Results of Sauve-Kapandji Procedure

C K Low, W Y C Chew

ABSTRACT

Introduction: Sauve-Kapandji procedure is used to treat distal radioulnar joint disorder.

Materials and Method: Sixteen patients with distal radioulnar joint (DRUJ) disease treated with Sauve-Kapandji procedure between 1996 and 1998 were available for review at an average follow up period of 32.8 months, ranging from 24 to 48 months. The patients were young and the average age at the time of procedure was 33.6 years. There were eight cases of post-traumatic DRUJ arthritis, two cases of dislocation of DRUJ with malunion of radial fractures and six cases of rheumatoid patients with destruction of DRUJ. The distal end of ulnar shaft was stabilised with a sling created using radial 1/2 slip of extensor carpi ulnaris (ECU) tendon. Functional results were evaluated with Mayo wrist score.

Results: Fusion of DRUJ was achieved in all cases by two months. Excellent results were achieved in eight cases, good in six, fair in one and poor in one. All except one case gained increase range of forearm rotation. Complications included one case of closure of pseudoarthrosis and required excision of the ulna head to restore forearm rotation.

Conclusion: Sauve-Kapandji procedure is recommended in young patients with distal radioulnar joint disorder.

Keywords: DRUJ disease, DRUJ Fusion, Pseudoarthrosis, ECU sling, Mayo Wrist Score

Singapore Med J 2002 Vol 43(3):135-137

INTRODUCTION

DRUJ disorder as a result of trauma or rheumatoid arthritis, causes pain and limitation of forearm rotation. It leads to severe limitation of hand function and inability to perform activities that need forearm rotation. In 1936, Sauve and later Kapandji described an operation consisting of radioulnar joint fusion, creation of a pseudoarthrosis proximal to the fusion and stabilisation procedure for the proximal ulnar stump. It will eliminate pain and restore forearm rotation. The aim of this study is to review the results of Sauve-Kapandji procedure in young patients with distal radioulnar joint disorder.

MATERIALS AND METHODS

Between 1996 to 1998, 20 patients with DRUJ disorder were treated with Sauve-Kapandji procedure together with creating a sling using radial 1/2 of ECU to stabilise the proximal ulnar stump. Sixteen patients were available for review after an average follow up period of 32.8 months, ranging from 24 to 48 months. The average age at the time of operation was 33.6 years and the range was 26 to 48 years. There were nine males and seven females. Six procedures performed on the right hand and 10 on the left hand. Five patients were housewives, eight were manual workers and three were non-manual workers. The procedure was indicated in those patients with distal radioulnar arthritis, dislocation or destruction and had high functional demands. Patients with low functional demands or with DRUJ instability which is amenable to other treatment such as ligament reconstruction were excluded from the study.

There were eight cases of post-traumatic DRUJ arthritis, two cases of chronic dislocation of DRUJ with malunion of radial fracture and six cases of rheumatoid patients with destruction of DRUJ. Preoperatively, the patients were evaluated with Mayo wrist score[1] (Pain: 25 points, Functional Status: 25 points, Range of Dorsi and Palmar Flexion: 25 points and Grip Strength: 25 points), range of forearm rotation and radiological examination (Fig. 1).

The DRUJ was fused with one or two 4 mm cancellous screws. A pseudoarthrosis was created proximal to the arthrodesis by resecting a centimeter segment of ulna. The distal end of ulnar shaft was stabilised with a sling created using the radial 1/2 slip of extensor carpi ulnaris (ECU) tendon. The tendon was split along the midline from the musculo-tendonous junction to the insertion. The radial half was transected at the musculo-tendonous junction and a tendon slip

