A Study of Asthi Sharir In Context of Various Types of Asthi Described In Ayurvedic Samhitas

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ABSTRACT

Ancient seers of Ayurveda have classified the elements of the body under three fundamental components- Dosha, Dhatu and Mala. According to Acharya Sushruta the pioneer of Ayurveda, Asthi is last part of body to be destroyed. Knowledge of Asthi can be traced back from Vedas passing chronologically down to Samhitas. Asthi plays the role of kernel of body on which whole system depends. Profound description is illustrated in classical texts about nomenclature, enumeration, types, Bhagna and its treatment. Especially types and nomenclature are to be discussed in light of modern and classical grammar. Here main aims are Analytical discussion about Sankhya and nomenclature of Asthi, Asthi Prakaras and grammatical validation. As knowledge about Asthi dates from Pre-Vedic period concepts, believes, methods, usefulness etc have changed from time being. The nomenclature of Asthi and Bhagna and Prakar is also same as in the contemporary knowledge and profoundly described.

Keywords: Asthi Bhagna, Asthi Sankhya, Asthi Prakara

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Introduction

It is very clearly apparent from the admonitions of Galen how great is the usefulness of a knowledge of the bones, since the bones are the foundation of the rest of the parts of the body and all the members rest upon them and are supported, as proceeding from a primary base. Thus if anyone is ignorant of the structure of the bones it follows necessarily that he will be ignorant of very many other things along with them.”

Niccolo Massa, 1559.
Being an eternal science, ‘Ayurveda’, the science of human life deals with physical, psychological as well as spiritual well being of an individual. It covers all the spheres of human life. As we all know that, this entire world can be divided into two types of material i.e. soft and hard. Soft and hard though are antonyms yet are equally important for sustainability. This division is also evident in human body. Here several parts are soft organs and rest hard. Hard part of body is skeleton system which provides support and shape. Thus, parts which provide support, shape, helps in locomotion, protection to soft organs are hard parts forming nutshell of human body, comprising bones, teeth etc.

According to Acharya Susruta the pioneer of Ayurveda explained, the organs of the body destroy after death except the Asthi. Asthi is the last to be destroyed, even after death when body is buried or burnt the remnants left are bones. Knowledge of Asthi can be traced back from Vedas passing chronologically down to Samhitas. Considering its history of description and importance many methods and thought can be visualized in classical texts. Each explains their own way of enumeration and nomenclature.

Literal Review

In Atharva Veda, Narayana is author of the Atharva hymn which takes us back to that period of prehistoric or semi-mythical age of the medicine men who combined the functions of priest and physician. Narayana is representative of this Indian medicinal tradition. He is also author of famous “Purusha Sukta” (RV.X.90=AV.XIX.6), which contains many anatomical references. The hymn X.2.1-8 is reported to show how Artharva mentioned bones of human body.

It is a hard substance which remains even after most part of body has been decayed. According to Susrutha it is substance which remains even after else very part like flesh, muscles etc. are shattered even after burying the body after death. It remains as last identity of person even after demise. According to Shabdstomkara- it is part of body which remains till long period even after death of body. “Hada” is synonym of Asthi.

Though every substance is made of all five Mahabhutas (Akasha, Vayu, Agni, Jala and Prithivi), but Asthi has predominance of Prithivi and Vayu Mahabhuta. The Asthi Karms are as follows Deha Dharan., Majja Pushti and supporting the Mamsa, Sira and Snayu. The numbers of Asthi in the Sharira according to different Samhitas are as follows-

<table>
<thead>
<tr>
<th>S.No</th>
<th>Text books</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Charaka Samhita</td>
<td>360</td>
</tr>
<tr>
<td>2.</td>
<td>Susruta Samhita</td>
<td>300</td>
</tr>
<tr>
<td>3.</td>
<td>Astanga Hrudaya</td>
<td>360</td>
</tr>
<tr>
<td>4.</td>
<td>Astanga Sangraha</td>
<td>360</td>
</tr>
<tr>
<td>5.</td>
<td>Bhavaprakasha</td>
<td>300</td>
</tr>
<tr>
<td>6.</td>
<td>Kashyapa Samhita</td>
<td>360</td>
</tr>
<tr>
<td>7.</td>
<td>Bhela Samhita</td>
<td>360</td>
</tr>
</tbody>
</table>

