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Extensor indicis proprius transfers for extensor pollicis longus ruptures secondary to rheumatoid arthritis

Romatoid artritte ekstansör pollisis longus kopmaları için ekstansör indisis proprius transferi

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Amaç: Bu çalışmada romatoid artrite bağlı ekstansör pollisis longus (EPL) tendon kopmalarında ekstansör indisis proprius (EİP) transferinin sonuçları incelendi.

Çalışma planı: Yirmi dört hastada (7 erkek, 17 kadın; ort. yaş 41; dağılım 22-72) romatoid artrite bağlı gelişen 25 EPL kopması için EİP transferi yapıldı. Tendon kopması ile cerrahi arasında geçen süre ortalama 4.3 aydı (dağılım 1.5-11 ay). Transfer sonrasında parmak hareketlerinin değerlendirilmesinde Lemmen ve ark. tarafından geliştirilen spesifik EİP-EPL değerlendirme yöntemi kullanıldı. Hastaların çimdik ve kavrama güçleri ölçüldü. Başparmak için metakarpofalangeal (MKF) ve interfalangeal (İF) eklemlerin hareket genişlikleri sağlam tarafla karşılaştırıldı. Hasta memnuniyeti görsel analog skala ile değerlendirildi. Ortalama takip süresi 6.2 yıl (dağılım 4.7-7.9 yıl) idi.

Sonuçlar: Parmak hareketlerinin değerlendirilmesinde 14 parmakta (%56) mükemmel, altı parmakta (%24) iyi, dört parmakta (%16) orta, bir parmakta (%4) kötü sonuç elde edildi. Parmakların çimdik gücü normal tarafın %86'sı, kavrama gücü %92'si kadardı. Görsel analog skala ile memnuniyet skoru ortalama 74 (dağılım 24-99) bulundu. Ameliyat edilmeyen tarafla karşılaştırıldığında, başparmak hareket genişliğinde ortalama 23°, işaret parmağın hareket genişliğinde 7°, başparmak ekstansiyonunda İF eklemde 9°, MKF eklemde 17° kayıp oluştu. Yirmi bir elde bağımsız işaret parmağı ekstansiyonu izlendi.

Çıkarımlar: Romatoid artrite bağlı kopmalarda EİP'nin EPL'ye transferi başarılı bir yöntemdir.

Anahtar sözcükler: Artrit, romatoid/komplikasyon; kopma, spontan; tendon yaralanması; tendon transferi; başparmak/ yaralanma.

Objectives: We evaluated the results of extensor indicis proprius (EIP) to extensor pollicis longus (EPL) transfers for EPL ruptures secondary to rheumatoid arthritis.

Methods: Twenty-four patients (7 males, 17 females; mean age 41 years; range 22 to 72 years) with rheumatoid arthritis underwent EIP to EPL transfer for 25 ruptures. The mean duration from rupture to surgery was 4.3 months (range 1.5 to 11 months). Functional assessment of the fingers was made using a specific EIP-EPL evaluation method developed by Lemmen et al. Pinch and grip strengths were measured. Range of motion of the metacarpophalangeal and interphalangeal joints of the thumb was compared with the normal side. Patient satisfaction was evaluated by a visual analog scale. The mean follow-up period was 6.2 years (range 4.7 to 7.9 years).

Results: Functional results were perfect in 14 fingers (56%), good in six fingers (24%), moderate in four fingers (16%), and poor in one finger (4%). The pinch and grip strengths were 86% and 92% of the uninvolved hand, respectively. The mean visual analog scale score was 74 (range 24 to 99). Compared to the uninvolved side, the range of motion of the thumb and index finger decreased by 23° and 7°, respectively, with a 9% loss of interphalangeal motion and a 17% loss of metacarpophalangeal motion in thumb extension. Independent extension of the index finger was possible in 21 hands.

Conclusion: The results of EIP to EPL transfers are successful in ruptures secondary to rheumatoid arthritis.

Key words: Arthritis, rheumatoid/complications; rupture, spontaneous; tendon injuries; tendon transfer; thumb/injuries.

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Flexor and extensor tendons ruptures caused by tenosynovial and bony irritations are frequent complications of the rheumatoid arthritis in spite of the serious medical treatment applications. Tenosynovectomie has some success to prevent the ruptures but because of these complications arise frequently without symptoms such as the pain and swelling, it's difficult to follow the patients under risk1. Primary repair after the rupture is not always possible. Tendon transfer or tendon grafting is indicating if the joints' ranges of motions are between normal ranges.

