



## Orthopedics In India

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*Ayurveda is a complete science of life, where we get elaborate descriptions about prevention of disease in a healthy individual as well as the management diseases. One of the common problems and challenges to modern world is trauma and the management the skeletal system injuries which occur as the result of trauma in most of cases. Such skeletal injuries are well explained with their classification and treatment in classical Ayurvedic Literature. Such orthopedic conditions are well explained and documented in the literatures of Ayurveda in the name of Bhagna Chikitsa. This paper presents a historic perspective of fracture management in the Ayurveda tradition.*

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### Introduction

Traumatic conditions skeletal system injuries are as old as the evolution of human beings. The accidental injuries are unavoidable incidents from the day of origin of mankind to till these modern days. Once an injury has been received it is natural reflex of our body to make it to heal in a quicker & better way<sup>1</sup>.

In some such conditions our body requires assistance for healing assisting or helping an injured bony tissue /cartilaginous tissue is termed as Bhagna Chikitsa in ancient Ayurvedic literature. In India, this type of traumatic orthopedic surgery was well practiced by Acharya Sushruta in 1<sup>st</sup> cent B.C.

The word orthopedics in modern surgery denotes straightening of the bent limbs. In the period of Hypocrites this orthopedic practice started in western system of medicine whereas Bhagna Chikitsa denotes correction of broken bones. Elaborate description of this branch of traumatic orthopedic surgery is available in ancient Indian literature .The Sushruta samhita is a treatise written by Acharya Sushruta, has mentioned orthopedic surgery in detailed form. It is fact that the management of skeletal injuries is well advanced in today's modern era. But it is also true that the principles of diagnosis & management of skeletal injuries laid down by Sushruta still hold good & deserve appreciation. When there was no existence of any system of medicine in those days on advanced orthopedic surgery existed & practiced with almost perfection.

Sushruta has devoted 2 chapters for diagnosis & treatments for fracture & dislocation which refers all the basic principles involved in handling such cases. The concepts mentioned by Sushruta are based on vast clinical experience & observation.

There are different of opinions regarding Sushruta & his period. But in general it is believed that Sushruta lived in Buddic period that may be around 1500-800 B.C. As our present interest is not decide Sushruta's period we will more concentrate on word of orthopedic surgery.

Sushruta has described osteology, etiology, pathology of fractures, clinical features, types, non-surgical & surgical management & complication & their management.

### **Osteology In Ayurveda<sup>2</sup>**

Bones in Ayurveda are termed as 'Asthi'. The substance which remains for long period even after death of human body is the bone & which is the meaning of Asthi. Ayurveda has explained the embryological origin of bony tissue. It is mentioned that in the 3<sup>rd</sup> month of intrauterine life there is formation of bony tissue. These bones are further classified in ancient Indian literature based on their size & shape in 5 types these are

- 1) Kapala - which means broken mud pot- **flat bones**
- 2) Ruchaka –that which has got luster in it-**teeth**
- 3) Taruna –means soft bones-**cartilagous**
- 4) Valaya –**curved bones**
- 5) Nalaka –stick like or rod like-**long bones**

Further these bones are classified based on their position like bones of upper extremity, lower extremity, etc.

### **Causes Of Fractures:-**

Acharya Sushruta was well aware that an insult to a bone is a cause for break in its continuity & this insult may be due to external factors like trauma or due to internal factors like some diseases. Specifically Sushruta has mentioned trauma is the major cause of bone injury & joint dislocations. The trauma that which causes Fracture are-

- Fall from height
- Blows
- Squeezing
- Beating
- Bite from wild animals, etc

These causative factors given by Sushruta in view of the commonest everyday injuries resulting in different type of fractures. As in those days people used to leave in villages & used to travel from one place to another on animals. So the causative factors which he has mentioned may not be more popular in today's modernized townships. But the principle behind it is there should be a trauma for an injury to bone.

### **Fracture Physics-**

Sushruta was well aware the trauma is major cause for Fracture and depending on direction of force, velocity of force, the bones sustain different types of injuries & they exhibit different type of Fracture which is described in next context of paper. Whereas he used to diagnose the type of Fracture based on the type of

bone & the force it sustains. He has mentioned the trauma on cartilages make them bend, on long bones they break, flat bones they tear or there will be multiple cracks & the small bones like teeth may get fragmented. These diagnostic steps put by Sushruta are perfect even today & those days without x-rays Sushruta used to diagnose Fracture by above manner & used to treat them properly.

