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EXPLORING INDRABASTI MARMA: IN PURVIEW OF PERIPHERAL HEART

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Abstract: The term "Marma" originates from the Sanskrit word "Mrin Maranae." The Sanskrit phrase "Mriyatae Asmin Iti Marma" means "there is a likelihood of death or serious damage to health when these points are afflicted." Therefore, these areas are referred to as marma. In Sanskrit, marma also means hidden or secret. Marma point is a juncture on the body where two or more types of tissues, such as muscles, veins, ligaments, bones, or joints, converge. The 107 Marma points are categorized based on various factors such as structure, region, dimension, and prognosis. Indrabasti Marma, located in both Shakha (extremities), has been characterized with a focus on its anatomical and surgical perspectives. The term "*Indrabasti Marma*" is derived from two words: "*Indra*," meaning *prana* (life force) or to reside in, and "*basti,*" meaning to encase. Thus, Indrabasti Marma refers to the location where Prana resides. Its size, location, and the effects of injury (*aaghata parinama*) are mentioned in traditional texts. To apply the knowledge of *Indrabasti Marma* in the modern era, as described by the *Acharyas*, it is crucial to correlate it with contemporary anatomy, specifically considering the concept of the peripheral heart or calf muscle. This study aims to examine the *Indrabasti Marma* from a modern perspective, focusing on its relevance to the peripheral heart or calf muscle and related structures.

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Assistance is required to facilitate venous return, particularly when blood must overcome gravitational forces to flow from the lower extremities to the cardiac chambers. The soleus muscle assumes a pivotal role in actively propelling venous blood towards the heart from peripheral regions of the body. This study aims to establish the significance of *Indrabasti Marma* in relation to the peripheral heart by analysing the symptoms described as *Viddhya Lakshan*. Through cadaveric dissection, we seek to pinpoint its precise location and better understand its importance in this context.

Keywords*: Indrabasti Marma, Kalantara pranahara Marma*, *Mamsa Marma,* Peripheral Heart

Introduction:

In Ayurveda, recognizing various crucial points is essential. Rachana Sharir elaborates on many significant concepts related to the human body. Notably, Acharya Sushruta has extensively explained this topic in his Samhita, particularly in Sharirsthan. Marma points are among the key aspects of this study. Marma is the most basic aspect of the human body. *Sushrutacharya* mentioned this perception in *Sharirsthan.* He defines a *marma* as a site where muscles (*Mamsa*), vessels (*Sira)*, ligaments or tendons (*Snayu*), bones (*Asthi*), and joints (*Sandhi)* coexist. (1) The blending of all these five structures constitutes the *marma sthan*. *Acharya Sushrut* has explained 107 *marmas. Acharya Dhalhan* explains the importance of *marmas* as "*Maryanti iti marmani,"* which means any trauma to these points may lead to death or may result in disability. (2) According to *Acharya Charak, marmas* are the vital parts and seat of *prana,* or *chetna*. (3) According to *Acharya Vaghbhat,* those sites that are painful on application of pressure and that show abnormal pulsation are known as *marmas* and are said to be the seat of *"jiva."* (4*) Marmas* are also considered half of *Shalyatantra* (surgery). It is for this reason that, while doing any surgical process, a surgeon must have a basic knowledge of the structures that are present at the operational site. (5) For this purpose, understanding Marma is vital. It is essential to examine the five basic structures present in *Marma* using modern anatomy through cadaveric dissection analysis. Additionally, the arrangement of Marma points is categorized in various ways, including by *Shadang* (location), *Rachana* (structure), *Pariman* (measurement), and *Parinam* (effects of injury). According to Rachana, these five types are particularly significant.

Indrabasti marma is one of the most delicate and vital points of the body, located in the hands and feet.

Location:

- **Upper limb**: In the middle and anterior part of the forearm.
- **Lower limb**: In the middle of the leg (calf muscles) and along the line of the parshni (calcaneum, lateral malleolus) of the leg.

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Regionally:

- *Indrabasti Marma* is included in the category of ***Shakhagata Marma***. Since Indrabasti Marma is located in all the limbs, it falls under the subcategory of ***Adhoshakhagata Marmas***.
- ***Mamsa Marma***: *Indrabasti Marma* is predominantly composed of muscle tissue, which forms its structural component. Other elements, such as *sira* (vessels), *asthi* (bones), *snayu* (ligaments), and *sandhi (*joints), are present but in a recessive form.
- ***Kaalantara Pranahara Marma****: Indrabasti Marma* poses a life-threatening risk over time following an injury. The impact of the injury or damage may not be immediate but occurs gradually. Therefore, based on the nature of its injury impact*, Indrabasti Marma* is classified as a *Kalantara Pranahara Marma* (gradual life-threatening *marma)*.
- ***Pramana****: Indrabasti Marma* occupies a space of half an angula in dimension.
- ***Marma Viddha Lakshan***: *Shonitkshayen Maranam* (death due to excessive hemorrhage). Injury to this marma results in significant blood loss, which, after a short period, leads to death.

