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# *Asthi-Majja Vidradhi* (Osteomyelitis) through Integrated Approach

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## ABSTRACT

Osteomyelitis is an inflammation of the bone along with its marrow elements caused by an infecting organism. In *Ayurveda* osteomyelitis can be correlated with *Abhyantra vidradhi* and in particular with *Asthi-majjaparipaka* under *Asthividradhi*. It can also be correlated sometimes with *Nadivrana* or *dushtavrana* owing to the complications associated with this condition. On the account of *ashti* and *majjadushti* by perverted *doshas*, *Asthi Vidradhi* can be evolved any place in the bone. In today's era inadequate therapy of osteomyelitis may lead to relapsing infection and progression to chronic infection. Chronic osteomyelitis is amenable to cure only with radical resection or amputation. The exorbitant expense of surgical techniques, the high rate of recurrence, and antibiotic resistance necessitate the quest for a supportive, effective, and safe treatment. Though, it is clear concept of *Asthi-majjavidradhi* management which can offer us good supportive treatment protocol. This article reviews *Ayurvedic* etiology, pathophysiology, types, clinical features, management of *asthi-majjavidradhi* with possible interpretation according to modern medical concept.

**Key Words** *Ayurveda, Asthi-Majja Vidradhi, Chronic Osteomyelitis*

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## INTRODUCTION

Osteomyelitis is defined as an inflammatory and infective condition affecting the bone and its bone marrow, beginning with the infection of the cavity of the medullary tissue and quickly impacting the haversian systems. This disorder leads to a patient's serious morbidity and consequences. But, on the basis of *Ayurvedic* principles relating to pathophysiology, *Ayurveda* offers us a successful treatment procedure that gives these individuals a spotlight of hope.

## MATERIALS AND METHODS

Classical *Ayurvedic* text books, Modern text books, Internet, Review Articles and journals, case studies.

## AYURVEDIC VIEW

**Concept of *Asthi-majja Vidradhi* -Vidradhi** is classed as *Bahya Vidradhi* (external portion of the body) and *Antar Vidradhi* (inner part of the body)<sup>1</sup> according to *Ayurveda*. *Vidradhi* is compared to abscess. Abscess is the pus accumulation established into the tissue. The

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contained pus pocket is collected in the body's tissue, organ and space. When pus collects in *asthi* or *majja*, *asthi-majjavidraddhi* is called. The samprapti and sampraptighatak (in table 1) are mentioned as below-

**Table 1** Samprapti Ghatak

Dosha	Kapha –pitta Pradhana Tridoshaja
Dushya	Rakta, Kandara, Asthi, Majja
Dosha Adhistan	Asthi
Agni	Jatharagnijanya, Dhatvagnijanya
Strotas	Rasa, Rakta, Asthi, Majjavaha, Purishavaha
Strotodusti	Sanga, Vimargamanam
Udbhavastana	Amashaya (Kapha, Pitta), Pakvashaya (Vata)
Adhithana	The Adhithana was Asthi and Majja with Vata-Pitta- Kapha predominance.
Roga Marga	Madhyama
Vyadhi Swabhav	Chirkala

**Samprapti<sup>2</sup> (Pathophysiology)** – Vitiation of *Doshas*

Accumulation of *Doshas* in *Asthi-majja*

Collection of pus in *Asthi-Majja*

Development of symptoms like burning like fire

Formation a sinus

Pus secretions like *medhaprabha*, *snigdha*, *shweta*

*Asthi—Majja Vidradhi*

Exacerbated *doshas* creating vitiation of *Asthi* and *majja*, generate sluggish and mating (slow developing pus) swelling everywhere in the bone, with *jwalanvatvedana*, *chirkal* (chronic), slow pain, and fever.

**Classification (types)**-According to *Acharaya Sushrutavidradhi*s of 6 types<sup>3</sup> so in case of *Asthi-Majjagat Vidradhi* can also be divided in 6 types 1. *Vataja* 2 *Pittaja* 3. *Kaphaja*

4. *Tridoshaja* 5. *Kshatja* (due to injury) 6. *Raktaja* (due to contaminated blood)<sup>4</sup>.

