (SD)=16.9] were included. The mean follow up was 56.4 months (SD=9.8). In order to quantify the clinical results, we used the preoperative and postoperative visual analogue scale (VAS) score at rest and during activity, abbreviated Disabilities of the Arm, Shoulder and Hand (QuickDASH) score and postoperative ROM.

**Results:** The postoperative VAS score at rest and during activity showed a decrease of 86.2% and 62.5%, respectively, when compared to the preoperative one. Regarding postoperative ROM at final follow-up, patients had a mean wrist flexion 71° compared to 78° of the contralateral hand, while the mean extension was found to be 57° compared to 66° of the contralateral side.

**Conclusions:** The evaluated novel technique with the use of PL tendon as interposition material seems to offer satisfying results, while allowing to keep the FCR tendon intact. More studies comparing these techniques are of utmost importance to conclude which is the optimal treatment.

**Keywords:** : interposition arthroplasty, tendon autograft, scaphotrapeziotrapezoidal arthritis, flexor carpi radialis, palmaris longus.

Address for correspondence:  
Christos Koutserimpas, MD  
Department of Orthopaedics and Traumatology  
"251" Hellenic Air Force General Hospital of Athens, Greece  
Kanellopoulou Avenue, Athens, 115 25  
Tel: 00306948712130  
Email: chrisku91@hotmail.com

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## INTRODUCTION

Isolated scaphotrapezotrapezoid (STT) joint osteoarthritis (OA) was firstly reported by Carstam *et al* in 1968, and its incidence ranges from 2 to 16% (1, 2). It is more frequent among postmenopausal females, while it is often related to first carpometacarpal (CMC) OA, scapholunate dislocation or prior traumatic events (2, 3). Furthermore, correlation between flexor carpi radialis (FCR) tendinopathy and STT joint arthritis has also been observed, due to the anatomical and functional relationship between the FCR tendon and the volar surfaces of scaphoid and trapezium bones (4, 5).

Numerous treatment methods for isolated STT joint OA have been reported. Non-operative therapy, including activity modification, rest, splints, physiotherapy, anti-inflammatory drugs and corticosteroid injections, is recommended as initial management (6). Surgical treatment should be considered in persistent cases or when conservative treatment fails. Arthrodesis, first described by Watson and Hempton (7), remains the traditional operative management for STT OA. Other surgical options include distal scaphoid excision, trapeziectomy with or without trapezoidal excision, interposition arthroplasty, and arthroscopic surgery (6, 8).

This study aims to report an innovative surgical technique of excisional arthroplasty with the use of palmaris longus (PL) tendon as interposition material, instead of FCR tendon or polycarbon implants, in patients suffering from symptomatic isolated STT OA and to present the outcomes from a small case series. □

## METHODS

The present research is a retrospective observational study. All patients suffering from symptomatic isolated STT OA, without midcarpal instability, and treated with excisional arthroplasty with the use of PL tendon as interposition material, at the Department of Upper limb – Hand surgery and Microsurgery of “KAT” General Hospital of Athens, Greece, were evaluated.

Details of symptomatology, clinical examination and imaging findings are presented. The postoperative outcome was evaluated by the abbreviated Disabilities of the Arm, Shoulder and Hand (QuickDASH) score, visual analog scale

(VAS) score for pain and wrist range of motion (ROM).

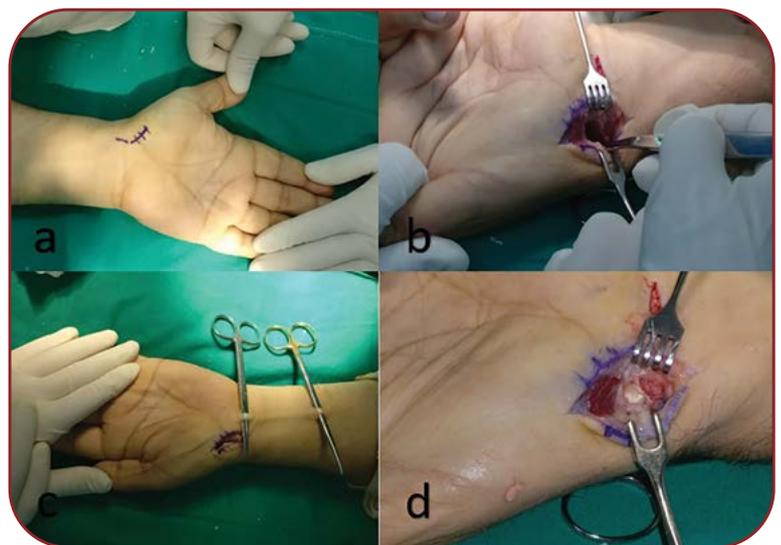
Informed consent has been obtained from all enrolled patients and the study was approved by the hospital’s bioethics committee.

