

# Treatment of Scapho-Trapezio-Trapezoid (STT) arthritis - A review

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## ABSTRACT

Scapho-trapezio-trapezoid (STT) arthritis is a common arthritis of the wrist joint, however the incidence can vary and the presentation can be isolated or in combination with basal thumb arthritis. There are various treatment options available for STT arthritis. This review will discuss the anatomy of the STT joint, pathological changes, treatment options, review current literature and propose algorithmic approach in the management of STT arthritis.

*Key words:* Scapho-trapezio-trapezoid arthritis, STT arthritis, Trischaphe arthritis.

## Introduction

Arthritis of the scapho-trapezio-trapezoid (STT) joint can occur in isolation or as part of thumb basilar arthritis. It is the second commonest joint involved in osteoarthritis of the wrist and the clinical incidence has been reported to be between 2-16% (Wollstein and Watson, 2005; Armstrong et al., 1994; Viegas et al., 1993; Watson and Ryu et al., 1984). When occurring in isolation it is commoner in older women. In a study of one hundred consecutive radiographs, an incidence of 59% was noted for changes suggestive of STT arthritis (Wollstein et al., 2012). In a cadaver study STT joint changes were noted in 83% of hands (Bhatia et al., 1996). Most radiographic changes are likely to be asymptomatic and therefore will not present clinically, explaining the low clinical incidence.

Patients with STT arthritis present with pain over the base of the thumb. A clinical distinction between thumb basilar joint arthritis and STT joint arthritis is not always possible and radiographs are needed for assessment. STT arthritis often co-exists with thumb basilar arthritis. Most patients are managed conservatively with activity modification, NSAIDs, splints and steroid injections. A small proportion of patients proceed to have surgical treatment. Similar to thumb basilar joint arthritis, several treatment options exist for STT arthritis. These range between distal pole of scaphoid excision, STT fusion, trapeziectomy, interposition arthroplasty and denervation.

Though there are several published clinical series on individual treatments but there are no randomised controlled trials comparing various treatments. The aim of this article is to review the anatomy of the STT joint, the pathological changes with osteoarthritis, treatment options including non-surgical and surgical treatments and the literature.

## Surgical anatomy

The STT joint is formed between the distal pole of scaphoid and the proximal parts of trapezium and trapezoid bones. The joint is stabilised on the volar aspect by the STT

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ligaments which is 'v' shaped with the apex of the 'v' distally (Diagram 1).

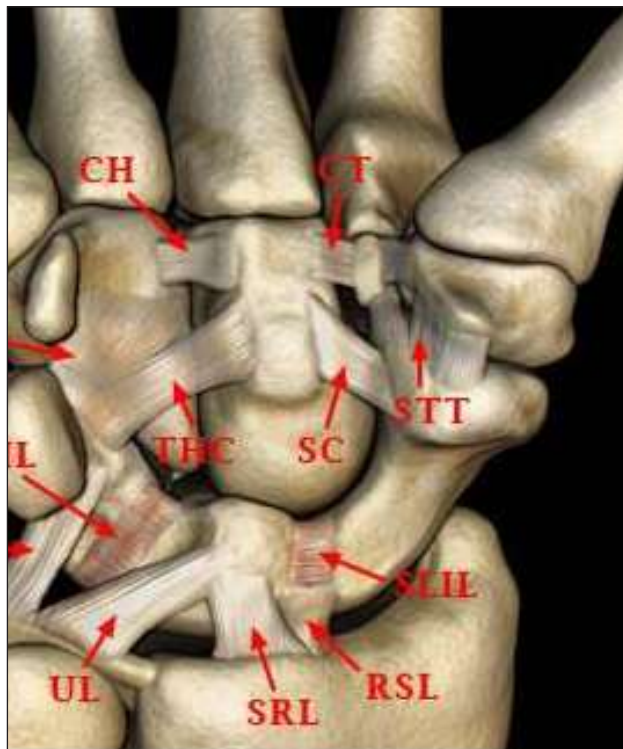


Diagram 1. STT joint and ligament

The ligament complex consists of the STT ligament, the scapho-capitate ligament and the FCR tendon. These structures are stabilisers of scaphoid and where there is a scapholunate ligament acts as secondary stabilizers preventing flexion of the scaphoid. The joint can be approached through a dorsal incision as shown in Photograph 1.



