

## AN ANATOMICAL STUDY OF ADHOSHAKHAGATA INDRABASTI MARMA: ON THE BASIS OF CADEVERIC DISSECTION

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### ABSTRACT

In *Ayurveda*, term *marma* is a representative of vulnerable areas in the body. A trauma occurring in these areas will affect the health and vitality of a person. The response to an injury can vary from deformities to fatality. In order to protect the *marma* and for proper management of the injury, its necessary to identify the structure related to that *marma*, It is also helpful while during any surgical procedure by avoiding injury to the adjacent vital point, while marshal arts, making of sports gaurds, pads, helmets etc.

### INTRODUCTION

*Ayurveda* is that science, which imports all the knowledge of life.

life is the combination of all four factors sharira, indriya, satva and atma. Thorough structural scientific knowledge of the life was recommended by ancient *Acharyas*. The knowledge of *Sharir Rachna* is mandatory for the students of any system of medicine. It is a vital subject in pre-clinical studies. *marma* science is the most important. *Marmas* are not superficial landmark on the body surface but these are deep seated important anatomical structures and it is an ancient traumatological anatomy presented by *Acharya Sushruta*. *Acharya Sushruta* has referred 107 anatomical sites as *marmas*.<sup>[1]</sup> He has presented all the *marmas* particularly on the basis of injury result. He has high interest in revealing the cause of disability because of the trauma in the body. Here in this study we will discuss about the *adhoshakhagata Indrabasti marma*. According to the text *Indrabasti marma* is situated between the ankle and knee joint. (janumadhya).<sup>[2]</sup>

In compositional point of view, it is a *mamasa marma*<sup>[3]</sup>, and according to the time of mortality it is a *kalantar marma*.<sup>[4]</sup> An injury on the *indrabasti marma* can lead to death due to the excess bleeding.<sup>[5]</sup>

**Aims and Objectives:** Aim of the study is to identify and determine the location, composition and traumatic effect of *indrabasti marma* of lower limb.

**Material and Method:** various books, journals and articles, confirmed world wide web sources and literary works related to the subject were reviewed. one male and one female cadaver were dissected at the dissection hall of the sharir Rachana department, R.A Podar Ayurved college worli Mumbai. Dissection was done at the posterior compartment of the leg as per the guideline given in the cunningham's manual of practice anatomy<sup>[6]</sup> and human anatomy of B.D Chaurasia<sup>[7]</sup>. photographs of this region were taken. collected information from literature is compared and correlated with finding from dissection and conclusion were made.

**Cadaveric study** -*Acharya Sushruta* has mentioned process of dissection in detail and has also described the importance of dissection. Before treating a disease or performing a surgical procedure, physician must have complete theoretical and practice knowledge.<sup>8</sup> Location type, magnitude and symptoms of injury of *marma* are described in classics, but with the help of cadaveric study we can determine the exact location of *marma* and observe various anatomical structures related to *marma*.

- 1. Muscles-** Indrabasti marma of ( lower limb) belongs to mansa marma and group heap of muscle (Gastrocnemius, soleus, plantaris, popliteus, flexor digitorum longus, flexor hallucis longus) are present here.
- 2. Posterior Tibial artery-** This is the larger terminal branch of the popliteal artery. Apart from the back of the leg, its branches also supply the lateral compartment of the leg and the sole of the foot. It begins at the lower border of the popliteus, between the tibia and the fibula, deep to the gastrocnemius. it runs downwards and slightly medially, to reach the posteromedial side of the ankle, midway between the medial malleolus and the medial tubercle of the calcaneum and terminates deep to flexor retinaculum by dividing, in to the lateral and medial planter arteries.

**Branches**

**Peroneal artery** –Largest branch of the posterior tibial artery.

**Several muscular branches**

**Nutrient artery**

**Anastomosis branches - Circumflex fibular branch**

**A communicating branch**

**Malleolar branch**

**Calcaneal branch**

**Terminal branches**

**Peroneal artery-** This is the largest branch of the posterior tibial artery. It supplies the posterior and lateral compartment of the leg.

**Courses and relations** - It begins 2.5 cm below the lower border of the popliteus. It runs obliquely towards the fibula, accompanied by the nerve to the flexor hallucis longus. It passes behind the inferior tibiofibular and ankle joints, medial to peroneal tendons, and terminate by dividing into a number of lateral calcaneal branches.

