

Evidence-Based Medicine: Thumb Basal Joint Arthritis

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Learning Objectives: After studying this article, the participant should be able to: 1. Assess the patient's history, clinical examination, and radiographic findings to diagnose and stage basilar joint arthritis. 2. Recall the cause and epidemiology of the condition. 3. Formulate a management plan including nonoperative management, and evaluate the candidacy for surgical treatment. 4. Understand the rationale for the various surgical options available (including rehabilitation), their potential complications, and the evidence related to outcomes.

Summary: This article has been prepared to accompany practice-based assessment with ongoing surgical education for the Maintenance of Certification for the American Board of Plastic Surgery. It is designed for clinicians to analyze and structure their care of a patient with arthritis of the trapeziometacarpal joint. (*Plast. Reconstr. Surg.* 139: 256e, 2017.)

Trapeziometacarpal joint osteoarthritis is a common radiographic finding, particularly in postmenopausal women, but is painless in most cases.¹ Only a minority of symptomatic patients consult a surgeon, and most can be managed nonoperatively. Trapeziectomy with its adjuncts is the most commonly performed procedure for osteoarthritis in the upper limb.² A careful history and examination with consideration of the best evidence will allow selection of the most appropriate treatment for each patient.

CAUSE OF THUMB BASE ARTHRITIS

The human trapeziometacarpal joint is a biconcave saddle joint that allows flexion, extension, abduction, adduction, pronation, and supination. This allows opposition, a uniquely human movement. However, the price of greater mobility is less stability, which may predispose to degenerative osteoarthritis.

Multiple ligaments stabilize the trapeziometacarpal joint. The beak ligament has traditionally been considered the most important, but recent research suggests the dorsoradial ligament may be

more important.³ Weakening of these ligaments alters joint loading, with migration of the point of maximal contact from volar-ulnar to dorsoradial. Distinct patterns of wear may then ensue, resulting in arthritis.⁴

Computed tomography of 68 healthy and 87 arthritic subjects shows that the articular morphology in health does not differ between the genders but changes with aging and the development of arthritis.⁵ Nonetheless, trapeziometacarpal ligaments do have greater expression of the receptors for the pregnancy hormone relaxin in female patients with more severe arthritis.⁶ Relaxin softens ligaments, and this finding could support the hypothesis that trapeziometacarpal joint osteoarthritis is most common in postmenopausal women because of hormone-mediated weakening of the trapeziometacarpal joint ligaments.

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The left trapeziometacarpal joint tends to become arthritic before the right, which could be caused by the protective effect of greater thenar muscle strength in the usually dominant right hand.⁷ Malunion of intraarticular fractures is a theoretical cause of trapeziometacarpal joint arthritis, but is rarely seen. Hypermobility is a known risk factor.⁸ There is no racial predilection or association with socioeconomic status or occupation. A positive family history is common; however, no hereditary pattern has been recognized.

DIAGNOSIS OF BASAL THUMB ARTHRITIS

The diagnosis of trapeziometacarpal joint arthritis is made mainly on the basis of a history and clinical examination, supported by radiography. The typical presentation is a postmenopausal woman with a history of gradually worsening pain at one or both thumb bases. Activities that require strong grip, twisting, or tripod pinch cause exacerbations of sharp pain on a background of a dull ache at rest.⁹ Patients have usually tried activity modification and analgesia before consulting a specialist. They have often “self-diagnosed,” as many Web sites describe the condition.¹⁰

Typical examination findings with advanced trapeziometacarpal joint osteoarthritis are a broad thumb base caused by dorsal subluxation and adduction deformity (which gives the hand a “squared” appearance), with compensatory hyperextension of the metacarpophalangeal joint—the Z deformity (Fig. 1). In most cases of trapeziometacarpal joint osteoarthritis, the joint margins are focally tender, and this tenderness can be

differentiated from tenderness of the scaphotrapezoidal trapezoid joint, which is 1 cm proximal to the trapeziometacarpal joint.⁹ The grind test is positive if there is pain, often with crepitus, on axial compression and rotation of the thumb metacarpal. It has 97 percent specificity but only 30 percent sensitivity.¹¹ More sensitive is the “traction-shift test,” in which the metacarpal is passively subluxed and then relocated, causing pain (67 percent sensitivity and 100 percent specificity).¹¹

