



STRUCTURAL CHANGES IN SANDHI WITH SPECIAL REFERENCE TO AMAVATA A REVIEW

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ABSTRACT

Ayurveda, the Holistic branch of science is welcomed globally for its rich heritage and everlasting principles and concepts. It stems from the ancient Vedic culture and is considered to be the oldest healing science. A joint is a point where two or more bones or cartilages meet. It's a device that helps to move around. Immovable joints, on the other hand, are designed for growth and may allow for molding during childbirth. In Ayurveda, Sandhi is a technical word indicating that it is a place where two or more bones meet together and the Sandhi may be fixed type or with less or more movement. There are eight types of Sandhi. They are Cheshtavant (movable) and Sthira (fixed). He has also identified the different locations of Cheshtavant and Sthira Sandhi in different parts of the body. This means movable joints are in Shakha (limbs). **Amavata**. *Vata dosha prakopa* and *Ama* formation takes place simultaneously due to their respective causative factors. Thus produced *Ama* circulates in the body driven by the vitiated *Vata* exhibiting an affinity to get lodged in the *Sleshma Sthana* specially *Sandhi*. This circulating *Ama* in *Dhamanis* interacts with *Sthanika Vata*, *Pitta* and *Kapha dosha* giving rise to virulent *Ama*. It becomes qualitatively heavy and viscous, facilitating *Sroto abhishyandana* and *Srotorodha*. These chain of pathological events results in the disease *Amavata*. **Rheumatoid arthritis** affects the lining of the joints, causing a painful swelling that can eventually result in bone erosion and joint deformity. The inflammation associated with rheumatoid arthritis is what can damage other parts of the body as well. While new types of medications have improved treatment options dramatically, severe rheumatoid arthritis can still cause physical disabilities.

KEYWORDS: Sandhi, Joints, Amavata, Rheumatoid Arthritis, Structural changes.

INTRODUCTION

Human beings live in an era where there is rapid advancement in the field of Science and Technology. The advancement made their lives much easier at the same time a bit complicated. The ultimate aim of life is to attain the *Dharma*, *Artha*, *Kama*, *Moksha*. In an attempt to lead a luxurious life, regardless of health, they started harming their body. Ayurveda advocates the principle that "Prevention is better than cure." Accordingly, various theories have been proposed to maintain a healthy life.

Movement is a fundamental aspect of life. When the movement gets affected, life becomes miserable harming the daily activities. Sedentary lifestyle pose serious impact on the physical function giving birth to many diseases, most common among them being diseases affecting the joints. Thus, knowingly or unknowingly they are prone to various diseases.

Sandhi Sharir

In this context, we are dealing with Asthi Sandhi only. Sushruta has further identified Asthi Sandhi functionally into two forms.

Acharya Charaka has defined Sandhi as the joining of two bones. He has mentioned in *Vimana Sthana* that Asthi Sandhi is the root of *Majjavaha Srotas*. Sharangadhara has defined the term Sandhi as a place where two body parts join with the help of *Shleshma* or *Kapha*.

Acharya Sushruta has described various types of Sandhi viz. *Peshi Sandhi*, *Snayu Sandhi* and *Shira Sandhi* etc. Many structures with their functions have been explained in Ayurveda as far as the word Sandhi is concerned. But some concepts mentioned by Acharya have lot of ambiguities.

In this context, we are dealing with Asthi Sandhi only. Sushruta has further identified Asthi Sandhi functionally

into two forms. They are Cheshtavant (movable) and Sthira (fixed). He has also identified the different locations of Cheshtavant and Sthira Sandhi in different parts of the body. This means movable joints are in Shakha (limbs), Hanu (temporomandibular) and Kati (intervertebral regions) while others are fixed. Thus, it can be said that the joints in between Kapalasthi are Sthira (fixed). Though the Hanusandhi (temporomandibular joint) is in between Kapalasthi, but it is a movable joint which is an exception. Similarly intervertebral joints are formed in between Valayasthi which are a little Cheshtavanta (slightly movable). Cheshtavanta (movable joints) can further be classified into Alpacheshavant (less movable) and Bahucheshavant (freely movable).

