

## TENDON TRANSFERS FOR RADIAL NERVE PALSY

Nur Rachmat Lubis<sup>1</sup>, Wiria Aryanta<sup>1</sup>, Davin Caturputra Setiamanah<sup>1</sup>

Orthopedic and Traumatology Division, Department of Surgery, Faculty of Medicine Sriwijaya  
University, Palembang

Email: noerrl2@yahoo.com.sg

---

### ABSTRACT

**Background:** High radial nerve palsy mostly caused by injury of nerve branching from proximal to the elbow resulting in function loss of wrist, finger and thumb extension, as well as thumb abduction. Tendon transfers are the most common technique for motor reconstruction indicated in high radial nerve palsy if the patients fail to achieve nerve regeneration and recovery. This procedure will restore finger, thumb, and wrist function, without foisting other motoric deficits on the hand, with satisfying results.

**Case:** 19 years old male was referred to RSUP dr. Mohammad Hoesin Palembang with right wrist joint instability and limited range of motion (ROM). Past history of fracture at the middle third of the right humerus 6 months ago. Physical examination showed total loss of active wrist extension, thumb extension and abduction, and finger extension at metacarpophalangeal (MCP) joints. The patient is diagnosed as a high lesion of radial nerve palsy. Tendon transfers procedure were prepared to restore better wrist function and ROM. Tendon transfers performed with Riordan method, using pronator teres as extensor carpi radialis brevis for wrist extension, flexor carpi ulnaris to extensor digitorum communis for finger extension, palmaris longus to extensor pollicis longus for thumb extension.

**Conclusion:** Tendon transfers for high radial nerve palsy is an effective technique to restore the function of wrist extension, finger extension, and power of handgrip.

**Keywords:** *High radial nerve palsy, tendon transfers*

---

### 1. INTRODUCTION

High radial nerve palsy mostly caused by injury of nerve branching from proximal to the elbow resulting in function loss of the wrist, finger (metacarpophalangeal joint), and thumb extension, as well as thumb abduction. Tendon transfers are the most common technique for motor reconstruction indicated in high radial nerve palsy. This procedure principle is detaching functioning muscle-tendon unit (MTU) from its insertion and reattached it to another tendon or bone to replace the function of the paralyzed muscle or injured tendon, while the transferred tendon remains attached to its parent muscle with an intact neurovascular pedicle. This surgery aims to use the power of the functioning muscle unit to activate a non-functioning nerve, muscle or tendon unit; to correct instability, imbalance, lack of coordination and restore function; by redistributing remaining muscular

forces. This procedure, perhaps, will restore finger, thumb, and wrist function without foisting other motoric deficits on the hand with satisfying results.

## CASE REPORT

19 years old male was referred to RSUP dr. Mohammad Hoesin Palembang with right wrist joint instability and limited range of motion (ROM). This patient had a history of fracture at the middle third of the right humerus 6 months ago. Physical examination showed total loss of active wrist extension, thumb extension and abduction, and finger extension at metacarpophalangeal (MCP) joints. The clinical sign of drop hand was found. Humeral shaft fracture is concomitant to radial nerve injury, with the incidence rate of 2 – 17%.

This case showed us a stage of irreparable or often called long-standing radial nerve injury without any signs of re-innervation or nerve regeneration. Nerves are assumed to regenerate 1mm per day. In a span of 3 months, if there is no recovery, nerve transfer is recommended to be done. Regardless of how nerves are regenerating, if the condition does not even occur in 6 to 10 months, resulting in degeneration of motor endplate, tendon transfers come as the only option for functional recovery. Therefore, we diagnosed the patient as a high lesion of radial nerve palsy and prepared tendon transfers procedure to restore better wrist and finger extension, thumb extension, radial abduction, and better strength of handgrip.

Tendon transfers performed with Riordan method, using pronator teres (PT) as extensor carpi radialis brevis (ECRB) for wrist extension, flexor carpi ulnaris (FCU) to extensor digitorum communis (EDC) for finger extension, palmaris longus (PL) to re-routed extensor pollicis longus (EPL) for thumb extension.

