

# Preliminary assessment of anatomical variability of *nervus peroneus superficialis* in the foetal period

Zygmunt Domagała, Bohdan Gworys, Krystian Porwolik

Department of Normal Anatomy, Medical University, Wrocław, Poland

[Received 27 May 2003; Revised 1 September 2003; Accepted 1 September 2003]

*An assessment of the variability of the course and ramifications of the superficial peroneal nerve within the crus was made on a material of 33 foetuses of both sexes miscarried in the 6th month of foetal life. Particular attention was paid to the relation of the nerve under examination to the anterior intermuscular septum. To facilitate the analysis the material investigated was grouped into several types.*

*The post mortem examination revealed that the nerve referred to followed a typical course within the shank in 54% of cases. At the same time in 15% of cases the examined nerve was split into two terminal branches within the fascial compartment of fibular muscles, leaving the fascia independently. In 19% of cases n. peroneus superficialis passes through the intermuscular septum to the anterior fascial compartment of the shank. Moreover, in 12% of cases the presence was demonstrated of n. peroneus superficialis accessorius passing together with n. peroneus profundus to the extensors chamber and further on into the medial cutaneous nerve of the foot.*

**key words:** *superficial peroneal, development*

## INTRODUCTION

The shank, and particularly the anterior fascial compartment, is constantly suffering from mechanical injuries, which often require surgical treatment. Surgeons have found hitherto unknown branches of the common peroneal nerve during operations [1–3, 5, 9]. These nerves, due to their non-typical course, are often damaged during the surgery, which prolongs the operation and often makes complete recovery of the patient impossible. Knowledge of the anatomical variability of the main common peroneal nerve branches, i.e. *nervus peroneus superficialis* and *nervus peroneus profundus* seems, therefore, to be

of great importance. The available literature describes the postnatal period and the results presented are, due to the different methodology used, not comparable or hardly comparable [1, 4–7]. For this reason comprehensive research has been undertaken by the Department of Anatomy into the variability of the course of these nerves in the lower limb in human foetuses. This publication focuses on the superficial peroneal nerve and constitutes the first part of this research. The aim of the work is to assess the variability of the course of the superficial peroneal nerve and to determine the frequency of changes in its topographical modifications and rare branches

## MATERIAL AND METHODS

An analysis was made of 33 fetuses in the 6th month of foetal life. Their age was calculated on the basis of clinical data and verified with our own foetal age evaluation method [10]. Before preparation a post mortem examination was performed on each foetus to detect and eliminate individuals with visible malformations. During initial preparation, the skin and subcutaneous tissue were removed to reveal the extrafascial terminal branches of the nerve under examination. Next the fascia was cut to gradually reveal the nerve trunk and its ramifications and to open the chambers of the peroneal muscles and shin extensors. During the examination the main efforts were concentrated on assessment of the relationship between the nerve studied and the anterior intermuscular septum. The preparation was carried out with the use of a biocular microscope. The observations were documented with schematic figures and photographs (Practica photographic set).

## RESULTS AND DISCUSSION

The presence of several observable types course of the nerve course was demonstrated. The classical course of *nervus peroneus superficialis*, that described in the literature, was bilaterally present in 18 fetuses. Simultaneously, the bilateral high split of the nerve into 2 terminal branches, the medial dorsal cutaneous nerve and intermediary dorsal cutaneous nerve, in the central part of the peroneal muscle chamber (Fig. 1) was observed in 5 fetuses — type I. In 7 cases (5 right limbs and 2 left limbs) the analysed nerve passed through the proximal part of the anterior intermuscular septum and ran from the peroneal muscle compartment to the anterior fascial compartment of the shin — type II. Within

this compartment the nerve ran on the lateral side of the extensor muscles of the lower shank and passed through the fascia, leaving the compartment. In the remaining 13 examined foetal limbs (5 right and 8 left) the presence is shown of an additional branch, the additional superficial peroneal nerve, passing through both compartments that were open during preparation (Fig. 2, 3). What is interesting in this group is that the coexistence was found of *musculus peroneus tertius* in 12 out of 13 limbs (5 right and 7 left ones). This is considerably more (92%) than in the groups without the presence of *nervus peroneus superficialis acc.* (about 75%) or in the analysis of the examinations made by Sokołowska-Pituchowa et al. [8] (about 78%), currently acknowledged as the definitive ones.