This broad classification is done by Sushruta and can further be improved as –

- Bahucheshta (diarthrosis)
- Alpacheshtha (amphiarthrosis)
- Sthira or Acheshta (sinarthrosis).

The Bahuchesta type which is the most common

among all types can be further classified on the basis of the axis on which it moves. They are –

- Eka-Dhuriya (uniaxial)
- Dwidhuriya (biaxial) and
- Bahu-Dhuriya (polyaxial).

Every such joint has a Sandhiguha (joint cavity) in between two bony surfaces. There is a Sautrik Kosh (articular capsule) which covers it. The joint cavity develops in the third month of intrauterine life. Within this capsule a jelly like fluid is formed within the Synovial membrane. These joints are known as Snehak Sandhi (synovial joints). Fluids facilitate the movement of articular surface of the joint and avoid rubbing of bony surfaces.

In this reference Sushruta has further stated that the joints move on an axis greased with only Shleshma. Shleshma facilitates their movement. Sushruta has classified the movable bony joints into eight types – Kora, Ulukhala, Samudga, Pratar, Tunnasevani, Vayasatunda, Mandala and Shankavarta.

TYPES OF SANDHI AND STRUCTURES INVOLVED ALONG WITH EXAMPLES

No.	Type of Sandhi	Structure	Examples
1.	Kora	Hinge joint	Anguli, Manibandha, Janu, Kurpara
2.	Ulukhala	Ball & socket joint	Kaksha, Vankshana, Dashana
3.	Samudga	Saddle joint	Amsapeeta, Guda, Bhaga, Nitambha
4.	Prathara	Plain gliding joint	Greeva, Prishtavamsa
5.	Tunnasevani	Sutures	Sira, Kati, Kapala
6.	Vayasatunda	Condylloid Joint	Hanu
7.	Mandala	Circular Joint	Kantha, Hrudaya, Kloma, Nadi
8.	Shankavarta	Bony Labyrinth	Shrotra, Shringataka

PREVALENT PROBLEMS IN SANDHI

Sandhishoola

Shoola could be the symptom that is mainly because of vitiated Vata. It is stated that without Vata Shoola will not occur. Akunchan Prasaranayoh Vedana is explained by Acharya Charaka. Right here Shoola is believed whenever Sandhis are made to do the event of Akunchana and Prasarana.

Sandhishotha

Dosha Sanchaya in particular site is the causative factor for Shotha. In, Prakupita Vata gets enlodged in Sandhi where Srotoriktata is present. So, there is chances of Vata getting accumulated here, resulting in Shotha.

Sandhivishlesha and Stambha

First Sushruta explains this symptom followed by Madhavakara while commenting about this term, Dalhana and Gayadas describes it as a failure to perform flexion and extension. However, this symptom may not to be noticed at the beginning of disease. Whenever disease aggravates the Vata this results in failure of movements.. One is Sandhivishlesha and the other is Stambha. Right here, Sandhivishlesha takes place as a

result of vitiated Vata lodged in Sandhi. Stambha suggests immobility as defined by Dalhana. Arundatta explained Stambha as less or loss of flexion as well as other movements.

Akunchan Prasaranayoh Vedana

Acharya Charaka has explained this symptom. Sandhis perform the function of Akunchana and Prasarana. When Prakupita Vata gets located in Sandhi, it hampers the normal function of Sandhi which results in Vedana during Akunchana and Prasarana.

Amavata

When vitiated Ama and Vata gets lodged in Trika and Sandhi, it leads to Stabdhatata of the body parts and the condition is known as Amavata. The *Tridoshas*, *Saptadhatu*s and *Malas* gets mix up with the *Ama* in the *Amashaya* and leads to the manifestation of various diseases.

Cardinal symptoms of Amavata are Sarvanga or Ekanga Sandhi Shotha, Arti or Shula, Graha or Stabdhatata, Sandhi gaurava, Jwara, Agnimandya and Trishna. Affliction of Sandhi by Ama and Vata is the

central event in the Samprapti of Amavata. So features of affliction of joint may be considered to be the pratyatma Lakshana or cardinal signs and symptoms of Amavata.

