A Conceptual Study on Avascular Necrosis of Femoral Head: an Ayurveda Perspective and Management

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ABSTRACT

Avascular necrosis of femoral head refers to death of osteocytes with subsequent structural changes due to impaired blood supply. People between 30 and 50 years of age are usually affected. It is associated with excessive alcohol intake and long-term use of high dose steroid medications. In the initial stages, this disease is generally asymptomatic but as the disease progresses, there is constantly increase in pain which affects the patients’ day to day routine life. In Ayurveda, there is no direct correlation of Avascular necrosis of femoral head but it can be correlated with the Lakshanas of AsthiMajjakshya, AsthimjjagataVata, Ubhyashrita Vatarakta. In modern science treatment includes NSAIDS, core decompression, Bone grafting and total joint arthroplasty which have their own complications, costly affair and prognosis is also very poor. Hence, an attempt is made to understand AVN of femoral head as Vatavyadhi in Ayurveda and its management by Panchkarma is discussed which can be helpful in improving quality of life of patient affected with AVN.

Keywords: Avascular Necrosis, Asthi Majjakshya, Asthi Majjagata Vata, Vatarakta, Panchkarma

INTRODUCTION

Avascular necrosis of femoral head (AVN) is a pathological process arising from occluded blood vessels supplying to the bones. It generally affects the people during 3rd to 5th decade of life. It is also known as osteonecrosis, aseptic necrosis and ischemic necrosis where ischaemia due to interrupted blood supply is the main cause of the death of the bone marrow cells.

The epiphysis of the long bones and is generally affected ant it is most commonly seen in the femur. In Early stages patient usually does not have symptoms, but as the disease get worsens, it becomes painful. In early stages, changes are not visible on plain radiograph and MRI is the most specific modality to diagnose AVN, in later stages MRI shows “crescent sign”, i.e. flattening of articular surface with joint space loss.¹ Pathology of AVN is not clearly defined yet but it is assumed that osteonecrosis/aseptic necrosis occurs due to various traumatic and non-traumatic causes which interrupts blood supply to the bone. Occlusion to blood flow to the bone causes the death of bone marrow and osteocytes leading to collapse of the necrotic segment. Commonest traumatic causes are femoral neck fracture and dislocation in hip joint which include dislocation of femoral head from acetabulum. It may include variety of non traumatic causes like intake of excess alcohol, high-dose corticosteroids, smoking, trauma, sickle cell disease, coagulopathy, chronic inflammatory disease, and infections such as human immunodeficiency
virus (HIV), tuberculosis, meningococcal infections.²

In Ayurveda, there is no direct correlation of any disease with avascular necrosis. According to the involvement of Dosha and Dushya treatment modality of this disease should be planned. It may be correlated with ‘Asthimajjagatavata one among the Vatavadyadhis. General line of treatment of Vata Vyadhi is Abhyanga (oil anointing), Swedana (sudation), Basti (therapeutic enema), etc. In avascular necrosis the, Vata Dosha is the main vitiated Dosha here, so treatment process should be Vatashamaka (pacifies Vata) and therapies such as Abhyanga (oil anointing), Mridu Swedana (mild sudation) and Brihmana Basti (nourishing type of enema therapy) to restore the diminished Dhatu. Panchakarma procedures involving Pinda Swedana (a kind of sudation therapy) Shashtikashali Pinda Sweda and Parisheka along with Brihmana Basti (nourishing type of enema therapy) like Tiktakshira Basti along with shaman medicine have shown satisfactory results in improving quality of life of the person suffering from AVN of femoral head.³

LITERATURE REVIEW

Asthī and Majja

In Ayurveda, Dhatus are the main constitutional elements that hold up the basic structure of body. The main Karma of Dhatu is Dharana (that withholds the body) and Poshana (nourishment) of the Sharīra. Asthī Dhatu (bone tissue) is fifth among seven Dhatus. Asthī Dhatu is described as Kathintam (hardest) Dhatu. Function of Asthī Dhatu is compared with the hard core of bark of the tree. The Ayurvedic Principle of Ashraya – Asharyi Bhava links between Asthī and Vata.

Consistent with this principle Asthī Dhatu is the Asharaya for Vata Dosha. Asthī & Vata are opposite to each other i.e if Vata Dosha increases Asthī Kṣhaya increases and vice versa regarding Vridhhi (elevation) & Kṣhaya (diminution).¼

Among all Sapta dhatus, Majja is the sixth Dhatu of the body. Majja is formed from as Asthī dhatu as per Uttrrotara Dhautu Poshana Siddhanta.(process of gradual metamorphosis of tissues). According to Acharaya Charaka Moolasthana of Majjavahā Srotasa is Asthi and Sandhi Majja (marrow) is present in Sthūlaasthi (long bones) in the form of jelly like material. Meda (Adipose tissue) is mainly present in Udara (abdominal area) whereas Sarakta Meda is present in AnuvAsthi (small bones) and when it fills in the internal cavities of long bones with a jelly like material known as Majja Dhatu (marrow). According to Acharaya Sushruta, Majja Dhatu helps in the formation of Shukra Dhatu and provides Sneha and Bala (strength to the body)⁵.