Aim:

- To investigate the correlation between the *viddha lakshana* (signs of injury) of *Indrabasti Marma*, as described by *Acharyas*, in relation to the peripheral heart or calf muscle from a modern perspective.

Objectives:

- To examine the significance of *Indrabasti Marma* in detail.
- To analyze *Indrabasti Marma* in the context of the peripheral heart or calf muscle and related structures from a modern viewpoint.

Method and Methodology:

Following the standard dissection procedure as per Cunningham's manual, the posterior compartments of the legs of two cadavers were dissected, irrespective of gender and without injuries in the study area, were used for this research. in the Department of Rachana Sharir, at the Dr. D. Y. Patil College of Ayurveda and Research Centre, Dr. D. Y. Patil Vidyapeeth, Pimpri, Pune.

All observed structures at the Marma location were documented and photographed. The location and anatomical structure of *Indrabasti Marma* were determined through cadaveric dissection and regional anatomy, supported by literary and observational studies.

Observation:

Cadaveric Dissection: In the posterior compartment of the leg, the important structures present at the site of dissection include:

- The medial and lateral heads of the gastrocnemius muscle.
- The soleus muscle, along with its venous sinuses.

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Photographs:

Image1: Medial Head of Gastrocnemius muscle

Image 2: Lateral Head of Gastrocnemius muscle

Image 3: 1. Location of Indrabasti Marma
2.Soleus Muscle

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Discussion:

A study titled "Structural Study of *Indrabasti Marma* in Upper Extremity" was conducted at Dr. J. J. *Magdum Ayurved* Medical College, J*aysingpur*, Maharashtra, India, where a male cadaver was dissected to examine the structural components of *Indrabasti Marma*. Similarly, another study titled "Understanding Regional Anatomy of *Indrabasti Marma*: A Cadaveric Study," conducted at the Department of Rachana Sharir, Sri *Dharmasthala Manjunatheshwara* College of *Ayurveda* and Hospital, Hassan, provided practical observations related to *Indrabasti Marma*. (7)

Sr. No.	**Ayurvedic View**	**Modern Correlation**
1	Mamsa	The junction between the muscular components of the two heads of the gastrocnemius and the beginning of the tendinous extension, known as the Achilles tendon or triceps surae.
2	Sira	The sural nerve and short saphenous vein, along with the united parts of the two heads of the gastrocnemius and the soleus, under which the posterior tibial artery, peroneal artery, and tibial nerve are located.
3	Snayu	The two heads of Gastrocnemius and Soleus muscles
4	Asthi	Anterior and lateral surface of tibia
5	Sandhi	No relative comparative structure was found

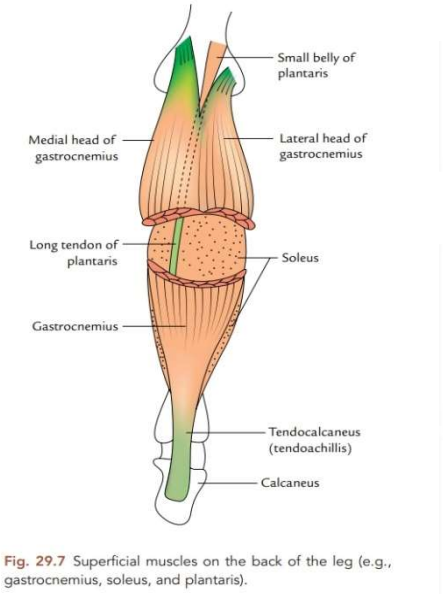

Fig. 29.7 Superficial muscles on the back of the leg (e.g., gastrocnemius, soleus, and plantaris).

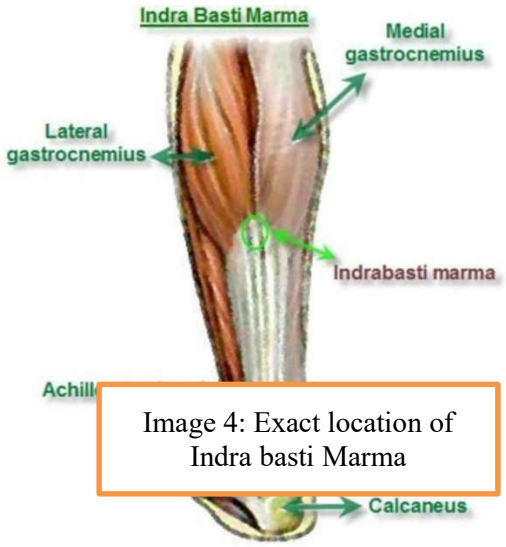

Image 4: Exact location of Indra basti Marma

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Concept of peripheral heart:

In the context of cardiovascular physiology, the heart consistently engages in the systemic distribution of oxygenated blood through an extensive network of vasculature spanning hundreds of kilometres. However, assistance is required to facilitate venous return, particularly when blood must overcome gravitational forces to flow from the lower extremities to the cardiac chambers.