Depending upon size, shape, position of Asthi in the body total Asthi is divided into five types. These are tabulated below

<table>
<thead>
<tr>
<th>S.No</th>
<th>Types</th>
<th>Su.S</th>
<th>As.S</th>
<th>As.H.</th>
<th>B.P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kapala</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2</td>
<td>Ruchaka</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3</td>
<td>Taruna</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>Valaya</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>5</td>
<td>Nalaka</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
According to modern anatomy, there are about 206 bones in the adult human skeleton. The early Indian anatomist, on the other hand, count either 360 (Aterya) or 300 (Susrutha) bones. This large excess is principally due to the fact that (besides including the teeth, nails, and cartilages) they counted prominent parts of bones, such as are now known as ‘processes’ or ‘protuberances’, as if they were separate bones. Their reasons for counting in this manner were mainly three.

- Sometimes processes or protuberances of bones were popularly known by special names, and regarded as special bones. Examples are the malleoli, or ankle bones and the styloid processes or wrist-bones.
- In other cases the separate enumeration of process or protuberances was due to an exaggerated regard for the homological principle. For example the right and left halves of the skeleton were regarded as homologous.
- Sometimes, again it was a fancy for artificial symmetry which led to the multiplication of bones. This can be cause of assumption of the existence of a third joint in the thumb and great toe, and of twelve costal tubercles instead of ten.

We can trace this variation in nearly all Asthi Sankhya but major variations can be traced in enumeration of ribs, vertebrae, phalanges etc. Like while enumerating ribs Charaka states that there are 24 Parsvaka or ribs, 24 Sthalaka, sockets, and 24 Arbuda (tubercles) and of course as indicated by Susrutha manner of counting, it is to be understood that there are 12 of such kind, that is, altogether thirty six, on each side.

As in Greeva Charaka makes the number of neck-bones to be fifteen. The Susrutha makes it to be only nine, while the list of Vagbhata makes it to be thirteen. As a matter of fact, the number of the cervical vertebrae is seven. Susrutha counts nine neck-bones, each of the six upper vertebrae as single bone; but the seventh he treated in the same way as he treated the thoracic vertebrae, that is to say, he counted it as consisting of three bones; viz. a body plus spine and two transverse processes. He thus obtained 6+3=9, bones.
Charaka obtained his total of fifteen bones by treating the cervical column somewhat similarly to the vertebral column. As regards the count of Vagbhata, his total of thirteen bones probably represents, as usual, a compromise between the systems of Charaka and Susrutha.

Likewise several other Asthi and their Sankhya can be discussed and it can be seen though the enumeration was varied but each one satisfied their own principle and thus no major controversy can be drawn.

Now talking about types or Prakara as per Samhita, we can see that division was basically on the terms of Shalya Tantra and is uniformly pentad type. Asthi can be divided in these five divisions as follows-

<table>
<thead>
<tr>
<th>S.No</th>
<th>Asthi Prakara</th>
<th>Number</th>
<th>Names</th>
</tr>
</thead>
</table>
| 1    | Tarunasthi    | 14     | ● Ghrana-3  
               ● Karna-2  
               ● Griva-9  
               ● Aksikosa |
| 2    | Valayaasthi   | 110    | ● Parsv-72  
               ● Prsth-30  
               ● Uras-8   |
| 3    | Nalakaasthi   | 125    | ● Padanguli (3x5)-15x2=30  
               ● Padatala  
               ● Padakurcha 20  
               ● Gulpha  
               ● Parsni-2  
               ● Jangha-4  
               ● Uru-2  
               ● Hastanguli(3x5)-15x2=30  
               ● Hastatala  
               ● Hastakurcha 20  
               ● Manika  
               ● Karpurasthi-2  
               ● Prakosthasthi-4  
               ● Bahunala-2  
               ● Trikasrita-1  
               ● Amsaphalaka-2  
               ● Kanthanadi-4  
               ● Hanwasti-2 |
<table>
<thead>
<tr>
<th>5</th>
<th>Ruchakasthi</th>
<th>32</th>
<th>- Danta-32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>300</td>
<td>300</td>
<td></td>
</tr>
</tbody>
</table>

On using Tarka and Pramana we can understand that the particular five types defined are just symbol for major division. In fact these merely are not just types but these are basically five ways of divisions of bones on different basis.