RADIOGRAPHIC STAGING OF THUMB BASE OSTEOARTHRITIS

Twenty-one percent of adults older than 40 years have radiographic evidence of basal thumb osteoarthritis.¹² Although correlation between radiographic osteoarthritis and symptoms is poor, it is higher for the trapeziometacarpal joint than for other hand joints.¹³ [See **Figure, Supplemental Digital Content 1**, which shows radiographic signs of basal thumb arthritis and their technical relevance (*TMCJ*, trapeziometacarpal joint; *STT*, scaphotrapezoidal trapezoid), <http://links.lww.com/PRS/B941>.] The Eaton and Littler staging system (Table 1) has undergone modifications, such as a fifth stage to incorporate scaphotrapezoidal trapezoid joint arthritis and subdivision based on the amount of trapeziometacarpal joint subluxation.⁹ It is helpful for patient education but does not dictate treatment. Standard posteroanterior, lateral, and oblique radiographs of the hand reliably demonstrate advanced but not early osteoarthritic change. Gedda views of the thumb are superior but require accurate positioning of the thumb (Fig. 2).¹⁴ Trapeziometacarpal joint stress views



Fig. 1. The Z deformity, resulting from subluxation of the trapeziometacarpal joint, which causes adduction of the metacarpal, limiting the grip span. This in turn causes compensatory hyperextension of the metacarpophalangeal joint and finally flexion of the interphalangeal joint.

Table 1. The Eaton and Littler Radiographic Staging System for Basal Thumb Osteoarthritis

Stage	Radiographic Findings
I	Normal articular contours; slight widening of joint space (joint capsule distension)*
II	Slight narrowing of joint space; calcific/bony debris <2 mm in diameter; minimal sclerotic changes*
III	Marked joint space narrowing; sclerotic bone and cystic changes; varying degrees of subluxation; debris >2 mm in diameter; STT joint spared*
IV	Obliteration of TMCJ as in stage III with STT joint narrowing associated with sclerosis and cystic changes*
V	Pantrapezial arthritis†

STT, scaphotrapezoidal trapezoid; TMCJ, trapeziometacarpal joint.

*From Wajon A, Vinycomb T, Carr E, Edmunds I, Ada L. Surgery for thumb (trapeziometacarpal joint) osteoarthritis. *Cochrane Database Syst Rev.* 2015;2:CD004631.

†From Tomaino MM. Thumb basilar joint arthritis. In: Green DP, Hotchkiss RN, Pederson WC, Wolfe SW, eds. *Green's Operative Hand Surgery*. 5th ed. New York: Churchill Livingstone; 2005:461–485.



Fig. 2. The Gedda view of the trapezium gives a simultaneous view of all of the trapezoidal joints.

demonstrate joint laxity but cannot differentiate between painless constitutional laxity and painful pathologic laxity.

TREATMENT

Nonoperative Treatment

For patients with mild symptoms, a simple explanation of the disease and its natural history, with reassurance that there will never be a time when the arthritis is too advanced to treat surgically should the pain deteriorate, may be adequate. For patients with moderate symptoms, activity modification, analgesics, splints, and reassurance may suffice. Oral analgesics can be supplemented by topical diclofenac gel, which has been shown in a randomized controlled trial to reduce pain

scores by 40 percent specifically in hand osteoarthritis.¹⁵ Although custom-made thermoplastic splints can be worn, a randomized controlled trial suggests that neoprene splints are more comfortable, as effective, and cheaper.¹⁶ Another randomized controlled trial has shown that physiotherapy temporarily reduces pain.¹⁷

