

# 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 progress, 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, AsthimjagataVata, 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 3<sup>rd</sup> to 5<sup>th</sup> 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 and 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.<sup>1</sup> 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.<sup>2</sup>

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 *Vatavyadhis*. 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*s. *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.<sup>3</sup>

## LITERATURE REVIEW

### *Asthi and Majja*

In *Ayurveda*, *Dhatu*s are the main constitutional elements that hold up the basic structure of body. The main *Karma* of *Dhatu*s is *Dharana* (that withholds the body) and *Poshana* (nourishment) of the *Sharira*. *Asthi Dhatu* (bone tissue) is fifth among seven *Dhatu*s. *Asthi Dhatu* is described as *Kathintam* (hardest) *Dhatu*. Function of *Asthi Dhatu* is compared with the hard core of bark of the tree. The Ayurvedic Principle of Asharya –*Asharyi Bhava* links between *Asthi and Vata*. Consistent with this principle *Asthi Dhatu* is the *Asharaya* for *Vata Dosha*. *Asthi & Vata* are opposite to each other i.e if *Vata Dosha* increases *Asthi Kshaya* increases and vice versa regarding *Vridhhi* (elevation) & *Kshaya* (diminution).<sup>4</sup>

Among all *Sapta dhatus*, *Majja* is the sixth *Dhatu* of the body. *Majja* is formed from as *Asthi dhatu* as per *Uttrotara Dhatu Poshana Sidhanta* (process of gradual metamorphosis of tissues). According to *Acharaya Charaka Moolasthanana of Majjavaha Srotasa is Asthi and Sandhi Majja* (marrow) is present in *Sthulaasthi* (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)<sup>5</sup>.

*Samprapti of Asthi Majjakshya*- In *Ayurveda* the main pathological conditions of *Dhatu*s are *Vridhi* and *Kshaya*. On evaluating the *Guna* and *Karma of Majja*, *Acharaya Sushruta* says that *Majja* provides *Bala* and *Snehana* to the *Sharira*<sup>6</sup>. It appears that *Majja* helps in maintaining of the shape of *Asthi* along with *Vata*. *Asthi* is the *Asharayi Bhava* of *Vata Dosha* whereas *Majja* is filled in *Asthi Dhatu*. When normal formation of *Asthi Dhatu* is disturbed it leads to *Asthi Kshaya* leading to *Kshaya of Asthi Dhatu*. According to the principle of *Ashraya Ashrayee Bhava*, both are inversely proportional to each other.<sup>7</sup> *Acharaya Charak*, have enumerated that the main causes of *Vata Prakopa* (elevated *vata Dosha*) are that *Dhatu Kshaya* and *Margavarana*. Here due to various *Vataprakopaka nidana's* which causes *Asthi Dhatukshaya*, due to deprivation of nutrients to *Asthidhatu* and *Majja* resides in the *Asthi*, thereby leading to *Uttrotara Dhatu* depletion i.e *Majjakshya* too.<sup>8</sup>

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:

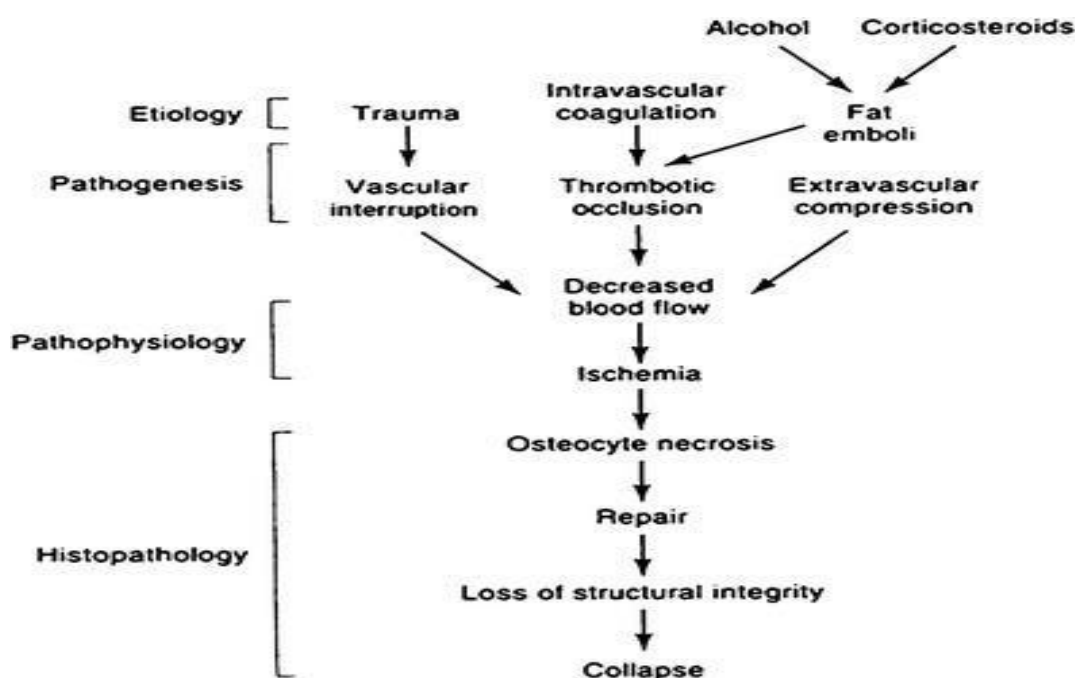
In *Ayurveda classics*, *Gata Vata* (Movement/Passage) is a condition

