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Creator : fs71

Date : 7/16/2008

Time : 3:26

Article Title :

Number of Pages (including this page) : 5

Template Version : 3.6

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TECHNIQUE

Modified Jones Transfer for Radial Nerve Palsy Using a Single Incision: Surgical Technique

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■ ABSTRACT

Various modifications in the classic Jones transfer for radial nerve palsy have been described. All use multiple incisions producing multiple surgical scars over the forearm. To avoid this problem, we have devised a method in which the tendon transfer procedure can be carried out through a single incision. Sixteen patients with radial nerve palsy were operated on from 2003 to 2007. We used a single incision running along the radial border of the distal third of the forearm curving obliquely at the lower end of radius to end at the Lister tubercle. We used the flexor carpi radialis transfer in all patients. The cosmetic as well as functional results were excellent in all cases. The advantages of this method are better cosmesis with a single linear scar on the radial border of the forearm, easy rerouting of the extensor pollicis longus tendon without the need for a tendon tunneller, and less operating time.

Keywords: single incision, Jones transfer, modified, cosmesis

■ HISTORICAL PERSPECTIVE

The classical Jones transfer described in the early part of the 20th century has often been quoted and misquoted in various articles. The part of the confusion is because Jones himself has described 2 slightly different combinations of transfers in 1916¹ and 1921.² Numerous modifications have been described since then by various authors (Starr,³ Brand,⁴ and Boyes⁵). In the original Jones procedure and its subsequent modifications, multiple incisions are required over the volar as well as dorsal aspects of the forearm. Although the functional results were good in these procedures, the cosmesis was unacceptable to many. To avoid this problem, we have devised a method

No sources of external support in any form were received for the conduction of this study.

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using a single incision through which the entire tendon transfer procedure can be done. The technique was initially executed successfully in fresh cadaveric specimens before it was attempted in human subjects.

The purpose of this article is to evaluate and highlight the simplicity and the usefulness of this single incision procedure.

■ INDICATIONS

Sixteen patients with complete radial nerve palsy were operated on using the single incision method from 2003 to 2007. The procedure was carried out in 11 males and 5 females. The right hand was operated on in 12 patients and the left hand in 4 patients. Of the 16 cases, 7 were due to old cut injuries, 2 cases were iatrogenic after surgery, 3 cases were associated with fracture shaft of humerus, and 4 cases were injection palsies.

The transfer was carried out between 6 and 10 months of injury in most patients. In 4 patients, we did an early transfer at the end of 3 months from the original injury either due to dense scarring at the injury site or too large a gap between the cut ends at the time of exploration. Two patients reported to us late after 1 year of injury.

■ SURGICAL TECHNIQUE

The incision is first marked over the radial aspect of the forearm (Figs. 1 and 2) extending distally from the middle [F1](#) [F2](#)

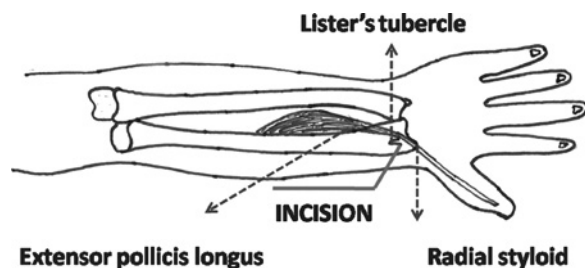


FIGURE 1. The vertical limb of the incision extends from the mid third-lower third junction of the forearm and ends 1 cm above the radial styloid. The oblique limb extends dorsally toward the Lister tubercle to enable access to the extensor pollicis longus (incision: shown in red).

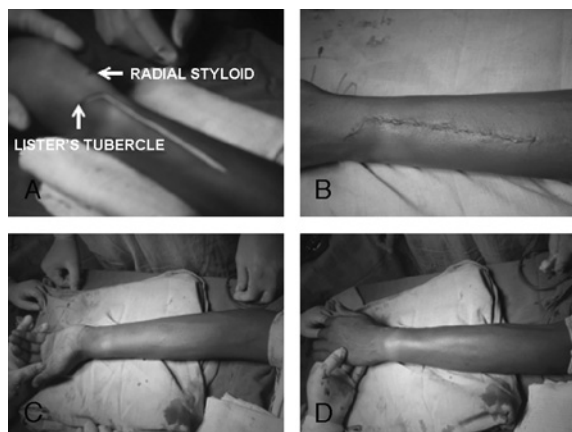


FIGURE 2. A, Surgical incision on the skin surface. B, Postoperative wound closure with subcuticular sutures. C and D, Inconspicuous nature of the incision on the radial aspect.

third—distal third junction to 1 cm proximal to the radial styloid and then curved obliquely to end at the Lister tubercle. We used the flexor carpi radialis transfer (first described by Starr³ in 1922) in all patients. All the tendons required for the transfer are explored and identified through the same incision (Figs. 3 and 4).