If these methods are insufficient, steroid injections may help. The mechanism of action of intra-articular steroids is not fully understood, but they can provide excellent pain relief for 2 to 3 months in most patients and considerably longer in a minority.¹⁸ Ten to 40 mg of triamcinolone with or without local anesthetic is the commonest formulation used. Radiographic guidance improves accuracy of injection, although this not been proven to increase efficacy.¹⁹ Hyaluronic acid, a constituent of synovial fluid, has yet to gain U.S. Food and Drug Administration approval for injection into the thumb, but trials so far suggest that it is at least as efficacious as steroids.^{20–22} It has many possible mechanisms of action, including chondroprotection.²³ In the future, cartilage regeneration with mesenchymal stem cells may replace the symptomatic treatments of today with a genuinely curative therapy.²⁴

Operative Treatment

The only indication for surgery is intolerable pain. Patients should be reassured that delaying surgery does not risk the procedure becoming technically impossible. Although the outcomes of numerous procedures have been published, high-quality research is lacking, and a recent Cochrane review update failed to show that any operation produced better outcomes than another.^{25–31} Many surgeons favor particular operations according to their own or their trainers' personal biases (esteem-based rather than evidence-based medicine). The best option for a particular patient probably depends on their expectations, knowledge gleaned from information sheets and the

Internet, and their surgeon's judgment. Different groups may be best served by different procedures, although evidence to support this assertion is lacking and operation selection according to patient age or radiographic grade of osteoarthritis is of unproven value (unless there is additional scaphotrapezial trapezoid arthritis, which should be identified and addressed preoperatively and intraoperatively). What is of proven value, however, is that complete removal of the trapezium is the critical operative step in achieving pain relief.

Anesthesia for Surgery

The type of anesthetic used for trapeziometacarpal surgery depends on patient preference and general health, the predicted tourniquet time, and the expertise of the anesthesiologist. The choice ranges from local anesthetic with epinephrine and no tourniquet (simple trapeziectomy) to regional block (Bier block, brachial plexus block) with or without intravenous sedation and general anesthesia.³² There is no evidence to support prophylactic antibiotics, although it is conventional practice.

Osteotomy

A 20- to 30-degree extension osteotomy at the base of the thumb metacarpal can be used in stage I disease to inhibit dorsoradial subluxation.³³ Long-term follow-up (mean, 9.9 years) demonstrates reasonable patient satisfaction (77 percent of 13 patients were satisfied or very satisfied) with reliable relief of pain.³⁴ Hobby et al. reported long-term pain relief (mean, 6.8 years) and restoration of strength, with a low complication rate.³⁵ Alternatively, an opening wedge osteotomy on the radial border of the trapezium redistributes joint contact pressure, thereby reducing metacarpal subluxation.³⁶ However, this may restrict thumb extension. Osteotomies have not gained widespread acceptance or a compelling evidence base,

and may not produce better thumb function than more invasive procedures such as trapeziectomy.

Arthrodesis

Although fusion theoretically achieves more durable pain relief than arthroplasty in the young active patient, accomplishing actual union is notoriously challenging. A randomized controlled trial comparing arthrodesis with trapeziectomy and ligament reconstruction was discontinued because of a higher complication rate after arthrodesis (71 percent versus 29 percent).³⁷ Patient recommendation rates were significantly lower (53 percent versus 86 percent), although Disabilities of the Arm, Shoulder, and Hand questionnaire scores were equivalent at 12 months.³⁷ Although arthrodeses may fail to unite, Rubino et al. noted that such cases rarely had a poor outcome.³⁸ This inspired them to treat 248 patients by deliberately creating a narrow pseudarthrosis, somewhat like a partial trapeziectomy, with considerably improved pain and Disabilities of the Arm, Shoulder, and Hand questionnaire scores at final follow-up.³⁸

Simple Trapeziectomy

Simple trapeziectomy was described by Gervis in 1947 and remains the foundation of treatment of trapeziometacarpal joint osteoarthritis.³⁹ (See **Video, Supplemental Digital Content 2**, which displays a step-by-step guide to simple trapeziectomy. This video is available in the "Related Videos" section of the full-text article on PRSJournals.com or at <http://links.lww.com/PRS/B942>.) The original procedure has been superseded in many countries by modifications such as trapeziectomy with ligament reconstruction and tendon interposition.⁴⁰ A Cochrane review and its recent update found that simple trapeziectomy was as beneficial in terms of pain relief and function as trapeziectomy with ligament reconstruction and tendon interposition but created fewer complications.^{31,41} Dorsal (Fig. 3) or volar (Wagner) approaches