### Clinical features<sup>5</sup>

The *Doshas* located around or in the *Asthi* (bone tissue) on getting vitiated contaminate *twak* (skin), *Rakta* (Blood), *Mamsa* (Muscles) and *Meda* (fat) which develop gradually into big size and get hard in consistency. This is called *Asthi-Majja Vidradhi*. *Asthi-majja Nirodhana* having discharge as *Medoprabha*, *Snigdha*, *Shukla*, *Shita*, *Guru* and associates clinical features depending on aggravated *doshas*.

1. **Vataja**– Thin and transparent secretion or fluid associated with pain, hard texture, color of secretion is black

2. **Pittaja** – Secretion yellow in color associated with burning sensation.

3. **Kaphaja**- color of secretion is white in color and cold in touch associated with mild pain.

4. **Sannipataja**- vitiation of all 3 doshas secretion different in color

5. **Kshataja**-this is caused due to injury. Vitiation *vata*, *pitta*, and *rakta* after injury and associated with fever, thirst, burning sensation hence inflammatory and suppurative in nature.

6. **Raktaja** – due to the vitiation of *Rakta* (contaminated blood), secretion dark black in color.

### TREATMENT PRINCIPLE<sup>6</sup>

According to *Acharaya Sushrut Asthi-majja Vidradhi* is challenging to treat. The principle of treatment includes *Snehan*, *Swedan*, *Raktavsechan* in the immature stage of the abscess, *Ekadasupkrama* to liquefy the abscess,

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and *Bhedana Karma* (curettage) in the maturation (liquefaction) of the abscess. After *Bhedan karma*, *vranashodhan* is done by *Tikatdravyakshaya* by external application and *Raktshodanatiktaghritas* for internal uses. If there is no discharge from the abscess, the wound should be cleaned with *Kshayas* (decoction) as mentioned in *Ayurvedic* texts. *Acharya Sushruta*

has explained the oil prepared with *Dravyas* such as *Priyangu*, *Dhataki*, *Rodhra*, *Katphala*, *Tinisa* and *Saindhava*. This heals up the wound of *Asthimajjavidraddhi*.

## MEDICATIONS

**Different types of *AntaVidraddhiharakashaya*** are explained below in tables 2 to 6 shown as-

**Table 2** *Vyaghryadi kashaya*<sup>7</sup>

Ingredients	Botanical Name	Method of using	Indications
<i>Kantakari</i>	<i>Solanum xanthocarpum</i>	The decoction prepared with these ingredients should be served fresh	Abscesses formed inside the body
<i>Varuna</i>	<i>Crateva religiosa</i> / <i>Crateva nurvula</i>		
<i>Agnimantha</i>	<i>Clerodendrum phlomidis</i> / <i>Premna integrifolia</i>		
<i>Shrigu</i>	<i>Moringa oleifera</i>		
<i>Ginger</i>	<i>Zingiber officinale</i>		
<i>Punarnava</i>	<i>Boerhaavia diffusa</i>		

**Table 3** *Mustadi kashaya*<sup>8</sup>

Ingredients	Botanical Name	Method of using	Indications
<i>Musta</i>	<i>Cyperus rotundus</i>	The decoction prepared with these ingredients should be served fresh with honey.	1. Abscesses formed inside the body 2. Destroys pus
<i>Sandalwood</i>	<i>Santalum album</i>		
<i>Darvitwak</i>	Bark of <i>Berberis aristata</i>		
<i>Bhunimba</i>	<i>Andrographis paniculata</i>		
<i>Ushira</i>	<i>Vetiveria zizanioides</i>		
<i>Kutaja</i>	<i>Holarrhena antidysenterica</i>		

**Table 4** *Varunadi Gana Siddha Kashaya*<sup>9</sup>

Ingredients	Botanical Name	Method of using	Indications
<i>Varuna</i>	<i>Crateva religiosa</i> / <i>Crateva nurvula</i>	The decoction prepared with these ingredients should be served fresh	1. <i>Kapha</i> disorders 2. <i>Vatarakta</i> 3. <i>Sororoga</i> 4. <i>Abhyantragranthi</i> 5. <i>Abhyantravidhradi</i>
<i>Saireyakayugma</i>	Two types of <i>Barliapronitis</i>		
<i>Shatavari</i>	<i>Asparagus racemosus</i>		
<i>Chitraka</i>	<i>Plumbago zeylanica</i>		
<i>Murva</i>	<i>Marsdenia tenacissima</i>		
<i>Bilwa</i>	<i>Aegle marmelos</i>		