occurring which is used for describing about *Samprapti* that leads to *Dhatukshaya* (diminished). The *lakshana* of *AsthiMajjagataVata* 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).<sup>9</sup>

Acharya Charaka also describes a condition called *Ubhayashrita Vatarakta*

where the symptoms of both *Utthana & Gambhira Vatarakta* are mentioned . Here in this *Ubhayashrita Vatarakta* ,Vitiated *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*.<sup>10</sup>

### Pathophysiology of avascular necrosis<sup>11</sup>



Stages of Avascular necrosis: Steinberg system of classification<sup>12</sup>

- 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 *AsthiMajjagataVata* or *AsthiMajjakshyaya* according to their *Nidanas*(aetiology) of *Asthi* and *Majjavaha srotodushti* like *Abhighatat*(trauma), *Prapidanat* (excessive physical stress), *Ativyayamat* (excessive excercise), *Atisankhyovat* (irritation by external stimuli), *Ativighatanat*(crack in bone) these all causes are traumatic. With this all symptoms of AVN are also likely with *AsthiMajjagataVata*.<sup>13</sup> Non traumatic cause which involves pathologies like thrombotic occlusion or extra vascular compression

may be correlate with *Vatarakta* according to *samprapti* (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.<sup>14</sup>

### Treatment principle:

Starting from *Nidana Parivarjan* (elimination of causative factors) management of all disease are based on *Samprapti* (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.<sup>15</sup> 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).<sup>16</sup>

### Role of Panchkarma in AVN of femoral head :

According to *Ayurvedic* perspectives of pathogenesis of *Vatavyadhi* as follows: *Dhatukshaya* (diminution of tissue elements) and *Margavarodha* (occlusion of channels of circulation) is the main causative factors for this condition. Due to *Srotorodha* (obstruction), *Rakta Dhātu* (blood) nourishment to the femoral head is decreased which causes less nutrition supply to *Asthidhatu* (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 Doṣha* which resides in *Asthi* (bones) and *Majjā* (marrow) with the clinical features such as *Bhedo-Asthiparvaṇām* (breaking type of pain) , *Sandhishūla* (jointpain), *Satataruk* ( constant pain), *Māṃsabalakṣaya* (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 *Abhyāṅga* (massage) with medicated oils . *Abhyāṅga karma* in classical texts is described as *Snehana*, *Kledakara*, *Jarahara*, *Paushtika*,and *Kapha-Vata Nirodhana*. *Snehan* through *Abhyāṅga* 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 “*Bṛhmyāṃstu Mṛdu Langhayet*” which means the need of *Rūkṣaṇa /Langhana* before *Bṛhmaṇa* . *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 Doshayukta* patient while *Deepana- Pachana* on *Krisha* i.e lean and thin) Patient. Thus *Rūkṣaṇa cikitsā* is beneficial may be considered in certain cases of AVN initially based upon the condition of the *Dosha* and the patient. <sup>17</sup>



### 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 decreased the *Stambha* (stiffness). By administering proper *Snigdha Swedana*, it helps in alleviating vitiated *Vata Dosha*. *Patra Pinda Swedana* may increase the local blood flow to the affected tissues, and *Swedana*, might produce a hypoanalgesic 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.<sup>18</sup>

