International Journal of Anatomy and Research,
Int J Anat Res 2017, Vol 5(3.2):4187-90. ISSN 2321-4287
DOI: https://dx.doi.org/10.16965/ijar.2017.281

Original Research Article

MORPHOMETRIC ANALYSIS OF LATERAL TARSAL ARTERY AND ITS SURGICAL IMPORTANCE

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ABSTRACT

The present study was carried out on 60 cadaveric lower limbs in Dept. of Anatomy, TNMC, Mumbai. Lateral tarsal artery (LTA) was studied with regard to origin, course, branches and its length & external diameter were noted. LTA was present in 59 cases. Dorsal metatarsal arteries in 7 cases arose from LTA. The mean length was 34.16 ± 0.22 mm. The mean external diameter at its origin was 2.09 ± 0.33 mm. Lateral tarsal artery is useful as an artery flap to repair web contractures and plays a great role in forefoot defect surgeries.

KEY WORDS: Dorsalis Pedis Artery, Lateral Tarsal Artery, Foot Surgery.

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Access this Article online

Quick Response code

DOI: 10.16965/ijar.2017.281

Web site: International Journal of Anatomy and Research
ISSN 2321-4287
www.ijmhr.org/ijar.htm

Received: 03 June 2017
Peer Review: 04 June 2017
Revised: None

Accepted: 18 Jul 2017
Published (O): 31 Aug 2017
Published (P): 31 Aug 2017

INTRODUCTION

Lateral tarsal artery is a branch of dorsalis pedis artery. It supplies dorsum of foot. It ends by supplying overlying muscles and underlying metatarsals [1]. It's a significant vascular channel of foot. Forefoot is portion of the foot distal to the tarsometatasal joint and is the major weight bearing portion in standing. A lateral tarsal (LT) flap is a reasonable option for treating traumatic forefoot skin and soft tissue defects [2]. Bypass to tarsal arteries plays important role in limb salvage of ischemic limbs in diabetic patients. Knowledge of this artery is helpful in limb amputation surgeries [3].

MATERIALS AND METHODS

The study was conducted in the department of anatomy in TNMC & BYL Nair Ch. Hospital, Mumbai. The study was carried out on 60 lower limbs of unknown sex & age from the department of Anatomy and dorsum of foot was dissected.

The long extensor tendons were severed. Dorsalis pedis artery identified, its branches were traced (Fig. 1). Lateral tarsal artery deep to tendons was identified and traced, and its length & external diameter were measured.

Length of the lateral tarsal artery: It was measured as the distance between its origin i.e. point of origin from DPA to its termination i.e. when it joins any other artery to form anastomosis with the help of calibrated digital vernier caliper.(Fig. 2)

External diameter of the lateral tarsal artery: It was measured at its origin from dorsalis pedis artery with the help of calibrated digital vernier caliper. (Fig. 3)

Fig 1: Dorsalis pedis artery & it branches (Note Lateral tarsal artery)

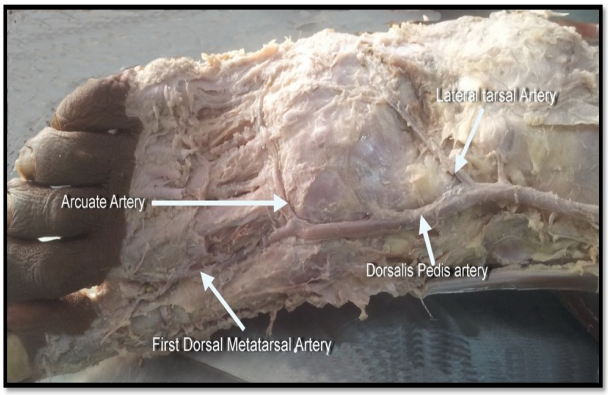


Fig. 2: Measurement of the length of lateral tarsal artery.

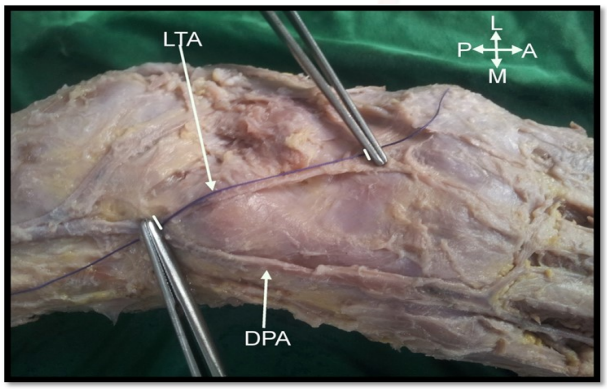


Fig. 3: Measurement of the external diameter of lateral tarsal artery at the origin.