The rupture of the extensor pollicis longus (EPL) is a frequent and disabling complication of the rheumatoid arthritis. The EPL tendon is repaired primary when the lesion is the result of a sharp injury. But a tendon transfer is suggested for the lesions occurred after the blunt injuries, distal radius fractures and secondary to rheumatoid arthritis.[2,3] Extensor indicis proprius (EI), extensor carpi radialis (ECRL), palmaris longus and the third and fourth superficial flexor tendons are frequently used for the transfer to EPL.[2-4] EI tendon is a good choice because of the similarity to the EPL in length and pulling direction. Trevor firstly cited about the biomechanical properties of the EI transfer and then quite a few authors emphasized the success of this transfer.[5-7]

The extensor pollicis tendon which takes place in the third dorsal compartment of the wrist provides the extension of the distal phalanx and has a great emphasis for the hand functions. It makes a radial deviation with an angle of 45° at the level of the Lister's tubercle and reaches to the thumb. This rotation helps to the thumb adduction from the carpometacarpal joint and when it fails, the motions requiring adduction and the circumdiction act which is the combination of the flexion-extension and adduction-abduction can not be performed correctly.

EPL furnish the extension of the interphalangeal (IP), metacarpophalangeal (MCP) and carpometacarpal (CMC) joints. The first dorsal compartment muscles also facilitate the extension at the CMC joint. The EPL muscle has an adduction moment and this effect helps to the adductor pollicis tendon.[2,8]

The aim of this study was to analyze over the thumb and index finger the results of the extensor indicis transfers after the EPL tendon ruptures related to the rheumatoid arthritis.

Material and methods

Twenty-five ruptures of the twenty-four rheumatoid patients treated between 1990 - 2004 were evaluated. One patient had bilateral ruptures. The series was formed from the seven men and seventeen women. The mean age was 41 years (22 – 72 years) and the mean follow-up period was 6,2 years. The mean period between the ruptures and the surgery was 4,3 months (1.5 – 11 months).

To assess the results of finger functions after transfer, a specific Extensor indicis- Extensor pollicis longus evaluation method proposed by Lemmen et al. was used2. In this method, elevation deficit of the thumb, combined flexion deficit (opposition), free extension of the index were measured from the MCP and IP joints. The patients were graded upon 100 points as excellent (100-81 pt.), good (80-61 pt.), moderate (60-41 pt.) and bad (<40 pt.). The grip and pinch strengths were also measured with Jamar dynamometer (Sammons Preston Rolyan, Bolingbrook, IL, USA). The patient satisfaction evaluation was obtained using a visual analog scale (0-100 points). According to this scale, "0" was very unsatisfied and "100" very satisfied.

The thumb and index finger MCP and IP joints' ranges of motions were measured at the operated hand and the other side.

Surgical technique

EI tendon was isolated by a transverse incision at the MCP joint. This tendon usually settled at the ulnar side9. The tendon reached to the thumb through a subcutaneous tunnel. EI tendon was sutured to the extensor mechanism using the pulvertaft technique at the MCP joint. To obtain the appropriate tension it was given attention to the extension posture of the thumb when the wrist in flexion and vice versa and to bring face to face the pulps of the thumb and the fifth finger. The distal part of the donor tendon was sutured to the common extensor tendons. Active motion was permitted after a five weeks immobilization period (Fig. 1 – 5).

Results

Fourteen perfect, six good, four moderate and one bad result was present according to the evaluation method. The pinch strength was 86 %, and the grip

strength was 92 % of the other hand. The pinch and grip strength of the bilateral case were not recorded. The mean subjective satisfaction score was 74 (24-99) with the visual analog scale. Elderly people was more satisfied then the youngs. Overall range of motion of the thumb was 175º (171-182º) on average at the normal side and 152º (144-162º) at the operated side. The deficit was 23º. The mean range of motion of the index finger was 265º (260-270º) at the non operated hand and 258º (253-262º) at the affected hand. The deficit was 7º. The extension deficit of the thumb was 9º at the IP joint and 17º at the MP joint in comparison with the other hand.

