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Ksheeravasthi in AVN Femoral Head – A Case Study

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Abstract

A 41-year-old male patient radiologically diagnosed as a case of avascular necrosis of head of both femur with Grade 2 of Ficat and Arlet classification, presented with the following chief complaints of pain in both hip joints, more on left side, of Harris Hip score was 66 and associated with decreased range of movements with slight limping. This presentation was correlated with *Asthikshayaja vyadhi* and treated accordingly. Initially, patient had been administered *dipana* and *pacana* followed by *snehapana* and *koshtasodhana* by *virechana*. Further *panchathikthaka ksheera vasthi* (medicated enema prepared with milk and ghee) was administered. This resulted with improvement of Harris hip score to 91.

Keywords: *Asthikshayaja vyadhi*, Avascular necrosis of head of femur, Harris hip score, medicated enema, *Panchathikthaka ksheera vasthi*

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Introduction

Avascular necrosis (AVN) is a condition that occurs when there is a loss of blood to the bone and which eventually leads to death of bone tissue, prime choice of this disease is surgical intervention.[1] A patient presented to us had Grade 2 AVN of head of femur, bilaterally, and advised for surgery. In this stage, the case was well managed and relieved significantly by *Panchathikthaka ksheera vasti*.

According to Ayurveda, imbalance of *dosha* is termed as *roga*. Among in *tridosha*, *vata* is responsible for majority of all illnesses. The *Asthi dhatu* is the one which plays an important role of *Shareera dharana* among the *saptha dhatus*.[2] Every instability in the *dhatus* equilibrium contributes to irregularities in the *sharira*. Asthikshaya is the condition in which there is *kshaya* of *Asthi dhatu*. *Vata* and *asthi* have *asraya-asrayi bhava*, that is, *asthi* is directly influenced by *vata* vitiation. *Asthi dhatu* and *vata dosha* are inversely proportional to each other. The former diminishes when the latter is increased. The symptoms of *asthikshaya* are –*asthisula, toda,* and *sandhisaidhilya*.[3] Here, in the pathogenesis of AVN of head of femur, there is *raktamargavarodha*. This is the main cause of destruction of *asthi dhathu* and hence *asthi kshaya*. The *chikitsa sutra* of *asthikshaya* directly described by *acharya vagbhata* and *acharya charaka*. The *vasti* along with *ksheera, ghruta,* and *tiktha rasas* should be given in the management of *asthikshaya*.[4]

AVN is a disease in which there is temporary or permanent loss of blood supply to bone. In early stages, there are no symptoms but in advance stage, patient suffer from severe pain and dysfunction of affected joint. The bone tissue dies without blood, and ultimately the bone may collapse. The process is almost always progressive without treatment, which leads to the joint destruction within 5 years. AVN of head of femur is very serious problem in which more than 10% of total hip replacement surgeries performed. No medical treatment has proven effective in preventing or arresting the disease process.[5]

Several surgical procedures have been used in an attempt to treat AVN of head of femur. No surgical procedure is the best among surgeons in the treatment of AVN. In early stages of AVN of femoral head, core decompression with or without bone graft is typically considered the most appropriate treatment, in late stages, characterized by collapse, total hip arthroplasty is the most appropriate treatment. Yet, it has not achieved the desired results.

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Ayurveda is ancient medical sciences of the world. Since it is a disease caused by the aggravation of *vata*, so the pioneer treatment for *vatika* disorder is *vasti karma* so that *Panchathikthaka ksheera vasti* was selected as principal treatment for *Asthi kshaya* told by *Acharya charaka*.

Disease Review

Osteonecrosis or AVN of femoral head refers to a condition in bone metabolism. When cells of the cancellous bone spontaneously die, which is caused by the injury or any occlusion in the blood vessels nourishing the bone tissue. This leads to collapse of the femoral head and subsequent secondary osteoarthritis. About 16,000 people develop AVN of head of femur in India each year, with 60% of the cases being bilateral. It may be classified in to two types – post-traumatic and idiopathic.[6] It may be asymptomatic in the beginning, but later mild-to-severe degree of pain is seen along with change in gait. With disease progression, subchondral collapse and femoral head flattening become evident radiographically, joint space narrowing is the end result of untreated cases. It usually occurs in adults between the age of 20 and 40 years. Many surgical procedures such as drilling and insertion of bone graft, Modified Whiteman or Colona reconstruction, and insertion of prosthesis are carried out and also most patients require standard total hip arthroplasty. As it is one of the most challenging problem faced by orthopedic surgeons, the necessity to find best cure so as to make the affected to do all activities as early as possible. However, because of the young age of many of these patients, a hip replacement

cannot be expected to last the patient's lifetime, therefore, when feasible attempts should be made to save the femoral head before collapse with the use of less invasive treatment modalities.