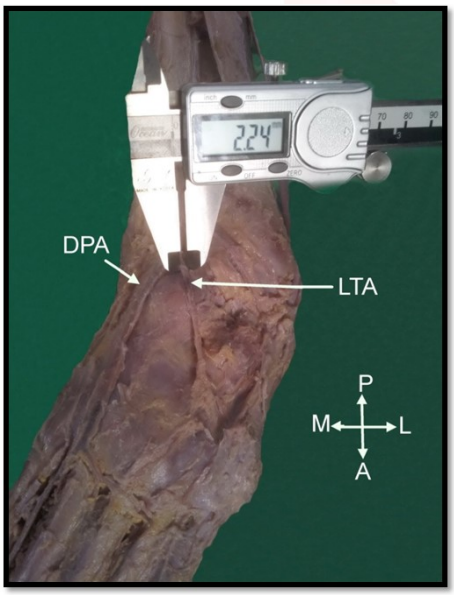


Fig. 4: Absent lateral tarsal artery and arcuate artery.

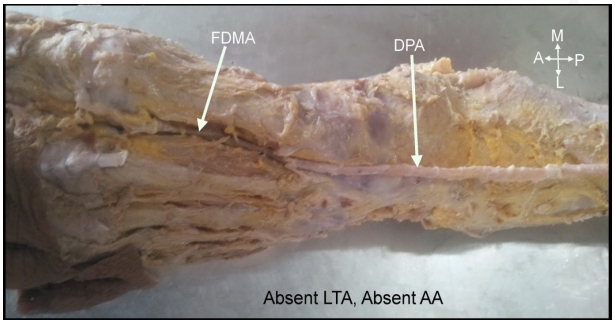
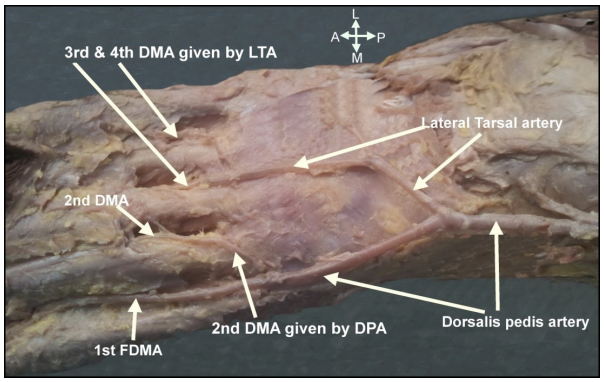


Fig. 5: Origin of 2nd DMA from DPA, LTA giving 3rd & 4th DMA



OBSERVATIONS AND RESULTS

In the **present study,** Lateral tarsal artery (LTA) was present in 59 cases (98.33%). It was absent in 1 (1.66%) case. Normally LTA does not give dorsal metatarsal arteries (DMA)1 however in the **present study i**n 7 cases (11.66%) LTA gave DMA's.

The mean length is 34.16 ± 0.22 mm. It ranges between 12.68 mm – 57.5 mm.

The mean external diameter of LTA at its origin is 2.09 ± 0.33 mm. It ranges between 1.11 mm – 2.93 mm. (Table 1)

Maximum number (76.27%) of lower limbs were having average length of LTA in the range of 25.48 mm – 44.69 mm and minimum number (13.55%) of lower limbs were having the length less than 25.48 mm and 10.16% had length more than 44.69 mm.(Table 2)

Maximum number (88.13%) of lower limbs were having the external diameter of LTA at its origin in the range of 1.63 mm – 2.67 mm and 8.47% of lower limbs were having E.D of less than 1.63 mm and 3.38% had E.D more than 2.67 mm.(Table 3)

Table 1: Descriptive statistics of measurements of the lateral tarsal artery:

Descriptive statistics (in mm)				
	Min	Max	Mean	S.D
Length	12.68	57.5	34.16	8.22
E.D at origin	1.11	2.93	2.09	0.33

(LTA - Lateral Tarsal Artery, E.D - External Diameter)

Table 2: Distribution of study group according to length of LTA.

(LTA - Lateral Tarsal Artery)

Distribution by groups		
Length (in mm)	No. of Samples	Percentage (%)
<25.48	8	13.55
25.48-44.69	45	76.27
>44.69	6	10.16

Table 3: Distribution of study group according to external diameter of lateral tarsal artery.