**Why Basti in AsthiMajjavikaras :** clinical presentation of avascular necrosis of femoral head indicates *Vata Dosh Prakopa* (allevated *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 *Margavarodha* also aggravates *Vata Dosha*. In advance stage of AVN, due to continuous *Vata Dosha* imbalance it is further responsible for causing vitiation of other two *Doshas* i.e *Pitta and Kapha*. In our Classics, *Basti* has been described as first line of treatment of *Vata Dosha* as well as *Pitta, Kapha Dosha* and *Rakta* also. In *Asthikshayaja Vikaras*, *Tikta Dravya Sadhita Ksheera Basti* (medicated enema formed with milk and bitter drugs) is specially indicated.

Before administration of *Basti* assessment of *Bala* and *Avastha* of patient, *Doshas* involvement, nature of disease, *Prakruti* of patient should be done. *Acharya*

*Sushruta* have said that 9th *Basti* will reach to *Majja Dhatu*, hence the *Basti* either *kala Basti* or *karma Basti* should be planned, as AVN is a chronic condition so that it will reach to *Majja Dhatu* and nourishes by *Anulomana* of *Vata*, *Basti* eliminates these *Dosha* by doing *Brihamana* (nourishment) of affected bone. By balancing the *Vata in Pakvasaya*, the other two *Doshas* also get pacified and all the disease related with *Vata* also gets pacified. However *Anuvāsana* (oil enema) can be administered with the use of a *Tikta Ghrita* such as *Ashvagandhā Ghrita*, *Guggulu Tikta Ghrita*, *Panchtikta Ghrita*.<sup>19</sup>

### 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*<sup>20</sup> and *Vatarakta*<sup>21</sup> *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.

After *Mridu shodhana*, *Rasayana* or *Brimhana* could also be planned as there *Dhatukshaya* are main concern. *Kaishore Guggulu*, *Mahamanjishthadi Kwatha*, *Panchtikta Ghrita Guggulu*, *Amritadi Guggulu*, *Lakshadi Guggulu*,

*Kashaya- Mahamanjishthadi Kashaya*, *Dashmoola Kashaya*, *Astawarga Kashaya*, *Guggulu Tikta Kashaya*. All these drugs having anti-inflammatory, analgesic, and *Vatahara* properties, which helps in pain management as well as improving blood circulation to affected part.

### Stage wise treatment of AVN

Table no.1

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

## 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 *Ashtidhatu* and leads to *AsthiMajjakshaya*. The treatment principle *Mridu Samshodhana* followed by *Brahamana* (nourishing) seems to be effective in such manifestation. *Acharaya Vagabhatta* have clearly mentioned, *Bhramyastu Mridu Langhyeta*. Before *Brahamana*, mild *Rukshana/langhana*, should be done by treatment modalities like *Udvaratana* (powder massage) which helps to remove *Srotorodha*.<sup>22</sup> *Basti* is one among the *Pañcakarmas* therapies which clearly shows its efficacy in chronic conditions due to aggravation of *Vata Dosha*. *Acharaya's* have already indicated *Tikta Dravya Sadhita Ksheera Basti* in *AsthiKshaya* Vikara which might be helpful in neovascularization of the affected part.<sup>23</sup> As *Poorva karma* of *Basti*, *Abhyanga* and *Swedana* is done. *Abhyanga karma* is *Snehana*, *Kledakara*, *Jarahara*. *Abhyanga* by *Vatahara* medicated oils helps to mitigate *Vata* increase blood supply to the muscles and strengthens the affected joint<sup>24</sup> 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.<sup>25</sup>

*Tiktaka Ksheera Basti* like *Manjisthadi Ksheera Basti*, *Panchtikta Ksheera Basti* should be planned which helps in strengthening of *Asthi 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* (Rejuvenating), *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 Ghrita & 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*. *Ghrita* having *Vata – Pitta shamaka*, *Rakta prasadaka*, *Balya*, *Agnivardhaka*, *Madhura*, *Shita 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 kshaya* and may help in treating Avascular Necrosis<sup>26</sup>. *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 *kaṣāya* (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 *Kaṣāya Rasa* (astringent), *Sheeta Vīrya* (cooling). It pacifies *kapha* and *pitta*. The *Kaṣāya 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.<sup>27</sup> 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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