

## Intermediate supraclavicular nerve perforating the clavicle: a rare anatomical finding and its clinical significance

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**ABSTRACT:** The dissection of a male 70-year-old cadaver revealed that the left intermediate supraclavicular nerve perforated the clavicle. Knowledge of this variation is important because it may cause neuropathy, with pain in the neck and shoulder region. Furthermore, it should be differentiated from a fracture of the clavicle.

*Key Words:* Supraclavicular nerves, Anatomical variations, Clavicle tunnel, Clavicle fracture, Entrapment neuropathies.

### INTRODUCTION

The supraclavicular nerves belong to the descending superficial branches of the cervical plexus and arise by a common trunk from the third and fourth cervical ventral rami. They emerge from the posterior border of the sternocleidomastoid and descend under the platysma and the deep cervical fascia. They are divided into medial, intermediate and lateral branches which diverge and pierce the deep fascia a little above the clavicle.

The medial supraclavicular nerves run inferomedially across the external jugular vein and the clavicular and sternal heads of the sternocleidomastoid in order to supply the skin of the internal part of the anterior surface of the thorax from the midline to the second rib and the sternoclavicular joint. The intermediate supraclavicular nerves cross the clavicle in order to supply the skin over the pectoralis major and deltoid down to the level of the second rib, next to the area of supply of the second thoracic nerve. The lateral supraclavicular nerves descend superficially across the trapezius and acromion, supplying the skin of the upper and posterior parts of the shoulder<sup>1</sup>.

Several anatomical variations of the supraclavicular nerves have been reported in the literature<sup>2</sup>. Few

are the reports concerning the abnormal course of the supraclavicular nerve through an osseous tunnel of the clavicle<sup>3-7</sup>. In the current study we describe a case of an intermediate supraclavicular nerve penetrating the clavicle in a cadaver. Moreover, we analyze the possible clinical implications of this variation according to the literature.

### CASE REPORT

A routine dissection of a male 70-year-old cadaver, during the anatomy courses in the Department of Anatomy in the University of Cologne, Germany, revealed the left intermediate supraclavicular nerve perforating the clavicle through the middle third of the bone (Figure 1). After leaving the osseous tunnel of the clavicle the nerve was divided into two branches that ended into the subcutaneous tissue of the subclavicular region. The medial and the lateral supraclavicular nerve followed a typical course, distribution and termination. Evidence of a prior fracture to the clavicle was not found and it is not known whether the man had any symptoms because of this abnormality.



**Figure 1.** The point at which the intermediate supraclavicular nerve emerges from the osseous tunnel of the clavicle to the thorax (arrow). Its following division into two branches is also observable.

## DISCUSSION

The clavicle is the first bone that begins to ossify, during the 5<sup>th</sup>-6<sup>th</sup> week of embryo life<sup>8</sup>. It is a membranous bone since it is not developed by cartilage but primarily by mesenchyma. At that stage, a branch of the supraclavicular nerves could easily pierce the clavicle<sup>9</sup>. Another aspect is that the nerve is enclosed into canals that are formed, usually in the central part of the bone, during the embryologic development of the embryo<sup>6</sup>. Nerves could also become entrapped in bone following fractures such as entrapment of the median nerve following forearm shaft fractures<sup>10</sup>. However, evidence of a prior fracture was not found in our case.

The incidence of the anatomical variation presented in our study varies from 1% to 6%<sup>2,6,11</sup>. It is interesting that this variation is usually situated on the left side and involves the intermediate supraclavicular nerve<sup>2,3,4</sup>, as it happened in our case. There are also reports of a double canal for the intermediate supraclavicular nerves<sup>12</sup> or even three canals<sup>6</sup>, while two nerves can pass through the same canal as well<sup>6</sup>.

From the clinical point of view, differential ra-

diologic diagnosis and symptomatic cases or injuries have been reported<sup>3,4,5,13,14</sup>. The osseous tunnel of the clavicle, occupied by the supraclavicular nerve, should be differentiated in a plain radiograph from the nutrient canal of the clavicle<sup>3</sup>, from a fracture<sup>15</sup> or from the grooves for the insertion of the coracoclavicular ligament<sup>15</sup>. The nutrient canal of the clavicle is usually located posteriorly and it is not seen in routine examinations, but it may appear on the inferior or superior borders of the clavicle on a frontal x-ray<sup>16</sup>. The supraclavicular nerve perforating the clavicle is usually clinically silent, but it may cause several symptoms due to the entrapment neuropathy syndrome. The development of entrapment neuropathy can be related to an episode of acute trauma and repetitive stresses and strains to the nerve, which lead to its compression within the narrow osseous tunnel. This repetitive microtrauma to the nerve is thought to be associated with an increased risk of peripheral nerve palsies in the shoulder girdle<sup>3,7,17,18</sup>. Symptoms are induced, on a previous asymptomatic abnormality, due to overuse of the shoulder joint, which is common in athletes or in workers and include pain at the neck, the clavicular, the thorax and the shoulder region<sup>3,7</sup>. When these symptoms persist and the conservative treatment fails, surgery in order to decompress the nerve is indicated<sup>3</sup>. Moreover, a fracture of the clavicle could cause severe injury of the nerve, resulting this way in great pain in the upper thorax region<sup>19</sup>. There is also a report of a traumatic neuroma developed on a supraclavicular nerve that perforated the clavicle<sup>19</sup>.

**Conclusion:** The course of the supraclavicular nerve through the osseous tunnel of the clavicle is a rare anatomical abnormality. The knowledge of this variation is important because it may cause neuropathy, with pain in the neck and shoulder region.

## Διέλευση μέσου υπερκλειδίου νεύρου από ίδιο τμήμα της κλείδας: ένα σπάνιο ανατομικό εύρημα και η κλινική του σημασία

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**ΠΕΡΙΛΗΨΗ:** Κατά την ανατομή πτώματος άνδρος 70 ετών το αριστερό μέσο υπερκλειδίο νεύρο διατρύπωσε την κλείδα. Η γνώση της παραλλαγής αυτής είναι σημαντική διότι μπορεί να προκαλέσει νευροπάθεια με αποτέλεσμα πόνο στον τράχηλο και την περιοχή του ώμου. Επιπλέον είναι σημαντικό να διαφοροδιαγνωσθεί από τη γραμμή ενός κατάγματος της κλείδας.

*Λέξεις Κλειδιά:* Υπερκλειδία νεύρα, Ανατομικές παραλλαγές, Τμήμα της κλείδας, Κάταγμα της κλείδας, Παγίδευση νεύρου.

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