First division can be on the basis of hardness or completion of ossification. On the basis of hardness this is first type of Asthi, thus other can be its antonym that is Asthi or Pakva-Asthi (normal or hard) or Jirna-Asthi (fully developed or hard). Next division is on basis of surface area. (Kapala-Asthi)- This is based on surface of bone. Kapala as described is flat or which has more area than thickness. Other bones mainly are slender or cylindrical here surface area is comparatively less (Nalaka-Asthi). Next division is on basis of specific shape (Vartulakara). This type bones are for specific functions of providing support as well as helping in inspiration and expiration i.e. providing elasticity as well as support for specific function. Thus, this can be basis for division into two groups i.e. bones with round shape and others without it i.e. Avartulakara.

Next division is on basis of length and end points (Nalaka-Asthi). Main function of these is to help in locomotion as these bones are mainly found in extremities. Thus, bones can be called as functioning in locomotion can be separated from others with function of protection mainly like Kapala or Valaya-Asthi or Analakakara. Next division is really interesting type as sense organ (Ruchaka-Asthi)- Acharya Susrutha have divided next variety specially on power of teeth as ‘Ruchaka’, i.e. one which can sense or know the taste of food during chewing process.

So, total types can be summarized in five group’s like-

1. Tarunasthi (undeveloped) and Pakvaasthi or Ghanasthi (fully ossified)
2. Kapalasthi-(great surface area) and Akapalasthi (less surface area).
3. Vartulakara (Valayasthi elastic and round) and Avartulakara (not round in shape).
4. Nalakaasthi (long and for movement) and Analakaasthi. (other than cylindrical)
5. Ruchaka (with sense power) and Kharasthi (normal bone).

The bones sustain trauma in different ways. Acharya Susruta has paid due attention to this fact and observed that all the bones do not show similar type of effect due to trauma. As we already know that Acharya have particularly described the types of fractures occurring in each type of bone mentioned as below-

1) Tarunasthi - Namayante
2) Nalkasthi - Bhajayante
3) Kapalasthi - Vibhidhyante
4) Ruchkasthi - Sphutayante
5) Valayasthi – Sphutayante
On profound analysis on literal basis of the words denoted as fracture types a clear picture can be drawn on relation of specific fracture with the specific type of bone. Firstly let us dissect word on basis of Dhatu Pada and its meaning as per Panini Vayakarana in Ganakaastadhyayi. Results can be tabulated as-

**Tables No. IV showing Asthi Prakara; it’s Dhatu Pada and their meanings.**

<table>
<thead>
<tr>
<th>Type of bone</th>
<th>Defination</th>
<th>Type of Bhagna</th>
<th>Sandhi</th>
<th>Dhatupa</th>
<th>Meaning of English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taruna</td>
<td>यानि घनता नः प्राप्तुवानि तानि तत्तुमानिनि</td>
<td>नघ्रंते</td>
<td>नम्भे अन्ते</td>
<td>नुम्</td>
<td>नाम प्रतिवधे शाब्दे चा</td>
</tr>
<tr>
<td></td>
<td></td>
<td>नघ्रंते</td>
<td>नम्भे अन्ते</td>
<td>नुम्</td>
<td>To bow , to bend, curve, bow down, sink</td>
</tr>
</tbody>
</table>

| Kapala       | कं नाम सिः तं गालमध्यति इति कपाले | जिहिम्हन्ते | जिहिम्हि अन्ते | जिहु, जिद्र् | जिहु जिद्राना, जिद्विजः जिद्वरणो, खण्डशो जिद्धते (चन्द्र) |
|              |             | जिहिम्हन्ते | जिहिम्हि अन्ते | जिहु, जिद्र् | Perforating, fissure, gap, cleaving |

| Valaya       | बर्तुलाकारणि बर्तुल अर्धवर्तुल सद्वानि | स्फुटयति | स्फुट अन्ते | स्फुट, | स्फुट विकासमे स्फुट भएते |
|              |             | स्फुटयति | स्फुट अन्ते | स्फुट, | Brust, split, cracked |

| Nalaka       | नल इव प्रतिसति: नलकं नलाकारकस्थविधयते इति | भन्यन्ते | भन्जि अन्ते | भन्जु भुज् | भन्जो आद्यः भन्जु कोटित्वे |
|              |             | भन्यन्ते | भन्जि अन्ते | भन्जु भुज् | Shatter, break to pieces |