Independent extension of the index finger was possible in 21 of the 25 hands. Independent extension was lost in four patients but no one complaint of it.

Discussion

The extensor tendon rupture is the one of the common complications of the rheumatoid arthritis. In spite of the preventive effect of the tenosynovectomie, this ruptures have a great place between the complications because most patients are followed by

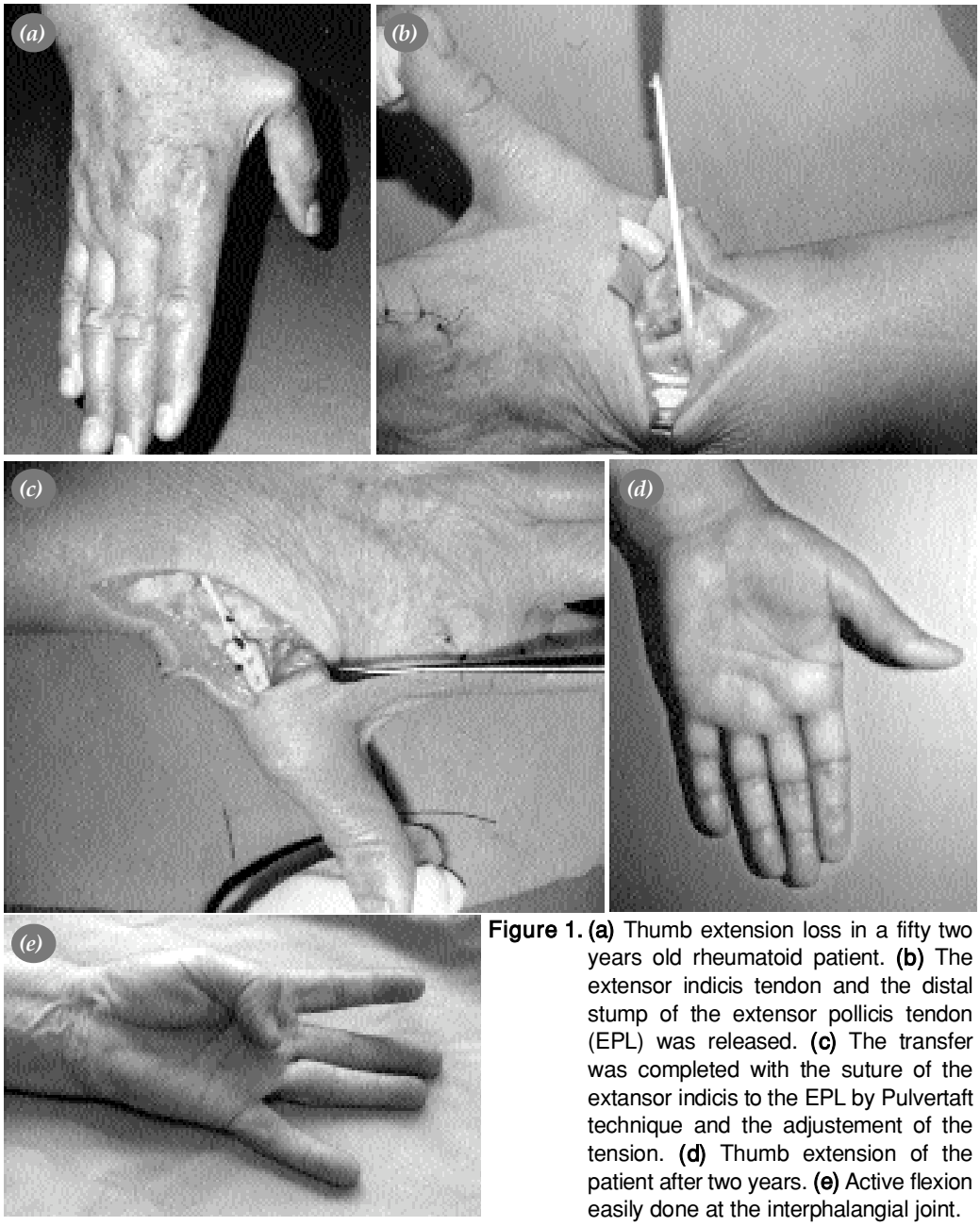

Figure 1. **(a)** Thumb extension loss in a fifty two years old rheumatoid patient. **(b)** The extensor indicis tendon and the distal stump of the extensor pollicis tendon (EPL) was released. **(c)** The transfer was completed with the suture of the extansor indicis to the EPL by Pulvertaft technique and the adjustement of the tension. **(d)** Thumb extension of the patient after two years. **(e)** Active flexion easily done at the interphalangial joint.