After the procedure was done, we continue the treatment with hand immobilization by using long arm (above elbow) splint for 4 weeks with a flexed elbow, pronated forearm, and extended. After 4 weeks, mobilization began with limited force to keep the tension of the transferred tendon off. Active flexion and extension of the fingers and thumbs started as early as 4 weeks and active movement of the wrist is recommended to begin at 5 to 6 weeks after surgery. Strengthening exercise and full activity started by the first day of week 12. Post-operative tendon transfers (figure 3) showing the patient's ability to stabilize the wrist so the transmission of flexor power to the fingers was recovered resulting in a better handgrip strength.

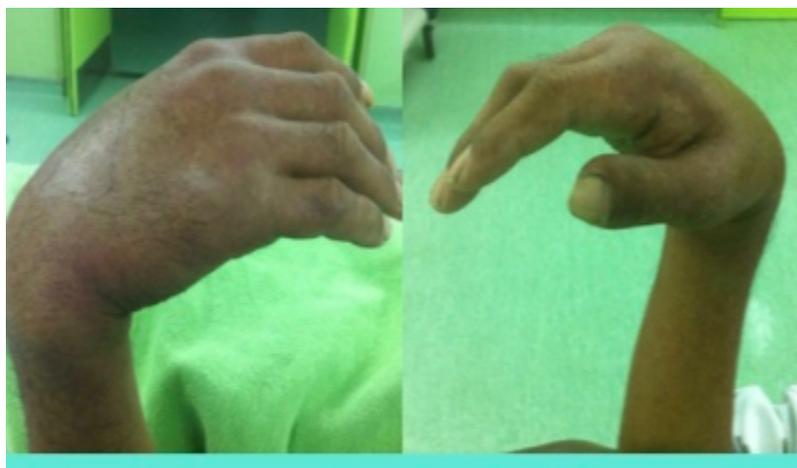


Figure 1. Before tendon transfers. Clinical sign of drop hand regarding to radial nerve palsy



Figure 2. Intraoperative tendon transfer. Dorsal forearm incision showing extensor carpi radialis brevis (ECRB) as recipient tendons



Figure 3. Post-operative tendon transfers. Hand grip, fingers' flexion and extension, including thumb extension and abduction were obtained

## CONCLUSIONS

Tendon transfers for high radial nerve palsy showed excellent outcome in the wrist extension, finger extension, and power of handgrip. We recommend the surgical intervention, using this method, to maintain and restore better hand function if spontaneous re-innervation of the most proximal muscle, brachioradialis, and extensor carpi radialis longus fails to occur in 3 – 6 months.

## REFERENCES

- [1]. Alia Ayatollahi Moussavi, Alireza Saied, Ali Karbalaekhani. Outcome of tendon transfer for radial nerve paralysis: Comparison of three methods. *Indian J Orthop*, 2011; Nov-Dec 45(6): 558-562, doi: 10.4103/0019-5413.87133
- [2]. Bumbasirevic M, Palibrk T, Lesic A, Atkinson. Radial nerve palsy. *EFFORT Open Rev*, 2016;1:286-294, doi: 10.1302/2058-5241.1.000028
- [3]. Hentz VR. Tendon transfers after peripheral nerve injuries: my preferred techniques. *Journal of Hand Surgery (European Volume)*, 2019; 0(0):1-10
- [4]. M. M. Al-Qattan. Tendon transfer for radial nerve palsy: a single tendon to restore finger extension as well as thumb extension/ radial abduction. *The Journal of Hand Surgery (European Volume)*, 2012; 37E(9):855 – 862, doi: 10.1177/1753193412437509
- [5]. Meirizal, Sudaryanto, Rahadyan Magetsari. Drop hand treated with modified Jones transfer. *Int J Case Rep Images*, 2018;9:100925Z01M2018, [www.ijcasereportsandimages.com](http://www.ijcasereportsandimages.com)
- [6]. Richford J, Abdullah S, Norhafizah M, et al. Outcome of Tendon Transfers for Radial Nerve Palsy in a Malaysian Tertiary Centre. *Malaysian Orthopaedic Journal*, 2018; Vol. 12 No. 1 , doi: <http://dx.doi.org/10.5704/MOJ.1803.001>
- [7]. Ucak M. Surgical restoration of drop hand syndrome with tendon transfer in patients injured in the Syrian civil war. *Military Medical research*, 2019; 6:35, <https://doi.org/10.1186/s40779-019-0225-6>