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A REVIEW ARTICLE ON CONCEPTS OF SANDHISHARIRAM IN AYURVEDA

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ABSTRACT

The meaning of word Sandhi is "the point where two or more structures meets." According to modern a point where two or more bones are articulates with each other is called joint. Acharya Sushruta has stated that although there are numerous Sandhi in our body which cannot be counted so only Asthi Sandhi should be considered while calculating Sandhis. The number of sandhi in human body are two hundred and ten. Sushruta has classified Sandhi as following: (a) On the basis of function (movements) are classified into Cheshtavanta and Sthira Sandhi and Acharya Gananatha Sen has given classification of Sandhis on the basis of movements as Bahucheshta, Alpacheshta, Acheshta. (b) according to structure are classified into 8 types i.e. Kora, Ulukhala, Samudga, Pratara, Tunnasevani, Vayasatunda, Mandala and Shankhavarta. A thorough understandind of the anatomy of joints is essential to diagnose and treat joint disorders effectively.

KEYWORDS: Cheshtavanta Sandihi, Joint, Sandhi, Sandhi Sankhya, Sthira Sandhi.

INTRODUCTION

In *ayurvedic* literature the detail knowledge of body is essential for every clinician. The definition of Sandhi in various *ayurvedic* grammatical literature are stated as "the union" or "to unite" or "the point where two or more structures meet." Regarding this *Acharya Sushruta* has stated that although there are numerous *Sandhi* in our body which cannot be counted so only *Asthi Sandhi* should be considered while enumerating *Sandhis.*

In our *ayurvedic* classics different *acharyas* have mentioned different numbers of *Sandh*i. According to *acharya sushruta sandhis* are 210 in number, which are held to be responsible for various movements, and their distribution is throughout the body. In *ayurvedic samhitas* the description of anatomy of *sandhi* in detail is not available. It is very well known that the incidence of joints disorders is peak in today's world. It is the burning problem for both families and society in todays situation. A thorough knowledge of the structure and function of the joint is mandatory for diagnosis and treatment of the diseases of joints.

***Ayurvedic* review**

According to *acharya sushruta* only *asthi sandhi* should be counted where as other *sandhi* of *peshi, snayu* and *sira* are not numerable and should be excluded[1]

Classification of *sandhi*-

Mainly is of two types. A. Based on *Kriya* B. Based on *Rachana*

***A. Kriyanusar vargeekaran* (Based on movement)[2]**

The *sandhis* are of two types. i. *cheshtavanta sandhi* & *sthira sandhi*.

The *sandhis* which are present in the *shakhas hanu* and *kati* are *cheshtavanta sandh*i while all the remaining *sandhi* are *sthira* in nature.

The *cheshtavanta sandhis* are further classified based on their extent of movement in two types as follows

1. ***Bahu chala* sandhi** (Freely movable)
2. ***Alpachala sandhi* (**Slightly movable)

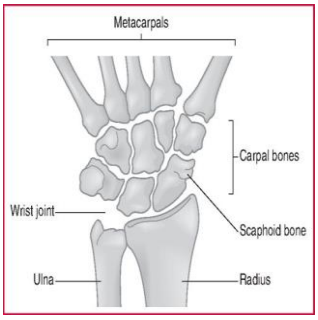
The *sandh*i of *shakhas hanu* and *kati* are of *bahuchala* type and the *sandhi* of *prushtha* Etc. are *alpachala one.*[3]

***B. Rachananusar sandhi vargeekaran*(Based on structure)**

Based on the structure *acharya sushruta* has given description of eight types of *sandhi*. They are as follows *kora, ulukhala, samudga, pratara, tunnasevani, vayastunda, mandala and shankhavart.*[4]