Photograph 1. Incision for accessing STT joint. Lister's tubercle is marked.

Following the skin incision, the superficial radial nerve branches are retracted. Extensor retinaculum is incised and access to the joint capsule made between ECRL and ECRB

(Photograph 2).



Photograph 2: Fat pad between ECRL and ECRB

A fat pad is seen in this location with a small artery in it which has to be cauterised. Volar approach to the joint is possible and is used when there is synovitis of the FCR tendon.

### Clinical assessment

Patients with STT arthritis usually present with thumb basal pain and weakness. Isolated STT arthritis is common in elderly women. History taking includes the patient's handedness, occupation, symptoms, disabilities with work or activities or daily living, past medical history and hobbies.

On examination there is tenderness over the base of the thumb and more characteristically over the volar aspect of the wrist over the tubercle of the scaphoid. The 'grind test' or 'torque test' used to assess the pain coming from the carpometacarpal joint. Clinical differentiation between pain over the carpometacarpal joint of the thumb and STT joint is often difficult and radiological assessment is necessary (Smith 2002).

Plain radiograms of the hand are sufficient to make a diagnosis. Standard AP and lateral views of the hand and wrist are taken. On the X-Rays, narrowing of the joint, sclerosis and osteophytes are seen. Involvement of the other joints are noted. On the lateral view the presence or absence of a DISI (Dorsal Intercalated Skeletal Instability) is an important finding. Patients with a DISI are not suitable for a distal scaphoid pole excision, as will be discussed later on in this review.

**Treatment options:**

Treatment depends largely on the severity of the disease and patient's symptoms. In most cases an initial conservative treatment through activity modification, splints and NSAIDs is tried (Wolf 2002). There are several splints available in the market for thumb support. Custom-made splints can be fabricated by Hand Therapists. Often the pain is exacerbated by a period of heavy activity and a period of rest in splint with NSAID medications usually help to settle the symptoms. When the pain persists for a long time, an intra-articular steroid injection can be tried. These injections are best done under image guidance as clinical landmarks for locating the joint is unreliable. These injections can be repeated but they carry the risks of soft tissue atrophy and skin hypopigmentation (Jeffrey 2011).

In a selected group of patients, surgical treatment is considered due to persistent symptoms. There are several options available and they have to be discussed with the patient and a decision taken based on several factors including patient's age, activity level, presence or absence of osteoarthritis in adjacent joints and co-morbidities.

In patients with concomitant arthritis of the first carpometacarpal joint, trapezium excision is an option. However proximal 2mm of the trapezoid may be removed at the same time, to remove the arthritic bone in that joint. A soft tissue interposition may be considered to prevent subsidence of the bones and recurrence of symptoms.

In a series of 15 patients with isolated STT arthritis, Langenhan et al. (2014) used trapeziectomy with ligament reconstruction as the sole treatment method. They demonstrated excellent pain relief with good functional outcomes in 14 patients who were available to follow up. They felt that excision of proximal trapezoid was not necessary (Langenhan et al., 2014). Andrachuk and Yang, performed trapeziectomy with ligament reconstruction including proximal

trapezoid excision on 12 wrists with symptomatic isolated STT arthritis. They demonstrated significant reduction in pain and increased in range of movements. They suggested that trapeziectomy with ligament reconstruction and excision of proximal trapezoid is an effective alternative to fusion (Andrachuk and Yang, 2012).

