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Research Article

Variation in the presence of the Communicating Branch of Lateral Plantar Nerve

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Abstract: The principal nerve entrapment syndromes in foot include those symptom complexes that are primarily neurologic in origin and result from embarrassment to any of peripheral nerve trunk or branches of foot. It is universally accepted axiom that the nerve supply to any muscle, particularly in an extremity, is of definite surgical importance. A frequent variation in this regard calls for surgeon's attention in order to avoid error in the judgment. In the present study both feet of 30 embalmed cadavers were dissected to show frequency of occurrence and anatomical variation of communicating branch of lateral plantar nerve. The communicating branch was present in 33.33% limbs. With no large gender based differences, branches occurred bilaterally in all. Formation of communicating branch has been thought to explain occurrence of this nerve of painful neurofibroma, the syndrome of which is known as Morton's toe. The neuroma was not detected in present study.
Keywords: Communicating branch, Lateral plantar nerve, Neurofibroma, Morton's toe.

INTRODUCTION

This communicating branch of lateral plantar nerve is an anastomotic branch between medial and lateral plantar nerve. It is classically described as arising proximally in foot from IV common plantar digital nerve and attached distally to III common plantar digital nerve. It primarily carries cutaneous fibres. Morton's neuroma is a painful neurofibrosis of a common plantar digital nerve due to repetitive micro-trauma [1]. The affliction, formerly called Morton's toe or Morton's metatarsalgia, has its pathologic basis in tumefactive perineural fibrosis of IV digital nerve of the foot. The lesion may affect digital nerve other than IV, the predilection for which may be determined by anatomic peculiarities in composition. The IV digital nerve is of double derivation being formed through anastomosis of branches from both medial and lateral plantar nerve. It is consequently somewhat thicker than its mates, a fact which in itself might indicate increased vulnerability to trauma [2].

MATERIALS AND METHODS

This study was carried out in Anatomy department of G.M.C Amritsar. Both feet from thirty cadavers were dissected as per dissection steps provided by Cunningham Manual of Practical Anatomy [3]. Following removal of plantar skin, common plantar digital nerves to 2nd, 3rd and 4th web spaces were identified distally. These nerves were traced proximally to medial and lateral plantar nerve trunks. Starting from lateral and medial plantar nerve trunks, the region of communicating branch was approached from proximal to distal direction, both laterally and medially. Extreme care was taken in removing plantar fascia as communicating branch is usually closely related to its deep surface, often with a branch penetrating the substance of fascia. The number of communicating branch, unilateral or bilateral with gender difference was determined.

RESULTS

In the present study, 20 (33.33%) limbs had communicating branch between medial and lateral plantar nerve. It was present bilaterally and there was no significant gender difference.

The communicating branch is usually described as arising proximally in foot from IV common plantar digital nerve and attaching distally to III common plantar digital nerve. 6 (30%) limbs had a reverse orientation i.e. they attached more proximally in foot to III common plantar digital nerve and travelled distally to attach to IV common plantar digital nerve.

Position and obliquity of communicating branches were qualitatively noted. It was observed that typically oriented communicating branches ran less obliquely between III and IV common plantar digital nerve than that had reversed orientation. Another interesting variation was noted. In 2 specimens,

communicating branches received accessory fibres from deep branches of lateral plantar nerve. In one specimen communicating branch received accessory fibres from deep branch of medial plantar nerve. In 2 additional specimens, the common plantar digital nerve in the vicinity of communicating branch gave rise to accessory branch that went deep in foot. Thus, in 5 (25%) specimen in which communicating branch was found, there were accessory connections between superficially located communicating branch or common plantar digital nerve themselves and deeper structure in foot. No swelling was detected in the present study.

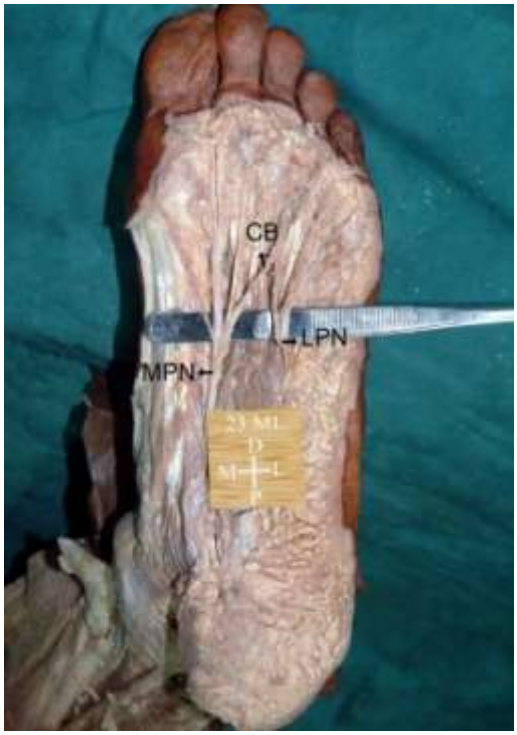

Fig. 1: Showing MPN – Medial Plantar Nerve, CB – Communicating Branch, LPN – Lateral Plantar Nerve

DISCUSSION

In the present study the frequency of occurrence and anatomic variation of communicating branch was studied. The communicating branch of lateral plantar nerve was found in 1/3 of feet dissected. This represented an intermediate value when compared to previous studies. The communicating branch was present bilaterally and does not appear to be gender dependent.

