Ligament reconstruction/tendon interposition arthroplasty (LRTIA) is a common procedure for basal joint osteoarthritis of the thumb. We evaluated 31 operations in 30 patients, 28 females, 2 males with a mean age of 57 years. The mean follow-up was 24 months (range 8 to 46 months). Pain reduction was 75% on average, with good preservation of motion and of first web space. Twenty-six patients were satisfied or very satisfied; five were not. The grip strength and key-pinching strength increased post-operatively, albeit not significantly.

Keywords: thumb; osteoarthritis; rhizarthrosis; trapeziectomy; arthroplasty.

INTRODUCTION

Osteoarthritis of the basal (or carpometacarpal (CMC) or trapeziometacarpal) joint of the thumb, also called rhizarthrosis, is not uncommon. Post-menopausal women are most frequently affected. The condition is characterized by pain and crepitus, joint instability, loss of motion and strength, and finally severe adduction contracture of the first web and hyperextension deformity of the metacarpophalangeal (MCP) joint occurs.

Although the condition has been called self-limiting in time, no evidence for this statement has been provided. The same can be said of nonoperative treatment. Many operations have been described, including ligamentous stabilization, denervation, arthrodesis, resection arthroplasty with and without interposition and with or without stabilization and total joint arthroplasty.

In 1949 Gervis (5) described simple trapeziectomy as an effective treatment. Since then several interpositions have been reported (tendon rolls, gelfoam, silicone). In 1986 Burton and Pellegrini (2) designed a procedure with trapezium excision, tendon interposition and ligamentous reconstruction to address the potential carpometacarpal instability.

The purpose of this study is to report the outcome of this procedure called ligament reconstruction/tendon interposition arthroplasty (LRTIA). This study is part of an ongoing prospective study on treatment modalities for rhizarthrosis.

PATIENTS AND METHODS

Surgical Technique

The technique was described by Burton and Pellegrini in 1986 (2, 12). General or regional anesthesia can be used. The trapeziometacarpal joint is approached through a longitudinal dorsal incision in the anatomical snuffbox, taking care not to injure the superficial branches of the radial nerve and the radial artery.
LIGAMENT RECONSTRUCTION/TENDON INTERPOSITION ARTHROPLASTY

A radially based flap of the capsule is created and the joint is opened. The trapezium is removed in toto or piecemeal. On the palmar side, the tendon of the flexor carpi radialis (FCR) than becomes visible. A small stab wound 10 cm proximal to the palmar wrist crease over the tendon of the FCR is performed, and the FCR is divided at that level. The tendon is retrieved through the trapeziometacarpal joint. Two sutures are placed in the palmar capsule. A tunnel is created with a burr, from the dorsoradial cortex of the metacarpal, through the medullary canal into the trapezium fossa. The FCR tendon is passed from its intact distal insertion, proximally to the base of the metacarpal, into the medullary canal and out through the hole in the cortex. The tendon is pulled tight, folded to act as a spacer, sutured to itself and then fixed in the trapezial space with the previously placed sutures. The capsule is closed with nonabsorbable sutures. After skin closure a bulky dressing is applied, and immediate mobilization is encouraged (fig. 1). In cases with hyperextension of the MCP exceeding 30°, a capsulodesis or arthrodesis is performed.

Patients

Between May 1996 and June 2000, 44 procedures were performed. Only 31 could be used for analysis, as 11 had incomplete preoperative data, one patient died and one patient suffered from a neurological disorder interfering with hand function. All patients had a preoperative evaluation, including VAS (visual analogue score) for pain, a measurement of opposition, web angle, range of motion of MCP and interphalangeal joint, key-pinch strength and grip strength.

There were 30 patients, 2 males and 28 females, with a mean age of 57 years, ranging from 46 to 69 years. Sixteen procedures were carried out on the right side, 15 on the left side. There was only one case of post-traumatic arthritis.

A “clunk” was present in 17 thumbs and grinding was present in 8 thumbs. The grip strength was 15 kg (range 4 to 32 kg, measured using the Jamar dynamometer) compared to 26 kg on the contralateral side (range 4 to 42 kg). (p = 0.038 t-test). The mean key-pinch strength was 4.6 kg (range 2.0 to 8.5 kg) compared to 6.1 kg contralaterally (range 2.2 to 10 kg) (p < 0.002, t-test). The opposition and web angles were similar on both sides (9.4 points on the Kapandji opposition score and 84° web angle).

An operation was proposed after failure of at least 6 months conservative treatment. The LRTIA was proposed independently of the radiological stage, but all patients presented with a stage 2 or higher. All operations were performed by the senior authors (LDS and HVR) or under their immediate supervision.