Pravruddha Amavata Lakshanas: It is the advanced stage of disease and very troublesome to patients as well as for physicians. According to *Kriyakala*, it is the worst stage of disease. Articular and Extra-articular feature present in this stage have been elucidated by *Madhavakara, Bhavamishra* and *Yoga Ratnakara*.

SAMPRAPTI

A disease before manifesting itself undergoes different stages of pathogenesis and each disease has a specific way of surfacing and it depends upon many other factors. Understanding of *Samprapti* – the pathogenesis of the disease and *samprapti vighatana* – breaking the chain of the same, is very important in treating a disease and bringing back the *Dhatus* to its normalcy. *Samprapti* is to know the factors responsible for genesis of disease and its complete chronology.

Amavata is of five types:

1. *Vishtambhi Amavata:* This type of *Amavata* presents with *Shareera Guruta, Adhmana* and *Basti Shoola*.
2. *Gulmi Amavata:* *Amavata* having *Jatara garjana, Gulmavat peeda* and *Katijadata* is called as *Gulmi*.
3. *Snehi Amavata:* Here, *Gaatra snigdhatata, Jaadya, Mandagni* and excretion of *Vijala* and *Snigdha ama* are characteristic.
4. *Pakva Amavata:* This variety of *Amavata* presents with excretion of *Shyava vijalapitta* and *Pakva ama* along with *Shrama, Klama* associated with *Basti shoola*.
5. *Sarvanga Amavata:* Pricking pain in *Kati pradesha, Prishta, Vaksha*, Pain in *Basti Pradesha, Atopa, Sotha, Sirogourava, Ama Malapravrutti*.

Based on prognosis

Based on the general principle of *Sadhyaasadyata*, *Amavata* can be of 2 types:

1. *Naveena Amavata:* If the duration of disease is not more than one year, it may be termed as *Naveena Amavata*, which is *Sadhya*. For the present study *Naveena Amavata* was one of the inclusion criteria.
2. *Purana Amavata:* If the duration of the disease is more than one year, it is called

Purana Amavata, which is difficult to treat.

Classification of Synovial Joints and Their Movements: Structural consideration

Hyaline (articular) cartilage covers the articular surfaces (occasionally fibrocartilage in certain membrane bones). Articular cartilage is non-nervous, avascular, and elastic. The cartilage, which is lubricated with synovial fluid, produces slippery surfaces for free movement, similar to 'ice on ice.' Fine undulations in the cartilage's

surface are filled with synovial fluid.

A joint cavity filled with synovial fluid exists between the articular surfaces. An articular disc or meniscus may subdivide the cavity partially or completely.

The articular capsule, which is composed up of a fibrous capsule lined with synovial membrane, surrounds the joint. The fibrous capsule is sensitive to stretches imposed by motions due to its abundant nerve supply. This activates the proper reflexes to protect the joint from sprains. This is called the 'watch – dog' action of the capsule. The fibrous capsule is often reinforced by:

Capsular or true ligaments representing thickenings of the fibrous capsule. The accessory ligaments (distinct from fibrous capsule) which may be intra or extracapsular.

Except for the articular surface covered by hyaline cartilage, the synovial membrane lines the entire interior of the joint. The synovia or synovial fluid is a slimy viscous fluid secreted by the membrane that lubricates the joint and nourishes the articular cartilage. The viscosity of the fluid is caused by hyaluronic acid released by synovial membrane cells. The synovial joints always permit for varying degrees of movement.

Structures present in the synovial joints are,

1. Articular cartilage
2. Synovial fluid
3. Intra articular space
4. Joint capsule and synovial membrane.

Articular Cartilage

In synovial joint articular surface is covered with a layer of articular cartilage. It provides a smooth bearing surface so that with the movement, bone glide effortlessly over each other. Articular cartilage prevents concentration of stress, so the bones do not shatter when the joint is loaded.