Pathophysiology

Osteonecrosis is characterized by a stereotypical pattern of cell death and a complex repair process of bone resorption and formation. Decreased femoral head blood flow can occur through three mechanisms.

- Vascular interruption by fractures or dislocation
- Intravascular occlusion from thrombi or embolic fat
- Intraosseous extravascular compression from lipocyte hypertrophy or gauch

Table 1: Range of Movements

Movements	*Right*	*Left*
Flexion	100°	100°
Extension	95°	95°
Abduction	40°	40°
Adduction	40°	40°

Cell and Tissue Necrosis

The earliest pathologic characteristics of osteonecrosis are necrosis of hematopoietic cells and adipocytes followed by interstitial marrow edema. Osteocyte necrosis occurs after approximately 2–3 h of anoxia, but histological signs of osteocyte death do not appear until approximately 24–72 h after oxygen deprivation. Reactive hyperemia and capillary revascularization occur to a degree in the periphery of the necrotic zone, and with the entry of blood vessels, a repair process begins consisting of both bone resorption and production that incompletely replaces dead with living bone. New living bone is laminated on to dead trabeculae with partial resorption of dead bone. In the subchondral trabeculae, bone resorption exceeds formation leading to the net removal of bone, loss of structural integrity of trabeculae, subchondral fracture, and joint incongruity.

Actually, this disease is not mentioned in the eighty types of *vatarogas*. However, it is reasonably to say that, according to Ayurvedic concepts, it is not so necessary to name a disease, the description of which is not found in Ayurveda.

Table 2: Harris Hip Score

Pain (check one) • None or ignores it (44) • Slight, occasional, no compromise in activities (40) • Mild pain, no effect on average activities, rarely moderate pain with unusual activitity; may take aspirin (30) • Moderate pain, tolerable but makes concession to pain. Some limitation of ordinary activity or work. May require occasional pain medication stronger than aspirin (20) • Marked pain, serious limitation of activities (10) • Totally disabled, crippled, pain in bed, bedridden (0)	Sitting • Comfortably in ordinary chair for 1 h (5) • On a high chair for 30 min (3) • Unable to sit comfortable in any chair (0) Enter public transportation • Yes (1) • No (0) Stairs • Normally without using a railing (4) • Normally using a railing (2) • In any manner (1) • Unable to do stairs (0) Put on shoes and socks • With ease (4) • With difficulty (2) Unable (0) Absence of deformity (all yes=4; <4=0) Less than 30^0 fixed flexion contracture • Yes • No <10° fixed abduction • Yes • No <10° fixed internal rotation in extension • Yes • No Limb length discrepancy<3.2 cm • Yes • No
Limp • None (11) • Slight (8) • Moderate (5) • Severe (0)	
Support • None (11) • Cane for long walks (7) • Cane most time (5) • One crutch (3) • Two canes (2) • Two crutches or not able to walk (0)	
Distance walked • Unlimited (11) • Six blocks (8) • Two or three blocks (5) • Indoors only (2) • Bed and chair only (0)	Range of movements (*Indicates normal) Flexion (*140°) Abduction (*40°) Adduction (*40°) External rotation(*40°) Internal rotation(*40°) RANGE OF MOVEMENT SCALE 211°–300°(5) 61°–100°(2) 161°–210°(4) 31°–60°(1) 101°–160°(3) 0°–30°(0)
Total Harris hip score	

While applying Ayurvedic theory on this topic under study, the *kshaya* or necrosis of *Asthi dhatu* in femoral head is either by the lack of nutrients from the former *Rakta dhatu* or by the disturbance of *asthidhatwagni* or metabolic process. The ischemic stage during the samprapti of the disease may be due to *sanga* or obstruction of the *raktavaha srotas* supply to the femoral head. As the srotas is meant for the growth and destruction of body tissue, the impairment of their integrity reaches to the pathological state of the body. The *sanga* taking place in *srotas* might be by the *avarana* of *vata*. *Avarana* of *vata* is due to the vitiation of *vata* by *Vata prakopa- ahara* and *vihara*. The intraarticular pressure preceded by an *abhighata* may cause *Vata prakopa* and does *avarana* of *Rakta vaha srotas* which supplies the femoral head.

