

TOPOGRAPHIC ANATOMY OF THE TIBIAL NERVE: - THE DISTANCE BETWEEN THE TERMINAL DIVISION POINT OF THE TIBIAL NERVE AND THE TERMINAL DIVISION POINT OF THE POSTERIOR TIBIAL ARTERY

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ABSTRACT

The tibial nerve is one of the terminal branches of the sciatic nerve. The Posterior Tibial Artery is one of the terminal branches of the popliteal artery. They travel on the posterior aspect of the leg and terminate under the flexor retinaculum. Here both structures are present in an osseofibrous tunnel, in this tunnel the tibial nerve might be entrapped and the condition is known as tarsal tunnel syndrome.^[1] During different procedures on the posterior tibial artery, the tibial nerve might be injured. Thus, the doctor should know the various possibilities of the relations between the posterior tibial artery and the tibial nerve. In the present study, we will provide knowledge of the arrangement of structures in the tarsal tunnel and will also study the various points of termination of the tibial nerve in relation to the posterior tibial artery.

INTRODUCTION

The Tibial nerve and the posterior tibial artery are present in the posterior tarsal tunnel.^[1] In this tunnel, these both give their terminal branches. The relation between the point of these terminal branches is important for surgeons, anesthesiologists and Orthopedics. Damage to the tibial nerve typically occurs when the nerve is compressed as a result of consistent pressure. This is known as tarsal tunnel syndrome.^[1] In this, the patients may experience pain, numbness, or tingling sensation. This pain can be felt anywhere along the distribution of the tibial nerve. This can be sharp, shooting pain, pins and needles, an electric shock, or a burning sensation. Pain and other symptoms are often aggravated by physical activity.^[2]

Knowledge regarding these variations can also help anesthetists give ultrasonography-guided ankle blocks without puncturing the blood vessels. Thus, in the present study, we observed the variations in the level of terminal branches.

MATERIAL AND METHODS

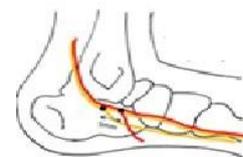
We performed our study in forty (20 right and 20 left) formalin-fixed adult cadaveric lower limbs, irrespective of sex, in the Department of Anatomy, IGMC Shimla, Himachal Pradesh, India. To expose the tarsal tunnel and structures within it, we followed the steps given in Cunningham's dissection manual. The flexor retinaculum was identified, divided at its anterior end, and reflected posteriorly to visualize the structures in the

posterior tarsal tunnel. All the structures in the posterior tarsal tunnel were cleaned and photographed.

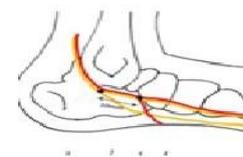
We observed the distance between the terminal division point of the tibial nerve and the terminal division point of the posterior tibial artery in millimeters with the help of the vernier caliper and categorized it.

The distances were categorized into four categories as per Awari P et al.^[2]

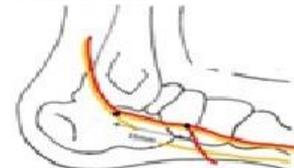
Category 1: - 0-5mm



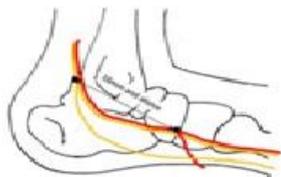
Category 2: - 06mm-10mm



Category 3: -11mm-15mm



Category 4: -16mm and above



OBSERVATIONS AND RESULTS

We studied the distance between the terminal division point of the tibial nerve and the terminal division point of the posterior tibial artery in forty specimens out of which in one specimen the posterior tibial artery was absent. Thus, the total number of cases is thirty-nine in our study.

