



Review Article

AYURVEDA APPROACH IN MANAGEMENT OF AVASCULAR NECROSIS

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ABSTRACT

Avascular necrosis (AVN) is a commonly encountered type of bone tissue death, presenting clinicians with multifaceted challenges in treatment. Effective management necessitates a delicate balance between preserving bone structure, restoring functionality, and relieving pain. Surgical interventions like drilling, bone graft insertion, and prosthetic placement are commonly pursued, yet their high cost and limited success rates underscore the need for alternative approaches. Exhibiting symptoms akin to disorders of musculoskeletal origin, AVN often manifests in a chronic stage, demanding comprehensive care. In Ayurveda, its clinical presentation and underlying pathology can be correlated with *Asthi Majjakshaya* (depletion of bone marrow), and *Asthimajjagata Vata* (*Vata* vitiation affecting bone and bone marrow). Ayurvedic management of AVN often involves *Panchkarma* therapies, (*Shodhana* i.e., eliminating toxins, restoring *Doshik* equilibrium, and rejuvenating the body) and medicinal intervention (*Shamana* i.e., pacifying *Doshas* within the body). Promising results viz., symptomatic improvements, revealed significant enhancements in pain relief, tenderness reduction, stiffness mitigation, and gait improvement underscoring the potential of Ayurvedic principles in providing substantial relief and enhancing the quality of life for individuals grappling with AVN. By incorporating *Panchkarma* therapies into the treatment of AVN, Ayurveda provides a holistic approach that not only alleviates symptoms but also targets the root causes contributing to the progression of the condition.

INTRODUCTION

Avascular necrosis (AVN), alternatively termed osteonecrosis, emerges when blood flow to bones is interrupted, primarily impacting the epiphyseal area of weight-bearing joints [1]. Studies have reported an 8% prevalence rate of AVN, with diagnosis typically occurring between 18 and 54 years of age, with a higher incidence among males [2]. Despite various interventions such as vascularized bone grafts, biological agents, and joint salvaging procedures like core decompression, the management of AVN remains challenging, often culminating in the need for hip arthroplasty, which itself carries risks of complications. AVN is known by several names

including osteonecrosis, aseptic necrosis, and ischemic necrosis, with ischemia resulting from impaired blood flow being the primary culprit behind the death of bone marrow cells. While initial changes may not be apparent on conventional X-rays, magnetic resonance imaging (MRI) emerges as the gold standard for AVN diagnosis. In advanced stages, MRI typically reveals the distinctive "crescent sign" a hallmark indication of the disease's progression[3]. The pathology of AVN remains somewhat elusive, although it is hypothesized to result from a spectrum of traumatic and non-traumatic factors that impede blood supply to bone tissue. This interruption in blood flow precipitates osteonecrosis or aseptic necrosis, characterized by the demise of bone marrow and osteocytes, ultimately culminating in the collapse of the affected segment. Traumatic incidents, such as femoral neck fractures or hip joint dislocations, rank among the most common instigators of AVN. These events, which can involve the displacement of the femoral head from the acetabulum,

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inflict significant vascular compromise, setting the stage for the development of AVN.

Indeed, AVN can stem from a diverse array of non-traumatic factors, reflecting the intricate interplay between systemic health and bone physiology. Factors such as excessive alcohol consumption, prolonged use of high-dose corticosteroids, and smoking exert deleterious effects on vascular integrity, predisposing individuals to AVN by compromising blood flow to bone tissue. Additionally, certain medical conditions heighten the risk of AVN development. For instance, sickle cell disease, characterized by abnormal hemoglobin molecules that impair oxygen delivery to tissues, poses a significant risk for ischemic events leading to AVN. Coagulopathies, chronic inflammatory diseases, and infections, including human immunodeficiency virus (HIV), further underscore the multifactorial nature of AVN etiology [4]. By recognizing the broad spectrum of non-traumatic contributors to AVN, clinicians can adopt a comprehensive approach to patient care, addressing both modifiable risk factors and underlying medical conditions to mitigate the onset and progression of this debilitating condition. In Ayurveda, while there isn't a direct correlation between avascular necrosis (AVN) and a specific disease entity, the principles of Ayurvedic diagnosis and treatment emphasize the involvement of *Doshas* (bio-energies) and *Dushyas* (tissues) in determining the appropriate management strategy.

