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Case Report

Spiral oblique retinacular ligament reconstruction in correction of swan neck deformity: a case report

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ABSTRACT

Hyperextension of the proximal interphalangeal (PIP) joint and flexion of the distal interphalangeal (DIP) joint constitute swan neck deformity (SND) of the finger. Surgical management is advised if there is extensor lag or functional impairment. We present a case of SND correction using spiral oblique retinacular ligament (SORL) reconstruction. A 34-year old male with SND with a previous history of tendon repair procedure after a cut to the index finger. The index finger got hit by an electric cord six months later and had left his finger untreated, resulting in stiffness and inability to extend the DIP joint. A SORL reconstruction was performed, using flexor carpi radialis tendon. On follow-up examination the patient showed satisfactory outcome with the DIP joint being able to be extended. SORL reconstruction has tenodesis effect, in which it extends the DIP joint as the PIP joint is extended without alteration of extensor mechanism or restriction of joint flexion. SORL reconstruction using tendon graft can be treatment of choice for treating SND.

Keywords: Ligament reconstruction, Mallet finger, ORL, SND

INTRODUCTION

Hyperextension of the PIP joint and flexion of the DIP joint constitute SND of the finger.[1] SND may result from imbalance of the finger extensor mechanism in which there is laceration or stretching of the extrinsic tendon forces on the distal phalanx and tightness of intrinsic muscles at the PIP level. In general SND is caused by either of the following three events: terminal extensor mechanism disruption with or without PIP hyperextension, disruption or laxity of the volar plate, flexor digitorum superficialis (FDS) or vertical retinacular fibers at PIP joint level, or intrinsic muscle contracture or spasticity that usually results from systemic disease or central nervous system impairment. A SND can also result from chronic mallet finger, presenting for more than four weeks, usually as a result of traumatic disruption to the distal extensor tendon at the DIP level. Mallet finger is characterized by DIP joint held in flexion and inability to actively extend the distal phalanx.[1,2]

Surgical management is advised in chronic mallet finger with presence of extensor lag or functional impairment. There are several methods that have been described including tenodesis, central slip lengthening, tenodermodesis, intrinsic muscle release, ORL reconstruction and arthroplasty.[3]

We reported a case of SND treated with SORL reconstruction using a flexor carpi radialis tendon.

CASE REPORT

We present a 34 year old male patient with stiff left index finger. The stiffness was persistent and became worse overtime resulting in inability to extend the finger at all. Prior to the current complain the patient had a history of

cut injury to the index finger one year prior to admission. Following the injury the patient had his finger treated at a nearby hospital and a tendon repair surgery took place. Following the surgery the patient was able to move his finger without difficulty, however, six months later the patient got another injury to his left index finger got hit by an electric cord and left his finger untreated. Overtime his index finger became stiff. The patient has already received physical therapy but the stiffness did not improve (Figure 1).

Reconstruction was performed, using graft harvested from flexor carpi radialis tendon (Figure 2). A dorsal incision (Figure 3) on the distal phalanx was made, followed by tunneling of the graft to the volar side. The graft was at last fixated using a button (Figure 4). Then an oblique incision on the ulnar side of the middle phalanx and radial side of the proximal phalanx were made. Graft reconstruction was performed in spiral oblique manner from the dorsal of distal phalanx to the ulnar side of the proximal phalanx, with tunneling toward the radial side (Figure 5). Proximal from the exiting side, the tunneling was redirected to the ulnar side, followed by graft fixation on the proximal phalanx. Finally, the PIP joint was fixated using a Kirschner wire (Figure 6).

