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ABSTRACT

The human pelvis has been considered as an evolutionary compromise between birthing and walking upright. The Sroni is a bony structure that can be found in both male and female skeletons. The bony pelvis of adult human exhibits marked sexual dimorphism, The structure of the Sroni is designed to give females the ability to undergo pregnancy and childbirth, while males are able to hold larger and heavier muscles upon their frame. With the onset of puberty, the female pelvis expands; with the onset of menopause, it contracts again. The morphology of the female pelvis is influenced by hormonal changes in puberty and during menopause. As an obstetrician, you will need to have a sound knowledge and understanding of the anatomy of the stree shroni in order to be able to competently assess a woman's progress in Prasava & pelvic floor plays an important role during Prasava. This involves you being able to identify the relationship between the position and descent of the fetus and the relevant landmarks of her pelvis. Hence, the information in this article will provide a concise introduction of the stree Shroni.

KEYWORDS: Sroni, Prasava, Pelvis, Pelvic Floor, Labour.**INTRODUCTION**

Pelvis means a basin. Primarily, the *pelvis* acts as the main support for the upper part of our body. It transmits our body's weight to our legs, which enables mobility – walking and running – and flexibility of movements. *Pelvis* rests upon the lower limbs. The *pelvis* refers to all the supportive structures that are in *pelvis*. The female *pelvis* differs from the male *pelvis*, being overall broader with a rounded brim that contributes to its specific role in childbearing. The female *pelvis* also acts as a protective structure for the reproductive organs – the uterus and ovaries – as well as the bladder and rectum and, to a much lesser extent, the organs of the lower abdomen. The *pelvic floor* play a key role in core stability, & parturition.

श्रोणि**Normal Measurement of Sroni**

पुरुषोरः प्रमाणविस्तीर्णा स्त्रीश्रोणिः
अष्टादशाङ्गुलविस्तारमुरः।
तत्प्रमाणा पुरुषस्य कटी। (सु. सू. ३५।१२)
पूर्वभागो गुरुः पुंसामधोभागस्तु योषिताम्॥(सु. सू. ४६।१३२)

Sroni is the area below *urusandhi* & above *smaramandira*. The measurement of chest of male & waist of female is identical. The chest of female is 18 *angulas* so is the waist of male. The chest of male is said to be 12 *angulas* by *Acharya Dalhana* & 24 *angulas* by *Acharya Chakrapani*. The chest of male & waist of females is relatively broader. In *tika*, *Dalhana* explained that these measurements are attained after maturity.

Number and Types of bones in Sroni

द्वे श्रोणिफलके, एकम् भगास्थि। (च. शा. ७/६)
श्रोण्याम् पन्च, तेषां गुदभगनितम्बेशु चत्वारि,
त्रिकसम्शनीतमेकम्। (सु. शा. ५/१९)

According to Charaka2 Sroniphalaka and 1 *Bhagasthi*.**According to Susruta**

1 *Gudasthi* (Coccyx), 1 *Bhagasthi* (pubic bones), 2 *Nitambasthi* (Hip Bones) and 1 *Trikasthi* (Sacrum).
The bones of *Sroni* are *Kapala* (flat) type.

Joints of Sroni

त्रयः कटीकपालेषु। (सु. शा. ५/२६)

There are 3 joints of flat bones of *Sroni* which are *tunnasevani* (suture) type.

Sroni Mahatava according to classics

In the context of *mudhagarbha*, *Susruta* had explained the importance of *Sroni*. While mentioning the causes of *mudhagarbha* he said even if *garbha* attains *apatya patha* (birth passage) in a proper position still it gets obstructed sometimes probably due to abnormal passage which can be constriction of passage at different levels. The abnormalities of passage can lead to dystocia & fetal distress.

स यदा जानीयाद्विमुच्य हृदयमुदरमस्यास्त्वाविशति,
वस्तिशिरोऽवगृह्णाति, त्वरयन्त्येनामाव्यः

परिवर्ततेऽधो गर्भ इति; । (च. शा. 8/39)

एवमवाक् परिवर्तते गर्भः। तस्य लक्षणम् । विमुच्य
हृदयमुदरमाविशति वस्तिशिरोऽवगृह्णाति

त्वरयन्त्येनामाव्यः ।

(अ. स. शा. 3/20, 21)

In the reference of second stage of *prasava*, *Acharya Charaka* opines that when the fetal head descends further or becomes *parivartita* i.e going to be expelled, it leaves the *hrdaya*, enters or descends in lower abdomen (enters into pelvic cavity) & stays at neck of bladder. Then the frequency and duration of *labor* pain increases. Here in this context, *parivartana* refers to *internal rotation* occurring in *pelvis* after descend and exaggerated flexion. If there is any obstruction or abnormality in *sroni* descend will not take place properly and it will lead to *mudhagarbha*. Hence, it shows the importance of *sroni*.

