

Median Nerve Trifurcation

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Summary: Median nerve trifurcation in the carpal tunnel has only rarely been described and never reported to be found at surgery. We present the first such case, highlighting a median nerve trifurcation found at carpal tunnel release. Consideration of amendment of the Lanz classification should be made to account for such cases, and surgeons should be aware of possible anatomical variations to avoid iatrogenic injury. (*Plast Reconstr Surg Glob Open* 2016;4:e1129; doi: 10.1097/GOX.0000000000001129; Published online 23 November 2016.)

A number of anatomical variations of the median nerve have been described, found with either imaging studies or at surgery. These include motor branch anomalies, multiple divisions, and variation in association with aberrant muscles. Median nerve trifurcation has only rarely been described in the literature, with 3 published case reports describing a trifurcation of the median nerve found on ultrasonography. This anatomical variation has not yet been described as a surgical finding.¹⁻³ We present such a case.

CASE REPORT

A 32-year-old man, with right carpal tunnel syndrome, confirmed on nerve conduction studies, underwent an elective right carpal tunnel release. The patient had no comorbidities, and only past medical history was a right radius fracture 3 years before. During the surgery, he was found to have a trifurcation of his median nerve within the carpal tunnel. The median nerve has an early bifurcation proximal to the carpal tunnel. Within the carpal tunnel itself, one of the aberrant branches of the median nerve is then further divided to form a trifurcation. A recurrent branch can be seen emerging from one of the median nerve divisions (Fig. 1). His procedure proceeded without complication. He had a

good resolution of his symptoms after release at 2-week follow-up.

DISCUSSION

Lanz⁴ classified the anatomical variations of the median nerve within the carpal tunnel. The variations are classified into 4 groups: group 1: variations of the course of the thenar branch; group 2: accessory branches at the distal carpal tunnel; group 3: high division of the median nerve, into 2 branches, thus a bifid median nerve with or without median artery or an aberrant muscle; and group 4: accessory branches proximal to the carpal tunnel. The bifid median nerve has been reported to have an incidence of 2.8%. Modification of group 3 of the Lanz classification should be considered to include trifurcation of the median nerve proximal to the carpal tunnel.

Although a bifid median nerve has been shown in the literature to not be associated with an increased risk of carpal tunnel syndrome, it is not found whether there is the presence of median artery or not. Theoretically, an increase in cross-sectional volume within the carpal tunnel by a further additional aberrant branch could contribute to nerve compression. This is an area that may warrant further investigation.

There is a risk of injury to the median nerve if it follows an aberrant pathway when patients undergo surgical decompression. There are several carpal tunnel release techniques, some of which remain controversial. Many surgeons would advocate a release of antebrachial fascia, located at the proximal wrist crease. A traditional open carpal tunnel release does not usually involve an incision more proximal than the distal wrist crease; hence, many of these divisions may occur outside of direct vision. The presence of a trifid median nerve can therefore increase the risk of injury. Furthermore, not all carpal tunnel releases are performed with formal

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Fig. 1. Intraoperative image of the trifurcating median nerve in the carpal tunnel after division of the transverse carpal ligament. recurrent thenar branch (1), radial aberrant branch of median nerve (2), ulnar aberrant branch of median nerve (3), middle aberrant branch of the median nerve (4).

neurolysis, and thus, the entire median nerve anatomy cannot be appreciated. A trifold nerve could be mistaken for a recurrent branch, and identification of a single or

bifid nerve is therefore not sufficient to avoid injury to the recurrent branch.

CONCLUSIONS

Surgeons should be aware of this particular anatomical variation of median nerve trifurcation to avoid iatrogenic injury.

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This research conforms to the Helsinki Declaration.

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