



AN ANALYTICAL STUDY OF SHIROGREEVAASTHI AND ITS MODERN PERSPECTIVE

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ABSTRACT

The ancient science of human existence known as *Ayurveda* addresses a person's physical, psychological and spiritual well beings. It encompasses all aspects of human existence. *Dosha*, *Dhatu* and *Mala* are three basic components under which the parts of body are categorized by ancient *Ayurvedic* seers. As per *Ayurvedic* pioneers *Acharya Sushruta*, finally bodily part to be destroyed is *Asthi*. *Asthi* function as central component upon which entire system is dependent. It is one in *Saptadhatus* found in *Sharira*. In present era head and neck injuries are increasing. Fractures are increasing day by day. Classical sources describe *Bhagana*, its treatment, types, enumeration and nomenclature in great detail. There is vast difference regarding number of bones in modern anatomy compared to that of *Ayurveda*. This present paper commences with general consideration of some preliminary points *Asthi Vyakarana Sharira*, *Asthi Upogogita*, *Asthi Sankhya* followed by identification of individual bones situated in in *Shirogreeva* region.

KEYWORDS : *Asthi*, *Saptadhatu*, *Bhagna*, *Shirogreeva Asthi***INTRODUCTION:**

Asthi Vyakarana Sharira / oestology is branch which deals with study of bones. In *Ayurveda* it is stated that:

- अम्यन्तरगतैः सार्यथा तिष्ठन्ति भूरुहः । अस्थिसारैस्तथा देहा श्रियन्ते देहिनां ध्रुवम् । तस्माच्चिरविनाष्टेषु त्वङ्मांसेषु शरीरिणाम् । अस्थीनि न विनश्यन्ति साराण्येतानि देहिनाम् । मांसान्यत्र निबद्धानि सिरामिः स्नायुभिस्तथा । अस्थीन्यालम्बनं कृत्वा न शीर्यन्ते पतन्ति वा । (सु.शा. 5/21-23)

As the trees stands by means of internal heart wood, body of human beings are supported firmly by bones which are essence like heartwood. Therefore even if skin and muscle decays, bones are not destroyed for long as they are essence of human body. Bones acts as a support for muscles which being firmly adhered along with blood vessel and ligament do not decay or fall down.^[1]

- स्थीनि देहधारणं मज्जः पुष्टि च कुर्वन्ति । (सु.सु. 15/6)

Asthi provide support to body and nourishment to bone marrow.^[2]

- गर्भस्य, केश-श्मश्रु-लोमा-स्थि-नख-दन्तसिरा स्नायु-धमनी-रेतः प्रमृतीनि स्थिराणि पितृजानि । (सु.शा. 3/33)

According to *Acharya Sushruta* fetal bones are gifts of father. He states that hairs, teeth, veins, nerves, arteries are contributed by *Pittraj-Bhava* i.e. paternal development in conception.^[3]

***Asthi sankhya*:**

- रत्नच षडङ्गम-शाखाश्चतस्रो, मध्यं पञ्चमं, षष्ठं शिर इति । (सु.शा. 5/2)
- तेत्रायं शरीरस्याङ्गविभागः तद्यथा-द्वौ बाहू, द्वे सक्थिनी, शिरोऽग्रिमं अन्तराधिः, इति षडङ्गमङ्गम् । (चौशा० 7/5)^[8]

| Region | Charaka Samhita | Sushruta Samhita | Asthanga Sangraha |
|-----------------|-----------------|------------------|-------------------|
| Shakhagata | 128 | 120 | 140 |
| Kosthagata | 141 | 117 | 120 |
| Urdhvajatrugata | 91 | 63 | 100 |
| Total | 360 | 300 | 360 |

***Shirogreevaasthi* number:**

- ग्रीवायां नव, कण्ठनाड्यां चत्वारि, द्वे हन्योः, दन्ता द्वात्रिंशत् नासायां त्रीणि, एकं तालुनि, गण्डकर्णशङ्खेकेकं, षट् शिरसीति । (सु.शा. 5/21)
- त्रीणि सपष्टीनि शतान्यस्थानां सह दन्तोलूखलनखेन । तद्यथा-द्वात्रिंशद्दन्ता, द्वात्रिंशद्दन्तोलूखलानि, एकं जत्रु, द्वे तालुके, द्वे श्रोणिफलके, एकं भगारिस्थ, पञ्चत्वारिंशत् पृष्ठगतान्यस्थानि, पञ्चदश ग्रीवायां एकं हन्चिस्थ, द्वे हनुमूलबन्धने, एकारिस्थ नासिकागण्डकूटललाट, द्वौ शङ्खौ, चत्वारि शिरःकपालानीतिः एवं त्रीणि सपष्टीनि शतान्यस्थानां सह दन्तोलूखलनखेनेति । (चौशा० 7/6)
- तथा गण्डकर्णशङ्खेषु जत्रुतालुनोश्च । त्रयोदश ग्रीवायाम् । चत्वारि कण्ठनाड्याम् । द्वे हनुबन्धने । द्वात्रिंशद्दन्ताः । तद्वदुलूखलानि च । त्रीणि नासायां । षट् शिरसि । (अ.सं.शा. 5/42)