STT fusion or triscaphe fusion is the commonly performed procedure for isolated STT arthritis. This procedure is good in relieving pain and retaining grip strength. The negatives of this procedure are the risk of non-union and loss of movements of the wrist especially the 'dart-throwing' motion. In the series of 21 patients who underwent STT fusion for arthritis, Rogers and Watson documented good pain relief in all patients. One patient had a non-union which was treated by revision surgery and two patients had dystrophy which was treated with hand therapy (William et al., 1990). The same authors in a different article highlighted the risk of radial styloid impingement in 33% of patients who underwent STT fusion and recommended routine radial styloidectomy as part of this procedure (Rogers and Watson, 1989). In another series of 41 patients who underwent STT fusion for a variety of indications including arthritis, Keinbock's disease and trauma, authors found 34% of radial impingement and recommended radial styloidectomy as an adjunctive procedure (Voche et al., 1991).

In their series of 40 patients who underwent STT fusion including 10 with arthritis Ishida and Tsai documented a high complication rate of 53%. Additional procedures were required in 25% of cases. Fifty nine percent of their patients returned to initial employment and 68% reported good to excellent results.

They concluded that though the operation was good for pain relief, complications were frequent (Ishida and Tsai, 1993).

Kalb et al. (2001) evaluated 98 patients with STT fusion of various indications including

27 cases of arthritis. They found a 7.7% non-union rate through X-ray and CT scan evaluation. They found that the best functional outcomes were for patients with arthritis (Kalb et al., 2001).

Excision of the distal pole of the scaphoid is a simpler treatment for isolated STT joint arthritis. This can be performed through a dorsal or a volar approach and has the advantage of preserving movements. Garcia-Elias et al. (199) reported on 21 cases where this procedure was performed for STT arthritis. In 10 cases a soft tissue interposition was performed along with distal scaphoid excision. They reported complete pain relief in 13 patients and occasional mild residual pain in 8 patients. They found improvement in grip and pinch strength of 26% and 40% respectively. Radiographic evidence of DISI malalignment was noted in 12 cases but they did not progress on follow up (Garcia-Elias et al., 1999).

In a series of 19 patients treated with distal scaphoid excision, Malrich et al. (2014) found that the procedure increased grip strength and total arc of motion. There were two treatment failure requiring proximal row carpectomy and wrist fusion. However, their series comprised of patients who had arthritis secondary to scaphoid non-union (Malerich et al., 2014).

Arthroscopic treatment of STT arthritis has been evolving and resection of the distal pole of scaphoid can be done using an arthroscope. In a retrospective study of 8 patients who underwent this procedure, Normand et al showed that the pain decreased in 7 patients with complete resolution in 6 and worsening of pain in one patient. They recommended this treatment as first line treatment for isolated STT arthritis which is not relieved by medical treatment (Normand et al., 2012).

In a series of 13 patients, Mathoulin and Darin (2011) performed arthroscopic treatment of STT arthritis by resecting the distal scaphoid pole. They demonstrated improvement in

pain, increased mobility and strength in these patients. During the same period the authors used pyrocarbon implants in the same number of patients. They had two implant dislocations in that series. They recommended minimally invasive treatment for STT arthritis (Mathoulin and Darin, 2011).

Interposition arthroplasty using pyrocarbon implant through open and arthroscopic methods was performed by Pegoli et al. (2006) in 10 hands in 8 patients. They demonstrated functional improvement in all their patients (Pegoli et al., 2006).

One of the complications of distal scaphoid excision is a mid-carpal instability which has been reported. Following a distal pole of scaphoid excision in a 64-year-old patient, the procedure was complicated a mid-carpal instability and pain. This was salvaged through a capito-lunate fusion (Corbin and Warwick, 2009)

In the authors' unit, a similar complication was encountered in a 50-year-old patient following a distal scaphoid excision. The post-operative X-rays showing mid-carpal instability can be seen in photograph 3 and 4.



