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ADDUCTOR CANAL BLOCK A NEW INTERVENTION OF *URVI MARMA* IN AYURVEDA

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ABSTRACT: Ayurveda literally meaning the 'science of life' believes a completely normal state of health. *Marma* is one of the important sciences of treatment; described in the various ancient text of Ayurveda. The life force energy *i.e. Prana* is concentrated at the vital points in the body known as *Marma. Urvi Marma* is a *Vaikalyakara* type of *Marma* situated in the lower limb in the middle of the thigh, *i.e.*, at the adductor canal and injury or trauma at this specific site causes *Shonita Kshaya* (hemorrhage) and *Sakthi Sosha* (wasting of limb). Structurally it is *Sira Marma*, and the area of this Marma is one *Angula*. The Adductor canal is a space in a muscle located on the medial side of the middle one-third of thigh. It extends from apex of femoral triangle above to the fifth osseoaponeurotic opening of adductor magnus below. Femoral vessels and saphenous nerve are the main contents of this canal. The peripheral nerve block in adductor canal is an important surgical operation procedure for knee and foot. The main aim & objective of this paper is to explore the location of the *Urvi Marma*, which has great surgical significance and anesthetic block at adductor canal is a quiet helpful procedure in the surgery of knee. To establish a scientific & therapeutic guideline of *Urvi Marma* & to create a better understanding of *Urvi Marma* among students, health care providers & consumers.

INTRODUCTION: *Marma* points are the vital areas of the body. The word *Marma* is derived from the *Sanskrit* origin word '*Mri'* which means death. *Marma* in *Sanskrit* means hidden or secret. The *Marma* point is the meeting point on body where two or more types of tissue lies, such as muscles, veins, ligaments/nerves, bones and joints. Knowledge of *Marma* in ancient era was only confined to kings and warriors. It was especially applicable at the time of war to harm and attain maximum lethal effect on enemies. This science was used both in warfare and surgery. It indicates a common ailment to serious neuromuscular diseases [1].

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Acharya Sushruta, the great surgeon, recognized 107 *Marmas* and classified the types of *Marma* depending on their prognostic value and structural status. He also did an anthropometrical study taking the breadth of fingers as the unit of measurement given the name *Anguli Pramana*. The scientific approach of *Vaikalyakara Marma* in the ancient era was applicable to the surgical anatomy of orthopedic surgery and neurosurgery. *Marma Sharira* has importance with sports science and military science.

Knowledge of *Marmas* can make the people capable of protecting themselves physically, as well as prevent them from injury and diseases. Science of *Marma Sharira* is also a part of the martial art and science. *Acharyas* believe that *Marma* is the place or vulnerable site or areas of the body where *Prana* exists. Any trauma on these sites may cause the exit of *Prana* or severe loss of vitality to a particular organ/system or the body as

a whole, which is the main cause of death [2]. Therefore, it becomes quite necessary to have detailed knowledge of *Marma* for a physician to determine prognosis and for a surgeon to succeed in operative procedures & medicine because any faulty surgical process may raise various complications or death of the patient. Therefore the study of the science of *Marma* is clinically very important for all medical practitioners to save the lives of the patients and to affect the vitality of a particular organ/system. *Urvi Marma* is a *Vaikalyakara* type of *Marma* situated in the lower limb in the middle of the thigh, *i.e*., at the adductor canal. Structurally it is a *Sira Marma,* and the area of this *Marma* is one *Angula* [3].

Surface Anatomy of *Urvi Marma*: *Acharya Sushruta* has described that *Urvi Marma* is located above the *Ani Marma* in the middle of the thigh. Thiayagarajan, M. K., *et al.* described the precise location of the adductor canal during a cadaveric study. The study was done at the lower limbs of forty cadavers. The midpoint was measured from the anterior superior iliac spine to the patella base. The dissection of adductor canal and measurement between proximal foramen and, therefore the midpoint of thigh, the measurement of length of adductor canal, distal foramen and base of the patella was done. The mean of the adductor canal is about 10.5 cm. The typical distance from anterior superior iliac spine to proximal foramen is 25 cm. The typical distance from base of patella to distal foramen is 8.5 cm. In 36 (90%) lower limbs, the proximal foramen is 3 cm distal to the midpoint of the thigh [4]. Considering the facts described by *Acharya Sushruta* and correlating it with the modern research, the exact location of *Urvi Marma* lies at the adductor canal or Hunters canal. Neurovascular structure passes through this canal. So, it is an appreciable view of *Acharya Sushruta,* as the surface anatomy of *Urvi Marma* bears important surgical importance. So, by reviewing the descry-ption of *Urvi Marma,* surface marking drawn is- A point marked at 3 cm. below the midpoint in the thigh (femoral region) existing in the middle third of the thigh. This is the exact anatomical site of *Urvi Marma.*

Structural Anatomy of *Urvi Marma*: *Acharya Sushruta* described the structure of *Urvi Marma* as *Sira Marma*. As per the surface anatomy discussed above it is clear that vessels and nerve both are found at the exact location of *Urvi Marma. Acharya Sushruta* has stated four kinds of *Siras* (veins) are present in the body and are generally situated in the *Marma.* So, here *Vata Vaha Sira* denotes the nerve present in the scenario of *Urvi Marma* [5].