## Surgical technique

Patients were placed supine, while the suffering upper limb rested in supine position on the arm table. Surgical operation was performed under axillary block with a high humerus tourniquet.

The STT joint was reached through a 5 mm palmar lateral skin incision, while the sensory branch of the radial nerve and the radial artery were protected. At that point, a transverse capsulotomy distal to the scaphoid tubercle was performed to approach the STT joint. Following identification of bony structures, the distal articular surface of scaphoid was osteotomized and removed. Then, the PL tendon was rolled-up like an anchovy and was placed in the remaining space to fill the gap between the scaphoid and trapezium. The capsular and subcutaneous flaps were carefully closed with non-absorbable sutures and the skin was sutured (Figure 1).

Postoperatively, the wrist was immobilized in a short arm dorsal splint in neutral position for four weeks, followed by a rehabilitation program including active and passive wrist flexion, exten-



**FIGURE 1.** Surgical steps: a) drawing of the palmar lateral skin incision, distal to the scaphoid tubercle; b) osteotomized distal articular surface of scaphoid; c) skin incisions over PL tendon autograft; and d) the PL tendon rolled-up like an anchovy and placed in the remaining space

sion and progressive strengthening with progressive return to daily activities. □

## RESULTS

Five patients (two men and three women) with a mean age of 63.8 years [standard deviation (SD)=16.9] were included in the present study. The right side was involved in four patients, the dominant side in three cases, while the remaining two subjects were heavy manual laborers. Two patients had suffered from recurrent FCR tendonitis and none of all selected patients had concomitant CMC arthritis. The mean follow up was 56.4 months (SD=9.8).

The preoperative mean VAS score was 5.8 (SD=1.9) at rest and 8 (SD=3.5) during heavy activity, while the final follow-up mean VAS score was 0.8 (SD=0.8) at rest and 3 (SD=2.4) during heavy activity, showing a decrease of 86.2% and 62.5%, respectively.

At final follow up, all patients had continued previous working habits without any restrictions. Two patients reported postoperative minimal discomfort at the extremes of motion or when carrying out very demanding activities. The mean QuickDASH score was found to be 19.54 (SD=10.97).

Regarding postoperative ROM at final follow-up, patients had a mean wrist flexion of 71° compared to 78° of the contralateral hand, while the mean extension was found to be 57° compared to 66° of the contralateral side. □

## DISCUSSION

Scaphotrapeziotrapezoidal joint arthrodesis represents the “gold standard” treatment of STT OA. Nevertheless, it has been associated with a significant number of complications such as non-union and progressive radiocarpal joint arthritis (6, 9, 10). It has been suggested that STT joint arthrodesis altered the kinematics of wrist motion, leading to late secondary changes (11). In 2003, Watson *et al* presented the results from 800 STT fusions over a 27-year period; the overall complication rate was 13.5%, with 4% presenting with nonunion, 3.6% with reflex sympathetic dystrophy, 0.9% with radial nerve neuromas and 0.8% with infection (9). Furthermore, STT fusion has also been associated with

radioscaphoid impingement in up to 33% of cases (9, 12).

During the last decades, excisional arthroplasty was introduced as an alternative to STT joint fusion in cases without midcarpal instability, since when distal scaphoid was resected in conjunction with inadequate dorsal midcarpal capsuloligamentous elements, the carpus may collapse in a severe DISI deformity with the dorsal subluxation of capitate (13, 14). Interposition arthroplasty has proven to be less technically demanding, to require shorter period of immobilization and to have fewer complications when compared to STT joint arthrodesis (13). Table 1 highlights the clinical studies evaluating excisional arthroplasty (6, 11, 13, 15-18).

The present study has revealed satisfactory results regarding ache and function in patients suffering from isolated STT OA, without midcarpal instability, who underwent excisional arthroplasty with PL tendon as interposition material, with a mean follow-up period of 4.7 years. This study represents the first meticulous description of excisional arthroplasty with PL tendon as interposition material and just the second series, with only six patients being previously reported (6).