The Steinberg system of classification for avascular necrosis outlines the following stages:[5]

1. **Stage I:** Normal radiographs; abnormal findings on MRI or bone scan.
2. **Stage II:** Identification of abnormal lucency or sclerotic site within the femoral head.
3. **Stage III:** Presence of subchondral collapse, often indicated by the crescent sign, without flattening of the femoral head.
4. **Stage IV:** Flattening of the femoral head while maintaining a normal joint space.
5. **Stage V:** Observance of joint space narrowing, acetabular changes, or both.
6. **Stage VI:** Manifestation of advanced degenerative changes within the affected joint.

The Ficat and Arlet classification uses a combination of plain radiographs, MRI, and clinical features to stage osteonecrosis of the femoral head.[6]

1. **Stage 0**
 - Plain radiograph: Normal
 - MRI: Normal
 - Clinical symptoms: Nil

2. Stage I

- Plain radiograph: Normal or minor osteopenia
- MRI: Edema
- Bone scan: Increased uptake
- Clinical symptoms: Pain typically in the groin

3. Stage II

- Plain radiograph: Mixed osteopenia and/or sclerosis and/or subchondral cysts, without any subchondral lucency (crescent sign: see below)
- MRI: Geographic defect
- Bone scan: Increased uptake
- Clinical symptoms: Pain and stiffness

4. Stage III

- Plain radiograph: Crescent sign and eventual cortical collapse
- MRI: Same as plain radiograph
- Clinical symptoms: Pain and stiffness +/- radiation to knee and limp

5. Stage IV

- Plain radiograph: End-stage with evidence of secondary degenerative change
- MRI: Same as plain radiograph
- Clinical symptoms: Pain and limp

In the traumatic pathway leading to AVN, factors such as trauma, intense physical exertion, exercise, and external irritants can disrupt the *Asthi* and *Majjavaha srotas*, channels related to bones and bone marrow, according to Ayurveda. This disturbance may manifest as conditions like *Asthi Majjagata Vata* or *Asthi Majjakshyaya*. The symptoms commonly observed in AVN, such as bone and joint pain, weakness, and reduced blood flow, are consistent with the indications of *Asthi Majjagata Vata*.^[7] In the non-traumatic pathway, conditions such as thrombotic occlusion or external vascular compression disrupt blood flow, potentially resulting in AVN. In Ayurveda, this could be correlated with *Vatarakta*, where vitiated *Vata* obstructs pathways of blood circulation and affects the quality of blood. Symptoms of *Vatarakta*, such as joint pain and inflammation, may also manifest in AVN, especially in joints like the hip and interphalangeal joints [8]. By integrating Ayurvedic concepts, the potential correlations between the pathogenesis and symptoms of AVN with Ayurvedic principles related to bone and joint disorders are highlighted. This holistic approach could offer insights into both preventive measures and treatment strategies for AVN from an Ayurvedic perspective.

AVN can be understood within the framework of *Vatavyadhis*, a category of disorders primarily attributed to the vitiation of *Vata Dosha*. The general treatment approach for *Vata* disorders involves

therapies aimed at pacifying *Vata* and restoring balance to the affected tissues. These may include *Abhyanga*, *Mridu Swedana* (gentle sudation), and *Brihmana Basti* (nourishing enema therapy) to replenish and strengthen the affected tissues. *Panchkarma* procedures, such as *Patra Pinda Swedana* (sudation therapy using herbal boluses), *Bahya Basti* (retaining warm medicated oil over the affected area), combined with *Basti*, such as *Tiktakshira Basti* (enema therapy with medicated milk) [5], have demonstrated promising outcomes in improving the quality of life for individuals with AVN of the femoral head. By addressing the root cause of AVN through Ayurvedic principles and tailored treatment modalities, individuals can experience relief from symptoms and enhancement in overall well-being, showcasing the efficacy of Ayurveda in managing this challenging condition.