Table-2 [Total number of *Shirogreeva Asthi*]^[9,10,11]

| Region | Charaka Samhita | Sushruta Samhita | Asthanga Sangraha |
|-----------------|-----------------|------------------|-------------------|
| Greevaasthi | 15 | 9 | 13 |
| Kanthanadiasthi | - | 4 | 4 |
| Hanuasthi | 1 | 2 | 2 |
| Nasaasthi | 1 | 3 | 3 |
| Gandaasthi | - | 2 | 2 |
| Talvaasthi | 2 | 1 | 1 |

| | | | |
|-------------------|----|----|-----|
| Danta | 32 | 32 | 32 |
| Sankhasthi | 2 | 2 | 2 |
| Karnaasthi | - | 2 | 2 |
| Siroasthi | 4 | 6 | 6 |
| Jatru | - | - | 1 |
| Hanumulabandhanam | 2 | - | - |
| Dantaoolukhala | 32 | - | 32 |
| Total | 91 | 63 | 100 |

DISCUSSION:**1) Greevaasthi:**

- ग्रीवायां नव । (सु.शा. 5/21)
- पञ्चदश ग्रीवायां । (चौशा० 7/6)
- त्रयोदश ग्रीवायाम् । (अ.सं.शा. 5/42)

As regards the lists for number of bones, found in this region, differ more widely. *Acharya Charaka* counted 15 *Greevaasthi*. *Acharya Sushruta* counted nine *Greevaasthi*. *Acharya Vagbhatta* counted 13 *Greevaasthi*. When we see modern surface anatomy then there is seven cervical vertebrae differ among themselves in size, shapes and appearance.

Discussion as ग्रीवायां नवः

Acharya Sushruta enumerates nine neck bones. It appears that he has taken seven cervical vertebrae and hyoid bone. Here *Acharya Sushruta* considered two hyoid bone as sushruta's oestological system is dominated by principle of homology. So total there is nine *greevaasthi*. (7cervical vertebrae+2hyoid bone).

Discussion as पञ्चदश ग्रीवायां:

Acharya Charaka counted 15 cervical bones. He assumed two transverse processes to each vertebrae, counting them as separate bone and looked bodies of vertebrae as constituting single bone. Thus he enumerated 15 neck bones by counting 14 transverse processes (2 in each) + body of all jointly as 15th one.

Another assumption may be put forth that *Acharya Charaka* counted 2 bones (body/arch) for each of cervical vertebrae and odontoid process of second cervical vertebrae as separate bone.

Discussion as त्रयोदश ग्रीवायाम्:

it appears that he counted as 2 bones, as stated above, for each of cervical vertebrae except first, which being mere bony ring without body and spinous was recognized as single bone. He could obtain a sum of 13 cervical bones. (6×2+1=13).

2. Kanthanadi Asthi:

- कण्ठनाड्यां चत्वारि । (सु.शा. 5/21)
- चत्वारि कण्ठनाड्याम् । (अ.सं.शा. 5/42)

Kanthanadi is specialized term used by *Acharya Charaka* and *Vridhdha*

Vagbhata in their lists of bones. As we see surface anatomy in this region there is thyroid cartilage, cricoid cartilage, tracheal rings, tracheo-bronchial tube. All these structures cartilaginous in nature which may and may get ossified at advanced age. *Acharya Sushruta* considered these cartilaginous bones under classification of *Asthi* named *Taruna*.

3. Hanuasthi:

- द्वे हन्वोः (सु.शा. 5/21)
- एकं हन्वस्थिः चोशा 7/6)
- द्वे हनुबन्धने तद्वदुलूखलानि च (अ.सं.शा. 5/42)

The term *Hanu* simply means a jaw and ordinarily may indicate both upper and lower jaws. *Acharya Charaka* recognizes existence of only one jaw viz. lower. *Acharya Charaka* also describes two *Hanumulabandhana*. *Acharya Charaka* called this name *Hanumulabandhana* accounts of their being the bones by which body of lower jaw is attached to rest of skull. Assumption may be taken as zygomatic arches/processes by the term *Hanumulabandhana* on account of their resemblance of bony bonds at roots of jaw bone.

Acharya Sushruta recognizes two *Hanuasthi* or jaw bone. The term *Hanvasthi* signifies body of mandible, while the term *Hanumulabandhana* signifies two rami of mandible.

Acharya Vagbhata uses term *Hanubandhana* instead of simpler term *Hanu* and numbered as two. The term *Hanubandhana* is applicable to both jaw bones and *Dantaoolukhala* means tooth socket bearup by both jaw bones.