Through palmar approach following resection of distal scaphoid pole, PL tendon as interposition material was applied. No postoperative complications were recorded during the mean follow-up period of 4.7 years. The use of PL tendon is based on the fact that STT arthritis has been connected with FCR tendinopathy and FCR spontaneous ruptures (5, 6). Furthermore, PL tendon has been widely used as graft in reconstructive surgery, without serious complications (19). Parellada *et al* suggested that the close anatomical association between the FCR and the subjacent triscaphe joint predisposes the FCR tendon to be involved in arthritic processes, leading to a spectrum of tendinopathy that ranges from tenosynovitis to partial or even complete tear (20). Flexor carpi radialis represents one of the main wrist flexors and also assists in radial deviation of the wrist and pronation of the forearm. The described method with the use of PL tendon has the advantage of avoiding the reduction of wrist flexion which has been recorded when FCR tendon is used.

Apart from tendon autografts, some other interposition materials have been utilized too, with

**TABLE 1.** Summary of the studies evaluating excisional arthroplasty for the treatment of scaphotrapeziotrapezoidal arthritis

Study	Study design	Population	Interposition material	Follow up	Outcome and complications	Conclusions
Crosby <i>et al.</i> , 1978 (11)	Retrospective case series	10 wrists	- four with FCR - six with silicone implant	37.5 months	- Good results for one silicone implant and four fibrous arthroplasties - Fair results for four silicone implants - Poor results for one silicone implant (implant dislocation)	- Fibrous arthroplasty with FCR is a pleasing technique - Silicone implants satisfying but seem to inhibit further intercarpal collapse
Garcia-Elias <i>et al.</i> , 1999 (15)	Retrospective case series	21 patients	- nine with capsular flap - three with FCR - nine with no fibrous interposition	29 months	- 13 pain-free wrists, eight occasional mild discomfort - Mean wrist flexion-extension 119° - Grip and pinch strength improved - 12 patients with postoperative DISI	Good pain relief, more flexion – extension for wrists without fibrous interposition
Pequignot <i>et al.</i> , 2005 (16)	Retrospective case series	12 patients, 15 wrists	Pyrocarbon implant	Four years	↓pain - Slight loss of radial deviation and wrist extension - Grip strength similar to normal side - Slight ↓ in pinch strength	- Good results - Simple surgical procedure - Possible to revise
Pegoli <i>et al.</i> , 2006 (17)	Prospective case series	Six patients	Pyrocarbon implant	19 months	- DASH score reduced by 10 - All patients had functional improvement and returned to daily activities in three months 20% dislocated prostheses	Useful compromise treatment for this problem
Low and Edmunds, 2007 (18)	Retrospective case series	Nine patients	Pyrocarbon implant	16.4 months	- Mean DASH score of 21 ↓VAS pain scores - Mean wrist flexion 126° and radioulnar deviation 43° - Mean grip strength 82% and pinch strength 85% of other side	Good alternative to STT fusion
Garcia-Elias, 2011 (13)	Case report	One patient	Capsulodesis	28 months	- Only minimal discomfort at the extreme of motion - Wrist extension 35° less than other side - Grip and pinch strength ↓ 15% and 35% - Slight DISI malrotation	Effective treatment
Berkhout <i>et al.</i> , 2017 (6)	Retrospective case series	13 patients, 15 wrists	- six cases with PL - one case with APL - one case with FCR - six cases with no interposition implant	4.1 years	- Normal range on objective functional outcome and Q-DASH score - Mild post-operative DISI deformity which did not correlate with pain scores	Satisfactory midterm results

reported complications such as silicone synovitis and dislocation of pyrocarbon implants (6, 8, 18). Also, arthroscopic debridement has been proposed as a treatment option, since it may provide symptomatic relief. Nevertheless, it seems that it does not change the natural progression of STT OA (8).

The present study has some limitations: it used only a relatively small sample, it was performed in a single center and did not encompass a control group. Nevertheless, it represents the first meticulous description of excisional arthro-

plasty with PL tendon as interposition material in patients suffering from isolated STT OA. Additionally, it provides just the second series of patients treated with this method and has an adequate follow-up. □

## CONCLUSIONS

In conclusion, the technique described here seems to be technically simple and effective for patients suffering from isolated STT OA without midcarpal instability. The present study has re-

vealed favorable outcomes in a relatively small series of patients undergoing this procedure with a mean 4.7 years follow-up. More research is needed, especially through studies with control groups, comparing excisional arthroplasty with PL tendon as interposition material to excisional arthroplasty with FCR tendon and to standard STT arthrodesis with relative long follow-up. □

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