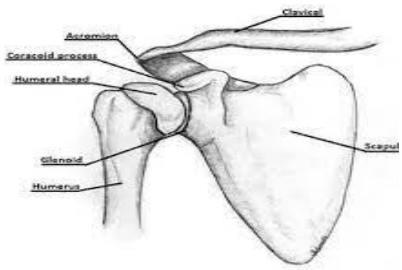
1. Kora sandhi

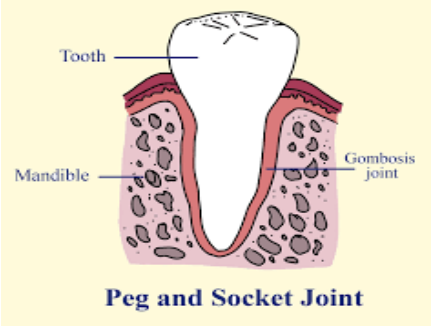
As per the h*aranchandra* commentary of *Sushrut Samhita*, *Kapar* etc. is taken for *Nibandhan* of a special device called *kora* is known that the *kabja* (hinge).[5] The *kora sandhi* is present in anguli, *manibandha, gulpha, janu and kurpara.*[6]



2. *Ulukhala sandhi*

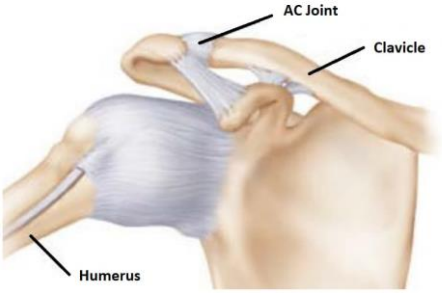
These are the types in which *sandhi* look like stone grinder used in the kitchen.[7] The *ulukhala* variety of joints seen in *kaksha, vankshana and dashana.*[8]





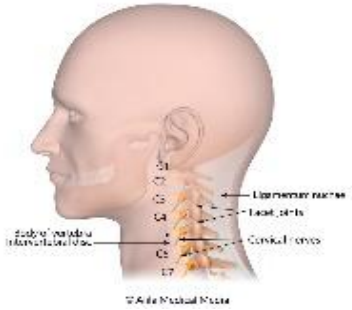
3. *Samudga sandhi*

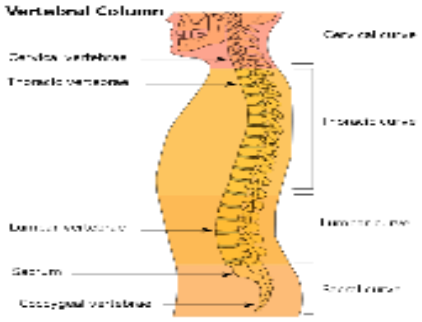
This type of *sandhi* looks like a box.[9] These *samudga sandhis* present at *ansapeeth*, *guda*, *bhaga* and *nitamba.*[10]



4. *Pratara sandhi*

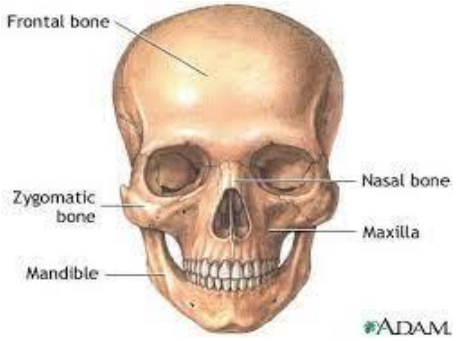
According to *dalhana*, the articulating surfaces of this type of joint are flat and floating, supported by cushion and friction is seen in between the articulating surfaces.[11] These are located at *greeva* and *prushthavansha*.[12]

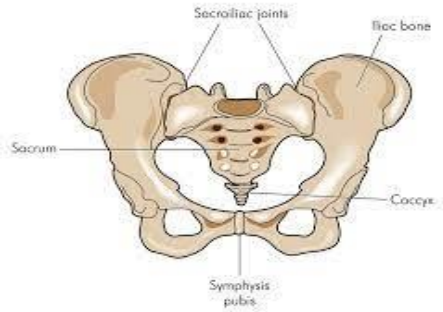




5. *Tunnasevani sandhi*

The commentator *gananathsen* articulating surfaces resembles dentate edges which are supported and stucked together or embedded into one other.[13] This type of *sandhi* present at *sirakapala* and *katikapala*.[14]