Hovelacque [4] was first to describe the variations of communicating branch of lateral plantar nerve. Jones and Klenerman [5] found that it was present in all 27 feet dissected. Levitsky *et al*. [6] found that communicating branch was present in only 19 of 71 feet (26.80%). Frank *et al*. [1] found it to be present in 53 of 80 feet (66.25%).

Table 1: Comparison of presence of communicating branch (CB) of lateral plantar nerve

Author	Year	No. of limbs studied	No. of limbs with (CB) [n (%)]
Jones and Klenerman [5]	1984	27	27(100.00%)
Levitsky *et al*. [6]	1993	71	19(26.80%)
Frank *et al*. [1]	1996	80	53(66.25%)
Present study	2008	60	20(33.30%)

Formation of communicating branch has been thought to explain the occurrence on this nerve of painful neurofibroma, the syndrome of which is known as Morton's toe.

Betts [7] apparently identified the lesion as neurofibroma; he suggested that reason it occurred on this particular nerve was that this one may be subjected to special trauma in consequence of it being more anchored in position, because of its double origin and less frequently moveable and more subjected to stretch.

Bicket and Dockerty [2] pointed out that neuroma sometimes laid on branch of medial plantar nerve before it bifurcated, sometimes on bifurcation and may be on one of proper digital branches. They expressed the belief that trauma resulting from weight bearing in small or ill fitting shoes may be responsible for lesion.

Nissen [8] argued that communicating branch was often absent and suggested that cause of damage is not direct injury to nerve, but rather injury to accompanying digital artery.

Although Morton's neuroma is a common cause of foot pain, these data suggest that mere presence or absence of communicating branch does not correlate well with likelihood of developing this condition. Also the method commonly used to treat Morton's neuroma is surgical excision and it is associated with high rate of failure. The presence of communicating branch could be a factor in recurrence of neuroma after excision. It can hinder the normal retraction of nerve stump after surgery possibly resulting in post-operative traumatic neuroma formation. Also, if it is transected during surgery, the communicating branch itself appears to be a possible source of postoperative traumatic neuroma.

The accessory nerve branches between the superficial plantar nerves and deeper structures in foot were noted in 25% of feet that had communicating branch. These accessory branches also appear to be a potential source of postoperative complication after excision of Morton's neuroma. McKeever [9] said that

best approach for removal of such neuroma was dorsal one. The occurrence of accessory nerve branches is interesting because the superficial branches of plantar nerves are generally considered cutaneous and deep branches of plantar nerves are generally considered motor. The presence of anastomotic connections between superficial and deep branches indicates that motor and sensory fibres may not always be segregated.

CONCLUSION

In the present study 33.33% limbs had communicating branch between medial and lateral plantar nerve, present bilaterally and there was no significant gender difference.

REFERENCES

1. Frank PW, Bakkum BW, Darby SA; The communicating branch of lateral plantar nerve: A descriptive anatomic study. Clin Anat., 1996; 9(4): 237-243.
2. Bickel WH, Dockerty MB; Plantar Neuromas, Mortons Toe. Surg gynaec Obstet., 1947; 84(1): 111-116.
3. Romans GJ; The popliteal fossa, back of thigh, leg and foot. In Cuningham's Manual of Practical Anatomy. 15th edition, Edinburgh, Book Society and Oxygen University Press, London, 1986; (3): 160- 214.
4. Hovelaque A; Anatome des Nerfs crannies et Rachidiens et du Systeme Grand Sympathique Chez I' Homme. Paris, Doin; 1927: 627-635.
5. Jones JR, Klenerman L; A study of communicating branch between the medial and lateral plantar nerves. Foot Ankle, 1984; 4(6): 313-315.
6. Levitsky KA, Alman BA, Jeusevar DS, Morehead J; Digital nerves of the foot: anatomic variations and implications regarding the pathogenesis of interdigital neuroma. Foot Ankle, 1993; 14(4): 208-214.
7. Betts LO; Morton's metatarsalgia: neuritis of fourth digital nerve. M J Australia, 1940; 1: 514-515.
8. Nissen KL; Plantar digital neuritis: Morton's metatarsalgia. J Bone and Joint Surg., 1948; 30-B(1): 84-94.
9. Mc Keever DC; Surgical approach for neuroma of plantar digital nerve (Morton's Metatarsalgia). J Bone and Joint Surg., 1952; 34(2): 490.