

**SANDHI SHARIR IN AYURVEDA ASPECT**

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Article Received on 21/02/2018

Article Revised on 14/03/2018

Article Accepted on 04/04/2018

**ABSTRACT**

The term Sandhi means samyoga or junction or union or meeting place or association. In context sandhi means asthi samyoga sthaana or the place where bones meet. Thus sandhi or joint is formed when two or more bony ends meet at a place. Acharya Sushruta has quoted that although there are numerous Sandhi in our body which cannot be counted so only Asthi Sandhi should be considered while enumerating Sandhis. There are 210 Sandhi in the human body. Sushruta has classified Sandhi on the following basis: (a) On the basis of function (movements) are classified into Cheshtavanta and Sthira Sandhi while Acharya Gananatha Sen has classified Sandhis on the basis of movements as Bahucheshta, Alpacheshtha, Acheshta. (b) On the structure are classified into 8 types i.e. Kora, Ulukhala, Samudga, Pratara, Tunnasevani, Vayastunda, Mandala and Shankhavarta. A thorough knowledge of the structure and function of the joint is required to diagnose and treat the diseases of joints. So the knowledge of anatomy of joints should be known.

**KEYWORDS:** Sandhi, Cheshtavanta Sandhi, Sandhi Sankhya, Sthira Sandhi, Joint.**INTRODUCTION**

In Ayurvedic Classics Atreya, Dhanvantari Sushruta and all other communities have made it important the knowledge of body to have undoubtedly for the sake of knowledge.

The definition of Sandhi in various Ayurvedic literature are given as "asthi samyoga sthaana" or "to unite" or "the meeting point of two or more structures. counted so only Asthi Sandhi or bony joints should be considered under the term Sandhis. In our Ayurvedic literature different Acharyas have mentioned different numbers of Sandhi. According to Acharya Sushruta Sandhis are two hundred and ten in number, which are responsible for various movements, and are distributed throughout the body.

In Ayurvedic Samhitas the description of anatomy of Sandhi in detail is not found. It is observed that the incidence of joints disorders are increasing in today's world. It is the burning problem for people and society. A thorough knowledge of the structure and function of the joint is required to diagnose and treat the diseases of joints.

**AYURVEDIC REVIEW**

According to Acharya Sushruta only Asthi Sandhi should be taken into account where as other Sandhi of Snayu, peshi and Sira are innumerable and should be excluded while counting.

**Classification of Sandhi-** Main classification is of two types.

1. Kriyanusar (Based on Kriya) 2. Rachananusar (Based on Rachana)

**1. Kriyanusar Vargeekaran (Based on Movement):** The Sandhis are of two types.

**1. Chal (Cheshtayukta Sandhi) Diarthrosis**

**2. Achal (Sthira Sandhi) Synarthrosis**

The Sandhis which are situated in the Shakhas, Kati and Hanu are Cheshtayukta Sandhi while all the remaining Sandhi comes under the Sthira in nature.

The Cheshtayukta Sandhis are further classified into two types based on their extent of movement.

They are-

1. Bahu chala (freely movable)
2. Alpachala (slightly movable)

The Sandhi of Shakhas, Kati and Hanu are of Bahuchala variety and the Sandhi of Prushtha etc. are Alpachala variety

**3. Rachananusar Sandhi Vargeekaran (Based on structure)**

Based on the structure Acharya Sushruta had described 8 types of Sandhi. They are Kora, Ulukhala, Samudga, Pratara, Tunnasevani, Vayastunda, Mandala and Shankhavarta.

**Kora Sandhi (Hinge joint)**

As per the description of Haranchandra in commentary of Sushrut Samhita, Kapat etc. is taken for Nibandhan of a special devise called Kora is known that the Kabja (hinges). The Kora Sandhi is seen in the following region- Anguli (phalangeai), Manibandha (wrist joint), Gulpha (Ankle joint), Janu (Knee joint) and Kurpara (Elbow joint).