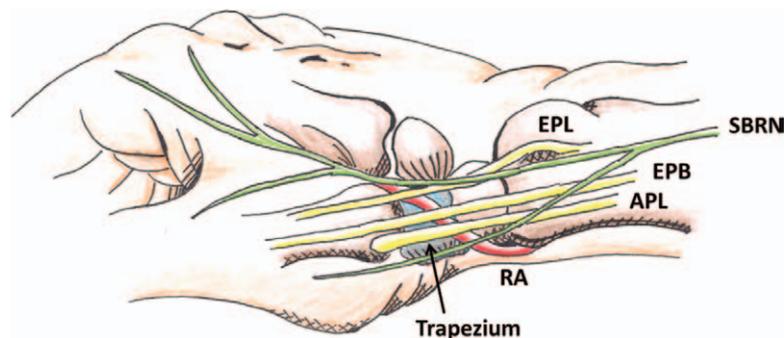


Fig. 3. Anatomy of trapeziectomy. RA, radial artery; EPL, extensor pollicis longus; APL, abductor pollicis longus; EPB, extensor pollicis brevis; SBRN, superficial branch of radial nerve.



Video. Supplemental Digital Content 2 displays a step-by-step guide to simple trapeziectomy. This video is available in the “Related Videos” section of the full-text article on PRSJournal.com or at <http://links.lww.com/PRS/B942>.

can be used and arthroscopic techniques are also described.^{42–44} A Kirschner wire may be placed to temporarily maintain the trapezial void after excision of the trapezium. However, patients often find the Kirschner wire uncomfortable, and a study comparing simple trapeziectomy with no wire (59 thumbs) and trapeziectomy with ligament reconstruction and tendon interposition and a wire (55 thumbs) found no significant differences in pain relief or function at 6-year follow-up.²⁶ Simple trapeziectomy is technically straightforward, quick, and inexpensive compared with alternative procedures. Its critics believe that direct contact between the thumb metacarpal base and the distal pole of the scaphoid and/or instability of the pseudarthrosis because of the lack of ligamentous support can lead to a weak and painful thumb base, particularly in the younger patient. This has never been proven, and the senior author (T.R.D.) has seen only two or three patients who presented at least 20 years after an initially successful simple trapeziectomy with recurrent pain.

Trapeziectomy with Ligament Reconstruction and Tendon Interposition

Eaton and Littler first described ligament reconstruction using the flexor carpi radialis in 1973, and Thompson introduced trapeziectomy with an abductor pollicis longus tendon suspension arthroplasty.^{45,46} Froimson described trapeziectomy with flexor carpi radialis tendon interposition, and Burton and Pellegrini described a combined procedure, trapeziectomy with ligament reconstruction and tendon interposition.^{40,47} Trapeziectomy

with ligament reconstruction and tendon interposition is now the most common operation for trapeziometacarpal joint arthritis in the United States.⁴⁸ However, randomized controlled trials have failed to show that ligament reconstruction and tendon interposition results in quicker recovery or improves either the short- or long-term outcome compared to simple trapeziectomy.^{25,26,49–51}

The procedure aims to prevent proximal migration and instability of the thumb base. Part or all of the flexor carpi radialis tendon is harvested as a strip of tendon that remains attached distally to its insertion on the index metacarpal base. This strip is passed through a tunnel in the base of the thumb metacarpal to form a “neoligament.” The tendon strip is sutured to the soft tissues on the radial aspect of the thumb metacarpal base to prevent proximal migration of the thumb onto the distal pole of the scaphoid. The remaining length of tendon is then interposed into the trapezial void (Fig. 4).