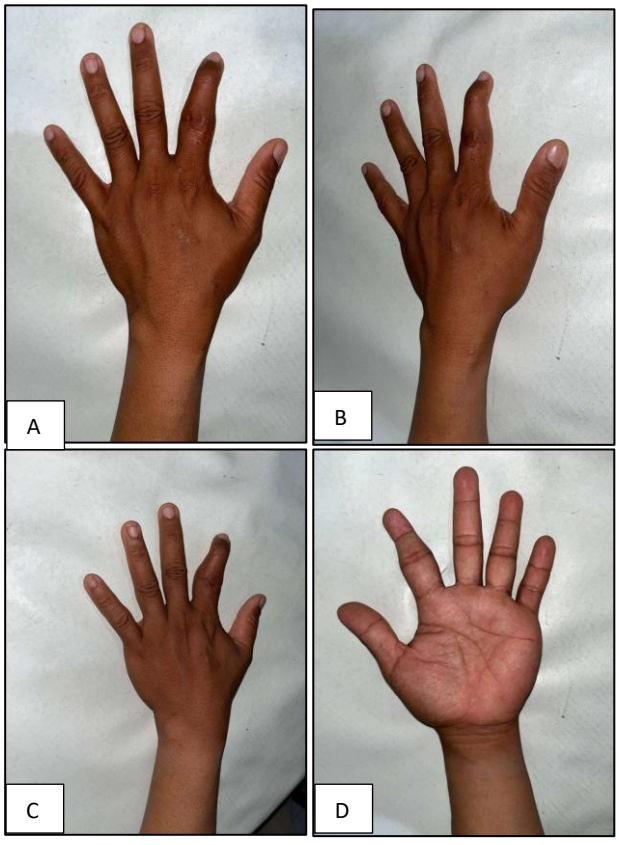

Figure 1 (A-D): Clinical picture of the left hand with hyperextension of the PIP joint and flexion of DIP joint, characteristic findings of swan neck deformity. Also note scar on the dorsal side of the index finger, the patient had previous history of tendon repair surgery following an extensor tendon injury.

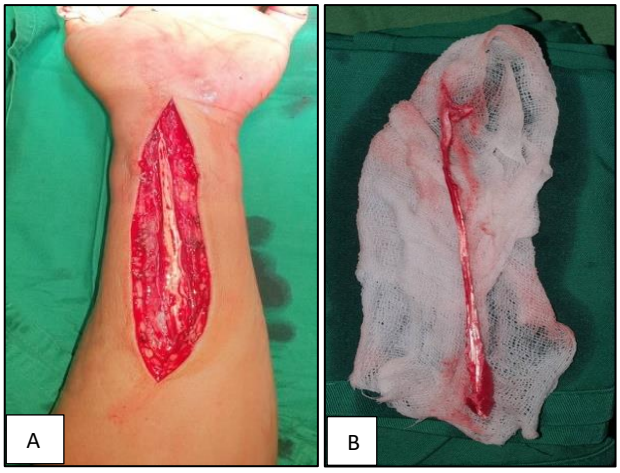

Figure 2 (A and B): Flexor carpi radialis tendon graft harvesting.

Figure 3: Surgical approach, incision was made on the dorsal side of the index finger.

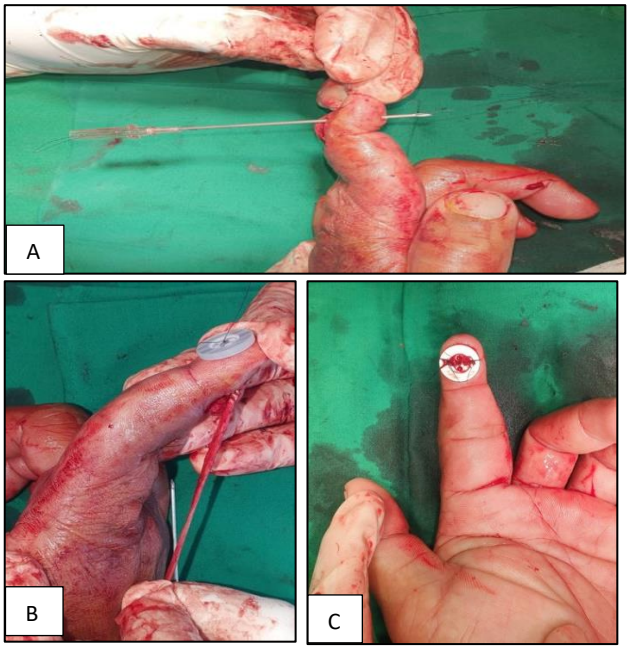

Figure 4 (A-C): Graft tunnelling at distal phalanx and fixation with button.