**Branches**

**Muscular branch** – to the posterior and lateral compartments.

**Nutrient artery to the fibula**

**Anastomotic branches**

- a) larger perforating branch pierces the interosseous membrane 5 cm above the ankle, and joins the lateral malleolar network.
- b) The communicating branch anastomoses with a similar branch from the posterior tibial artery, about 5cm above the lower end of tibia.
- c) The calcaneal branches join the lateral malleolar network.

**TIBIAL NERVE**

**Course-1)** Tibial nerve terminated by dividing into the medial and lateral Planter nerves.

2) The tibial nerve crosses the posterior tibial artery from medial to Lateral side.

**Branches**

**Muscular-** to the tibialis posterior, the flexor digitorum longus, flexor hallucis longus, deep part of soleus

Cutaneous –Medial calcaneal branches pierce flexor retinaculum, skin

Articular - To the ankle joint

Terminal – Medial planter and lateral planter arteries.

The cadaveric study has been done in dissection hall of Sharir Rachna Department, R.A podar Medical (ayu) college, Mumbai. regarding the cadaveric study of indrabasti marma of lower limb in male and female cadevers.

**Cadever - male approx. 40-45**

**Approx height - 5.8 – 5.10feet**

**Cadaver - female approx. 50-55 yr**

**Approx height -5.2 - 5.3feet**

**Observation** – as per the classical description about *indrabasti marma* following inferences can be drawn –

1. Number – 4 (one in each limb)
2. TYPE – *Maans marma ,kalantar pranhar marma , Shakhagata.*
3. Location – between knee joint and ankle joint(posterior side) (*janghamadhaya*)
4. Dimension –  $\frac{1}{2}$  *angul.*
5. *Viddha lakshan - shonit kshyen marnam*
6. *Mahabhoot pradhanya – jal and agni*

**On cadaveric dissection following structures are observed in this region –**

1. Posterior tibial artery and its branches
2. Peronal artery and its branches
3. Tibial nerve and its branches
4. Gastrcnemius superficial muscle
5. soleus muscle (sup)
6. plantaris (sup)

**Deep muscles**

7. popliteus
8. flexor digitorum longus
9. flexor hallucis longus
10. Tibialis posterior

## DISCUSSION

*Marma* are the vital points of our body and made from the composition of *maans*, *sira*, *snayu* *asthi* and *sandhi*<sup>[9]</sup>. *Indrabasti marma* is the variety of *mansa marma* and according to the *Acharya sushruta* location of the *indrabasti marma* between knee and ankle joint posterior side. If we are looking at the surface anatomy of *indrabasti marma* then we found it is right to be classified in to *mansa marma* because middle of the gastrocnemius, soleus, plantaris, popliteus, flexor digitorum longus, flexor hallucis longus, tibialis posterior muscles are present at this region. Beneath this layer posterior tibial artery, peroneal artery, tibial nerve and its branches also present. As *Acharya sushrut* mentioned, that injury to this *marma* causes death due to excessive blood loss. These arteries can be injured more often due to laceration and, fractures of the shaft of tibia and fibula. These fracture result blood loss into surrounding tissues. This excessive blood loss and pain may lead to shock and death. This loss of blood supply in injuries which involve high amount of damage of soft tissues, bone vessels, and nerves can be indication for amputation. Amputation is more common with the arterial injury at the knee joint level<sup>[10]</sup>. *Acharya sushrut* consider *indrabasti marma* as a *kalantar pranhar marma*. It has *saumya* and *Agney* property, so injury on this *marma* doesn't cause sudden death but if proper treatment not given then due to blood loss, shock may occur which may ultimately lead to death.

## CONCLUSION

The conclusion has been made on the basis of conceptual and cadaveric study-

1. *Indrabasti marm* that it is *jangha madhaya*, so it will presented 20 cm from knee to ankle.
2. According to the structural classification, it is the type of *mansa marma* namely muscles like, gastrocnemius, soleus, plantaris, popliteus, flexor digitorum longus, flexor hallucis longus muscles are found.
3. main two arteries i.e posterior tibial artery and its largest branch peroneal artery are found in proximity of *marma*.so the source of bleeding as a *viddha lakshan* of this *marma* can be from this vessels, especially on any lacerating injury. which can cause profuse bleeding and can cause death due to hypovolemic shock.

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