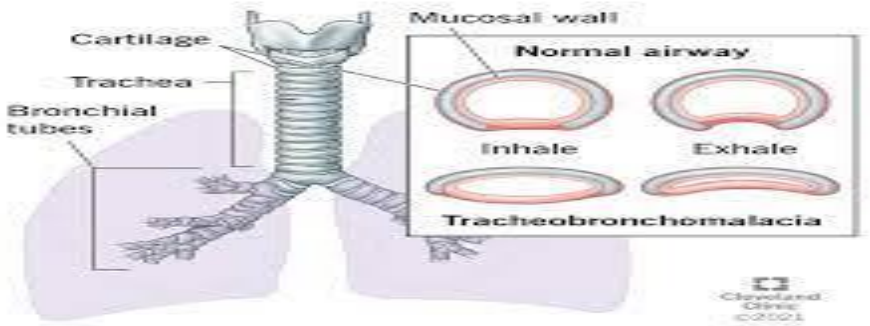


6. *Vayastunda sandhi*

According to *gananathasen* and *sushruta* the *hanu* which is situated within *shankhasthi* is *vayastunda sandhi*.[15,16]

7. Mandala sandhi

According to *dalhana* the sandhi, which are oval or round in shape are known as *mandala sandhi*.[17] This type of *sandhi* is present in *kantha*, *hrudaya* and *Netra*.*[18]*



8. *Shankhavarta sandhi*

Haranachandra states, these are circular in nature which resembles the circles of a snail or *shankha*.[19] According to *sushruta samhita* they are found in *shrotra* and *shringataka*.[20]

***Sankhya*:** According to *acharya charaka*[21] there are 200 sandhi in body and as per *acharya Sushrut*[22] there are210 *sandhi* out of these 68 are in the four extremities; 59 in the trunk *(Koshtha)*; and 83 in the neck and the region above it.

Constituents of *sandhi*

Dhatu

- *Asthi dhatu*
- *Tarunasthi (*Cartilage)
- *Rakta dhatu*
- *Mansa dhatu*

Upadhatu

o *Twacha* (Skin)

o *Snayu* (Ligaments)

o *Kandara*, *Shira* (Tendon, Vessels)

o *Kala - Sleshmadhara Kala* (Synovial Membrane)

Dosha

o Vata Vyana

o Kapha - Sleshaka Kapha (Synovial Fluid)

Modern review

Joints (Articulations) are unions or junctions between two or more bones or rigid parts of the skeleton. Joints exhibit in vafrious 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.[23] An articulation is a point of contact be tween bones between cartilages and bones, or between teeth and bones.[24]

Classification of joints[25]

Joints are classified structurally on basis of their anatomical characteristics and functionally on basis of the type of movement they permit.

Functionally, joints are classified as following types:

Synarthrosis: An immovable joint

Amphiarthrosis: A slightly movable joint.

Diarthrosis: A freely movable joint.

Structurally, joints are classified as following types: Fibrous joints, cartilaginous Joints, Synovial joints

1. Fibrous Joints

There is no synovial cavity present and bones are held together by dense irregular connective tissue. Fibrous joints permit very little or no movement. The three types of fibrous joints are sutures, syndesmoses and interosseous membranes.

2. Cartilaginous joints

Like a fibrous joint, a cartilaginous join lacks a synovial cavity 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.

3. Synovial joints

Synovial joints have certain characteristics that distinguish them from other joints. The unique characteristic of a synovial joint is it have 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 works by reducing friction between bones in the joint during movement and helps to absorb sock.

Synovial fluid

The synovial membrane secrets synovial fluid, a viscous, clear or paleyellow fluid named for its similarity in appearance and consistency to uncooked egg white.

Types of synovial joint

Although all synovial joints are similar in structure, the shapes of the articulating surfaces vary in them; thus, many types of movement are possible. These joints are divided into six categories based on type of movement: planar, hinge, pivot, condyloid, saddle and ball-and-socket.

Planar joints- The articulating surfaces of bones in a planar joint are flat or slightly curved. Planar joints primarily permit back- and-forth and side-to-side movements between the flat surfaces of bones.