Samprapti of Asthi Majjakshya:-

In Ayurveda the main pathological conditions of Dhatu are Vṛddhi and Kṣhaya. On evaluating the Guna and Karma of Majja, Acharaya Sushruta says that Majja provides Bala and Snehana to the Sharīra.⁶ It appears that Majja helps in maintaining of the shape of Asthī along with Vata. Asthī is the Asharayi Bhava of Vata Dosha whereas Majja is filled in Asthī Dhatu. When normal formation of Asthī Dhatu is disturbed it leads to Asthī Kṣhaya leading to Kṣhaya of Asthī Dhatu. According to the principle of Ashraya Ashrayee Bhava, both are inversely proportional to each other.⁷ Acharaya Charak, have enumerated that the main causes of Vata Prakopap (elevated vata Dosha) are that Dhatu Kṣhaya and Margavarana. Here due to various Vataprapakopa nidana’s which causes Asthī Dhatukshaya, due to deprivation of nutrients to Asthidhatu and Majja resides In the Asthi, thereby leading to Uttrrotara Dhautu depletion i.e Majjakshya too.⁸

On the basis of sign and symptoms it can also be correlated with ASTHIMAJJAGATAVATA. As per Ayurvedic text the symptoms of Asthi Majjagata Vata are:

¼ In Ayurveda classics, Gata Vata (Movement/Passage) is a condition
occurring which is used for describing about Samprapti that leads to Dhatukshaya (diminished). The lakshana of AsthiMajja gata Vata is BhedoAsthi Parvanam (breaking type of pain in bones and joints), Mamsa Bala kshaya (reduction of muscle tissue and strength), Aswapna (sleeplessness), Santata Ruja (constant Pain). 

Acharya Charaka also describes a condition called Ubhayashrita Vatarakta where the symptoms of both Utthana & Gambhira Vatarakta are mentioned. Here in this Ubhayashrita Vatarakta, Vatiate Vata along with Rakta (blood) circulates all over the body causing symptoms like Pain, Burning sensation, deformities occurs in the body parts due to the aggravated Vata traversing along Sandhi, Asthi, Majja and also gives rise to Khanjatva & Pangulyata.

Pathophysiology of avascular necrosis

Stages of Avascular necrosis: Steinberg system of classification
Stage I – Normal radiographs; abnormal MRI or bone scan
Stage II – Abnormal lucency or sclerotic site in femoral head
Stage III – Subchondral collapse (ie, crescent sign) without flattening of femoral head
Stage IV – Flattening of the femoral head; normal joint space
Stage V – Joint space narrowing, acetabular changes, or both
Stage VI – Advanced degenerative changes

According to this pathophysiological chain of the AVN, main etiology considered as traumatic and non traumatic which leads to decreased blood flow further necrosis of osteocyte resulting to AVN. Here Ayurveda theories may be implies as the traumatic pathway may correlate AsthiMajja gata Vata or AsthiMajja kshaya according to their Nidanas (aetiology) of Asthi and Majja srotodushti like Abhighatat (trauma), Prapidanat (excessive physical stress), Ativyayamat (excessive exercise), Atisankhyovat (irritation by external stimuli), Ativighatanat (crack in bone) these all causes are traumatic. With this all symptoms of AVN are also likely with AsthiMajja gata Vata. Non traumatic cause which involves pathologies like thrombotic occlusion or extra vascular compression
may be correlate with Vatarakta according to sampraphti (etiopathogenesis) which is the vitiated Vata obstruct pathway of blood circulation and vitiate to blood also. The vitiated blood lodge in Vakrasandhi (places where complex circulation) like interphalangeal joints mostly but hip joint can also be considered. Some symptoms of Vatarakta also reflects in avascular necrosis.14

Treatment principle:
Starting from Nidana Parivarjan (elimination of causative factors) management of all disease are based on Sampraphti (etiopathogenesis) and some unknown origin are according to Lakshana(sign and symptom). Here treatment to AVN may be according to AsthiMajjagataVata where Bahyaabhyantara sneha (external and internal oleation)like Abhyanga( oil anointing), Snigdha Pinda Swedana, Shastika shali pinda Swedana ( a type of sudation therapy) and internal oleation with different Basti like Matra Basti, Ksheera Basti, Yapana Basti (therapeutic enemas) can be usefull.15 some cases where no traumatic origin with excess rakta and pitta involvement Vatarakta line of treatment may be beneficial where it may include Snehapana (internal oleation) virechana (purgation) with Mridu Snigdha Dravya followed by Bastikarma (therapeutic enema therapy).16