**Table 5** *Nimbadi Kashaya*<sup>10</sup>

Ingredients	Botanical Name	Method of Drug	Indications
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<i>Neem Bark</i>	Bark of Azadirachta indica	The decoction prepared with these ingredients should be served fresh with honey and purified <i>Guggulu</i> . i.e. Commiphoramukul for 6 days	<i>Abhyantravidradhi</i> <i>DustaVrana</i>
<i>Guduchi</i>	Tinosporacardifolia		
<i>Ginger</i>	Zingiberofficinale		
<i>Daruharidratwak</i>	Bark of Berberisaristata		
<i>Vasa</i>	Adhatodavasica		
<i>Phalatraya/Triphala</i>	Fruits of- Terminaliachebula Terminaliabelirica Emblicaofficinalis		

**Table 6 Dashamuladi Kashaya<sup>11</sup>**

Ingredients	Botanical Name	Method of using	Indications
<i>Dashmoola</i>	Ten roots	The decoction prepared with these ingredients should be served fresh with honey and purified <i>Guggulu</i> i.e. Commiphoramukul for 6 days	1. Fever 2. Abscess 3. Swelling
<i>Guduchi</i>	Tinosporacardifolia		
<i>Haritaki</i>	Terminaliachebula		
<i>Devadaru</i>	Cedrusdeodara		
<i>Punarnava</i>	Boerhaviadiffusa		
<i>Shigru</i>	Moringaoleifera		

**MODERN VIEW**

**Osteomyelitis (OM)** is an infection of bone and bone marrow. The symptoms include pain in a specific bone with overlying redness, fever and weakness.<sup>12</sup> The long bones of the arms and legs are most commonly involved in children while the feet, spine, and hips are most commonly involved in adults.<sup>13</sup>

**Etiology-**In hematogenic osteomyelitis, a single pathogenic **organism** is almost always removed from the bone. In adults, *Staphylococcus aureus* is the most common isolated organism. In infants, the most common pathogens isolated from blood or bone are *Staphylococcus aureus*, *Streptococcus agalactiae*, and *Escherichia coli*. However, in children older than 1 year, *Staphylococcus aureus*, *Streptococcus pyogenes*,

and *Haemophilus influenzae* are isolated with greater frequency<sup>14</sup>.

**Classification<sup>15,16</sup>**- In the medical literature and in clinical practice following are the classification systems by Waldvogel and Cierny-mader.

**Waldvogel system based on**

- (1) Duration either acute or chronic.
- (2) Source of infection, as hematogenous when it originates from a bacteremia or as contagious focus when it originates from an infection in a nearby tissue.
- (3)vascular insufficiency.

**The Cierny-Mader classification** is a clinical classification based on anatomical, clinical and radiological features. It is divided into four stages.

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Stage 1 or medullary osteomyelitis, is limited to the medullary cavity of the bone.

Stage 2 or superficial osteomyelitis affects only the cortex and is mainly due to direct inoculation or infection with the adjacent focus.

Stage 3 or localized osteomyelitis, usually affects both the cortex and the medullary bone.

Stage 4 or diffuse osteomyelitis affects the entire thickness of the bone with loss of stability, as in infected nonunions.

**Pathogenesis;**-Acute osteomyelitis presents as a suppurative infection accompanied by edema, vascular congestion and small vessel thrombosis. In early acute disease, the vascular supply to the bone is reduced by an infection that spreads to the surrounding soft tissue. Large areas of dead bone (sequestra) may be formed when the medullary and periosteal blood supplies are compromised.<sup>17</sup> inflammation of bone marrow tissue

Spread exudate along the marrow space

Thrombosis of vessels due to compression

Necrosis of bone

Liquefaction of necrotic tissue

Lifting of periosteum due to further necrosis

**MANAGEMENT**–The osteomyelitis treatment includes adequate drainage, followed by debridement and obliteration of dead space, wound protection and culture-directed antibiotic coverage. In a compromised host, efforts should be made to correct or improve host defenses, and particular attention should be paid to the patient's nutrition, cessation of smoking and dealing with specific abnormalities such as diabetes.