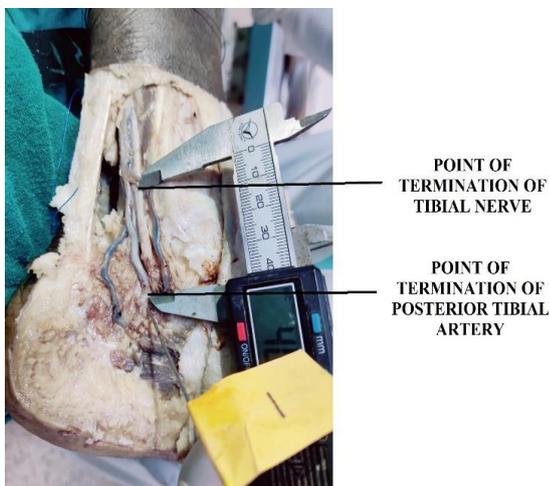


Figure No.1: The Distance Between The Terminal Division Point of The Tibial Nerve And The Terminal Division Point of The Posterior Tibial Artery.

Table NO1: Number of Cases of Categories According To Classification of Awari P., Vatsalawamy P.^[2] Classification.

Category	Distance Between Terminal Division Point of Tibial Nerve And Terminal Division Point of Posterior Tibial Artery	Number of Cases	Total no. of cases	Percentage
1	0 to 5 mm	21	39	52.5 %
2	6 to 10 mm	9	39	22.5%
3	11 to 15 mm	4	39	10%
4	16 mm and above	5	39	12.5%

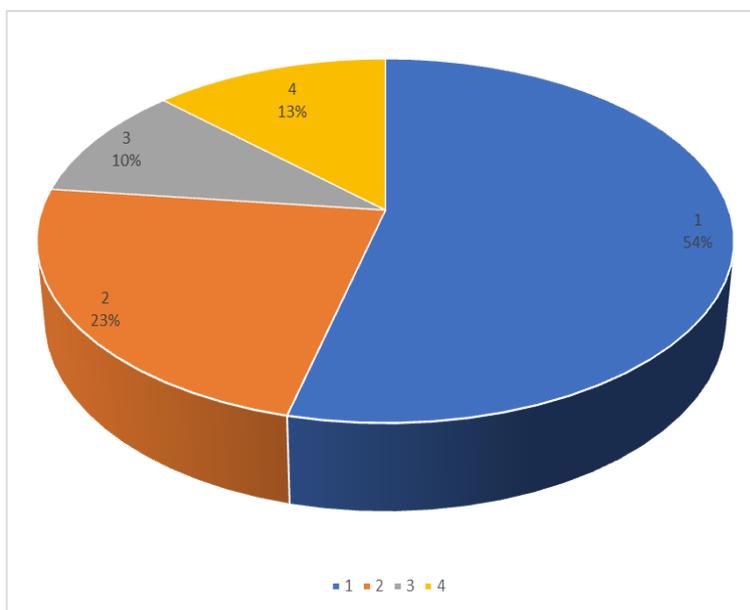


Figure 2: Pie Chart Showing The Number Of Cases Of Categories According To Classification of Awari P, Vatsalawamy P^[2] Classification.

DISCUSSION

Out of forty specimens in thirty-nine specimens the posterior tibial artery was superficial to the tibial nerve and was dividing at a level lower than the division of the posterior tibial nerve (in one specimen the posterior tibial artery was absent). Similar results were observed by Yang Y et al (2016)³ and Awari P et al (2020)^[2] in the Chinese population and in the Indian population respectively. In the study by Yang Y et al³ on average the bifurcation of the posterior tibial artery was 1.81 cm lower than the posterior tibial nerve and in one case it was 0.29 cm higher. Awari P et al^[2] reported 92% cases with lower bifurcation 4% at the same level and 4% higher than the posterior tibial nerve.

The flexor retinaculum was a 20 mm wide band of condensed deep fascia we noted. It extended from the medial malleolus to the medial tubercle of the calcaneum. We found 52.5 % cases of category I i.e. at a distance of 0.5mm. Awari P et al^[2] also reported 52 % of cases in category I. In the study by Bilge O et al^[4] the posterior tibial artery branched distal to tarsal tunnel in 46% of cases which is not present in our study.

CONCLUSION

The tibial nerve block at the ankle requires a better understanding of the relationship between the branches of the tibial nerve and the posterior tibial artery in the posterior tarsal tunnel. Very few studies have been done on this relationship and no one has measured the distance between the terminal division point of the tibial nerve and the terminal division point of the posterior tibial artery.

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