Ayurvedic Literature Review

Asthi Dhatu (bone tissue), is indeed crucial in Ayurveda, as it provides structural support to the body and is integral to its overall stability. Its primary functions include *Dharana* (maintenance) and *Poshana* (nourishment) of the body. *Asthi Dhatu* is often described as the hardest tissue among the seven *Dhatu*s, akin to the tough outer layer of a tree's bark. This hardness lends stability and strength to the body's skeletal structure. In Ayurveda, there's a principle called "*Asharya-Asharyi Bhava*" which signifies the relationship between *Asthi* and *Vata Dosha*. According to this principle, *Asthi Dhatu* serves as the "*Asharaya*" (seat) for *Vata Dosha*. Conversely, any imbalance in *Vata Dosha* can affect *Asthi Dhatu*, leading to either *Vridhhi* (increase) or *Kshaya* (decrease) in its quality and quantity. So, when *Vata Dosha* increases, it can lead to *Asthi Kshaya* (decrease in bone tissue density or strength). On the other hand, if *Vata Dosha* decreases, it can result in elevation of *Asthi Dhatu*, possibly causing issues like excessive bone growth or stiffness. Understanding and balancing the relationship between *Asthi Dhatu* and *Vata Dosha* is crucial in maintaining overall health and well-being according to Ayurvedic principles [9]. *Majja Dhatu* (bone marrow), the sixth of the seven *Dhatu*s in Ayurveda, is indeed formed from bony tissue according to the *Uttrotara Dhatu Poshana Sidhanta*, which describes the gradual transformation of tissues. *Majja Dhatu* plays a vital role in the body's structure and function. According to Acharya Charaka, the *Moolasthan* (origin) of *Majja Dhatu* is in *Asthi* (bone tissue). In *Sthulaasthi* (long bones), the bone marrow is present in the form of a jelly-like material. In its functional aspect, *Majja Dhatu* plays a pivotal role in the creation of *Shukra Dhatu*, the reproductive tissue crucial for fertility and vitality. Additionally, *Majja*

Dhatu provides *Sneha* (unctuousness) and *Bala* (strength) to the body. So, bone marrow not only serves as a structural component, but also plays a crucial role in reproductive health and overall bodily strength according to the teachings of Ayurveda [10].

The *Samprapti* (pathogenesis), of *Asthi Majjakshaya* (depletion of bone and marrow tissues) in Ayurveda primarily revolves around the concepts of *Vridhhi* and *Kshaya* in the *Dhatu*s (bodily tissues) as there is a depletion or diminution of both *Asthi* (bone tissue) and *Majja* (marrow tissue). This depletion can occur due to various factors such as dietary imbalances, lifestyle habits, or pathological processes. As the *Asthi* and *Majja Dhatu*s become depleted, the body may experience a decrease in strength and lubrication, leading to symptoms associated with weakened bones and reduced vitality such as bone pain, fragility, decreased bone density, and overall weakness. Therefore, in the context of *Asthi Majjakshaya*, the *Samprapti* involves a progressive decrease or *Kshaya* of both *Asthi* and *Majja Dhatu*s, resulting in compromised structural integrity and vitality of the body. Addressing this condition in Ayurveda would typically involve restoring the balance of these *Dhatu*s through appropriate diet, lifestyle modifications, herbal remedies, and therapeutic interventions tailored to the individual's constitution and condition. Based on signs and symptoms it can also be correlated with *Asthi Majjagata Vata*.

Asthi Majjagata Vata refers to a condition in which *Vata Dosha* affects the bones and bone marrow, leading to various symptoms. Some of the symptoms mentioned include: *Bhedo Asthi Parvanam* (breaking type of pain experienced in bones and joints. It implies a sharp, piercing pain that may worsen with movement), *Mamsa Bala Kshaya* (reduction in muscle tissue and strength. It suggests weakness and wasting of muscle mass), *Aswapna* (sleeplessness or disturbed sleep patterns. It suggests difficulty falling asleep or staying asleep throughout the night.), *Santata Ruja* (constant pain. It implies persistent or chronic discomfort experienced by the individual). These symptoms collectively suggest an imbalance of *Vata Dosha* affecting the skeletal system and muscles, leading to pain, weakness, and sleep disturbances. Ayurvedic treatment for *Asthi Majjagata Vata* typically involves balancing *Vata dosha* through diet, lifestyle modifications, herbal remedies, and therapies such as *Abhyanga* (oil massage) and *Basti* (medicated enema).

Treatment Principle

Our approach aligns well with Ayurvedic principles of treatment, focusing on addressing the root cause of the condition and managing it holistically which firstly include *Nidana*

Parivarjana. Secondly, *Samprapti* based treatment which includes *Snehana*, *Swedana*, *Virechana*, *Basti*, and *Jalaukavcharana*.

DISCUSSION

By incorporating these therapies into the treatment regimen, the aim is to rebalance the *Doshas*, eliminate toxins, and promote healing in the affected tissues.