Synovial Fluid

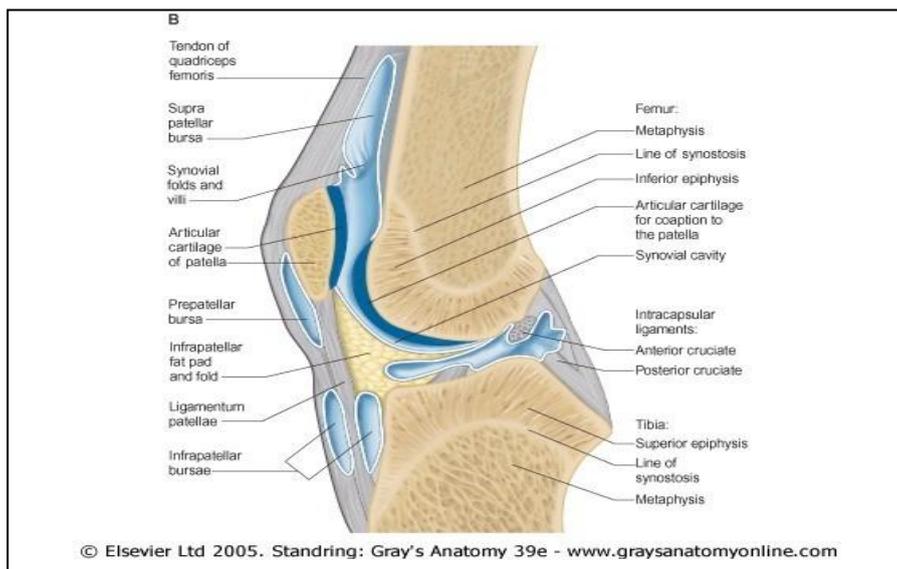
Surface of articular cartilage is separated by Synovial fluid. It is basically ultra filtrate of plasma into which synovial cells secrete Hyaluronan and Proteoglycan. It lubricates the joint.

Intra articular discs

Intra articular disc are the two fibro cartilaginous disc which is present within the joint space. It acts as a shock absorber.

Joint Capsule

Joint capsule is a fibrous structure, richly supplied by blood vessels, lymphatics and nerves. It joins two bones of synovial joint. Ligaments and a regional thickening of joint capsule stabilize the joint. Inner surface is lined by synovial membrane.



Synovial membrane

This membrane contains outer layer of blood vessels and loose connective tissues. Inner layer consists of Type A and Type B synoviocytes. Most of the inflammatory and degenerative joint diseases are associated with thickening of synovial membrane and infiltration by lymphocytes, macrophages.

Rheumatoid arthritis

Rheumatoid arthritis is a chronic inflammatory disorder that can affect more than just joints. In some people, the condition can damage a wide variety of body systems, including the skin, eyes, lungs, heart and blood vessels. An autoimmune disorder, rheumatoid arthritis occurs when the immune system mistakenly attacks own body's tissues. Unlike the wear-and-tear damage of osteoarthritis,

Signs and symptoms of rheumatoid arthritis may include:

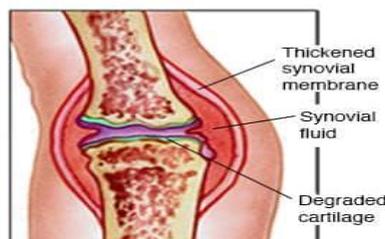
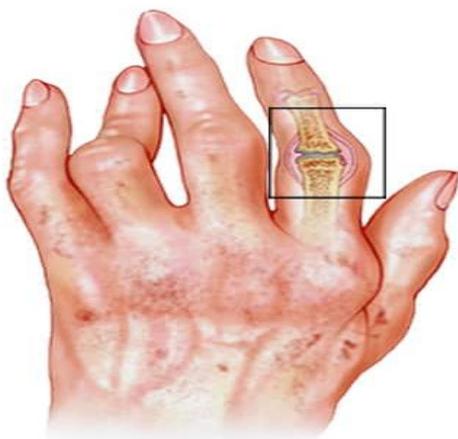
- Tender, warm, swollen joints
- Joint stiffness that is usually worse in the mornings and after inactivity

