

ORIGINAL ARTICLE

Metacarpophalangeal portal safety: An anatomical study[☆]



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KEYWORDS

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Abstract

Aim: To quantify the risk of dorsal innervation injury when performing direct metacarpophalangeal joint portals of the second to fifth fingers.

Material and method: An anatomical study of 11 upper limbs of fresh corpses was carried out. After placing them in a traction tower, the metacarpophalangeal portals were developed on both sides of the extensor tendon. The dorsal sensory branches were dissected, and the distances between the portal and the nearest nerve were measured by a digital calliper. The portals of all the fingers were compared globally to assess the safest finger, and two to two radial and ulnar portals were compared in each of the fingers to assess the safest portal within each finger.

Results: The overall comparison of all portals and fingers showed that the third finger is the safest in any of its portals, while the ulnar side of the second and radial of the fourth are the portals with the highest risk of nerve injury ($P=8.96 \times 10^{-5}$). Comparison two to two of the radial and ulnar portals in each of the fingers showed that the ulnar portal is safer than the radial on the fourth finger ($P=0.042$), while the radial is safer than the ulnar on the fifth finger ($P=0.003$).

Conclusions: The third finger was the safest to perform metacarpophalangeal portals, while the ulnar side of the second finger and radial side of the fourth had the highest risk of nerve injury.

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PALABRAS CLAVE

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Seguridad de los portales metacarpofalángicos. Estudio anatómico**Resumen**

Objetivo: Cuantificar el riesgo de lesión de la inervación dorsal al realizar portales directos de la articulación metacarpofalángica del segundo al quinto dedo.

Material y método: Se realizó un estudio anatómico de 11 extremidades superiores de cadáveres frescos.

Tras colocarlos en torre de tracción, se realizaron los portales metacarpofalángicos a ambos lados del tendón extensor. Se disecaron las ramas sensitivas dorsales y se midieron las distancias entre el portal y el nervio más cercano mediante un calibrador digital.

Se compararon de forma global los portales de todos los dedos para valorar el dedo más seguro y se compararon dos a dos los portales radial y ulnar en cada uno de los dedos, para valorar el portal más seguro dentro de cada dedo.

Resultados: La comparación global de todos los portales y dedos mostró que el tercer dedo es el más seguro en cualquiera de sus portales, mientras que el lado ulnar del segundo y radial del cuarto son los que tienen riesgo más alto de lesión nerviosa ($p = 8,96 \times 10^{-5}$).

La comparación dos a dos de los portales radial y ulnar en cada uno de los dedos mostró que el portal ulnar es más seguro que el radial en el cuarto dedo ($p = 0,042$), mientras que el radial es más seguro que el ulnar en el quinto dedo ($p = 0,003$).

Conclusiones: El tercer dedo fue el más seguro para la realización de los portales metacarpofalángicos, mientras que el lado ulnar del segundo dedo y el lado radial del cuarto son los de más alto riesgo de lesión nerviosa.

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Introduction

Since it began in the 1960s, arthroscopy has evolved exponentially with optimisation of the size and quality of the optics, light sources and arthroscopy towers. Surgeons have simultaneously persisted in pursuing the challenge to perform arthroscopies in increasingly smaller joints and it is even possible nowadays to perform them in joints as small as the metacarpophalanges (MPs).

Despite the fact that this technique is not yet widespread, there is a significant number of MP joint pathologies indicated for being treated arthroscopically, including inflammatory arthropathies, the removal of loose bodies, joint fractures and ligament injuries.¹

Similar to the widely studied dorsal portals of wrist arthroscopy,² MP portals are not risk-free. As far as we are aware, no study exists on the safety of the MP dorsal portals of the second to fifth fingers, in relation to nerve injuries.

The purpose of this study was to quantify the risk of nerve injury by assessing the safety of MP dorsal portals of the second to fifth fingers under the positioning and traction conditions used during this technique.

Material and method

An anatomical study of 11 upper limbs of fresh corpses from the Body Donation Centre and the dissection rooms of the Faculty of Medicine of the Complutense University of Madrid was conducted. The study was approved and developed within the UCM920547 research group. The medical records of all the corpses were available, and none had any

background of trauma or surgery or obvious limb pathologies.

Demographic data are shown in Table 1. 36.36% (4/11) were female limbs, whilst 63.64% (7/11) were male. 90.9% (10/11) were white and 9.1% (1/11) were black. The mean age was 77.7 (53–92). Mean height and weight were 167.63 cm (157.48–180.34) and 86.43 kg (54.43–124.74).

Dissections were made with magnifying spectacles $\times 2.5$ magnification by the main researcher. The procedure began with careful resection of the skin on the MP joints of the second to the fifth fingers. The skin size we decided to resect was 2×6 cm, sufficient to expose the MP joints but not wide enough to alter the original direction of the dorsal innervations. After this, the fatty tissue and superficial fascia were resected, maintaining dorsal innervations in their position and the extensor tendons. The soft tissues surrounding the nerves were not altered to ensure no variation of their original position.

Once dissection had been made, the hands were placed in an AcuWrist® (Acumed, Hillsboro, Oregon, USA) wrist arthroscopy traction tower, with a traction of 5–10 pounds. Two portals were used, in keeping with the recommended technique,^{1,3} with the aid of an intramuscular (IM) injection (19 gauge) on both sides of the common extensor tendon of the second to fifth fingers, in the recess areas 2 mm to each side of the tendon, at 45° towards the middle line (Fig. 1).

To assess the safety of the second and third finger portals, the traction was positioned in the second and third fingers. To study the fourth and fifth finger portals, traction was positioned on the fourth and fifth fingers.

In order to simplify the nomenclature of the dorsal innervations of the hand, numbering is used so that the most

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