**Ulukhala Sandhi (Ball and socket joint)**

These types of Sandhi look like stone grinder used in the kitchen in olden days that's why it is named so. The Ulukhala variety of joints is found at Kaksha (Shoulder joint), Vankshana (Hip joint) and Dashana (Teeth).

**Samudga Sandhi (Saddle joint)**

This variety of Sandhi looks like a box. This variety of Sandhi looks like a box. These Sa- mudga Sandhis is seen at Ansapeeth (Acromio-clavicular joint), Guda (Sacrum), Bhaga (Pubis) and Nitamba (Ilium).

**Pratara Sandhi (Gliding or plane joint)**

According to Dalhana, the articulating surfaces of this variety of joint are flat in nature and floating, supported by cushion and friction is seen in between the articulating surfaces. In Sushruta's opinion this variety of joints are located at Greeva (Cervical vertebrae), kasherukha (Vertebrae) and Prushthavansha (Thoracic vertebrae).

**Tunnasevani Sandhi (Sutures)**

The commentator Gananath Sen has opined that articulating surfaces resembles dentate edges which are supported and stucked together or embedded into one other. This type of Sandhi is found at Sirakapala (Skull) and Katikapala (Hipbone-sacrum, coccyx).

**Vayastunda Sandhi (Condylar joint)**

According to Gananatha Sen the Hanu which is situated within Shankhasthi both side of chin and creat T.M.J. (Temporo-Mandibular joint) is considered as Vayastunda Sandhi. Even Sushruta has got similar opinion about Vayastunda Sandhi.

**Mandala Sandhi**

According to Dalhana the Sandhi, which are oval or round are called as Mandala Sandhi. This type of Sandhi is present in Kantha (Throat), Hrudaya (Heart) and Netra (Eye) Clomnadi (Trachea).

**Shankhavarta Sandhi**

According to Haranachandra, these are circular in nature which resembles the circles of a snail or Shankha. According to Sushruta they are found in Shrotra (Ear) and Shringataka (Cavernus sinus).

**Sandhi Sankhya:** According to Acharya Charaka - 200 Sandhi in body. According to Acharya Sushruta -Body comprises 210 Sandhi. Of these sixty-eight are in the four extremities; fifty-nine in the trunk (Koshtha); and eighty-three in the neck and the region above it.

**According to Modern review**

Joints (articulations) are unions between two or more bones or rigid parts of the skeleton. Joints exhibit a variety of forms and functions. They are constructed to allow for different degrees and types of movement.

**Definition**

- Joint is a junction two or more bones or cartilages.
- An articulation is a point of contact between bones between cartilages and bones, or between teeth and bones.

**Classification of joints**

Joints are classified structurally, based on their anatomical characteristics, and functionally, based on the type of movement they permit. Functionally, joints are classified as one of the following types:

**(i) Structurally Classification of joints**

structurally, joints are classified as one of the following types: Fibrous joints, cartilaginous joints, Synovial joints.

**1. Fibrous Joints**

There is no synovial cavity, and bones are held together by fibrous connective tissue. Fibrous joints permit little or no movement. The three types of fibrous joints are sutures, syndesmoses and interosseous membranes Example- suture of skull, teeth-jaw, lower end of tibia and fibula.

**2. Cartilaginous Joints**

Like a fibrous joint, there is no synovial cavity and the bone are held together by cartilage and allows little or no movement. Here the articulating bones are tightly connected by either hyaline cartilage or fibrocartilage. The two types of cartilaginous joints are primary cartilaginous and secondary cartilaginous joint. Example- pubis symphysis, diaphysis and epiphysis, first costal cartilage and manubrium sterni.