**1. Antibiotic therapy**-Once the cultures are established, treatment with parenteral antibiotics is started to cover up clinically suspected pathogens. Once the organism has been identified, a specific antibiotic or antibiotics are selected through susceptibility testing. If immediate debridement surgery is required before cultures can be obtained, empirical broad-spectrum antibiotics can be instituted and the regimen can be modified when the results of cultures and susceptibility tests are known. Initial antibiotic therapy for long bone osteomyelitis may be nafcillin or clindamycin (or vancomycin for MRSA, methicillin-resistant *Staphylococcus epidermidis*, or *Enterococcus* spp. are suspected) and ciprofloxacin (except in children where an aminoglycoside must be used). Although levofloxacin has been utilised, serum levels have fallen below the minimal inhibitory concentrations and dosing has currently failed in both human and animal osteomyelitis studies<sup>19,20</sup>

**2. Surgery**-Surgical management of osteomyelitis is very challenging.

**1. Surgical debridement**- Proper surgical debridement will reduce the bacterial load, remove dead necrotic tissue, and allow the host's immune system and antibiotics to stop the infection. Adequate debridement may leave a large bony defect or dead space. The proper management of dead space is critical for halting the disease and preserving the bone's integrity. The objective of dead-space management is the replacement of dead bone and scar tissue with durable vascularized tissue<sup>21</sup>

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2. **Bone Grafts** - An alternative technique is to place cancellous bone grafts beneath local or transferred tissues until structural integrity has improved. This technique requires careful elective surgery to conserve the patient's limited cancellous bone reserves. Open cancellous grafts without soft tissue covers can help when free tissue transfer is not an option and local tissue flaps are inadequate. Antibiotic-impregnated acrylic beads or antibiotic-loaded cement also may be used to sterilize and temporarily maintain dead space<sup>22</sup>

## DISCUSSION

In present era, *Asthi-vidradhi* can be correlated with osteomyelitis. *Asthi-vidradhi* should be treated like a *DushtaVrana*. The *Vrana* more than a week are called *DushtaVran* which fails to heal for a long period due to predominance of *Vata* and *Pitta Dosha* and which are chronic.

1. **SNEHAN AND SWEDAN**- *Akanga*(local) and *Sarvanga*(complete)-*Snehan* and *Swedan* increases blood circulation of affected bone. It controls the vitiated the *Vata Dosha* by removing *Margaavarodh* and reduces *Vedana* (throbbing pain) and *Shotha* (swelling). Local *swedan* also increases vascularity of affected area.

### 2. **RAKTAVSECHAN**-

*Raktavsechan*(bloodletting) decreases the bacterial load, removes dead necrotic tissues and give a more chance for the host immune system to arrest and elimination of infection. *Raktavsechan* helps to remove

*RaktaDhatu* pollutants, decrease *strotorodha* that increase blood circulation and nourishment for proper granulation tissue creation (resolving in bone cavity with healing of bone)

3. **BHEDAN**-*Bhedan karma* (Surgical debridement) is treatment of choice of *Acharya Sushruta* as well as modern science. Adequate *Bhedan karma* decreases the bacterial load, removes dead necrotic tissues.

4. **VRANA SHODANA AND ROPANA**- The different types of *vidradhi harakashaya* (*Strotoshodha*, *Raktaprasadka* drugs) being capable for blood purification and enhancing destroying micro-organism in place of antibiotics. The *Shastiupkarma* could rightly be explored in a novel way for the treatment of chronic osteomyelitis (*Asthi-majjavidradhi or dushtavrana*).

## CONCLUSION

In *Sushruta Samhita*, the principle explained by *acharya Sushruta's* is definitive treatment of *Asthi-majja Vidradhi* (Chronic osteomyelitis), which can be effective in present era and *Ayurvedic Anta Vidradhi harakashaya* can be best alternative of antibiotic therapy. It is clear concept of *Asthi-majjavidradhi* management which can offer us good supportive treatment protocol.



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