In *dhatu parinama prakriya,* Ayurveda postulates that a *dhatu* consists of two parts, namely, poshya and poshaka. Among them, poshya bhaga is responsible for the formation of next dhatu. [7] In the context under study, the purpose of blood vessels to the femoral head is meant for the maintenance of osteoblastic activity or *Asthi dhatu poshanakarma* in the bone. The lack of this *asthidhatu poshya bhagas* of *Rakta dhatu* (rakta kshaya-ischemic state) leads to the disturbance of osteoblastic activity hence resulting in necrosis of bone cells. This necrotic region shows total avascularity and bone death with empty lacunae-*sowshirya*.

Anatomy of Femoral Head

The femoral head is the most proximal portion of the femur and is supported by the femoral neck. It articulates with the acetabulam of the pelvis. The femoral head is nearly spherical but has a medial depression known as the fovea capitis femoris that serves as an attachment point for the ligamentum teres. This structure has clinical significance as there is a major concern for AVN to the femoral head associated with hip fractures and dislocations.[8]

Blood Supply to Femoral Head

Three main arteries supply the femoral head.

- The lateral epiphyseal branch of the medial femoral circumflex
- Ascending branch of the lateral femoral circumflex

Both ascend from the deep femoral artery. This leaves the femoral head vulnerable to avascular necrosis in the presence of a femoral neck fracture since these vessels are easily ruptured with this injury.[9]

- The ligamentum teres artery

It descends from the posterior branch of the obturator artery and attaches at the fovea. This artery is commonly disrupted with dislocations.

During the process of pathogenesis, when the vitiated *vata* gets into the head of femur (*asthi*) then due to inverse relationship in *asthi* and *vata*, as *vata* increases *asthi* decreases, that is, *asthikshaya* – causing pain, tingling sensation, and numbness.

Today, the modern science deals with this disease with analgesics, steroids, and in later stage total hip replacement therapy, but their side effects hamper the physiology more. As per ayurvedic concepts, "*purishadhara kala*" is similar to "*asthidhara kala*," *thiktha ksheera vasti* is indicated in all types of *asthigata vikara*.[10]

Case Report

This is the case report of a 41-year-old male, non-diabetic, and non-hypertensive, who presented with pain in both hip joints for 1 year. One year back, he was noticed grating sound in his left hip joint while walking. However, he was not bothered about it and he continued his activities and work. Later, he felt slight pain in the same joint and which affected his job. He was a driver by occupation in the past 20 years. The pain was continuous in nature and used to aggravate severely during climbing stairs, long walking, and in prolonged sitting. Due to this pain, he found difficulty in sitting in squatting position also, with rest as relieving factor. Six months back, he also noticed pain in his right hip joint and with slight limping. Transient relief was found in conventional treatments with recurrence with intensified pain. His condition gradually worsened and he developed difficulty in walking without support. Then, he consulted nearby hospital and advised surgical intervention, which patient refused and consulted in our outpatient department for Ayurvedic treatment.

Personal history showed that mixed diet, reduced appetite, regular and normal bowel, and disturbed sleep (due to pain). He has habit of smoking and drinking alcohol for 20 years.

Systemic Examination

Locomotor System Examination

Affected joint: HIP JOINT

- INSPECTION: No abnormalities detected bilaterally
- PALPATION: Grade 2 tenderness present bilaterally.

Range Of Movements

Fabers Test

- Positive bilaterally
- Harris hip score was found to be 66
- Patient had normal muscle bulk and tone
- All other systemic examination was done and was found normal. Pulse rate – 72/min, BP – 130/90 mmHg.

Harris Hip Score

The ten items described above have each a series of answer choices with different number of points awarded. These range on scales from 0 to 47 while the maximum score awarded after answering all questions is 100. The higher the score, the better the prospects and the lower the dysfunction.

- Pain – one item, scores between 0 and 44
- Function – seven items, scores between 0 and 47
- Deformity – one item, score either 0 or 4
- Range of motion – one item, scores between 0 and 5.

Depending on the overall result, there are four categories of hip status:

- <70: Poor hip status
- 70–79: Fair hip status
- 80–89: Good hip status
- 90–100: Excellent hip status.

From the above Table 3, it was observed that before starting the treatment the total Harris Hip Score was 66 (poor hip status) and after the treatment the Hip Score was 89 (good hip status) and after follow-up, the score was 91 (excellent hip status).