**3. Synovial Joints**

Synovial joints have certain characteristics that distinguish them from other joints. The unique characteristic of a synovial joint is the presence of a space called a synovial (joint) cavity between the articulating bones. Because the synovial cavity allows a joint to be freely movable, all synovial joints are classified functionally as diarthroses. The bones at a synovial joint are covered by a layer of hyaline cartilage called articular cartilage. The cartilage covers the articulating surface of the bones with a smooth, slippery surface but does not bind them together. Articular cartilage reduces friction between bones in the joint during movement and helps to absorb shock.

Example- Shoulder joint and hip joint.

**(ii) Functional-classification of joints**

- **Synarthrosis:** An immovable joint.
- **Amphiarthrosis:** A slightly movable joint.
- **Diarthrosis:** A freely movable joint.

**[1] Synarthrosis (Im-movable)**

**1. Suture (seem)**-Found only B/W bones of the skull; articulating bones united by a thin layer of dense fibrous connective tissue.

Example – Coronal suture B/w frontal and parietal bones.

**[2] Gomphosis** (To bolt together) – Cone shaped peg fits into a socket; articulating bones united by periodontal.

Example- Roots of teeth in alveolo (Socket)

**[3] Syndesmosis** (Bend or ligament) – Articulating bones united by dense fibrous connective tissue.

**(II) Amphiarthrosis (Slightly movable) -**

**1. Synchondrosis** (Together-cartilage)- Primary cartilaginous joint.

- Connecting materials is hyaline cartilage.

Example- Temporary joint B/w the diaphysis and epiphysis of a long bone.

**2. Symphysis** (Growing-together)- Secondary cartilaginous joint.

- Connecting material is a broad, flat disc of fibrocartilage.

Example- Intervetebral discs and pubic symphysis.

**(III) Diarthrosis (Freely movable)**

**1. Gliding** (Arthodial joint) – Articulating surfaces usually flat,

Example-

1. Intercarpal and intertarsal joint.
2. Gliding joint B/w the navicular and II, III cuneiforms of the tarsal bone.

**2. Hinge** (Ginglymus joint)- Convex surface fits into a concave surface.

Example- 1. Elbow ankle and interphalangeal joint.

2. Hinge joint B/w the trochlea of humerus and trochlear notch of ulna at the elbow.

**3. Pivot** (Trochoid (wheel) joint)- Rounded or pointed surface fits into a ring formed partly by bone and partly by a ligament.

Example- 1. Joint B/w atlas and axis, joint at proximal ends of radius and ulna.

2. Pivot joint B/w head of radius and radial notch of ulna.

**4. Condylloid** (Ellipsoid joint)- Oval shaped condyle fits into an elliptical (round) cavity of another bones.

Example- 1. Joint B/w radius and carpals (scaphoid and lunate).

2. T. M. J. (Temporo mandibular joint)

3. Knee joint.

**5. Saddle** (Sellar joint) – Articular surface of one bone is saddle shaped and the articular surface of the other bone is shaped like legs of a rider sitting in the saddle.

Example- 1. Joint B/w trapezium of carpus and metacarpal of thumb.

**6. Ball and socket** (Spheroid joint)- Ball like surface of one bone fitted in to a cuplike depression of another bone.

Example-

1. Shoulder joint and hip joint.
2. Ball and socket joint B/w head of femur and acetabulum of the hip bone.

**DISCUSSION**

In Ayurvedic classics Sandhis have been classified into eight types by taking account of shapes of Sandhis mainly, movement of Sandhis has not been considered whereas in modern science, the classification of Sandhis has been done by taking account of both structure and function (movement).

**Kora Sandhi**

Kora Sandhi is like Garta (pit). According to modern Anguli Sandhi (Interphalangeal joint), Gulpha Sandhi (Ankle joint), Koorpara Sandhi (Elbow joint) are hinge variety of synovial joint. Manibandha Sandhi (Wrist joint) is ellipsoid variety of synovial joint and Janu Sandhi (Knee joint) is Compound synovial joint, in which two condylar joints between the condyles of the femur and tibia. So on the basis of shape of articulating surfaces hinge joint, ellipsoid joint and condylar joint can be included in Kora Sandhi of Ayurveda.