In human anatomy and physiology, under conditions of upright posture, the soleus muscle plays a pivotal role in actively propelling venous blood towards the heart from peripheral regions of the body. This function is commonly referred to as the skeletal muscle pump, peripheral heart, or sural (tricipital) pump. The soleus muscle is characterized by a higher proportion of slow-twitch muscle fibbers compared to many other skeletal muscles. (8)

As a result, a manual pumping system comprising the calf muscles alleviates the burden on the primary cardiac pump. Known as the **'Peripheral Heart**,' the rhythmic contraction and relaxation of these muscles facilitate the upward movement of blood with each instance of muscle activity, particularly during ambulation such as walking. Additionally, the soleus muscle contains numerous venous sinuses that act as the peripheral heart. The soleal vein, acting as a storage vein (venous sinus), is particularly prone to circulatory stasis. The large muscle pads necessary to support these vessels may be why Acharyas classified Indrabasti Marma as a Mamsa Marma.

Clinical Approach of Indrabasti and Its Correlation with the Peripheral Heart:

Indrabasti Marma is classified under *Kalanthara Pranahara Marma* due to the loss of *Rakta Dhatu* (blood) leading to *marana* (death). (9) In the lower limb, haemorrhage can result from injury to the posterior tibial artery, short saphenous vein, and soleus muscle with its venous sinuses. The soleus veins are often implicated as the initial site for deep vein thrombosis (DVT) initiation, as they primarily drain into the posterior tibial, fibular, and communicating veins.

Indrabasti Marma is primarily composed of *Mamsa* (muscle), but injury to this *marma* can lead to vascular symptoms. In this region, the superficial aspect includes the short saphenous vein over the calf muscles. Numerous sinuses and perforating veins are present within the soleus, beneath which the posterior tibial artery with its venae commitantes is located. A fracture of the tibia and fibula may result in acute compartment syndrome, causing obstruction of venous outflow, which leads to swelling and muscle ischemia.

Clinically, it is observed that general surgery or deep injuries to the calf region can lead to life-threatening complications such as deep vein thrombosis (DVT). DVT can result in a dangerous condition known as pulmonary embolism. Symptoms of DVT include oedema, leg pain, tenderness, warmth, and erythema of the skin over the area of thrombosis, indicating the involvement of Shonita (blood).

In one study, it was found that the anatomic connections of the soleal vein and its position relative to the calf muscles hinder the detachment of thrombi from their site of formation. This inhibition of detachment can lead to their circulation, causing pulmonary thromboembolism (PTE). Even if there is

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no visible local blood loss, successful thrombi entry into the pulmonary artery can result in PTE. Signs of pulmonary thromboembolism include low blood oxygen levels, rapid breathing, a fast heart rate, and sometimes a mild fever. Severe cases may lead to fainting, abnormally low blood pressure, and sudden death.

The most accepted explanation for this phenomenon is the theory of local venous hypertension, where the pressure inside the veins exceeds the pressure in the surrounding tissue compartments, allowing continuous venous flow. This increasing pressure prevents vascular collapse and decreases capillary blood flow within the affected compartment. (10) This can be correlated with *Shonitha Kshaya* (reduced blood) and ischemic changes in the region.

According to a study, irreversible nerve and muscle damage can start after 5 to 6 hours of ischemia. (11) However, more recent clinical studies have shown that muscle necrosis can occur within the first 3 hours. (12) This may explain why *Acharya Sushrutha* classified Indra *Basti Marma* as a *Mamsa Marma*, even though vascular injuries with bleeding and oedema are the primary causes.

Considering the impact of injury in the calf region and its pathophysiology, it becomes clear that blood and blood vessels play a significant role in the development of life-threatening conditions such as DVT, thromboembolism, and compartment syndrome. This reaffirms the validity of Sushruta's perspective on *Indra Basti Marma*.

Conclusion:

- The *Indrabasti Marma*, located in the mid-calf region of the lower limb within vascular structures, is a vital anatomical point. Studies on conditions such as compartment syndrome and vascular injuries highlight their critical nature, as these conditions can severely impact muscles and potentially lead to necrosis.
- The ancient designation of *Indrabasti Marma* as a *Mamsa Marma* (muscle vital point) is well-founded due to its strategic position among the neurovascular structures within the calf muscles.
- This classification aligns with the concept of the peripheral heart, emphasizing its crucial role in maintaining vascular integrity and muscular health in the lower limb. Understanding the significance of *Indrabasti Marma* enhances our knowledge of its impact on overall limb function and systemic circulation.
- Consequently, the investigation of the Indrabasti Marma situated in the Janghyon Madhye (mid-calf region) exhibits a noteworthy correlation with the concept of the peripheral heart.

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