Evaluation

The mean follow-up time was 25 months (range 8-52 months).

Patients were reviewed by independent observers (LV, WS and DS). The DASH (disability of arm, shoulder and hand) questionnaire was used. Grip strength, key-pinch strength and range of motion were measured. A VAS for pain, function, dexterity and satisfaction was recorded.

Radiographs were taken and compared to the preoperative films. The heights of the trapezium or trapezial space were measured, divided by the length of the first metacarpal and expressed as a percentage.

RESULTS

The VAS for pain was 2.5/10 including all cases, 2.0 in those without complications ; patients satisfaction was 8.5/10, function 7.8/10 and dexterity 7.3/10. The DASH score was 28.7 (23 for uncomplicated cases, 64.8 for complicated cases). Five patients were not satisfied ; 25 with 26 procedures were satisfied or very satisfied (83.9%).

The opposition was 9.3 points on the Kapandji scale (7). The web angle was 87°. The ROM of the MCP was 0° extension to 60° flexion (average). No patients developed hyperextension of the MCP postoperatively. The key pinch strength increased from 4.6 to 5.0 kg (range 2.0 to 8.0 kg ) (p = 0.319 = + 8%). The grip strength increased from 15 to 26 kg (4 to 55 kg) (p < 0.001 = + 73%). The mean
height of the trapezium was 10 mm (range 8 to 12 mm); length of the metacarpal was 42 mm (range 39 to 45 mm). Mean trapezial height was 6 mm (range 3 to 10 mm). The mean loss of height was 41% (range 16 to 71%).

There were only a few complications: one patient had a neuroma of the radial nerve, one suffered from severe rotator cuff tendinitis, and one patient developed a Dupuytren’s contracture. Five patients had stage 1 rhizarthrosis and two had severe rhizarthrosis contralaterally.

Different correlations (Pearson-Spearman correlation coefficients) were computed. The DASH score was significantly correlated with the VAS on dexterity, but not with the VAS on pain and function.

Patient satisfaction was significantly correlated with the VAS on function and dexterity but not with the VAS on pain and function. Patient satisfaction was correlated with the patients’ age: the younger patients were more satisfied than the older ones. Patient satisfaction was also correlated with the height of the trapezial space, as was the VAS on function.

The key-pinch and grip strength were not significantly correlated with the height of trapezial space. The DASH score was not significantly correlated with the radiographic parameters, nor with the grip or key-pinch strength.

**DISCUSSION**

Simple trapeziectomy has been reported as a reliable treatment for basal joint osteoarthritis of the thumb (5, 6, 14). The forces across the trapeziometacarpal joint are however very substantial, and stability of this joint is ensured by the anterior oblique (beak) ligament (3). When trapeziectomy is performed, this important ligament is sacrificed, and proximal and radial migration of the metacarpal is the direct result. The instability of the CMC and the loss of height of the thumb column in hands with generalized ligamentous laxity, as seen in the postmenopausal population, is the basis for the loss of grip and pinch strength. Some studies (1, 4) have compared different techniques to treat rhizarthrosis, but could not show superior results in “stabilized” trapeziectomies.

REFERENCES


SAMENVATTING


In een prospectieve studie werden de resultaten nagekeken van 30 patiënten, operatief behandeld wegens rhizarthrose aan 31 duimen. Er werd trapzietomie uitgevoerd, met reconstructie van het anterieur kapsel en met interpositie van pees in de achtergelaten ruimte. Deze techniek werd beschreven door Burton en Pelligrini in 1986. Er waren 28 vrouwen en 2 mannen, met een gemiddelde leeftijd van 57 jaar. De gemiddelde follow-up was 24 maand. Er was beduidende pijnreductie en goed behouden mobiliteit. De grip en pinchkracht namen postoperatief toe. Er werd eveneens een outcome score uitgevoerd, m.n. de DASH score. Deze bedroeg 28,7. Zesentwintig patiënten waren tevreden (83,7%).

RÉSUMÉ


L’arthroplastie par reconstruction ligamentaire et interposition tendineuse est une technique couramment utilisée dans le traitement de la rhizarthrose du pouce. Les auteurs ont évalué les résultats obtenus après 31 opérations réalisées chez 30 patients — 28 femmes et 2 hommes — dont l’âge moyen était de 57 ans. Le suivi moyen était de 24 mois (extrêmes : 8 et 44 mois). Ils ont noté une réduction de la douleur qui était en moyenne de 75%, avec une bonne conservation de la mobilité et de l’ouverture du premier espace. Vingt-six patients étaient satisfaits ou très satisfaits ; cinq étaient mécontents. La force de préhension et la force de la pince digitale étaient améliorées après l’opération, mais de façon non significative.