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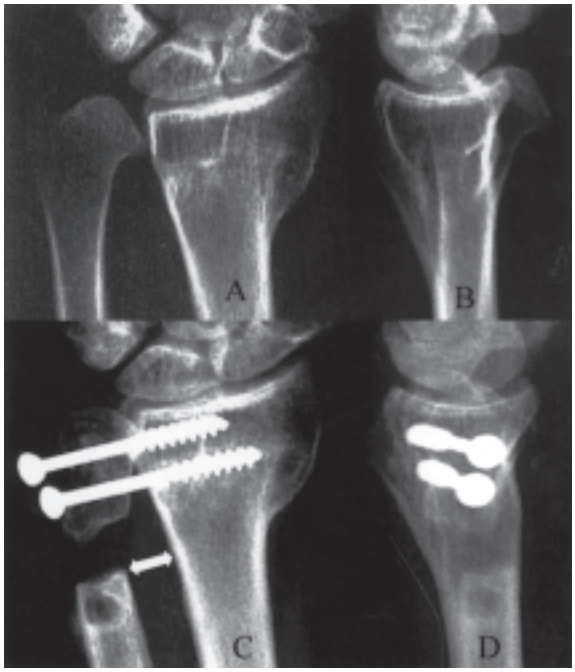

Fig. 1 The preoperative anteroposterior (A) and lateral (B) radiographs show dislocation of the distal radioulnar joint with arthritis. The postoperative anteroposterior (C) and lateral (D) radiographs show union of arthrodesis of the distal radioulnar joint.

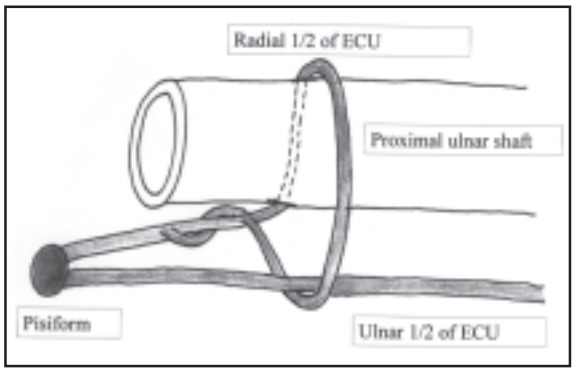

Fig. 2 A drawing of the tendon sling. The distal radius and the distal ulna stump are not drawn.

based on its insertion was created. A 3.5 mm drill hole was made 5 mm proximal to the distal end of the ulnar shaft in a dorsal to volar direction. The proximal end of the tendon slip was treaded through the hole in a volar to dorsal direction. It looped around the ulnar 1/2 of ECU and weave to itself using three passes of Pulvertaft technique with maximum tension while the wrist maintained at neutral position. A sling around the ulnar 1/2 of ECU (Fig. 2) was thus created. Pronator quadratus was released from the ulna and reattached to the ulnar 1/2 of ECU in the area of resection. Intra-operative radiological examination of the wrist was performed.

Postoperative rehabilitation

Gentle active and passive range of finger and wrist motion exercises began on the first postoperative day. The patient was instructed to keep the hand elevated to prevent oedema and stiffness of the elbow and shoulder. The sutures were removed on the fourteenth postoperative day. Radiological examination of the wrist was performed at two months after operation. Muscle strengthening and weight carrying exercises began when radiological union of arthrodesis was seen.

Assessment of results

The average follow up period was 32.8 months, ranging from 24 to 48 months. The patients were reviewed with Mayo wrist score, forearm rotation and radiological examination (Fig. 1).

RESULTS

Preoperative assessment

All cases had poor Mayo wrist score and poor forearm rotation with average of 33.2º of pronation (SD, 18.4º) and average of 29.6º of supination (SD, 15.8º). The average grip strength was 10.4 kg (SD, 2.0 kg).

Postoperative assessment

Radiological union of the DRUJ arthrodesis was seen in all cases by two months. At an average of 32.8 months follow up, the functional results rated by Mayo wrist score were excellent in eight cases, good in six, fair in one and poor in one. All cases except one gained increase range of forearm rotation with average 72.6º of pronation (SD, 8.3º) and average of 70.8º supination (SD, 11.1º). One case had closure of the ulnar pseudoarthrosis resulting in the forearm being fixed in mid prone position at two months post surgery and was rated to have poor functional results. Excision of the ulnar head was performed and it restored forearm pronation to 75º and supination to 65º. No patient complained of pain over the proximal ulnar stump or feeling of insecurity of the bone. The average grip strength at follow up was 23.3 kg (SD 5.5 kg)

All patients except one returned to work or participate in pre-injury household, recreational or leisure activities at an average of 60.8 days (SD 15.3) after the operation. One patient who had closure of the pseudoarthrosis returned to work 118 days after the Sauve Kapandji procedure.