Alternative procedures include the Weilby procedure, which does not require the creation of a bone tunnel in the thumb metacarpal base. Instead, a strip of flexor carpi radialis is passed around the flexor carpi radialis and the abductor pollicis longus tendons to create a sling, rather like a hammock, on which the thumb metacarpal base rests.⁵² A prospective, randomized, controlled trial comparing procedures with and without bone tunnels found a significantly faster recovery in terms of pain and function in the former but no difference after 12 months.³⁰ The trapezium excision and suture suspensionplasty

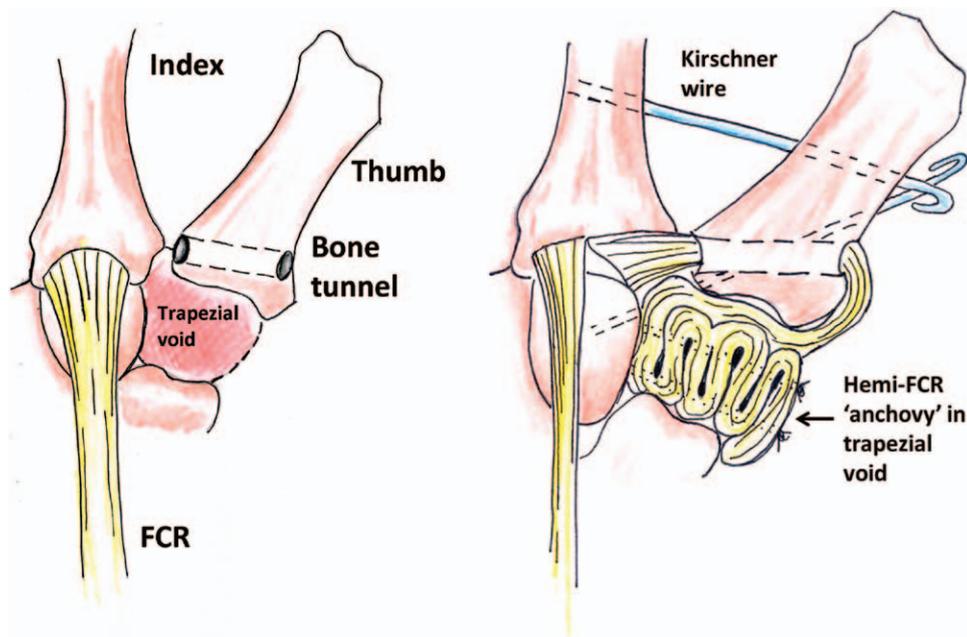


Fig. 4. Trapeziectomy and ligament reconstruction and tendon interposition using the flexor carpi radialis (FCR). (Left) The trapezium is excised and half of the flexor carpi radialis is harvested, preserving its insertion into the index metacarpal base. A bone tunnel is created through the base of the thumb metacarpal. (Right) The hemislip of flexor carpi radialis is passed through the bone tunnel to reconstruct the beak ligament, and the remaining tendon is interposed in “anchovy” fashion between the thumb metacarpal and scaphoid in the trapezial void.

technique avoids the morbidity of tendon harvest by using a Mitek anchor and suture for the ligament reconstruction, but recent case series have indicated problems with residual pain and late complications requiring surgery.^{53,54}

Patients having trapeziectomy with ligament reconstruction procedures should expect a significantly weaker pinch strength and poorer functionality (as measured by Disabilities of the Arm, Shoulder, and Hand questionnaire scores) compared with their healthy peers.⁵⁵ Grip strength, in middle-aged women at least, is not impaired.⁵⁵ This is probably the expectation for all types of surgery, including simple trapeziectomy.

Implant Arthroplasty

Various implants have been designed to prevent collapse of the metacarpal into the trapezial void and improve stability of the trapeziometacarpal joint. These range from simple spacers, through ball-and-socket prostheses,⁵⁶ to resurfacing implants (Table 1). Although some implants have low failure rates in the short term, further data regarding longevity and patient-reported outcomes are required to show whether they should be used in preference to trapeziectomy and its adjuncts.