Distribution by groups		
E.D (in mm)	No. of Samples	Percentage (%)
<1.63	5	8.47
1.63-2.67	52	88.13
>2.67	2	3.38

(LTA - Lateral Tarsal Artery, E.D - External Diameter)

DISCUSSION

Lateral tarsal artery arises from dorsalis pedis artery, supplies tarsals and metatarsals. It also gives some muscular branches to overlying short muscles of dorsum of foot. It ends by anastomosing with small branches of dorsalis pedis artery.

In the present study, LTA was present in 59 cases (98.33%). It was absent in 1(1.66%) case. (Fig 4)

Normally LTA does not give Dorsal metatarsal arteries(DMA)1 however in the present study in 7 cases (11.66%) LTA gave DMA's. (Fig. 5)

Keely cassidy & MA Khan (2011)[4] in a study of 18 feet noted the lateral tarsal artery present in 94% of the cadaveric feet and absent in 6 %.

Measurement of length of the lateral tarsal artery :(In mm)

In the present study the length of the lateral tarsal artery ranged from 12.68mm to 57.5 mm with a mean of 34.16±8.22 mm.

EM El-Saeed et al. (2008)[5] found the length of the lateral tarsal artery in the range 18mm to 37 mm with a mean of 27± 5.7mm (Table 4).

Table 4: Comparison of the length of the lateral tarsal artery with the previous studies.

Study	Year	Sample	Minimum	Maximum	Mean	S.D
EM El-Saeed et al. [5]	2008	20	18	37	27	5.7
Present Study	2014	60	12.68	57.5	34.16	8.22

Findings of the present study for length of the LTA were higher than EM El-Saeed et al. (2008) [5]. This can be attributed to racial, ethnic and population diversity.

Measurement of external diameter of the lateral tarsal artery : (In mm)

In present study the external diameter of lateral tarsal artery ranged from 1.11 to 2.93 mm with a mean of 2.09±0.33 mm.

Findings of the present study for external diameter of the LTA were closely related with EM El-Saeed et al. (2008) [5]. (Table 5)

Table 5: Comparison of the external diameter of the lateral tarsal artery with the previous studies:

Author	Year	Sample	Minimum	Maximum	Mean	S.D
EM El-Saeed et al. [5]	2008	20	1.2	2.8	2.1	0.59
Present Study	2014	60	1.11	2.93	2.09	0.33

(E.D- External diameter, LTA-Lateral tarsal artery, Min-minimum, Max-Maximum, S.D- Standard deviation)

Repair of forefoot defects remain a major challenge in surgical practice, especially in terms of reconstructing forefoot appearance and function.

Lateral tarsal artery flap is an artery flap based on septocutaneous or musculocutaneous perforators supplied by the lateral tarsal artery. Suitable vessel diameter, similar color and texture to hand, helps in its utility as a flap in repair of web contracture, a complication of hand injury [6].

A lateral tarsal (LT) flap has good contour, elasticity, and durability similar to the forefoot and thus is a reasonable option for treating traumatic forefoot skin and soft tissue defects or operative wounds [2].

Lateral tarsal (LT) flap with a reversed DPA pedicle is a reliable and effective technique for covering complex forefoot defects. The DPA pedicle used in flap is anatomically constant and well perfused [7].

Distal foot reconstruction, especially of wounds over the toes, has always been a challenging problem in plastic surgery. The Extensor digitorum brevis flap with intact lateral tarsal artery can be used for distal foot defects [8].

CONCLUSION

Lateral tarsal artery is a branch of DPA which supply bones & muscles of the dorsum of forefoot. LTA flap gives a great choice to surgeons for forefoot defects. Variations of lateral tarsal artery are important and can change the outcome of foot surgeries. Hence it's imperative for surgeons to have thorough knowledge of lateral tarsal artery.

ABBREVIATIONS

DPA- Dorsalis pedis artery
LTA- Lateral tarsal artery
DMA- Dorsal metatarsal artery
FDMA- First dorsal metatarsal artery

Conflicts of Interests: None

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How to cite this article:

Arun P Chepte, M V Ambiye. MORPHOMETRIC ANALYSIS OF LATERAL TARSAL ARTERY AND ITS SURGICAL IMPORTANCE. Int J Anat Res 2017;5(3.2):4187-4190. **DOI:** 10.16965/ijar.2017.281