Role of Panchkarma in AVN of femoral head:
According to Ayurvedic perspectives of pathogenesis of Vatavyadhi as follows: Dhaturkshaya (diminution of tissue elements) and Margavarodha (occlusion of channels of circulation) is the main causative factors for this condition. Due to Srotorodha (obstruction), Rakta Dhātuv (blood) nourishment to the femoral head is decreased which causes less nutrition supply to Asthidhātu (bony tissue) causing Asthidhātukṣāya (diminution of bony tissue). As Majjā (bone marrow) resides in Asthidhātu, it may further result in Majjādhātukṣaya and Vatavyadhi like Asthi-Majjagata vāta, mainly, occurs due to the vitiated Vāta Dosha which resides in Asthi (bones) and Majjā (marrow) with the clinical features such as Bheda-Asthiparvanāṃ (breaking type of pain), Sandhishūla (jointpain), Satataruk (constant pain), Māmsabalakṣaya (reduction of muscle tissue and strength) and Asvapna, (sleeplessness) which can be correlated with symptoms of AVN. Administration of Bahya (external) and Abhyantara (internal) Snehana (oleation therapy) form may be the best treatment modality in this disease. Snehana in the form External administration is by Abhyanga (massage) with medicated oils. Abhyanga karma in classical texts is described as Snehana, Kledakara, Jarahara, Paushtika,and Kapha-Vata Nirodhana. Snehan through Abhyanga provides nourishment to Mamsa, Meda,Asthi, Majja and so on. Massage gives strength to the muscles and due to its snehana effect it decreases the dryness of Sira (veins) and Snayus (ligaments) which might help to increase the blood flow and metabolism. Pāna (oral administration) and Basti (therapeutic enema) are the external administration methods of Snehana.

Role of Rukshana : Acārya Vagabhatta have prescribed “Brhmyāṃstv Tu Mrdu Langhayer” which means the need of Rūksaṇa i/Langhana before Brhmaṇa. Rukshana can be obtained by many treatment modalities such as Udvartana (powder massage), Deepana (carmitive) -Pachana (digestive) . Rukshana helps to remove Srotorodha (obstruction of channels) and Amavastha Udvartana having its Medohara effect can be applied on the Sthoola Prakurti and Kapha Dosha yukta patient while Deepana- Pachana on Krisha i.e lean and thin) Patient. Thus Rūksaṇa cikitsā is beneficial may be considered in certain cases of AVN initially based upon the condition of the Dosha and the patient.17
Role of Patrapinda Swedana:
After Abhyanga, Patra pinda sweda can be applied to the affected part of the body, which is Sandhichestakara, Srotosuddhikara, Agnideepaka, and Kapha-Vatanirodhana, it decreases the Stambha (stiffness). By administrating proper Snigdha Swedana, it helps in alleviating vitiated Vata Dosha. Patra Pinda Swedana may increases the local blood flow to the affected tissues, and and Swedana, might produce a hypoalgesic effect by diverting stimuli and helps in releasing pain, helps in eliminating Dosha imbalances, strengthens the muscles of the affected area by the release of toxins and reducing inflammation. 

Why Basti in AsthiMajjavikaras: clinical presentation of avascular necrosis of femoral head indicates Vata Dosh Prakopa (alleviated Vata dosha) leading Vikruti (vitiation) of Asthi Dhatu. In AVN, due to Margavrodha (blockage of channels) the blood (Rakta Dhatu) supply to the femoral head is decreased ultimately leads to ischaemia causing necrosis and Margavrodha also aggravates Vata Dosha.

Role of Virechana Karma

The main cause of Avascular necrosis of femoral head is blockage of small blood vessels which supplies blood to the head of femur. Following the principle of Vatavyadhi and Vatarakta, Mridu Virechana is indicated in both which can help in improving blood circulation. The prime cause leading to Asthi Dhatu Kshaya (degeneration of bony tissue) in the hip joint is Raktadhatu Dushti (Srotorodha) therefore Virechana can be planned.