DISCUSSION

In the treatment of distal radioulnar joint (DRUJ) disorders, the aim is to relief pain, correct deformity and restore forearm rotation. Sauve Kapandji procedure is used to treat patients with post-traumatic DRUJ problems that include arthritis, instability of the distal ulna and ulna plus variance[2] or rheumatoid arthritis with destruction of DRUJ[3]. It relieves pain,

correct deformity and restore forearm rotation[4]. Ulnar carpal shift, a known complication of Darrach procedure is prevented[5]. It is shown to provide a stable ulnar side support in the rheumatoid wrist with distal radioulnar degeneration[6].

The Sauve Kapandji procedure has an undesirable potential of developing an unstable ulnar stump. Taleisnik[7] reviewed the results of the Sauve Kapandji procedure in 23 patients who had post-traumatic derangement of the distal radioulnar joint. He reported that nine patients had pain related to the ulnar stump and two patients needed a repeat operation because of instability of the ulnar stump. Sanders et al[8] in a study of nine patients who had Sauve Kapandji procedure performed for post-traumatic arthritis of the distal radioulnar joint; reported that two patients had painful instability of the ulnar stump. Nakamura et al[9] performed Sauve Kapandji procedure in 15 non-rheumatoid patients with chronic distal radio-ulnar joint dislocation accompanied by joint damage or deformity. Functional results were favourable in all patients. However, radiological examination revealed an unstable proximal ulnar stump and radio-ulnar convergence in all patients and four patients had painful instability of the ulna. Miniami et al[10] reported that Sauve-Kapandji procedure gave satisfactory results in 15 patients with osteoarthritis of the distal radioulnar joint. However, 12 wrists showed unstable proximal stump and radioulnar convergence and two patients had persistent pain in the ulnar stump. Waizenegger et al[11] in a series of fourteen patients; reported four cases of unstable proximal ulna presenting with pain and feeling of insecurity.

Kapandji[12] recommended that resection should be as distal as possible above the remaining ulnar head leaving a short fragment of distal part of ulna and a small ulnar gap of not more than 10 mm to reduce instability of the ulnar stump. The remaining structures that stabilise the ulnar shaft after Sauve-Kapandji procedure are the interosseous membrane providing static stabilisation and the extensor carpi ulnaris, flexor carpi ulnaris and a portion of pronator quadratus providing dynamic stabilisation[13]. Release of pronator quadratus from the ulna and reattachment to the extensor carpi ulnaris in the area of resection helps to prevent ossification and acts as a soft tissue spacer to prevent impingement between the radius and the ulna during forearm rotation[13]. Release of the muscle also prevents it from actively contracting and narrowing the radioulnar space[13].

Few procedures to stabilise the distal ulna have been described. Breen and Jupiter[14] described a procedure using the extensor carpi ulnaris and flexor carpi ulnaris. The tenodesis, using a weave of a distally based slip of flexor carpi ulnaris and a proximally based slip of extensor carpi ulnaris to stabilise the distal ulna after a Darrach procedure. All eight patients obtained stable ulnae with mean motion of 62º of supination and 43º of pronation. Rothwell et al[15] described a procedure of stabilising the ulna shaft by suturing the sheath of the extensor carpi ulnaris and periosteum as a single layer firmly over the ulnar stump and pseudoarthrosis.

In this series, a sling was created using the radial $^1/_2$ slip of ECU that was used to loop around the ulnar $^1/_2$ of the ECU to stabilise the proximal ulnar stump and prevent radial or ulnar deviation and dorsal or volar displacement of the bone. It was effective as no pain or feeling of instability of the ulna shaft was reported.

CONCLUSION

Sauve Kapandji procedure is an excellent operation for the treatment of distal radioulnar joint derangement as it restore rotation of the forearm and grip strength while relieving pain and maintaining stability of the wrist.

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