Hinge joints- In a hinge joints, the convex surface of one bone fits into the concave surface of another bone. As the name implies, hinge joints produce an angular, opening-and closing motion like that of a hinged door.

Pivot joints- In a pivot joint, the rounded or pointed surface of one bone articulates with a ring formed partly by another bone and partly by a ligament.

Condyloid joints- In a condyloid joint or ellipsoidal joint, the convex oval-shaped projection of one bone fits into the oval-shaped depression of another bone.

Saddle joints- In a saddle joint, the articular surface of one bone is saddle shaped and the articular surface of the other bone fits into the "saddle" as a sitting rider would sit.

Ball and socket joint- Is a type of synovial joint in which ball shaped surface of one rounded bone fits in to cuplike depression of another bone.

DISCUSSION

In *ayurvedic* science *sandhis* have been classified into eight types by considering shapes of *sandhis* and movement of *sandhis* has not been considered whereas in modern science, the classification of *sandhis* has been done on basis 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 prakara* of *ayurveda.*

Ulukhala sandhi

In this type of sandhi one bone has mortar like structure which is united 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 prakara.

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* science 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*.

Tunnasevani sandhi

Tunnasevani is a suture type of joint. *Shirokapala* and *katikapala* have sutural joints, sutures can be included in *tunnasevani sandhi*.

Vayastunda sandhi

Where *sandhi* is like beak of crow is regarded as *vayastunda sandhi*. *Hanu sandhi* (Temporomandibular joint) is the condylar joint. So condylar joint can be included in *vayastunda sandhi.*

Mandala sandhi

Sushruta classified *v*into two types. Those which can be counted as some 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 consider a joint of irregular structures (or irregular form). *Shrotra* is mentioned in classics as a *shankhavarta 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 *samhitas*. So on going through the study of *shringataka marma* scolars 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* are 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 *prushravansha* may include intrevertebral joint. Sutures as *tunnasevani* and *hanu* in *vayasatunda* may be taken a tempomendibular. *Sankhavartha* include *shrota* and *shringataka* can be correlated with cochlea and region of nasal conchae.

REFERENCES

1. Sushruta, Sushruta Samhita, Edited With Ayurveda Tatvasandipika Hindi Commetary, By Kaviraja Ambikadutta Shastri, Chaukhambha Sanskrit Sansthan, Varanasi, Year of Sharir Sthana, 2009; 12: 62.
2. Sushruta, Sushruta Samhita, Edited with Ayurveda Tatvasandipika Hindi Commentary, By Kaviraja Ambikadutta Shastri Chaukhambha Sanskrit Sansthan. Varanasi, Year of, 2009; 60: 1 – 12.
3. Pratyaksha Shariram, A text-book of Human Anatomy in Sanskrit, By Gananath Sen, Part, Chaukhambha Sanskrit Sansthan, Varanasi, 1: 115.
4. Pratyaksha Shariram, A text-book of Human Anatomy in Sanskrit, By Gananath Sen, Chaukhambha Sanskrit Sanshan, Varanasi, 1: 115.
5. Sushruta, Sushruta Samhita. Edited With Ayurveda Tatvasandipika Hindi Commentary, By Kaviraja Ambikadutta Shastri. Chaukhambha Sanskrit Sansthan, Varanasi, Year of Reprint, 2009; 61: 1 – 12.
6. Sushruta, Sushruta Samhita, Edited with Sushrutarth Sandeepan Hindi Commentary, By Kaviraja Shri Haranchandra Chaukhambha Sanskrit Sansthan, Varanasi, Year of, 2009; 67: 2 – 12.