Stage wise treatment of AVN

<table>
<thead>
<tr>
<th>Stage</th>
<th>Management</th>
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</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Nidana Parivarjan, symptomatic medication for reducing pain and stiffness.</td>
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<tr>
<td>Stage 2</td>
<td>Same as above, Picha with Tail, Udwarana/Rooksha pinda Swedana, Abhyanga and Vashpa swedana, Matra Basti with Tikta Dravya. Shamana sneha as internal oleation, Kshara Basti.</td>
</tr>
<tr>
<td>Stage 3</td>
<td>All the above with Virechana followed by Basti for Brimhana, pinda sweda like Shastika Shali Pinda sweda.</td>
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<tr>
<td>Stage 4 &amp; 5</td>
<td>There will destruction of bone with severe aggravation of symptoms so need surgical intervention. Ayurveda may help in pain reduction with support to improving life style.</td>
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DISCUSSION

Avascular necrosis is death of osteocytes due to occlusion of the blood vessels supplying to femoral head affecting the day to day routine life of patient. AVN leads to pain around the hip joint, joint destruction and eventually requires surgical treatment. It is important to diagnose this disease in initial stages because later it causes loss of blood supply results in deprivation of nutrients to Asthithattu and leads to AsthīMajjakshaya. The treatment principle Mridu Samshodhana followed by Brahmaṇa (nourishing) seems to be effective in such manifestation. Acharaṇya Vagabhatta have clearly mentioned, Bhramayastu Mridu Langhyeta. Before Brahmaṇa, mild Rukshana/langhana, should be done by treatment modalities like Udvartana (powder massage) which helps to remove Srototorodha.22. Basti is one among the Pañcakarma therapies which clearly shows its efficacy in chronic conditions due to aggravation of Vata Dosha. Acharaṇya’s have already indicated Tikta Dravya Sadhita Ksheera Basti in Asthikshayaja Vikara which might be helpful in neovascularization of the affected part.23 As Poorva karma of Basti, Abhyanga and Swedana is done. Abhyanga karma is Snehana, Kledakara, Jarahara. Abhyanga by Vatahara medicated oils helps to mitigates Vata increase blood supply to the muscles and strengthens the affected joint24 whereas Swedana produces Mriduta with in body parts and relieves stiffness. Shola Shanti is one of the Samyak lakshana of Swedana Karma. Swedana also having its vasodilation effect which helps in improving the blood circulation to the affected joint.25

Tiktaka Ksheera Basti like Manjisthadi Ksheera Basti, Panchtiṭka Ksheera Basti should be planned which helps in strengthening of Asthī Dhātu. The drugs like Ashwagandha (Withania somnifera), Guduchi (Tinospora cordifolia), Musta (Cyperus rotundus) having Tikta rasa helps in balancing the aggravated Vata Dosha. The Kashaya thus prepared with Ksheera having Snigdha (unctuous) & Madhura (sweet) Guna helps to manage Vata & Pitta Dosha and acts as Brimhana (nourishing). Jeevaniya (Antiageing) Rasayana (Rejuvinating), Balya (strengthening). Saindhava because of its Sukshma Guna reaches the minute Srotasa’s of the body & helps to remove occlusion open fresh blood supply to the Asthi, sandhi etc. Guggulutikta Ghrīta & Balaguduchyadi taila used as Sneha having Tikta Rasa(Astringent), Ushna virya, Madhura & Katu Vipaka favours the normal functioning of Dhatvagni,(digestive fire) facilitating increased nutrition to the Asthi dhatu. Ghrīta having Vata – Pitta shamaka, Rakta prasadaka, Balya, Agnivardhaka, Madhura, Shīta virya properties, thereby pacifies Vata, improves Dhatu upachaya and acts as a Rasayana. Also vitamin D3 being a fat soluble vitamin easily gets absorbed from the blood & helps in osteogenesis by helping in Samprapti vighatana (break down of pathology) of Asthi kṣaya and may help in treating Avascular Necrosis.26 Ksheera (milk) Sadhita Niruha Basti because main ingredient is ksheera so named as ksheera Basti. Ksheera having Madhura and snigdha gunas which help to manage Vāta doṣa by doing the Brimhana (nourishing) karma. In kalka dravyas Manjistha can be used which possess Madhura (sweet), Tikta (bitter) and kaśāya (astringent) Rasa. The uṣṇa Guna of Manjistha allows the herb to work at the cellular level of the tissues and helps in Rakta Shodhana (blood purification and cleansing of the Vascular system) and favors smooth blood flow. The other kalka dravya such as Arjuna having Kaśāya Rasa (astringent), Sheeta Vīrya (cooling). It pacifies kapha and pitta. The Kaśāya rasa Karma is Sandhānakara (improves the compactness) in nature. Its Ksheerapak has been mentioned by the Ācāryas as Asthi Sandhānakara. Thus, it prevents the deposition of lipids in the femoral head which increase the permeability of vessels for increased circulation to the affected
bone. Thus, Mridu Shodhana and Brihmana line of treatment whole seems to be helpful in treating Avascular Necrosis

CONCLUSION

Avascular necrosis is a complex disease. It is important to avoid the etiological factors to prevent further deterioration of the disease. As a holistic therapy Ayurveda can prove a far better management through Panchkarma by giving significant relief in pain and improving range of motion and longer survival within the AVN patients. The therapy is cost effective. Conservative management of AVN through Ayurvedic principles and Snehana Swedana Virechana and Basti provides significant relief and improves quality of life.

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