



Case Report of a Patient Who Underwent Supercharge end-to-side (SETS) Transfer for Proximal Ulnar Nerve Injury Using AIN (Anterior Interosseous Nerve) Motor Branch

Proksimal Ulnar Sinir Yaralanmasına AİN (Anterior Interosseous Nerve) Motor Dalı Kullanılarak Supercharge end-to-side (SETS) Transferi Yapılan Hastaya Ait Vaka Sunumu

Emir Kütük¹*, Özgür Baysal¹*, Waziri Juma Msangi¹*

¹Marmara University, School of Medicine, Department of Orthopaedics and Traumatology, İstanbul, Turkey.

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ABSTRACT

If proximal ulnar nerve injuries are not intervened, it usually leads to irreversible and negative consequences. It results in motor and sensory defects in the areas innervated by the ulnar nerve and weakness in the intrinsic muscles of the hand. In patients with irreversible ulnar nerve damage due to cubital tunnel syndrome that have been left untreated for a long time, or proximal ulnar nerve injuries due to other reasons, the SETS method can restore especially the intrinsic functions of the hand.

In this article, a patient with ulnar nerve damage that developed after benign tumor resection in the vicinity of the ulnar nerve, and the SETS operation and its results, which was performed for a patient whose ulnar functions did not return despite being followed with EMG for 1.5 years, are presented.

Keywords: Ulnar supercharge, ulnar nerve, proksimal ulnar nerve injury, nerve transfer, end-to-side supercharge

Sorumlu yazar/Corresponding author: Emir Kütük, Marmara University, School of Medicine, Department of Orthopaedics and Traumatology, İstanbul, Turkey. emirkutuk@live.com / 0000-0003-3848-6838

ORCID:

Ö. Baysal 0000-0001-5150-8857, W. J. Msangi 0000-0001-6431-6344

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ÖZ

Proksimal ulnar sinir yaralanmalarına müdahale edilmezse genellikle geri dönüşsüz ve olumsuz sonuçlara yol açar. Hastalarda ulnar sinirin innerve ettiği alanlarda motor ve duyu kusuru, elin intrinsik kaslarında güçsüzlükle sonuçlanır. Uzun süre tedavisiz kalmış kübital tünel sendromuna bağlı geri dönüşsüz ulnar sinir hasarı olan hastalarda ya da diğer sebeplere bağlı gelişen proksimal ulnar sinir yaralanmalarında SETS yöntemi ile özellikle elin intrinsik fonksiyonlarında geri dönüş sağlanabilir.

Bu makalede ulnar sinir komşuluğunda benign tümör rezeksiyonu sonrası gelişen ulnar sinir hasarı olan ve 1.5 yıl EMG ile takip edilmesine rağmen ulnar fonksiyonlarında dönüş olmayan hastaya yapılan SETS operasyonu ve sonuçları sunulmuştur.

Anahtar Kelimeler: Ulnar süperşarj, ulnar sinir, proksimal ulnar sinir hasarı, sinir transferi, uç-yan sinir transferi

CASE

A 44-year-old right-handed, 85kg, 181cm male patient previously presented with a mass in the distal right humerus. After the resection of a benign calcified mass in the vicinity of the ulnar nerve, hypoesthesia was detected in the area innervated by the ulnar nerve. Control and follow-up continued with EMG. We were consulted at the 6th month control.

His complaints of numbness, tingling and loss of strength in his right hand continued. On examination, there was claw hand deformity in the 4th and 5th fingers of the right hand. There was no abduction-adduction of the fingers and atrophy of the interosseous and hypotenar muscles innervated by the ulnar nerve. Wartenberg, Jeanne

and Froment sign findings were positive. Two point separation measurements were increased in the ulnar region, especially on the 5th finger (> 4mm). In the current EMG, ulnar motor conduction block was observed in the elbow segment.

After talking to the patient, ulnar nerve exploration and release operation was recommended. When the ulnar nerve was explored, it was observed that its integrity was preserved. The ulnar nerve was decompressed by dissection and freed. Post-operative controls continued. Upon the persistence of ulnar neuropathy findings in the 3rd month after exploration, the patient was consulted and a decision was made for re-operation. The AIN motor branch to the pronator quadratus muscle was separated and the distal end of the ulnar nerve was anastomosed. During the repair, the nerves were sutured as an end-to-side anastomosis. No nerve graft or neural tube was used. Splint was applied for 1 month postoperatively. Some important points about the operation;

- The nerve should not be tense.
- If electrophysiological examination is to be done during the case, tourniquet and muscle relaxant should not be used.
- If a nerve graft is to be taken, it should always be kept moist.

At the 6th month postoperative, parmar adduction functions were fully restored. In addition, the atrophic hypotenar area was almost completely

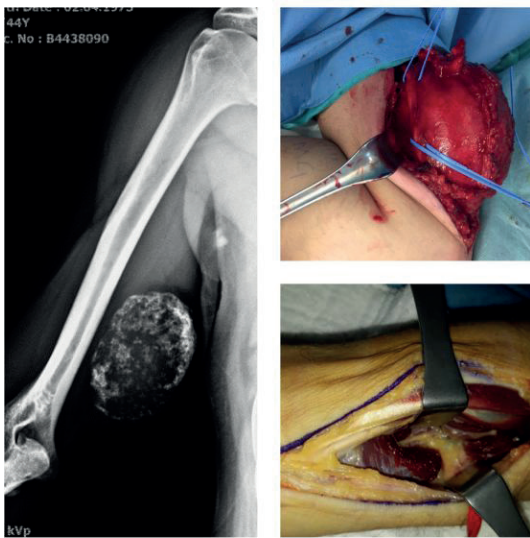


Figure 1. Benign tumor removed from the arm is seen on the left and upper right, while AIN nerve transfer to the ulnar nerve is seen in the lower right.

filled and the atrophy signs were almost completely disappeared. In the postoperative EMG, intrinsic motor functions were normal at the distal level of the wrist.