So, the version of *Acharya Sushruta* is reliable and supported by the modern anatomy and adductor canal and its content are the main anatomical structures present in the region of *Urvi Marma.*

Adductor Canal [6, 7]: It is also known as sub sartorial or Hunter's canal. It is space in a muscle located on the medial side of the middle one-third of the thigh. It extends from apex of femoral triangle above to fifth osseoaponeurotic opening of adductor magnus below. It is triangular in shape

Boundaries:
Roof: Fibrous wall on which lies sartorius and subsartorial plexus.

Floor: (a) Above - Adductor longus (b) Below - Adductor magnus.

Laterally: Vastus medialis

Contents: From lateral to medial-Nerve to vastus medialis. Saphenous nerve - It at first lies lateral to femoral artery crosses in front from lateral to medial side. The femoral vein - lies posterior and lateral to artery.

The femoral artery - It lays successively on adductor longus and magnus and then passes through the fifth osseoaponeurotic opening of adductor magnus and accompanied by a posterior division of obturator nerve and continues as popliteal artery. It gives a descending genicular branch in this region.

Injury Results of *Urvi Marma*: *Acharya Sushruta* opines that an injury at this *Marma* causes *Shonita Kshaya* (blood loss) and *Sakthi Sosha* (atrophy of the limb). *Acharya Sushruta* deals that an injury at this *Marma* causes wasting of the extremity due to hemorrhage.

This is admitted because if a penetrating injury cuts the femoral vessels, the patient may even die due to severe bleeding, and a little pressure exerted by the

scars or bony fragments may occlude the femoral artery causing wasting of the muscles [8].

Therapeutic Consideration of *Urvi Marma*: Adductor Canal Block: The adductor canal block (ACB) which is more specifically referred as a saphenous nerve block in the adductor canal, is a single-shot or continuous technique for anesthesia and analgesia of the knee and medial leg [9]. The peripheral nerve block in adductor canal is very effective in the surgical operation procedures of knee and foot [10, 11]. Van der Wal *et al.* [12] was the first one who told about the adductor canal block using surface landmarks, while Manickam *et al.* [13] used block at adductor canal for surgical operation procedures of knee under ultrasound guidance. It is also helpful as analgesia in postoperative pain in knee arthroplasty. The block at Adductor canal plays an important role in controlling pain it also reduces the time of stay in the hospital. The muscle strength of quadriceps muscle is well preserved, improvement in mobility, and reduced risk of fall after total knee arthroplasty [14-17].

The elective knee arthroplasty may uncommonly result in acute anterior compartment syndrome (ACS) of the thigh. The delay in either diagnosis or treatment, however, may cause catastrophic consequences [18]. There is a loss of function due to damage of muscle or either due to the formation of scar tissue; it may also result in loss of limb [19]. It is well-proven research that immediate surgical intervention can lead to a good prognosis [20]. The pain associated with ACS due to delay in diagnosis can be subsided by the epidural analgesia or peripheral nerve blocks [21, 22]. Koh I. J., *et al.* reveals that as there was no adequate management of pain after total knee arthroplasty (TKA) it affects its recovery and increases postoperative complications and dissatisfaction of patients.

Peripheral nerve blocks have been used as part of a contemporary approach to the management of pain after TKA. The femoral nerve block (FNB) plays an important analgesic role in postoperative TKA pain control. However, blockage of femoral nerve results in weakness of quadriceps muscle, which hinders early mobilization and increases posto-perative falls. The various researches prove that adductor canal block (ACB) facilitates posto-perative treatment in comparison with FNB because it causes blockage of sensory nerve, and strength of quadriceps femoris muscle remains intact [23].

"Adductor canal compression syndrome is an unusual non-atherosclerotic result from blockage of artery and ischemia of limb. Zhou, Y. *et al.* presented a case of acute left lower extremity ischemia. It underwent surgical exploration, division of an anomalous musculotendinous band compressing the left superficial arteria femoralis, and thromboendarterectomy of the distal left superficial arteria femoralis. The patient recovered well without any post-operative complications and could return to her daily activities 3 weeks following surgery. So, it is concluded in his paper that knowledge of rare non-atherosclerotic vascular disorders, such as adductor canal compression syndrome, is paramount when treating patients who present with limb ischemia and lack traditional risk factors [24]. Efficient pain management after total knee arthroplasty (TKA) surgery facilitates the rehabilitation and provides better functional results [25].