4. Dantaasthi:

- दन्ता द्वात्रिंशत् (सु.शा. 5/21)
- द्वात्रिंशदन्ताः, द्वात्रिंशदन्तोः लूखलानि चोशा 7/6)
- द्वात्रिंशदन्ताः । तद्वदुलूखलानि च (अ.सं.शा. 5/42)

The *Ayurvedic* concept regarding real morphological characters of teeth were limited. They took them to be bone, on account obviously of their hardness and probably also of their white appearance and because they were found in skull after every vestige of other tissue had disappeared.

Acharya Sushruta counts them 32 but *Acharya Charaka* increases number by counting corresponding sockets of each tooth by dividing alveolar processes. *Acharya Charaka* divides either alveolar process of maxilla or mandible into 32 alveoli or *Dantaoolukhala*; each counted as a separate bone.

Acharya Sushruta considering two *Hanvasthi* discarded socket bones altogether and counts only teeth.

5. Nasaasthi:

- नासायां त्रीणि (सु.शा. 5/21)
- त्रीणि नासायां (अ.सं.शा. 5/42)

Acharya Sushruta and *Vridha Vagbhata* both have counted three *Nasaasthi*. *Acharya Sushruta* assumed that two *Nasaasthi* constitute a single bone in median plane and added 2 lateral cartilages of external nostrils (*Taruna Asthi*). But when we see surface anatomy in modern we see that there are two nasal bones and one nasal septum formed by perpendicular plate of ethmoid bone, vomer and septal cartilage.

6. Talvaasthi:

- एकं तालुनि (सु.शा. 5/21)
- द्वे तालुके चोशा 7/6)

In *Ayurveda* *Talvaasthi* is also known as *Talusaka*. *Acharya Charaka* counts two *Talvaasthi*. These bones are not identical with palatine bones in modern anatomy, but identical with palatine process of maxillae. These processes projecting either side of junction of alveolar process and body of maxillae meet in media line/in a ridge or raphe and forms major portion of hard palate. *Acharya Charaka* is quite correct in counting 2 halves of hard palate.

Acharya Sushruta and *Vridha Vagbhata* ignores median ridge, counts only one palatine bone.

7. Gandakarnashankhaasthi:

- गण्डकर्णशङ्खेकेक (सु.शा. 5/21)

- तथा गण्डकर्णशङ्खेषु जत्रुतालुनोश्च (अ.सं.शा. 5/42)

Gandaasthi are counted separately by *Acharya Sushruta* and *Acharya Vridha Vagbhata*. As we see surface anatomy then there are two zygomatic/malar bones. They form a prominence below orbits and also form a part of outer border and floor of orbits. The temporal process of each bone projects posteriorly to meet zygomatic process of temporal bone. These two processes form zygomatic arch on either side of skull. They form bony overhang above upper jaw and therefore called cheek bone.

In ancient literature description of *Sankhaasthi* is limited. Both system of *Ayurveda* give number of *Sankhaasthi* as two, they are without any doubt identical with two temporal bones. But *Acharya Sushruta* and *Vridha Vagbhata* perhaps divides perhaps temporal bones into 2. The squamous portion of temporal bone is named as *Sankhaasthi*, while rest of bone is undertaken as *Karnaasthi*. In his class lists of bones he has explicitly enumerated *Karna* as made up of cartilage. That is why *Acharya Sushruta* who includes ears among bones of skeleton, was doubtless referring to external ear/auricle/pinna which is composed of cartilage under the classification *Tarunaasthi*.

8. Shirakapala:

- षट् शिरसीति (सु.शा. 5/21)
- चत्वारि शिरःकपालानीति चोशा 7/6)
- षट् शिरसि (अ.सं.शा. 5/42)

According to *Acharya Sushruta* enumerates six bones in place of four bones mentioned by *Acharya Charaka*. We considered that *Sushruta's* osteological system is strictly dominated by principle of homology, according to which skeleton is consisting of two lateral halves divided by median plane running through vertebral column. This plane cut frontal and occipital bone into two halves. As a matter of fact, these two bones (frontal and occipital) consists of two halves and truly these two halves coalesce into one from beginning of embryonic development, but in case of frontal bone both halves remain separate by metopic suture and don not fused till about 5th or 6th year of life after birth. Either of two halves of frontal and occipital bone forms a separate cavity. Thus *Sushruta's* postulation appears to be justified in counting six bones of cranium.^[12]

CONCLUSION:

Shirogreevaasthi can be correlated with following in modern:

- *Grevaasthi* – cervical vertebrae
- *Kanthanadiasthi* – hyoid bone/tracheal rings
- *Hanvaasthi* – mandible
- *Talvaasthi* – palatine bones
- *Shirakapalaasthi* – frontal, parietal, occipital
- *Shankhaasthi* – squamous portion of temporal bone
- *Karnaasthi* – remaining portion of temporal bone
- *Nasaasthi* – nasal bones
- *Gandakutaasthi* – zygomatic/malar bones
- *Dantaasthi* – teeth
- *Dantaoolukhala* – teeth socket

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