**Ulukhala Sandhi**

In this type of Sandhi one bone has mortar like structure which unites with pestle like head of another bone. Kaksha Sandhi (Shoulder joint) and Vankshana Sandhi (Hip joint) are ball and socket joints. Dashana Sandhi is gomphosis joint. A gomphosis is a specialized fibrous joint in which a conical process or peg of one bone fits into a hole or socket in another bone. So on the basis of shape of articulating surfaces ball and socket joint and gomphosis joint can be included in Ulukhala Sandhi.

**Samudga Sandhi**

These Sandhis have articulating ends which look like a Samputa (box) or an enclosed shell. Ansapeetha (Acromioclavicular joint) and Nitamba (Sacroiliac joint) are plane joints. Guda (Sacrococcygeal joint) and Bhaga (Pubic symphysis) are Secondary cartilaginous joints. So on the basis of shape of articulating surfaces plane joints and secondary cartilaginous joints can be included in Samudga Sandhi.

**Pratara Sandhi**

In Ayurvedic classics has mentioned that these types of joints are formed from articulation of 'Samatala' or flat part of slightly movable bony parts. Greevavansha and

Prushthavansha are Intervertebral joints. The joint between the vertebral bodies is secondary cartilaginous joint. So on the basis of shape of articulating surfaces secondary cartilaginous joints can be included in Samudga Sandhi.

#### **Tunna Sevani Sandhi**

Tunna Sevani is a suture type of joint. Shiro- kapala and Katikapala have sutural joints. So sutures can be included in Tunnasevani Sandhi.

#### **Vayastunda Sandhi**

Where Sandhi is like beak of crow is regarded as Vayastunda Sandhi. Hanu Sandhi (Temo- romandibular joint) is the condylar joint. So condylar joint can be included in Vayastunda Sandhi.

#### **Mandala Sandhi**

Sushruta classified Sandhi into two types. Those which can be counted and are between the bones and another type of joints are countless as these are the joints or junctions between Peshi (muscles), Snayu (tendons), Sira (vessels). Later type of junction is present in Kantha (larynx), Hrudaya (heart), eyes and Klom Nadi (trachea) as Sandhi. In Netra joints between five Mandalas form six Sandhis.

#### **Shankhavarta Sandhi**

Here the meaning of Shankhavarta should be taken as irregular structure. By Shankhavarta Sandhi it should be considered a joint of irregular structures (or irregular form). The word Sandhi in Ayurvedic classics do not focus on joints of bones only, it may be joints between two cartilages or between two Peshi (muscles), Snayu (tendons) and Sira (vessels).

Shrotra is mentioned in classics as a Shankha- varta Sandhi. So on going through the anatomy of the ear it is found that the joint of ear ossicles along with cochlea can be considered as Shankhavarta Sandhi in Shrotra.

The location of Shringataka is not clearly described in classics. So on going through the study of Shringataka Marma scholars have Shringataka Marma in nose. So the Sandhi should be present in nose as conchi, which is present as irregular form like Shankhavarta.

#### **CONCLUSION**

The various classical texts of Ayurveda have defined Sandhi as meeting place of two or more Asthis. Ayurveda and modern science both are same classification basis on the structural and function. Kora Sandhi can be considered as hinge joint, Ulukhala Sandhi may include ball and socket variety of synovial joint and gomphosis variety of fibrous joint. Ansapeetha, Guda, Bhaga, Nitamba has Samudga Sandhi can be considered as acromioclavicular, sacrococcygeal, pubic symphysis, and sacroiliac joint respectively. In Pratara, Greeva and Prushthavansha may include intervertebral joint. Sutures

as Tunnasevani and Hanu in Vayasatunda may be taken as tempomendibular. Sankhavartha include Shrotra and Shringataka can be correlated with cochlea and region of nasal conchae.

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