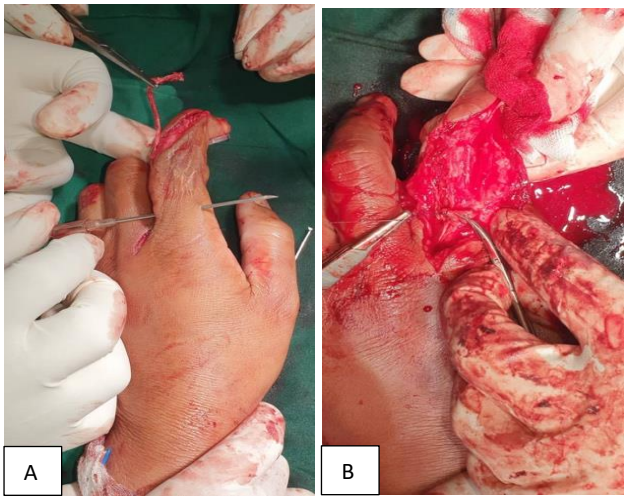

Figure 5 (A and B): Graft tunnelling at proximal phalanx and fixation with suturing into the bone.

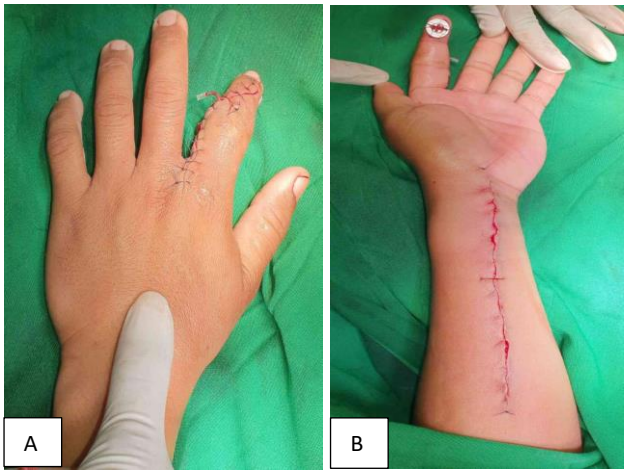

Figure 6 (A and B): Post operative clinical picture.

DISCUSSION

The tendon is stabilized by a fibrous band, the retinaculum. The ORL plays role in maintaining the balance of intrinsic and extrinsic muscles.[4] ORL originates volar to the PIP axis of rotation from the proximal phalanx and flexor sheath and passes dorsally and distally, joining the terminal extensor tendon. ORL acts as a dynamic tenodesis, extending the DIP joint as the PIP joint is extended.[5]

In treating SND, ORL can be released proximally and rerouted volar to the axis of PIP then secured to the flexor tendon sheath. Following recreation of ORL tenodesis would follow, with PIP hyperextension and DIP extension.[6] However, this method relies upon intact terminal extensor tendon insertion and therefore cannot be applied in the presence of extensor rupture, as in mallet finger.

To restore active flexion and extension of the DIP joint after extensor damage is challenging. Earlier surgical technique involved reinsertion of extensor mechanism into the distal phalanx. This, however, may result in devastating consequence of lost full DIP flexion despite the regained extension. Therefore, Thompson in 1978 proposed a surgical substitution of ORL function using a lateral band.[5] Small caliber free tendon acting as SORL can be used after rupture of terminal extensor and in the same time corrects DIP extension deficit and PIP hyperextension. Extensor mechanism would not be altered when terminal extension is restored. This technique also preserves the existing extensor mechanism. The free tendon graft is anchored to both proximal and distal part of the bone, preventing adhesion or laxity of fixation.[5]

In a previous case report by Latif, SND was treated by lateral band technique, rerouting it through volar passage tunnel then later anchor was sutured. K-wire was also used to immobilize the PIP joint. It was reported that good range of motion was achieved four weeks post operatively.[7] Successful SORL reconstruction using free graft tendon harvested from palmaris longus, followed by temporary immobilization with K-wire was reported in another case report.[8] Suroto also reported modified technique of SORL reconstruction in chronic mallet finger by using two skin incisions and one button fixated at distal phalanx to enhance comfort and prevent skin necrosis with acceptable outcome.[9] According to a comparative study by Oh et al SORL reconstruction with lateral and or free tendon graft showed no significant difference in post operative improvement of extension lag between the two groups and this is because both techniques use similar biomechanical basis.[3] The use of K-wire to temporarily fixate the DIP joint showed favorable outcome in SND and mallet finger correction.[7,8,10]

CONCLUSION

Swan neck deformity with mallet finger can successfully be managed by ligament reconstruction using SORL to achieve adequate DIP joint extension and PIP joint hyperextension while still preserving joint flexion.

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