Nidana Parivarjan (Eliminating causative factors contributing to the disease): It emphasizes preventive measures to maintain health and well-being. This approach involves identifying and eliminating factors that contribute to the imbalance of the body and mind, thereby preventing the onset of diseases. Fundamental principle is highlighting the importance of lifestyle, diet, and overall environment in maintaining overall health. In the context of AVN, this may include avoiding further trauma or stress on the affected joints, ensuring proper rest, and avoiding activities that exacerbate symptoms.

Samprapti based Treatment (considering the pathogenesis of AVN, treatment can be targeted towards balancing the disturbed *Asthi Majjagata Vata*). This can involve both internal and external oleation therapies to pacify *Vata dosha* and nourish the bones and joints.

External Oleation: Techniques like *Abhyanga* (oil massage) can help improve circulation, reduce pain, and promote healing in the affected areas. *Snigdha Pinda Swedana* and *Shastika Shali Pinda Swedana*, which involve applying medicated oil and poultices followed by sudation therapy, can further alleviate symptoms and improve joint mobility.

Internal Oleation (Through therapeutic enemas (*Basti*) using medicated oils like *Matra Basti*, *Ksheera Basti*, or *Yapana Basti* can help nourish the tissues, promote healing, and alleviate *Vata*-related symptoms). *Tikta Ghrita*, or bitter ghee preparations, such as *Guggulu Tikta Ghrita*, or *Panchatikta Ghrita*, can be used to administer *Anuvāsana* (oil enema).

Snehapana (Internal Oleation): Involves the consumption of medicated oils or ghee to balance aggravated *Doshas* and promote detoxification. In this context, *Snehapana* can help pacify *Pitta* and *Vata Doshas*, reducing inflammation and promoting the elimination of toxins from the body.

Virechana (Purgation): Involves the use of mild purgatives to eliminate excess *Pitta* and toxins from the body. This can be particularly beneficial in cases of AVN where there's *Pitta* aggravation and involvement of excess *Rakta*. *Virechana* aids in liver and digestive tract cleansing, which lowers the body's overall toxic burden and restores equilibrium.

Basti (Therapeutic Enema Therapy): To further treat *Vata* and *Pitta* imbalances, Therapeutic enema therapy may be administered after *Snehapana* and *Virechana*. Medicated decoctions or oils are poured into the colon during a *Basti* therapy, which helps to nourish the tissues, balance the *Doshas*, and encourage detoxification.

Jalaukavcharana (Leech Therapy): A blood-letting therapy to remove impurities and vitiated blood from the body. It removes toxins, reduces inflammation and pain, improves circulation and immune function and enhances overall well-being. Leeches help in restoring blood flow to the affected area by removing blood that has accumulated due to poor circulation. The anti-coagulants and analgesics present in leech saliva provide pain relief and reduce discomfort. By removing stagnant blood, leeches help prevent further tissue damage and promote healing. This stimulates angiogenesis (the formation of new blood vessels), which can aid in wound healing. It is a relatively non-invasive treatment option compared to surgery.

AVN is associated with an elevation of *Vata Dosha*, exacerbated by the blockage of channels (*Margavrodha*) leading to decreased blood supply (*Rakta Dhatu*) to the femoral head. In more severe cases, the vitiation of the *Pitta* and *Kapha Doshas* may result from the aggravation of the *Vata Dosha*, further complicating the situation. These preparations help in pacifying *Vata Dosha* and supporting the nourishment and healing of the affected bone tissue.

CONCLUSION

Avascular necrosis (AVN) presents a complex challenge due to bone tissue death caused by insufficient blood supply. While conventional medicine focuses on symptom management and surgical interventions, Ayurveda offers complementary therapies that can provide additional support. *Panchakarma* therapies like *Snehana* (oleation), *Swedana* (sudation), *Virechana* (purgation), *Basti* (enema) and *Jalaukavcharana* (leech therapy) are believed to detoxify the body, enhance circulation, and reduce inflammation, potentially alleviating AVN symptoms and slowing its progression. Additionally, Ayurveda emphasizes lifestyle adjustments, dietary modifications, and herbal supplements to bolster overall health and complement conventional treatments. Ayurveda holds promise in enhancing quality of life for AVN patients, and ensures a comprehensive and safe approach to managing AVN, optimizing therapeutic outcomes.

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