However, in spite of the latest achievements in the management of pain, postoperative pain still is a challenge for patients as well as surgeons after TKA. Many modalities, such as epidural analgesia, periarticular infiltration, and peripheral nerve block, are used for pain relief after TKA, but there are still no widely accepted guidelines or clear evidence present for an optimum postoperative analgesic regimen [26]. Opioid analgesics which are frequently administered parenteral or epidural route for the management of pain following TKA surgery are insufficient for pain control and can have side-effects [27]. Peripheral nerve blocks (PNB) have become more widely used in recent years as they have fewer side-effects and provide a comparable level of pain control [28].

Even though femoral nerve block (FNB) has a significant role and in spite of its effective management in pain prevention, as the motor block is formed with the sensory nerve block, postoperative early mobilization is adversely affected due to a reduction in the strength of quadriceps muscle, and there is an increased risk of falling [29, 30]. Therefore, the adductor canal block (ACB), doesn't affect the strength of quadriceps; it

only blocks the sensory nerve. So, it has become an acceptable alternative to FNB as a part of current multimodal pain management protocol [31]. Canbek, U. *et. al* studied the comparison of the single-shot adductor canal block (SACB) and continuous infusion adductor canal block (CACB) techniques with reference to early period pain levels, need for extra opioids, and ambulation and functional scores in patients who had undergone primary TKA. Canbek, U. *et. al* concluded in his study that pain control following total knee arthroplasty was found to be better in those patients treated with continuous adductor canal block as compared to those treated with single-shot adductor canal block. Patients treated with continuous adductor canal block also displayed better ambulation and functional recovery following total knee arthroplasty [32].

The femoral nerve block is although known as very effective with respect to the relief of pain; this method decreases quadriceps muscle strength, thereby impairing postoperative mobilization and increasing the risk of falls [33]. In recently published extensive reviews, ACB was shown to facilitate early mobilization by protecting quadriceps strength and provided an analgesic effect similar to that of FNB [31, 34]. After TKA, the aim is to reduce pain and to achieve a balance between analgesia and muscle strength.

As ACB is a purely sensory block, the motor function of only the rectus medialis is affected [35]. A study was done on healthy individuals; quadriceps strength due to ACB was reduced by 8%, whereas FNB initially reduced quadriceps strength by 49% [36]. So, ACB can be used as a single-shot injection or continuous infusion. In recent years, a few noteworthy studies were published that compare the efficacy of single-shot adductor canal block (SACB) and continuous infusion adductor canal block (CACB) [37-40].

Shah *et al.* studied the results of both adductor block methods after the procedure of TKA and found better pain scores results at postoperative 4, 8, 12, and 24 h in patients with continuous adductor blockade were used [37]. Conversely, Zhang *et al,* Lee *et al.* , and Turner *et al.* all have found the same results of pain scores after TKA with both SACB and CACB techniques [38-40]. It was expected that the same pain scores in the first postoperative 4–6 h with SACB and CACB techniques and better pain scores in CACB group after 4–6 h as the half-life of bupivacaine is about 3 h [41].

But, in the current study, CACB results show more effective than SACB in postoperative analgesia following TKA and the mean VAS scores at all the measured time-points were found lower in the patients of CACB group as compared to the SACB group. The only saphenous nerve is blocked by single shot technique, while administering larger quantity of local anesthetic spreading to adductor canal with continuous infusion may lead to blockade of nerves at the proximal and distal region of the adductor canal such as nerve to vastus medialis and deep nerve plexus and providing better pain relief [42].

An adductor canal block (ACB) can be expected to include all the contents like saphenous nerve, nerve to vastus medialis, medial femoral cutaneous, articular branches from the obturator and the medial retinacular nerves. This distribution supplies the medial, anterior, and lateral aspects of the knee. In recent years, the ACB has been proposed as a potential successor to the FNB [43-46].

The research investigated quadriceps strength and fall risk in volunteers finding that ACB significantly preserved motor strength and balance [46]. ACB also established advanced analgesia compared to parenteral opioids alone. Further, a research trial compares the effect of ACB & FNB. The results show that ACB has the same analgesic effect but the motor loss is less [45].

CONCLUSION: *Urvi Marma* is a *Vaikalyakara* type of *Marma* situated in lower limb at the middle of the thigh i.e., at adductor canal and injury or trauma at this specific site causes *Shonita Kshaya* (haemorrhage) and *Sakthi Sosha* (wasting of limb). Structurally it is *Sira Marma,* and the area of this *Marma* is one *Angula.*

The adductor canal block (ACB), which is more precisely known as saphenous nerve block in the adductor canal, is a single-shot or continuous technique for anesthesia and analgesia of the knee and medial leg. So, *Urvi Marma* can be therapeutically used as an adductor canal block in the surgical procedure of knee-like total knee

arthroplasty, which will be a new intervention in the therapeutic application of *Marma* in *Ayurveda*.

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