Investigations

Magnetic resonance imaging revealed – AVN of bilateral femoral head (Ficat and Arlet Stage 2) with moderate left hip joint effusion

Table 3: Harris Hip Score of Patient

Individual domain	*Harris hip score before treatment*	*Harris hip score after treatment*	*Harris hip score after 3 months*
Pain	20	40	40
Limp	8	11	11
Support	11	11	11
Sitting	3	3	5
Enter public transportation	1	1	1
Stairs	4	4	4
Put on shoes	2	2	2
Absence of deformity	4	4	4
Distance walked	8	8	8
Range of movement	5	5	5
Total score	66	89	91

Treatment Schedule

As the pathology of this condition ends in the *kshaya* of *Asthi dhatu* by the occlusion of *Rakta vaha srotas*, and vitiation of *vata dosha*, hence, the line of treatment meant to alleviate *vata* as well as remove occlusion in *srotas* and thus nourish *Asthi dhatu*.

Dipana (carminative) and *pacana* (digestive) were adapted by giving *Vaiswanara churnam* (1 teaspoon twice a day with hot water before food) and *Amritotharam kashayam*[11] (90 ml twice a day before food) for 3 days to relieve *ama* (a state where metabolism is deranged). The treatment was aimed at *Amapacana*, *vatanulomana,* and also for the nourishment of *Asthi dhatu*. Then *snehapana* was given using *Gugguluthikthaka ghrita*[12] as it has very good action at *dhatu* level especially in *asthi* and *majja dhatu*. Then, given *virechana* using *nimbamriterana tailam*, 20 ml with hot water at empty stomach in morning, which is also having effect in *asthimajjagata vata roga.* Later, *pancha thikthaka ksheeravasti* was planned.

Vasti Review

Vasti being the most widely used and highly effective treatment modality in *pancha karma.* Although *vasti* is mentioned in vitiation of all the *vata, pitha, kapha,* and *rakta doshas,* It is specially indicated for *vatika* disorders. *Acharya charaka* states vasti first acts on *pakwashaya* (large intestine) and keep the *vata* in *samavastha* (equilibrium). It produces *samana* of *vata*. Hence, *all the vata vikaras will be diminished just like the tree which is cut by its roots loses the* extremities and stem, *sakha* (branches), *kanda, and pushpa*.

Tiktha Ksheera Vasti

Acharya Charaka, and *vaghbhata* have said that in the diseases related to *Asthi*, one should give *vasti* using *Tikta rasatmaka aushadhi dravya* along with *ghrita* (Ghee) and *Ksheera* (milk).

Ksheeravasthi has been mentioned in the classics in several instances. *Chakrapani* has defined the word *"ksheera vasti"* in the context of *vatarakta chikitsa*, that a vasti having *ksheera* as the main ingredient. A *yoga* of *ksheeravasthi* is explained among *mridu*, *snehana niroohas* in *"Prasrita Yougika vasthi sidhi"* of *Charaka samhita*. Same is also mentioned by *Vaghbhata* in "*Vasthikalpa*," in *Kalpasthana*. *Ksheeravasthi* is *mridu*, *snaihika nirooha*, especially for *sukumara* persons, who cannot tolerate other *niroohas*. It is *vataghna* and gives *bala* and *varna*.

It contains

- *Ksheera*-2 *prasrita*
- *Madhu*-1 *prasrita*
- *Taila*-1 *prasrita*
- *Ghrita*-1 *prasrita*

Totally, the quantity is five *prasrita*. As it is told under *Prasrita yougika vasthis*, its quantity is fixed and should not be altered in any condition as other *vasthis*. There is confusion among the *teekakaras* whether to add *saindhava* and *kalka* or not, which are not mentioned in this particular *vasthiyoga*. *Chakrapani* agrees that *saindhava* should be added as it is an inevitable ingredient of *nirooha*, but disallows *kalka* due to the fixed quantity of the *vasthi*.

Here, the suitably modified *vasthiyoga* contains the following;

1. *Panchathiktha ksheerapaka*
2. *Gugguluthikthaka ghrita*
3. *Dhanwantaram tailam mezhukupakam*
4. *Madhu*
5. *Saindhava*

Quantity of ingredients

Ingredients	*Dose*
Makshika	120 ml
Saindhava	5 g
Ghrita	120 ml
Taila	120 ml
Ksheera kashaya	240 ml
Total	600 ml

Panchathiktha Ksheerapaka

Panchathiktha is a group of five dravyas having *tiktarasa* predominantly, mentioned by Rasa Tarangini and Bhavaprakasha. *Ksheerapaka* is prepared as per the ksheerapaka vidhi, by boiling them in *goksheera.*

Role of *Vasti*

As the *acharya Dalhana* has said, *asthidhara kala* is *purishadhara kala*. *Purishadhara kala* is nothing but *pakwashaya* (large intestine)."*pakwashaya"* is very important *sthana* (site) of *vata dosha* and also karyakshetra of *vasti* is *pakwashaya.*

Outcome and Follow-up

Pain, function, deformity, and range of movements were assessed using Harris hip score.