The available publications regarding the area tested are very scarce. Adkinson et al. [1] are the only ones who describe the presence of different variations in the course of *nervus peroneus superficialis* in adult individuals in 30% of cases. Therefore it is

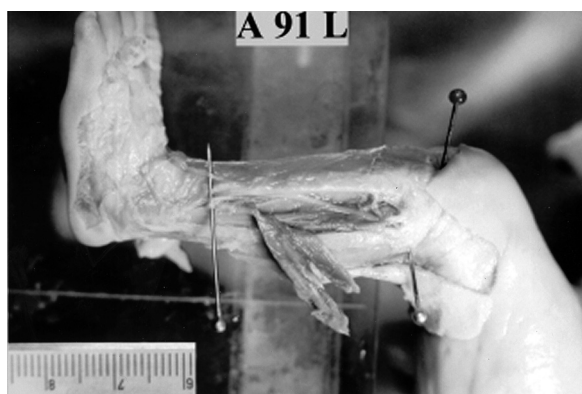


Figure 1. High split of *nervus peroneus superficialis* in a human fetus.



Figure 2. *Nervus peroneus superficialis* accessories.



Figure 3. *Nervus peroneus superficialis* and *nervus peroneus superficialis acc.* — proximal part of fetal crus.

not surprising that in our examinations the frequency of all variations of this nerve is equal to almost 50%. At the same time Adkinson et al. [1] has not found the presence of an additional superficial peroneal nerve branch. In contrast, the additional, third branch of *nervus peroneus communis* is described in an analysis made by Infante and Kennedy [6] and Reimann [7] on the material taken from adults. According to Reimann [7] *nervus peroneus superficialis accessorius* exists in 10% of cases, whereas in the foetal material tested by us the frequency of occurrence of this nerve is almost twice as great and equal to approximately 19%. Our own analysis proved the existence of a surprising relationship between the presence of *musculus peroneus tertius* and the additional superficial peroneal nerve in fetuses. We have found no mention of the dependence described in this work in the available literature [6–8]. However it requires the additional analysis of much more numerous material.

To sum up our findings, it may be stated that the classical course of the superficial peroneal nerve is present in as few as 54% of cases and has the following appearance: the nerve begins between the parts of the long peroneal muscle, runs between two peroneal muscles, the long one and the short one, within the chamber of peroneal muscles and in its lower part passes through the fascia and splits into two terminal branches. The variations in the course of this nerve are the high split of the superficial peroneal nerve, type I, which is present in 15% of cases, and type II, where the examined nerve passes through the further part of anterior compartment. Simultaneously the presence of an additional superficial peroneal nerve was found in about

12% of cases. During the examinations no significant dimorphic differences in any of the tested types were found. Last but not least, it should be stressed that this information is nothing more than a preliminary assessment of the topography and course of the superficial peroneal nerve. The tests are in progress and the final results are to be presented after collection of sufficiently numerous foetal material.

## REFERENCES

1. Adkinson DP, Bosse MJ, Gaccione DR, Gabriel KR (1991) Anatomical variation in the course of the superficial peroneal nerve. *J Bone Joint Surg Am*, 73 A: 112–114.
2. Aydogdu S, Yercan H., Saylam C, Sur H (1996) Peroneal nerve dysfunction after high tibial osteotomy. An anatomical cadaver study. *Acta Orthop Belg*, 62: 156–160.
3. Blair JM, Botte MJ (1994) Surgical anatomy of the superficial peroneal nerve in the ankle and foot. *Clin Orthop*, 305: 209–238.
4. Canovas F, Bonnel F, Kouloumdjian P (1996) The superficial peroneal nerve at the foot. Organisation, surgical applications. *Surg Radiol Anat*, 18: 241–244.
5. Huene DB, Bunnell WP (1995) Operative Anatomy of Nerves Encountered in the Lateral Approach to the Distal Part of the Fibula. *J Bone Joint Surg Am*, 77 A: 1021–1024.
6. Infante E, Kennedy WR (1970) Anomalous branch of the peroneal nerve detected by EMG. *Arch Neurol*, 22: 162–165.
7. Reimann R (1984) Accessory peroneal nerves in man. *Anat Anz*, 155: 257–267.
8. Sokołowska-Pituchowa J, Miałkiewicz Cz, Skawina A, Makoś K, Gorczyca J (1979) The third peroneal muscle in human fetuses. *Folia Morphol*, 35: 489–498.
9. Styf J, Morberg P (1997) The superficial peroneal tunnel syndrome. *J Bone Joint Surg Am*, 79 B: 801–803.
10. Ziółkowski M, Gworys B, Kurlej W (1988) Estimation of fetal age on the basis of certain measurements and ossification of the sternum. *Folia Morphol*, 47: 145–151.