Spacers

Spacers are used to fill the trapezial void and prevent thumb shortening. Silicone spacers were introduced in 1959 and had high rates of breakage, dislocation, and silicone synovitis.² Modern spacers may cause foreign body reactions, dislocate, or have high explantation rates.⁵⁷ A systematic review found that synthetic spacers are associated with higher rates of complications compared with autologous spacers.⁵⁸ A recent innovation is to use alloplastic materials that can become biologically incorporated and thus resistant to problems such as inflammatory reaction or loosening. Two recent case series describe the use of acellular human dermal matrix, with no adverse effects at 12-month follow-up.^{59,60}

Interposition Arthroplasty/Resurfacing

In this procedure, the distal portion of the trapezium is excised and replaced with a synthetic or alloplastic material, which theoretically preserves an approximation to trapeziometacarpal joint biomechanics. Patients treated with the PyroDisk demonstrated significantly improved Disabilities of the Arm, Shoulder, and Hand questionnaire scores postoperatively and no revisions were performed after a mean follow-up of 34 months in 27 thumbs.⁶¹ Costochondral cartilage allografts

have been used to resurface the trapezium in conjunction with ligament reconstruction. At a mean 56-month follow-up, 90 percent of patients had minimal symptoms and good function.⁶² Cartilage autografts from the ear have been used in 67 thumbs for trapezium resurfacing, with no extrusion and no ear complications.⁶³

Joint Replacement

Joint replacement with a ball-and-socket prosthesis has the theoretical advantages over spacers of better but not normal joint biomechanics and immediate stability.⁵⁷ The Norwegian Arthroplasty Register reports 90 to 94 percent 5-year survival of two spacers, the silastic trapezium and the Swanson Titanium Basal Thumb; and two ball-and-socket arthroplasties, the Elektra and the Motec.⁶⁴ However, these figures are based on Cox regression models, with median follow-up of 2 and 1.9 years for the two arthroplasties, respectively.⁶⁴ Many devices have been marketed but poor results are common, even after short follow-up periods (Table 2). Complications reported include loosening and migration or tilting of the components, all of which may require revision surgery. The ARPE prosthesis has a hydroxyapatite-coated cobalt/chromium stem and polyethylene cup and has proved more reliable than its competitors (Fig. 5). The 10-year survival estimate of the ARPE prosthesis was 94 percent in a 65-implant case series, with 60 of 65 prostheses functional at 10 years.⁶⁵

Hemiarthroplasties also exist, such as the BioPro Modular Thumb, which achieved pain relief in 135 of 143 thumbs, with six revisions, after a mean

72-month follow-up.⁶⁶ Ascension has developed three pyrocarbon hemiarthroplasties that have achieved pain relief in 100 percent of patients at 1- to 4-year follow-up, with no reoperations.⁶⁷

Metacarpophalangeal Joint Hyperextension

Metacarpophalangeal joint hyperextension is common in thumbs undergoing surgery for trapeziometacarpal joint osteoarthritis.⁶⁸ If untreated, it may cause persistent pain, weakness of grip or persistent subluxation of the metacarpal after trapeziometacarpal joint surgery, or dislocation of a joint replacement. Surgical correction of significant hyperextension deformities can be undertaken simultaneously with trapeziectomy. A study of 12 thumbs that had trapeziectomy and palmar plate capsulodesis found that partial correction of the hyperextension (from 45 degrees to 30 degrees) was still present at 9-year follow-up, with continued relief of pain.⁶⁹ However, correction of metacarpophalangeal joint hyperextension may not affect the outcome after trapeziectomy, particularly if the hyperextension deformity is less than 30 degrees.⁶⁸

Informed Consent for Surgery

The evidence suggests that trapeziectomy with or without ligament reconstruction significantly improves thumb pain in 80 percent of patients and preserves a good functional range of thumb movement. Most of the remaining 20 percent report no change in their pain levels, but a few experience markedly increased pain and stiffness because of complications of surgery, including complex regional pain syndrome. Occasionally,

Table 2. Implant Survival and Complications of Trapeziometacarpal Joint Spacers and Prostheses

