Two-Stage Flexor Tendon Reconstruction. A Case Report

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ABSTRACT

A 16 year old girl presented with an untreated cut flexor digitorum superficialis and profundus tendons of right middle finger at zone II. The injury sustained four years ago. She could not flex the middle finger, resulting in an extended middle finger after forming a fist. It interfered with her hand function and was cosmetically and socially unacceptable to her. Reconstruction was performed in two stages. First stage was insertion of a silicone rod. Twelve weeks later, a second stage procedure with tendon transfer using flexor digitorum superficialis of ring finger and palmaris longus grafting was performed. At two years follow up, she could flex the middle finger to make a full fist.

INTRODUCTION

Flexor tendon grafting can be performed in a one-stage procedure using a palmaris or plantaris tendon graft in cases with less scarring. Two stage flexor tendon reconstruction with grafting has been shown to give good results in patients who have sustained delayed or neglected flexor tendon injuries, tendon ruptures following previous repairs, zone II tendon injuries and flexor tendon injuries which are dirty or contaminated at the time of injury.[1-4] The purpose for using silicone rod is to prepare an artificial tendon sheath to avoid adhesions of the tendon graft. The disadvantage of two operations seems to be justified by better results.[1-4]

CASE REPORT

A 16-year old girl sustained a laceration at the proximal interphalangeal (PIP) joint of her left middle finger 4 years ago and was untreated. She complained of inability to flex the middle finger since then (Figure 1a). The left middle finger was hyperextended at the proximal interphalangeal (PIP) joint. Full passive flexion was possible. Sensation was intact. A two-stage flexor tendon reconstruction with grafting procedure was performed. First stage was for insertion of a silicone rod. Small incisions were made at the distal interphalangeal (DIP) joint crease, distal palmar crease, wrist crease and mid forearm. A plane was created subfascially between these incisions and the silicone catheter inserted at the DIP incision and tunneled through from the DIP crease incision to the forearm incision. The distal end of the catheter was secured by suturing the catheter to the profundus (FDP) tendon. Intensive passive range of motion exercise began on the second postoperative day. Twelve weeks later, second stage reconstruction was performed. Incisions were made along the scars at the DIP crease of the left middle finger, wrist crease and forearm. The silicone rod was in situ and a tunnel formed from the DIP crease to the forearm. The FDP stump of middle finger was dissected. The palmaris longus tendon graft harvested. The distal end of the graft weave to the FDP stump. Its proximal end was sutured to the silicone rod (Figure 1b). The silicone rod was retrieved from the forearm incision and removed. The graft followed the rod and occupied the tunnel formed. The FDS of the ring finger harvested at the forearm. It was weaved to the proximal end of the palmaris longus graft using Pulvertaft technique. The wounds closed after hemostasis. Occupational therapy commenced on the second postoperative day. At two-year follow up, she had full extension and flexion (Figure 1c) of the middle finger.

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DISCUSSION

Late treatment of lacerated flexor tendon refers to situations when treatment is only begun 3 weeks or more after injury. There are different modalities of surgery available and these include direct repair; one or two stage grafting; tendon transfer and tendon advancement with or without tendon lengthening. The decision on which one to attempt, depends on the time elapsed since injury, site and extent of injury.

Tendon grafting can be performed either in one or two stages. The deciding factor being the status of the pulley system and flexor sheath. An intact pulley system with minimal scarring in the sheath would allow for a tendon graft to be placed in a one-stage procedure. However if the system is deficient, the system has to be reconstructed over a silicone rod followed by tendon graft at a later date.

Prior to the development of the two-stage procedure, a one-stage flexor graft was done with only a modest improvement expected. In 1965, Hunter[3] first published his account of his experiences with tendon implants. In 1971, he and Salisbury[4] published their 10 years experience with regard to this technique in which flexor tendons were excised and the system rebuilt about a silicone Dacron implant. A pseudo sheath was formed in response to the implant that served to help organizing the area. The second stage was performed 3 months postoperative and after the patient had undergone a passive exercise program. The implant being replaced by a long tendon graft, while disturbing the sheath as little as possible.