F3 F4

By good retraction of the wound proximally, Pronator teres muscle is raised from its insertion with a sleeve of periosteum. The pronator teres tendon is passed subcutaneously around the radial border of the forearm, superficial to the brachioradialis and extensor carpi radialis longus to reach the musculotendinous junction of extensor carpi radialis brevis muscle. The palmaris longus and the flexor carpi radialis tendons are identified and transected at the level of the wrist. Both tendons are

identified at a higher level through the same incision and pulled up proximally. The flexor carpi radialis tendon is passed around the radial border of the forearm to reach the extensor digitorum communis tendons at the lower third of the forearm. Extensor pollicis longus tendon is divided at the musculotendinous junction and rerouted to the radial side of Lister tubercle. Now the tendon anastomosis are carried out one by one under appropriate tension. Pronator teres is sutured to the extensor carpi radialis brevis tendon, followed by suturing of flexor carpi radialis tendon to extensor digitorum communis tendons, and finally, the palmaris longus tendon is sutured to the extensor pollicis longus tendon.

All sutures are made with 3-0 or 4-0 polypropylene. In 2 cases where the palmaris longus tendon was absent, we used the flexor digitorum superficialis of the long finger. The wound is closed with subcuticular sutures after obtaining hemostasis.

Postoperative Rehabilitation

All patients are given an above elbow plaster holding the wrist in 30 to 40 degrees of dorsiflexion, metacarpophalangeal joints in 20 to 30 degrees flexion, and the thumb in maximum radial abduction. This position is maintained for a period of 4 weeks followed by a supervised exercise program. A below elbow night splint is used for another 3 weeks maintaining the same position.

RESULTS

Marginal skin necrosis was noted in 2 patients. Cosmetic result was satisfactory to the patients as well as the surgeon with a single linear scar on the radial aspect of the distal forearm when compared with other procedures

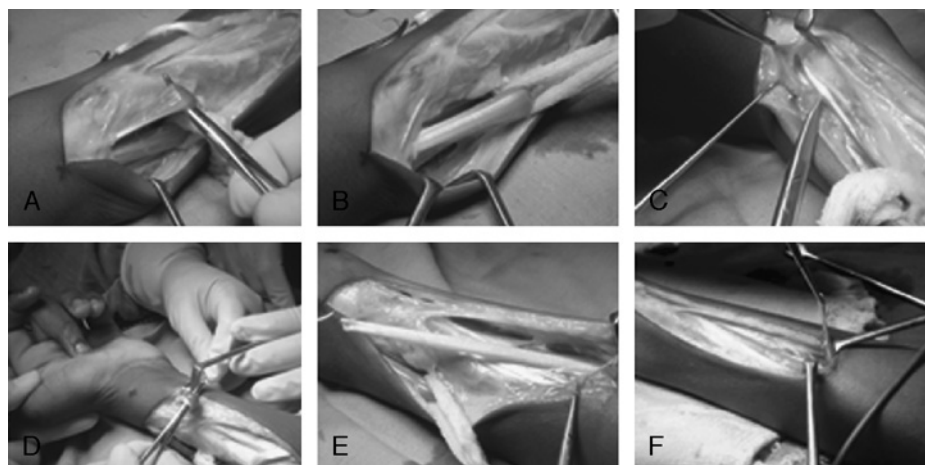


FIGURE 3. A–F, Identification of tendons required for the transfer through the same incision. A, Extensor pollicis longus. B, Extensor digitorum communis. C, Rerouting of the extensor pollicis tendon. D, Flexor digitorum superficialis tendon of the long finger. E, Flexor carpi radialis. F, Pronator teres with a sleeve of periosteum.



FIGURE 4. A–C, View of the final transfers. A, Palmaris longus to rerouted extensor pollicis longus transfer. B, Flexor carpi radialis to extensor digitorum communis. C, Pronator teres to extensor carpi radialis brevis.

using multiple incisions. The functional results in terms of range of movements were excellent.

■ DISCUSSION

Although the original Jones transfers were popular, they were not accepted universally. The only part of the classic Jones transfer that has become universally accepted is the use of the pronator teres to provide active wrist extension. As a result, a multitude of transfers were described, each with its own merits and demerits.

All these procedures, since described, have been carried out using multiple skin incisions over the dorsal and volar aspects of the forearm. The classic flexor carpi ulnaris transfer requires 3 incisions, and the original flexor carpi radialis transfer proposed by Starr and later modified by Brand⁴ and Tsuge requires 4 incisions. The superficialis transfer as described by Boyes is carried out using 2 longitudinal incisions and 1 or 2 transverse incisions.⁵ The problem of multiple scarring associated with the above-mentioned procedures may be avoided with our single incision technique.

In the absence of palmaris longus, various alternatives have been described. We used the middle-finger flexor digitorum superficialis in case of an absent palmaris longus, which is easily traceable through the same incision. This single incision also allows for easy rerouting of the extensor pollicis longus tendon and sub-

sequent transfer. To sum up, our technique is easy to execute and gives excellent functional results without the problem of multiple surgical scars. The incision over the radial border of the forearm is less inconspicuous giving a better cosmetic appearance when compared with other methods.

■ ACKNOWLEDGMENTS

The author thanks the Department of Anatomy, Madurai Medical College, for allowing them to perform cadaveric dissections.

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