Prosthesis	No. of Implants	Mean Follow-Up (mo)	Implant Survival at Last Follow-Up (%)	Complications	Study
Elektra	39	48	56	Loosening	Klahn et al., 2012 ⁷⁵
ARPE	65	60	94	5 nonfunctional; radiologic cup subsidence in 16%	Martin-Ferrero, 2014 ⁶⁵
Artelon	32		63	37% explantation	Blount et al., 2013 ⁷⁶
BioPro	143	72	94	6 revisions	Pritchett et al., 2012 ⁶⁶
Ivory prosthesis	22	67	95	1 revision because of polythene wear and instability	Goubau et al., 2013 ⁷⁷
Arex615R	68	36	87	8 implants removed due to foreign body reaction	Semere et al., 2013 ⁷⁸
MAIA	74	6	100	6 De Quervain, 1 aseptic loosening	Jager et al., 2013 ⁷⁹
Moje arthroplasty	12	50	58	All patients had loosening	Kaszap et al., 2012 ⁸⁰
Pi2	18	20	94	6 implants revised	Maru et al., 2012 ⁸¹
Pyrocarbon spacer	70	24	91	6 dislocations	Szalay et al., 2013 ⁸²
PyroDisk	19	68	90	2 patients had symptomatic instability	Barrera-Ochoa et al., 2014 ⁸³
Suture-button suspensionplasty	21	34	100	CRPS and index metacarpal fracture in same patient	Yao and Song, 2013 ⁸⁴

CRPS, complex regional pain syndrome.

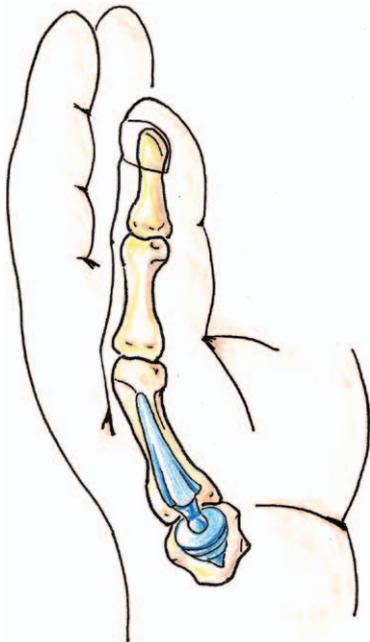


Fig. 5. The ARPE prosthesis.

this will cause severe and permanent loss of hand function, and thus the hand has been made much worse by the operation.

Thumb strength (key and tip pinch) usually remains weaker than that of a normal thumb and may not be any stronger than preoperatively.^{25,26,52} Many patients become more aware of thumb weakness following surgery when the thumb is no longer painful. Thus, patients usually continue to have trouble opening tight screw-top bottles and jars.

If the patient obtains a good outcome from this operation within 1 year, it is likely that this will persist indefinitely. In the senior author's (T.R.D.) experience, patients who are still working before surgery, despite pain, do not always return to the same line of work postoperatively. Furthermore, those who undergo the surgery with the hope of being able to return to their previous profession do not always do so. Nonetheless, some patients are able to return to heavy manual work after simple trapeziectomy.

REHABILITATION

No studies have specifically examined the effect of different therapy protocols on the outcome of trapeziectomy, and a systematic review failed to find sufficient evidence to provide recommendations.⁷⁰ Most surgeons recommend 4 to 6 weeks of immobilization within a bulky dressing or cast after trapeziectomy, followed by gradually increasing mobilization. However, the outcome of

simple trapeziectomy with postoperative immobilization of the thumb in a bulky bandage for only 3 weeks produced equivalent outcomes to trapeziectomy with ligament reconstruction and tendon interposition, temporary Kirschner wire stabilization, and 6 weeks of immobilization.²⁸ This suggests that 3 weeks of immobilization may be sufficient to produce a robust pseudarthrosis between the distal pole of the scaphoid and the base of the thumb metacarpal. We recommend return to work on light duties from 6 weeks, aiming to regain full function by 12 weeks.