Photographs 3-4: X-rays showing post-operative views of distal scaphoid excision complicated by mid-carpal instability.

Tay et al. (2007) studied the clinical implications of STT arthritis with associated carpal instability in 24 wrists in 16 patients. They concluded that a significant proportion of STT arthritis patients have mid carpal instability not associated with scapho-lunate dissociation. The patients in their series had a variety of surgical procedures ranging from denervation to STT fusion. Four patients required revision surgery through STT fusion and during the final review 31% of patients remained dissatisfied with procedure and still had the pain. However, they did not find a direct association between unsatisfactory outcome and the degree of mid carpal instability. They cautioned that if resection arthroplasty is performed there is risk of increasing mid-carpal instability (Tay et al., 2007).

Given the proportion of patients with mid-carpal instability with STT arthritis, there are only isolated reports of mid-carpal collapse following distal scaphoid excision. Kamal et al. (2012) studied the effect of dorsal intercarpal ligament on lunate extension after distal scaphoid excision in 10 cadavers. They concluded that a symptomatic carpal instability after distal scaphoid excision may be due to an incompetent dorsal inter carpal ligament (Kamal et al., 2012).

There are no randomised controlled trials comparing any of the treatments in patients with isolated STT arthritis. There are several case series on individual treatments as discussed above. The author has proposed a treatment algorithm based on the available literature and it can be seen in Diagram 2.

#### A treatment algorithm for STT arthritis

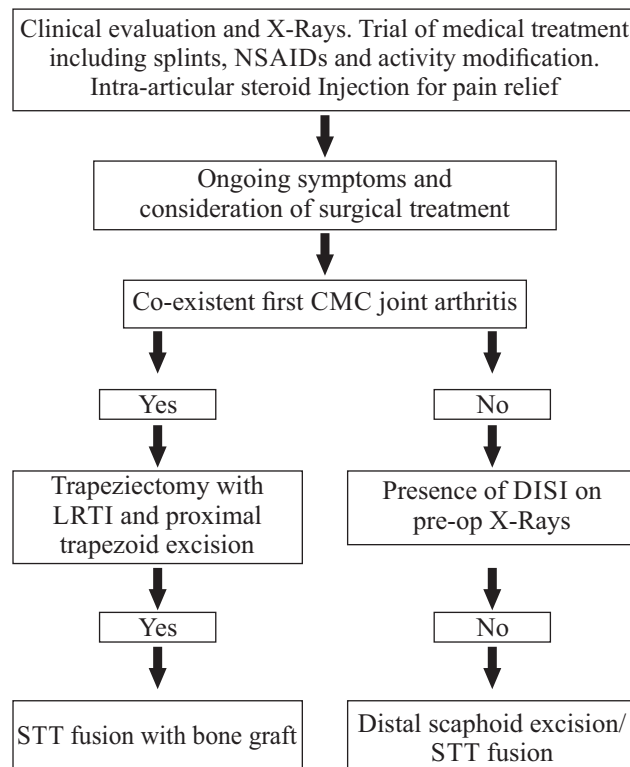


Diagram 2: Algorithm of STT arthritis treatment

#### Conclusion

STT arthritis can occur in isolation or in combination with arthritis of other hand joints especially the first CMC joint. Evaluation of these patients should include a detailed history, physical examination and plain radiograms of the hand. A true lateral view is important to look for a DISI deformity, and if present excisional procedures in these patients should be avoided. An initial medical treatment should be trialled in all patients and includes analgesics, splints, and activity modifications. Intra-articular steroid injections can give temporary pain relief. In patients with concomitant first CMC joint arthritis, trapeziectomy with excision of proximal pole of scaphoid can be tried. In isolated STT arthritis the surgical options range between arthroscopic/open distal pole of scaphoid excision and STT fusion. Patients without a pre operative DISI are candidates for both but in those with a pre-existing DISI, STT fusion is the preferred operation.

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