## Classification Of Bone Injuries<sup>2</sup>

All skeletal injuries are classified basically in 2 types-

- 1) Savrana bhagna-open or compound Fracture
- 2) Avrana bhagna-closed or simple Fracture

This classification is important in the management of Fracture's. Sushruta has clear idea between a Fracture and dislocation. So he has classified traumatic injuries into

- 1) Sandhimuktha-Dislocations
- 2) Kandabhagna-Fractures

These injuries further classified into 6 types of dislocations & 12 types of fractures. Those are

### **D) Sandhimoksha**

- 1) Utklista-fracture dislocation
- 2) Vishshlista-dislocation due to tear of ligament
- 3) Vivartita-anterio posterior dislocation
- 4) Avakshipta-downward displacement
- 5) Atikshipta-gross displacement
- 6) Tiryakakshipta-oblique displacement

Again this classification of dislocation depends on articulating bone & the direction of force they sustain. Even today such classification is in use in a western system of medicine.

The Fracture is of 12 types. Those are

- |                  |                               |
|------------------|-------------------------------|
| 1) Karkataka –   | Depressed Fracture            |
| 2) Ashwakarna-   | Complete oblique Fracture     |
| 3) Churnita-     | Comminuted Fracture           |
| 4) Pichita-      | Compressed Fracture           |
| 5) Asthichalita- | Periosteal evulsions Fracture |
| 6) Kandabhagna-  | Complete compound Fracture    |
| 7) Majjanugata-  | Fracture impaction            |
| 8) Atipatita-    | Complete compound Fracture    |
| 9) Vakra-        | Green-stick Fracture          |
| 10) Chinna-      | Incomplete Fracture           |
| 11) Patita-      | Comminuted Fracture           |
| 12) sputita-     | Fissured Fracture             |

The fact it is understood by seeing the above classification that with Sushruta with his clinical experience without the help of radiographies was able to describe all types of fractures & even after 2000yrs these Fracture classification holds good & there is no change in it.

The important point to note here is Sushruta was keen & particular about his observation. By seeing Fracture classification like periosteal evulsion, incomplete Fracture & green-stick Fracture. It appears that Sushruta's classification is more fine & superior than modern Fracture classification. Here it is also observed that Sushruta has not limited himself to classify only discontinuity of bones (fractures).

### **Clinical Features<sup>3</sup>-**

The general clinical features of fractures noted by Sushruta are as mentioned below-

- I) In case of dislocation there will be
  - i) Inability to extend, flex, circumbduct the limb.
  - ii) Severe pain
  - iii) Tenderness
- II) In case of fractures
  - i) Marked swelling
  - ii) Tenderness
  - iii) Crepitus
  - iv) Loss of function of limb
  - v) Different types of pains
  - vi) Inability to find comfort in any position.

With observing these features we feel that even after 2000yrs no alteration is required in these features & even till today a Fracture patient will report to the OPD with one or more above mentioned features.

This indicates the perfection that sushrutha achieved in those days without the ultramodern amenities. One more point to note here is in his clinical features sushrutha has mentioned as different types of pain where it indicates sushrutha has gone further deep into the subject. He has not only limited to type of fracture like complete/an oblique fracture, he was also aware after an trauma there will cause the vitiation of three humors of the body and probably he wants to explain a different body constituent person will exhibit different types of pain.

### **Prognosis-**

The prognosis of the case of skeletal injury depends on several factors like

**Age-** In children fracture will heal quickly if immobilized properly

In elderly patient there is a chance of delayed healing due to their body constituents.

**Site Of Fracture-** If a fracture of skull involving brain injury or a vertebral fracture involving spinal cord are difficult to treat.

**Type Of Fracture-** If there is more damaged, gross displacement/missing of bony piece there is delayed healing.

In case of simple fracture /green stick fracture there will be early or good healing.

#### **Status Of Bone-**

A previously deformed/diseased bone or joint, if it sustains further injuries are incurable.

#### **Status Of Patient-**

The general condition of patient is an important factor for fracture healing. An old aged emaciated patient or patient with debilitating diseases like DM, etc will have bad prognosis.

#### **Season-**

There is influence of various seasons on over body and it also influence on our body. Winter is better season in compare to others.

#### **Complication Of Fractures-**

The complications may be -1 local 2 systemic

#### **The local complications may be-**

Mal union

Non union

Delayed union.

#### **Systemic complication like-**

- Fever
- Abdominal distension
- Cessation of passage of excreta like urine and feces

Further it is also mention in ancient literature that advanced complication of fracture like sepsis which results into septicemia or toxemia.