**Table No. V showing comparison of word meanings of Asthi Bhagna; and type of fractures.**

<table>
<thead>
<tr>
<th>Asthi prakara</th>
<th>Bhagna</th>
<th>Meaning of Bhagna</th>
<th>Bone example as per modern</th>
<th>Common fracture</th>
<th>Word meaning/meaning of fracture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taruna</td>
<td>Namayante</td>
<td>To bow, to bend, curve.</td>
<td>Cartilaginous or bones of child (which are not fully ossified)</td>
<td>Green Stick Fracture</td>
<td>bone bends and breaks</td>
</tr>
<tr>
<td>Valaya</td>
<td>Sphutayante</td>
<td>Burst, split, cracked.</td>
<td>Ribs</td>
<td>break in the rib (detach)</td>
<td>Separation, cracking</td>
</tr>
<tr>
<td>Kapala</td>
<td>Vibhidhyante</td>
<td>Fissure, gap, cleaving.</td>
<td>Flatbones like Skull bones, hip bone, scapula</td>
<td>Linear, Depressed, Diastatic, Basilar</td>
<td>widen the suture, displaced inward, transverse break in the full thickness of the skull</td>
</tr>
</tbody>
</table>
Nalaka | Bhajayante | Shatter, break to pieces. | Various Long Bones like Femur, Humerus etc. | Transverse, Oblique, Spiral, Comminuted. | Perpendicular to the long axis, at an angle, bone fragments scatter

By these tables it is clearly visualized that our Acharaya had given principle of Asthi Bhagna and Asthi Prakara on clinical basis as is proved here merely by meanings of root word. This knowledge can be used in vice a versa way that the particular type of fracture occurs in particular type of bone as, which means bones which tend to bend or curve can be a type of Tarunaasthi, bones in which linear fractures or fissure is commonest type of fracture can be a type of Kapalasthi, bones which commonly breaks into pieces or detaches (having semi circular shape) from its attachment can be a type of Valayaasthi and bones in which fracture are mainly perpendicular to axis, transverse to axis or at angle can be a type of Nalakasthi.

**Conclusion**

As knowledge about Asthi dates from Pre-Vedic period concepts, believes, methods, usefulness etc. have changed over time. As per basic definition of Asthi according to Susruta “it is substance which remains as the last identity of person even after demise.” Whereas in modern science it is simply defined as connective tissue i.e. hard in texture and characterized by the presence of Haversian system. Thus, a major difference arises as per definition so the differences are seen in enumeration, types and function.

The pentad division of Asthi Prakara was given mainly in accordance with Shalya Tantra especially for dislocation and fracture of bones. Basically this pentad division is not the types of bone, but actually these are principles for division which can be further elaborated like as Tarunasthi and Ghanasthi, Vartulakara and Avartulakar etc. This proves that classification of bones based on shape, size and texture was given firstly in Samhita not in modern text as per popular belief.

Leaving Rucaka, as a type especially for Danta, rest can be classified under rest four as Tarunasthi-14, Valayasthi-110, Nalakasthi-125 and Kapalasthi-19; as per Acharya Susrutha. Type of bone and type of fracture in it, are in accordance with its modern counterpart as proved by literal grammatical study of Dhatupada and their Artha.

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सारांश
आयुर्वेद के आचार्यों ने शरीर को श्वसन के बाद ध्यान में लेकर लेखा है। अन्नन के लिए उपचार का राना है जो वर्णक्रम में संख्या, प्रकार, भ्रम, इत्यादि वर्णों में संबंधित है। अन्नन के लिए उपचार का राना है जो वर्णक्रम में संख्या, प्रकार, भ्रम, इत्यादि वर्णों में संबंधित है। अलग अन्नन में नामकरण, संख्या में प्रकार है जिनका निर्णय आचार्यों ने अपने-अपने दंडों से किया है। फिर भी आयुर्वेद दृष्टि से इनका और आधिक विश्लेषणात्मक अध्ययन आवश्यक है। प्रस्तुत विषय में अन्नन के नामकरण, संख्या में प्रकार पर प्राचीन एवं आयुर्वेद मतानुसार व व्यक्तिक के उपयोग से इन मतभेदों का निर्णय किया गया है। इस प्रकार प्राचीन मत भी आजकल के सिद्धांतों के अनुसार ही पूर्ण एवं चिकित्सा उपयोगी है।