- Fatigue, fever and loss of appetite

Early rheumatoid arthritis tends to affect the smaller joints first — particularly the joints that attach the fingers to the hands and toes to feet. As the disease progresses, symptoms often spread to the wrists, knees, ankles, elbows, hips and shoulders. In most cases, symptoms occur in the same joints on both sides of the body. Rheumatoid arthritis signs and symptoms may vary in severity and may even come and go. Periods of increased disease activity, called flares, alternate with periods of relative remission — when the swelling and pain fade or disappear. Over time, rheumatoid arthritis can cause joints to deform and shift out of place.

Etiology of Rheumatoid Arthritis

This is perhaps the most common form of inflammatory Arthropathy seen in India. Among adult population below the age of 50 years, this is the most common form of Arthritis which results in the joint damage and physical disability. Because it is a systemic disease, Rheumatoid Arthritis.



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Features of Articular manifestation of Rheumatoid Arthritis:

Any diarthrodial joint may be inflamed. Arthralgia, Arthritis, muscle wasting, tendonitis, tendon rupture and deformities constitute the main lesions. The affected joints are warm, painful, and swollen. Movements are restricted, especially in the morning after sleep (morning stiffness) and after periods of resting. In the hands, there is the typical ulnar deviation of the metacarpophalangeal joints. Sometimes there is anterior subluxation of metacarpal heads and medial dislocation of the extensor tendons. Swan neck deformity of the fingers consist of Hyperextension of the Proximal interphalangeal joints and flexion of the distal interphalangeal joints. This deformity impairs effective handgrip. Sometimes the extensor expansion overlying the proximal interphalangeal joint ruptures resulting in the dorsal protrusion of the head of the proximal phalanx. This leads to the flexion of proximal interphalangeal joints and Hyperextension of the distal interphalangeal joints (boutonniere or button hole) deformity. The extensor tendon may undergo attrition, these result in loss of extension of the fingers (dropped fingers). The thumb may show a 'Z'- shaped deformity (**Hitch-Hiker's thumb**). Large joint like the knees, wrists, ankles, elbows and shoulders may also be involved. Tense synovial effusion may develop in the knees. Baker's cyst are tense cyst developing in the popliteal fossae as a result of collection of synovial fluid. These may occasionally rupture giving rise to a painful and tendor swelling on the calf. Lateral subluxation of the knee joint is also very common. Chronic arthritis develops which leads to permanent deformities. Deformities are also common in the feet. Hammer toe is flexion at the Proximal interphalangeal joint and Hyperextension at the Metatarsophalangeal joint. Hallux valgus (lateral deviation of the big toe) may develop. The arches of the feet may be lost due to affection of the joints and ligaments. Callosities develop over prominent bony points. Less commonly, the cervical spine and Temperomandibular joints are affected. There will be Atlanto-axial subluxation. This leads to pain in the neck and pain referred to the temporal and retro-orbital regions. There may also be a "clunking sound" in the neck on flexion. Tempero-mandibular Arthritis leads to pain on mastication.

CONCLUSION

Arthralgia, Arthritis, muscle wasting, tendonitis, tendon rupture and deformities constitute the main lesions. The affected joints are warm, painful, and swollen. Movements are restricted, especially in the morning after sleep (morning stiffness) and after periods of resting. In the hands, there is the typical ulnar deviation of the meta carpo phalangeal joints. Sometimes there is anterior subluxation of metacarpal heads and medial dislocation of the extensor tendons. Swan neck deformity of the fingers consist of Hyperextension of the Proximal interphalangeal joints and flexion of the distal interphalangeal joints. This deformity impairs effective handgrip. Sometimes the extensor expansion overlying

the proximal interphalangeal joint ruptures resulting in the dorsal protrusion of the head of the proximal phalanx. This leads to the flexion of proximal interphalangeal joints and Hyperextension of the distal interphalangeal joints (boutonniere or button hole) deformity.

So we can see that the important anatomical structures of mainly Hand and Foot along with the other organs are involved when the Amavata is for more than one year.

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