7. Sushruta, Sushruta Samhita, Edited with Ayurveda Tatvasandipika Hindi Commentary, By Kaviraja Ambikadutta Shastri Chaukhambha Sanskrit Sansthan, Varanasi, Year of, 2009; 61: 1 – 12.
8. Sushruta, Sushruta Samhita, Edited with Sushrutarth Sandeepan Hindi Commentary. By Kaviraja Shri Haranchandra, Chaukhambha Sanskrit Sansthan, Varanasi, Year of Reprint, 2009; 67: 2 – 12.
9. Sushruta. Sushruta Samhita, Edited with Ayurveda Tatvasandipika Hindi Commentary. By Kaviraja Ambikadutta Shastri Chaukhambha Sanskrit Sansthan, Vara- nasi, Year of Reprint, 2009; 61: 1 – 12.
10. Dalhana, Sushruta Samhita of Sushruta with the Nibhandhasangraha commentary.edited by Vaidya Yadavji Trikamji Acharya, Chaukhamba Surbharati Prakashan, Varanasi, 2012; 367.
11. Sushruta, Sushruta Samhita, Edited with Ayurveda Tatvasandipika Hindi Commentary, By Kaviraja Ambikadutta Shastri, Chaukhambha Sanskrit Sansthan, Varanasi, Year of Reprint, 2009; 61: 1 – 12.
12. Dalhana, Sushruta Samhita of Sushruta with the Nibhandhasangraha commentary. edited by Vaidya Yadavji Trikamji Acharya, Chaukhamba Surbharati Prakashan, Varanasi, 2012; 367.
13. Sushruta, Sushruta Samhita, Edited with Ayurveda Tatvasandipika Hindi Commentary, By Kaviraja Ambikadutta Shastri Chaukhambha Sanskrit Sansthan. Varanasi, Year of Reprint, 2009; 61: 1 – 12.
14. Pratyaksha Shariram, A text-book of Human Anatomy in Sanskrit. By Gananath Sen, Chaukhambha Sanskrit Sans- than, Varanasi, 117: 1.
15. Sushruta. SushrutaSamhita, Edited with Ayurveda Tatvasandipika Hindi Commentary. By Kaviraja Ambikadutta Shastri, Chaukhambha Sanskrit Sansthan, Varanasi, Year of Reprint, 2009; 61: 1 – 12.
16. Pratyaksha Shariram, A text-book of Hu- man Anatomy in Sanskrit, By Gananath Sen. Chaukhambha Sanskrit Sansthan, Varanasi, 117: 1.
17. Sushruta. Sushruta Samhita, Edited with Ayurveda Tatvasandipika Hindi Commentary. By Kaviraja Ambikadutta Shastri Chaukhambha Sanskrit Sansthan, Varanasi, Year of Reprint, 2009; 61: 1 – 12.
18. Dalhana, Sushruta Samhita of Sushruta with the Nibhandhasangraha commentary. edited by Vaidya Yadavji Trikamji Acharya, Chaukhamba Surbharati Praka- shan, Varanasi, 2012; 367.

19. Sushruta, Sushruta Samhita, Edited with Ayurveda Tatvasandipika Hindi Commentary. By Kaviraja Ambikadutta Shastri Chaukhambha Sanskrit Sansthan, Varanasi. Year of Reprint, 2009; 61: 1 – 12.
20. Sushruta, Sushruta Samhita, Edited with Sushrutarth Sandeepan Hindi Commentary, By Kaviraja Shri Haranchandra Chaukhambha Sanskrit Sansthan, Va- ranasi. Year of Reprint, 2009; 67: 2 – 12.
21. Sushruta. Sushruta Samhita, Edited with Ayurveda Tatvasandipika Hindi Commentary, By Kaviraja Ambikadutta Shastri. Chaukhambha Sanskrit Sansthan, Vara- nasi, Year of Reprint, 2009; 61: 1 – 12.
22. Charaka, Charaka Samhita of Agnivesha, elaborated by Charaka and Drudhabala, edited with Charaka-Chandrika Hindi commentary, By Brahmanand Tripathi, Chaukhambha Subharati Prakashan, Varanasi, Year of Reprint, 2009; 926: 1.
23. Sushruta. Sushruta Samhita, Edited with Ayurveda Tatvasandipika Hindi Commen tary, By Kaviraja Ambikadutta Shastri Chaukhambha Sanskrit Sansthan, Vara- nasi, Year of Reprint, 2009; 61: 1 – 12.
24. B. D. Chaurasia's handbook of General Anatomy, Fourth Edition, Edited by Dr. Krishna Garg, 57.
25. J. Tortora, Principles of Anatomy and Phy- siology. Twelth Edition, 1: 264.