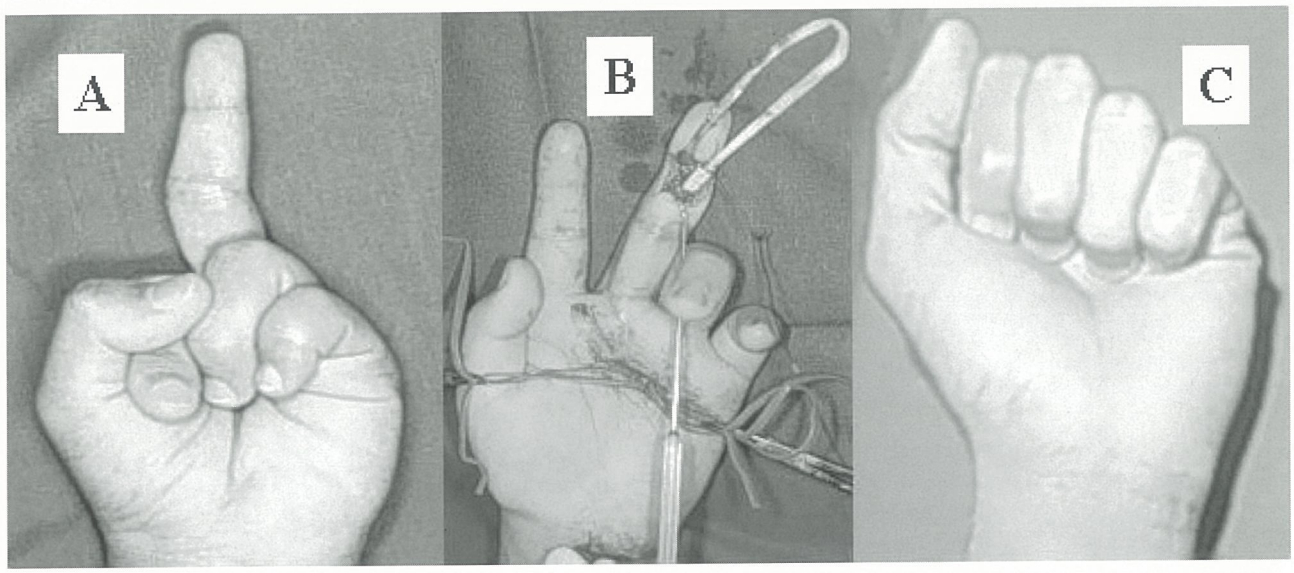

Fig 1a. - A 16-year-old girl sustained a laceration at the proximal interphalangeal (PIP) joint of her left middle finger 4 years ago and was untreated. She complained of inability to flex the middle finger since then

Fig 1b. - The distal end of the palmaris longus tendon graft weave to the FDP stump. Its proximal end was sutured to the silicone rod

Fig 1c. - At two-year follow up, she had full flexion of the middle finger

Need for such technique arose because in some patients with flexor tendon injury, reconstruction by conventional tendon grafting techniques will likely fail due to the severity of the original injury, damaged pulley system, failure of previous operation, excessive scarring of the tendon bed secondary to the patient's healing response or infection. When a two-stage tendon reconstruction is considered, the patient should understand the complexity of the problem and be willing to undertake a difficult postoperative therapy program.[5]

There have been complications noted after each stage of surgery.[6] After stage 1, synovitis has been noted in 15-20 percent of the patients. Causes for the synovitis are mechanical irritation, tight or inadequate pulleys and foreign materials on the implant. Synovitis is a serious complication, characterized by increased heat, swelling, crepitus and obvious swelling of the joints. It is also associated with a poorer outcome for Stage II operation. Other complications following Stage I include infection and mechanical failure either due to the quality of the implant or that of surgical technique. Complications after Stage II are that of mechanical failure, breakdown at the proximal or distal juncture of the graft. It can be avoided with good surgical technique.

In this patient, the injury occurred 4 years ago. Contraction of the musculotendonous unit after such a long interval would make extending the muscle to appropriate length difficult. Furthermore scar tissue within the flexor sheath would decrease the space available for the tendon. A staged flexor tendon graft would thus be indicated for this delayed or neglected flexor tendon injury.

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