EARLY COMPLICATIONS

A Cochrane review found that the overall complication rates were 11 percent for trapeziectomy and 23 percent for trapeziectomy with ligament reconstruction and tendon interposition, although long-term complication rates were equivalent.^{25,41} General complications include hematoma, infection, delayed healing, and poor surgical scarring. Numbness, tenderness, or tingling in the distribution of the superficial branch of the radial nerve was present in approximately one-third of patients at 3 months after trapeziectomy through a dorsal approach but was present in less than 10 percent at 6-year follow-up.²⁶ Dysfunction of the palmar cutaneous branch of the median nerve is present in less than 5 percent of patients at 1 year,²⁵ and less than 10 percent develop a painful scar associated with neuroma.²⁶ De Quervain syndrome occurs in less than 5 percent.²⁶ In procedures that use the flexor carpi radialis, a sensation of pulling in the forearm with wrist motion is present in almost half of patients at 3 months.²⁶ Flexor carpi radialis tendonitis was reported in 25 percent of 81 patients undergoing trapeziectomy and abductor pollicis longus suspensionplasty, with onset at a mean of 5 months after surgery.⁷¹ Complex regional pain syndrome occurs in approximately 2 percent of patients, depending on diagnostic criteria.²⁵ Implants have additional specific complications. For example, the ARPE may be complicated by prosthesis dislocation (6 percent), trapezium fracture (3 percent), and implant breach of cortices (1.5 percent).⁶⁵

LATE COMPLICATIONS

The main long-term complication is ongoing pain, and this affects approximately 10 percent of patients.²⁵ Causes may include incomplete removal of the trapezium, neuroma, complex regional pain syndrome, metacarpal subsidence,

painful pseudarthrosis, or failure to address scaphotrapezoid arthritis. However, in the senior author's (T.R.D.) experience, the cause of the persistent pain is usually uncertain. Conversion of a simple trapeziectomy to a trapeziectomy with ligament reconstruction and tendon interposition on the assumption that the persistent pain is caused by instability/subluxation of the pseudarthrosis is almost always unsuccessful in his hands. Furthermore, similar proportions of patients who originally underwent trapeziectomy with ligament reconstruction and tendon interposition present with pain of uncertain origin. Although radiographic evidence of degenerative change at the pseudarthrosis is more common in simple trapeziectomy patients, this did not negatively impact the clinical outcome at 6-year follow-up.⁷² The senior author, during his 23-year experience as a staff doctor, has seen only three patients with recurrent pain at the base of the thumb following a simple trapeziectomy that was initially successful. This was the operation of choice of his predecessor, and all these cases presented over 20 years after surgery, and all had been pain-free throughout these years. There is no difference between simple trapeziectomy and more complex procedures in terms of instability of the thumb as it relates to function and grip strength even after 18-year follow-up.²⁵ Long-term revision rates for trapeziectomy and trapeziectomy with ligament reconstruction and tendon interposition or suspensionplasty are approximately 3 percent.²⁵

In the long term, implants suffer from extrusion, inflammatory reactions, loosening, and failure and may require revision surgery. For example, 8 percent of ARPE prostheses failed over 10 years, with 5 percent requiring revision surgery.⁶⁵

CONCLUSIONS

Despite the evidence showing no benefit to ligament reconstruction after trapeziectomy, only 3 percent of 1024 American hand surgeons perform simple excision of the trapezium for basal thumb arthritis.⁷³ Aliu et al. observed that 92 percent of almost 7000 patients with thumb base arthritis in California were treated with trapeziectomy with ligament reconstruction and tendon interposition. Only 4.3 percent underwent trapeziectomy alone.⁷⁴ Surgeons' breadths of practice were much greater determinants of procedure than patient factors.⁷⁴

Basal thumb osteoarthritis is a common condition, the diagnosis is clinical, the staging is radiographic, and treatments are nonoperative and

operative. The core surgical procedure is a type of trapeziectomy that reliably relieves pain in the majority of patients, with a low complication rate. Several arthroplasty procedures have also been developed, but it is not known whether they provide a better outcome than the various versions of trapeziectomy.

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