DISCUSSION

With the supercharged end-to-side anterior interosseous nerve to ulnar motor nerve transfer (SETS) method, recovery in intrinsic muscle strength and improvement in claw hand deformity can be achieved in isolated proximal ulnar nerve injuries, especially in patients with motor function loss. Barbour et al. (6) were the first to describe SETS of AIN to ulnar motor fascicles transfer. Nerve transfer has gained importance recently due to the inadequate results of direct nerve repair. The motor branch of AIN can be dissected at the entrance to the pronator quadratus muscle. Anastomosis can be performed by opening an epineural window in the ulnar nerve 6-8 cm proximal to the wrist crease.

In the study conducted by Üstün ME et al. On 10 cadaver arms in 2001, it was revealed that the most suitable nerve for motor branch transfer in patients with ulnar nerve injury is the AIN motor branch to the Pronator Quadratus. The use of flexor pollicis longus and flexor digitorum profundus motor branches has been reported to be less suitable, as a longer segment will require grafting due to a longer distance (5).

In 2019, Eslam Koriem et al. compared isolated ulnar repair and ulnar repair + SETS method on 21 patients with ulnar nerve injury. 11 patients had ulnar repair + SETS, while 10 patients had isolated ulnar repair. The results in terms of return of intrinsic functions and regression of deformity were observed better in the UR + SETS group (1).

In 2015, Davidge KM et al. 55 patients with severe ulnar neuropathy were followed up for

an average of 8 ± 5.7 months postoperatively. Satisfactory improvement in intrinsic functions was reported in 71% (39/55) of the patients (7). In 2018, Jarvie G et al. Follow-up results of two patients who operated with SETS method were published. They reported that the intrinsic muscle strength was measured as 5/5 in the second-year control in the first patient, and 4 + / 5 in the second-year control in the second patient (3).

CONCLUSION

The supercharge end-to-side transfer (SETS) method is a successful method for restoring hypotenar atrophy and restoring the intrinsic functions of a patient with proximal ulnar nerve injury. In the case we presented, we provided a demonstrative improvement in the patient. The atrophic hypotenar area was filled and palmar adduction started again. An important point that should not be forgotten in these cases is that only motor functions will return and the sensory defect will not return because the motor branch transfer is performed.

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REFERENCES

1. Koriem E, El-Mahy MM, Atiyya AN, Diab RA. Comparison Between Supercharged Ulnar Nerve Repair by Anterior Interosseous Nerve Transfer and Isolated Ulnar Nerve Repair in Proximal Ulnar Nerve Injuries. *J Hand Surg Am.* 2020 Feb;45(2):104-110. <https://doi.org/10.1016/j.jhsa.2019.11.005>. Epub 2019 Dec 20. PMID: 31866151.

2. Dunn JC, Gonzalez GA, Fernandez I, Orr JD, Polfer EM, Nesti LJ. Supercharge End-to-Side Nerve Transfer: Systematic Review. *Hand (N Y)*. 2019 Mar 29;1558944719836213. <https://doi.org/10.1177/1558944719836213>. Epub ahead of print. PMID: 30924361.
3. Jarvie G, Hupin-Debeurme M, Glaris Z, Daneshvar P. Supercharge End-to-Side Anterior Interosseous Nerve to Ulnar Motor Nerve Transfer for Severe Ulnar Neuropathy: Two Cases Suggesting Recovery Secondary to Nerve Transfer. *J Orthop Case Rep*. 2018 Sep-Oct;8(5):25-28. <https://doi.org/10.13107/jocr.2250-0685.1194>. PMID: 30740369; PMCID: PMC6367287.
4. Woo A, Bakri K, Moran SL. Management of ulnar nerve injuries. *J Hand Surg Am*. 2015 Jan;40(1):173-81. <https://doi.org/10.1016/j.jhssa.2014.04.038>. Epub 2014 Nov 6. PMID: 25442770.
5. Ustün ME, Oğün TC, Büyükmumcu M, Salbacak A. Selective restoration of motor function in the ulnar nerve by transfer of the anterior interosseous nerve. An anatomical feasibility study. *J Bone Joint Surg Am*. 2001 Apr;83(4):549-52. <https://doi.org/10.2106/00004623-200104000-00009>. PMID: 11315783.
6. Barbour J, Yee A, Kahn LC, Mackinnon SE. Supercharged end-to-side anterior interosseous to ulnar motor nerve transfer for intrinsic musculature reinnervation. *J Hand Surg Am*. 2012 Oct;37(10):2150-9. <https://doi.org/10.1016/j.jhssa.2012.07.022>. PMID: 23021177.
7. Davidge KM, Yee A, Moore AM, Mackinnon SE. The Supercharge End-to-Side Anterior Interosseous-to-Ulnar Motor Nerve Transfer for Restoring Intrinsic Function: Clinical Experience. *Plast Reconstr Surg*. 2015 Sep;136(3):344e-352e. <https://doi.org/10.1097/PRS.0000000000001514>. PMID: 26313839.