#### **Principles Of Management Of Fractures<sup>4</sup>**

The management of a case is always challenging. The management practiced today is bound to be modified tomorrow. It always depends on need of the day. Whatever treatment modality sushruta practiced in several years ago is effective even today which requires a justified. Due to development in the science and technology, there is tremendous change in fracture management. However the principles behind every line of management if correct lay down would universally remained unchanged whatever be the means that may be adopted to achieve them. The efficacy of sushruta skill regarding the management of fracture can be very well put to test on this basis.

Unchangeable principles-

There are four principles which sushruta has mentioned for treating of skeletal injuries. They are-

1. Anchana – Traction
2. Pidana – Manipulation by local pressure
3. Samskepana – opposition and stabilization
4. Bandhana - Immobilization

These four principles are the basic principles of fractures without applying this it is not possible to treat a fracture case.

Other than these Sushruta has given different treatment principles of fracture management. Those are

1. Reduction – Fracture required reduction and for reducing displaced fragment brought to alignment and depressed fragment should be elevated and elevated fragment to be depressed to make proper alignment.

2. Immobilization – Once the manipulation is done with proper alignment then that requires immobilization for better healing and this immobilization is achieved by putting splints around Fracture area. The ward kusha bandhana denote splinting/usage of splints & here he has specifically mentioned certain plant barks for this purpose like banyan tree, bamboo, Arjuna plant etc. The reason for the same may be these tree barks are

- 1) Easily available
- 2) They can be carved in required shapes.
- 3) They are strong externally to immobilize bone.
- 4) They are smooth internally not to irritate the internal skin.
- 5) They also provide cushion effect to limbs and will avoid cushion scars.

### **Parisheka – (Pouring Of Medicated Decoctions)**

Ancient Indian medicinal literature emphasizes to wash/use certain medicated decoctions/milk preparation for pouring over fracture sites. Usually panchavalkala kashaya, triphala kashaya, panchavalkala ksheerapaka are used. By their usage there will be cleaning of that area followed by these decoctions will reduce pain at the injured site & are also responsible for reduction of swelling & early bone healing.

### **Prevention Of Osteomyelitis:**

The ancient Indian surgeons were well aware that if an infection sets in a bone it's very difficult of cure, so it is mentioned in text that a fracture treating surgeon should take utmost care so that no infection sets in a bone.

While managing open fracture they have advised to apply ghee, honey at fracture area. The ghee & honey definitely prevents growing of microbes at wound area.

### **Management Of Mal Union**

In case of mal union the surgeons should re- break bone and it should be properly aligned.

### **Self Splitting**

Sushruta has mentioned to use a healthy palm as a splint in case of Fracture of hand bones\_ or he has mentioned to use healthy finger as a splint in case phalangeal bone Fracture.

### **Special Devices Like Fracture Bed**

In ancient Indian surgery usage of and wooden rod (Musali) for correction of shoulder dislocation is indicated & they also mentioned Fracture bed which consists of 5-6 nails to immobilise the lower limb was used in lower bone Fracture's.

### **Rehabilitation**

The concept of Rehabilitation in orthopedics cases probably its first derived from Ayurveda where it is mentioned immediately after removal of a bandage / plaster pt is unable to do routine activities probably due to muscle wasting. In those cases a surgeon should advise to do the lower exercises to higher exercises like in case of hand bone Fracture a pt should lift mud ball first for few days followed by salt ball & at the end he should lift the heavy objects like is stone. This rehabilitation principle may be a principle to origin physiotherapy.

Other than these Sushruta & his contemporaries who used to manage skeletal injuries have also indicated internal administration of drugs. The milk preparation, prepared with shala is proven bone healing effect such several preparations & drugs are mentioned. Other than these the Surgeons have also mentioned usage of panchakarma therapy like Basti (administration of various medicated enemas), Nasya-(nasal administration of drug) and Raktamokshan- (blood letting procedures) Such a good number of therapies been explained

At the end once bone heals/fracture heals its not sufficient So sushruta has mentioned along with anatomical Healing their should be a functional healing of Bones . To assess these he has given few points like

- 1) There should be absence of gap between broken Fragments
- 2) Absence of shortening
- 3) Absence of deformity
- 4) Painless and easy movement

To conclude injuries of bone and skin where probably the earliest recorded injuries in the history of Medicines. Ancient Indian surgeons/physician were well versed in trauma care and its management. Acharya sushruta has elaborately described types of Bones, causes of bone injuries, its clinical features, and dislocation and their management

In his text book named sushruta samhita The principles of management of fracture mentioned by sushruta are never changing principles even after Any advancement in modern surgery.

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