On the day of admission, the Harris hip score was 66, after this procedure, the score had to be increased by 89 and after the follow-up period, that is, after 3 months, the Harris hip score was 91.

Discussion

According to commentator Arunadatta, the substance having *snigdha* and *soshana* properties and produce *kharatwa* (roughness) increases *Asthi* (*Asthivardhan*), as *Asthi* is also *Khara* by nature. However, no substance is available that has both *Snigdha* and *Shoshana* properties. Hence, *Ksheera* (milk) and *ghruta* (ghee) which are *Snigdha* in nature are advised to be used with the substances which are *Tikta* (Bitter) and possess *Shoshana* (drying) property. It was advised that *Ksheera*, *Ghruta,* and *Tikta dravyas* should be used together in the form of *Ksheera vasti*. This combination has ability to produce *Kharatwa*. Hence, it can be said that *Tikta Ksheera vasti* has ability to repair degeneration of bones and cartilage. Hence, *Ksheera, Ghrut,* and *Tikta dravyas* will act on the site of lesion in AVN, that is, hip joint.

Table 4: Ingredients of Panchathiktha Ksheera Paka

S. No.	*Name*	*Botanical name*	*Rasa*	*Guna*	*virya*	*Vipaka*	*Karma*
1	*Gudoochi*	*Tinospora cordifolia*	T, Ks	G, Sn	U	M	*Tridosha hara*
2	*Nimba*	*Azadirachta indica*	T, Ks	L	S	K	*KP hara*
3	*Bhishag Mata*	*Adathoda beddomei*	T, Ks	L, R	S	K	*KP hara*
4	*Nidighdika*	*Solanum xanthocarpum*	T, K	L, R	U	K	*KV hara*
5	*Patola*	*Trichosanthes dioica*	T	L, R	U	K	*Tridosha hara*
6	*Ksheeram*		M	Sn, G	S	M	*VP hara K kara*

Rasas, Gunas, Veeryas and *Vipakas* are represented as *Ushnam*-U, *Madhuram*-M, *Thiktam*-T, *Katu*-K, *Seeta*-S, *Laghu*-L, *Ruksham*-R, *Kashayam*-Ks, *Snigdham*-Sn, *Guru*-G, *Pichilam*-P, *Teekshna*-Th, *Lavanam*-La, *Amlam*-A, *Chedanam*-C and *Sara*-Sa

Ashtanga hridaya denotes that excess use of *tiktha* rasa causes *dhatukshaya* and *vatavridhi*.[13] This states that *tiktha rasa* has the ability to reach to *Asthidhatu* and deal with *vata dosha*.

Tiktha ksheera vasti was planned for strengthening *Asthi dhatu*. *Tikta rasa* is predominance of *vayu* and *akasha mahabhuta*. Hence, it has got affinity toward the body elements like *asthi* which has same *mahabhuta tattwa* (subtle constituents of matter).Most ingredients of *Gugguluthikthaka ghrita*[14] that is administered have *tikta rasa, ushna virya,* and *madhura* and *katu vipka* favors normal functioning of *dhatuagni* (metabolic stage), facilitating increased nutrition of the *Asthi dhatu* (bony tissue).

Ghrita is *vata pitta samaka* (reduces *vata* and *pitta*), *balya* (increases body strength), *agni vardhaka* (increases appetite as well as metabolism), *madhura, sita veerya* (cold in potency), thus it pacifies *vata,* improves the *dhatu upachaya* (metabolism of the tissues), and acts as a rejuvenator of the body. *Ghrita* has the properties of *samskarasya anuvartana* (that which inherits the properties of other drugs without altering itself) precipitating bioavailability of other drugs. *Ghrita* also contains Vitamin D which plays an important role to utilize calcium and phosphorous from blood and helps in bone formation. *Niruha vasti* (a type of enema) containing *ksheera* (milk) as the main ingredient is called as *ksheera vasti*. *Ksheera* has *madhura* and *snigdha* (having oleation property) properties which help to control *vata dosa* and acts as brmhana (nourishing) – thus the whole formation acts at different levels.

At the end of the treatment, patient had complete relief from pain and also increased the range movement.

Conclusion

This single-case report showed AVN of head of femur can be managed effectively by Ayurveda.

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