the rheumatologists with medical therapy. Because of the invasion of the rheumatoid granulation tissue and the friction of the tendon over the Lister's tubercle are between the frequent causes of the ruptures, Ryu et al. suggest to perform a prophylactic tenosynovectomie when there is a synovial swelling resistant to anti-rheumatoid medicaments used over six month10.

The functional status in EPL rupture is closely related to the extensor pollicis brevis (EPB) and the thumb ray joints. Some patients can extend their thumbs while the others have dropped thumb. The thumb can reach to the neutral position with the intrinsic muscles at IP joint after the rupture. The EPL is necessary for hyperextension of the thumb. The extension deficit is seen at the MCP joint because the EPB can not extend alone the joint.

In the EPL ruptures and the delayed EPL tendon cuts, end to end anostomosis can frequently not be done. In this situation tendon graft application and the tendon transfers must be preferred. In spite of the good results, grafting can cause some adherences in rheumatoid patients. Having the anostomosis in two different levels and a complication in one of them decrease the success rate.[5] In the extensor tendon ruptures related to rheumatoid arthritis, Nakamura and Katsuki came to the conclusion that the tendon graft application was unsuccessful by reason of the restrictions of the finger flexion due to the muscle contractures.[11] In such a case EI transfer is a good alternative. There is not any lack oft the independent extension of the index finger after the transfer.[2] To achieve this independent extension, the distal part of the EI tendon must be sutured to the common extensor. In this study at the 21 index finger of the 25 patients an independent extension was present and the entire patient in whom there was a lack of extension was satisfied. But even this complication is rarely seen the patients must be informed before the operation.

As a result of tendon transfer which is commonly applied in the literature, there is a certain loss on radial side in wrist extension as ECRL is an important extensor. Therefore, EI transfer is more advantageous.[8,12]

In patients, satisfaction score is higher in old people than in younger ones. This observation has been interpreted as a fact that in Turkish society, old population ignores pain and restriction of action and movement due to cultural and religious reasons and impressions.

A certain loss of movement has been observed on thumb IP and MCP joints as a result of transfer. There has been 23º loss in total range of motion of the joint. At the time of transfer, adjustment of tendon tension has an effect on this angle and width. In this exercise, while wrist is flexion, thumb is in extension movement, and when the wrist is in extension movement, gaining the ability of flexibility has been considered and accepted as a suitable tension measurement.

Low et al. noted that during the transfer, the best range of motion has been obtained when the wrist is in neutral position and thumb is in full extension.[13]

With regard to the questions directed to the patients, it has been found out that some patients have difficulty of movement on their thumbs especially when they use their mobile phones. Some patients have pointed out that even if the their pinch strength is very close to the other side, when they start to open the door by key; they have the difficulty of holding the key at the first movement of holding it. These problems have also been mentioned and emphasized in the literature.[3,14] As it is in this series, in classical EI transfer, the oblique trace of EPL has not been taken into consideration, CMC joint and tendon relationship is damaged and addiction moment arm is lost.[3] In Shah et al. highlighted that the closest transfer to EPL functions is the transfer that has been made in such a way that, as being similar to EPL of EI tendon with a pulley formed from 4th compartment retinaculum. In this study it has been showed that, the closest effect to the original tendon addiction effect can be obtained only in this way.[14] Therefore, optimum function can be obtained when the transfer is made in this way.

Especially, musicians and those who have to use keyboard should be very careful in the EI tendon transfer independent second finger extension loss could happen and this can cause problem. Besides this, in the cases where general and local conditions are not suitable, interphalangial joint arthrodesis choice can be applied all the time.

SEEM evaluation method is a suitable method in terms of showing the functions of both thumb and

index finger. But regarding addiction loss, objective measurement can not be carried out.

Transfer of extension indicis to EPL is a very suitable treatment method for the secondary ruptures due to rheumatoid arthritis. In this way, as it is in the late tendon reconstruction suture to the degenarated tendon is avoided and healthy motor power is being used.

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