

Case Report

Median nerve function impairment after Steindler flexorplasty - A case report

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ABSTRACT

Background and purpose: There are several surgical techniques described to restore elbow flexion in brachial plexus injuries with a late presentation. Among these, Steindler flexorplasty is a method with good outcomes and few complications. To date, no reports of chronic median nerve neuropathy as a complication of the procedure are known.

Case description: The current case report presents a patient that developed paresthesias of the median nerve territory after a Steindler flexorplasty, with documented chronic nerve injury on electromyography. Implant removal and neurolysis were performed with functional improvement.

Conclusion: Median nerve injury was caused both by screw head prominence and the large size of the bone graft.

1. Introduction

Traumatic brachial plexus injury can bring severe disabling consequences concerning upper limb function.

The surgical treatment for adult patients with late-presentation brachial plexus palsy is based on salvage procedures, aiming to restore the motion required for daily activities.

There are a few options to restore elbow flexion in upper-root palsy.¹ One of them is transfer of the wrist flexor-pronator mass to the anterior humerus, first described by Steindler² and later modified by Mayer and Green,³ with promising results.^{4–7,8}

The most common complications described in the literature are implant failure or transient ulnar paresthesias.^{7–9}

So far, no median nerve lesion after the procedure has been mentioned. However, this case report describes a median nerve injury after a Steindler flexorplasty.

2. Case description

We report the case of a 47-year old male that 25 years ago suffered a motorcycle accident, which led to a brachial plexus palsy involving C5–C6–C7 roots.

Clinically the patient showed a 4/5 shoulder flexion and abduction, with no capacity for active external and internal rotation, no degree of

active elbow flexion (with the full range of motion of passive flexion) and complete preservation of elbow extension, as well as wrist flexion and extension. Initial DASH score was 65.

The pre-operative electromyographic study showed a chronic post-ganglionic root injury of C5–C6–C7 levels, and pointed out a normal motor function and diminished sensitive conduction relative to median nerve evaluation.

The Steindler procedure was performed by transferring the wrist flexor-pronator muscle mass and its bony attachment to the distal humerus, the fixation was achieved with a 3.5 mm screw (Fig. 1).

After six weeks of cast splint immobilization, the patient began a rehabilitation protocol.

Six months from the procedure, the patient recovered active elbow flexion of 90°, with muscle power 4/5, improved quality of life significantly, with decrease of DASH score to 40. An initial extension deficit of 20° was overcome after prolonged rehabilitation.

At this point, the patient complained of paresthesias in the sensitive territory of the median nerve with no associated muscle power deficit. The six-month post-operative electromyographic study revealed a severe median nerve injury at the elbow level, with relative preservation of the anterior interosseous nerve.

In order to identify the source of median nerve injury and treat it accordingly, surgical exploration of the median nerve was performed, with macroscopic evidence of median nerve compression and

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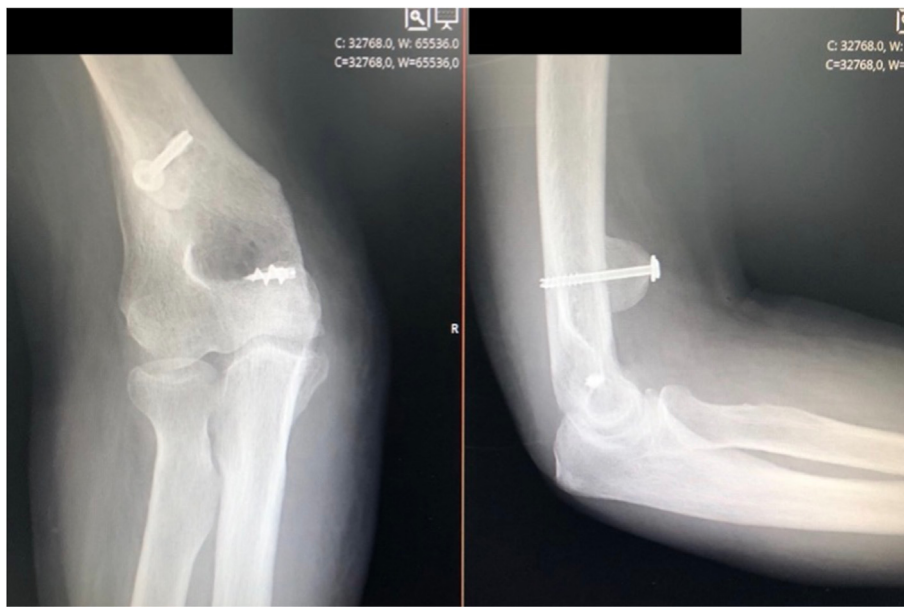


Fig. 1. Post-operative radiography.

neuropathy immediately distal to the flexor mass bony attachment. The screw was removed, and the median nerve neurolysis was performed. (Fig. 2).

The patient showed an improvement of paresthasias at immediate follow-up with no effect on the previously achieved elbow, wrist or hand range of motion or muscle power.

3. Discussion

Modified Steindler flexorplasty is a reliable surgical method used to restore elbow flexion associated with chronic nerve injuries. Complications reported are implant failure, infection, and transient ulnar nerve paresthasias.⁷⁻⁹

In the current case, the causes of median nerve injury were most likely

both the large size of the bone graft and screw head prominence. That may have lead to local impingement on the median nerve; additionally, excessive tension of the flexor-pronator mass could lead to constraining the nerve pathway in the elbow.

Hardware removal and adequate neurolysis improved patient's symptoms, further confirming our hypothesis.

A critical aspect of this case is the lack of median nerve motor symptoms, favoring the hypothesis of local nerve compression, rendering symptoms similar to the compression in the carpal tunnel.

This is an unreported complication; therefore, this case report is drawing attention to the intraoperative technique, namely appropriate bone graft sizing and the use of headless screws to prevent median nerve damage.

Currently, there are no publications concerning the recommended bone graft size, although Chen¹⁰ describes in his technique that the bone fragment should have a size of about $2.5 \times 2.5 \times 1.5$ cm. Regarding the screw size, the cases found in the literature typically used a 3,5mm cortical screw.^{10,11}

Marinello et al.¹¹ recommend performing median nerve neurolysis during the approach since this can help to decrease median nerve tension and prevent its damage.

4. Conclusion

Chronic median nerve injury following Stendler's flexorplasty is a possible, but so far unreported complication, most likely related to intraoperative technique. Careful bone graft sizing, screw placement and median nerve neurolysis might help prevent this complication.

Disclosures

The authors have no conflicts of interest to disclose.

Patient has signed an Informed Consent to authorize clinical data publishing.

Author's contributions

Alina Frolova: Writing – Original Draft and Editing, Research. Vitor Vidinha: Conceptualization, Writing – Review. Luis Alves: Writing – Review, Research. Manuel Gutierrez: Conceptualization, Writing – Review, Supervision.



Fig. 2. Intra-operative image of median neuropathy.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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