Composition of Pelvis: In females by *pelvis* we usually consider bony *pelvis* which is formed by 4 bones & 4 joints:

- Bones - 1) 2 Hip bones 2) Sacrum 3) Coccyx
- Joints – 2 Sacroiliac joints, Sacrococcygeal joint & Pubic Symphysis

Pelvic cavity is made up of 4 walls: Anterior pelvic wall, Lateral pelvic wall, Posterior pelvic wall and *Pelvic floor* or Inferior pelvic wall.

The *pelvis* is divided into

False *pelvis*: above the pelvic brim and has no obstetric importance.

True *pelvis*: below the pelvic brim and related to the child -birth.

The true *pelvis* is important in obstetrics, it is a bony canal formed by the sacrum and coccyx posteriorly and by the ischium and pubis laterally and anteriorly. It is composed of inlet, cavity, and outlet. The true *pelvis* dimensions are of concern in obstetrics because sometimes these are inadequate to permit passage of the fetus.

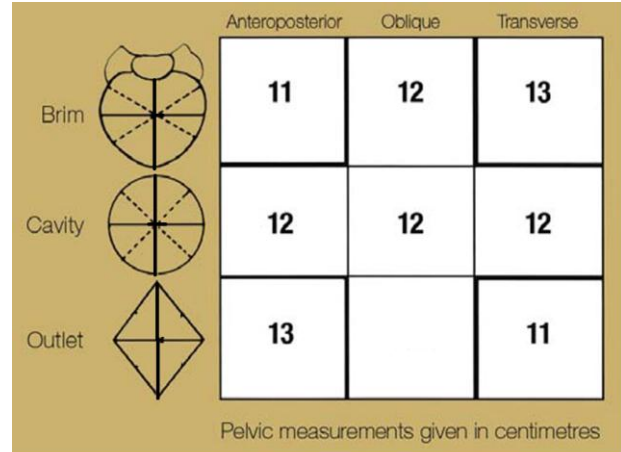


Diagram No.-1 (Diameters of Pelvis).

The largest diameter of pelvic outlet = AP diameter.

Pelvic Floor

▪ *Pelvic floor* is formed by pelvic diaphragm which is composed of: 1) Levator ani: Puborectalis, Pubococcygeus and Iliococcygeus 2) Coccygeus (Ischiococcygeus)

Role of Pelvic Floor during Labor

- The *pelvic floor* supports the *pelvic* viscera, and assist in their functions & important function during 2nd stage of *labor*. When the head reaches the *pelvic floor*, the gutter shape of floor tends to cause the fetal head to rotate so that its long axis comes to lie in AP position. The occipital part of the head now moves downwards and forward along the gutter until it lies under the pubic arch.
- As fetal head passes through the lower part of birth canal, the small gap that exists in the anterior part of pelvic diaphragm becomes enormously engaged so that the head may slip into the perineum. Once the fetus has passed through the perineum, the levator ani muscles recoil and take up their previous position.
- Levator ani have an important sphincter action on the anorectal junction & act as sphincter of vagina. Relaxation of levator ani muscle allow urination & defecation to occur.
- Inability of levator ani to relax at the time of delivery is often responsible for delay in second stage of labor. Levator ani muscle often stretch and can be injured during childbirth. Of these, pubococcygeus & puborectallis muscles are more commonly damaged. These injuries may predispose women to greater risk of pelvic organ prolapse and urinary incontinence.
- The Coccygeus muscle draws the coccyx forwards after it has been pushed backwards during parturition or defecation. Coccygeus also supports the *pelvic floor* against intrabdominal pressure.
- During pregnancy, the pelvic joints & ligaments are relaxed which after delivery again tighten up, so that it returns to its original efficiency. Damage by

laceration during delivery can lead to permanent weakness of *pelvic floor*.

Variation in Shapes of Pelvis

Each type of the *pelvises* have certain diameters and we have to know the characteristic of each type and its compatibility for vaginal delivery of the fetus:

- **Rachitic Pelvis:** This deformity is caused by rickets (due to Vit D deficiency) Sacrum is rotated so that the sacral promontory projects forward and coccyx tips backward. AP diameter of inlet is therefore narrowed but the outlet is increased. Mode of Delivery is C-section.
- **Naegele's Pelvis:** It is found very rare & is due to arrested development of one ala of sacrum. It may be Congenital or Acquired. Delivery by C- section is ideal.
- **Scoliotic Pelvis:** Due to scoliosis when lumbar region is involved. In this type of *pelvis*, the oblique asymmetry results in contraction of one of the oblique diameter. Hence, delivery by C- section is preferred.
- **Kyphotic Pelvis:** It is always secondary to Kyphosis. Subpubic angle is narrow. There is extreme funneling of *pelvis*. Caesarean delivery is ideal.
- **Robert's pelvis (Transversely contracted):** Extremely rare present. There is absence of Ala of both sides of sacrum. Mode of delivery is Caesarean.

Normal Variants of Pelvis

- **Gynaecoid** – It is most common type of *pelvis* & a typical female *pelvis* with following features: Found in 50 % of women. Inlet is rounded & straight pelvic sidewalls with roomy pelvic cavity. The ischial spines are not prominent & there is wide interspinous diameter with good sacral curve. Fetal head engages in transverse or oblique; OA (occipito-anterior) position is common. *Labor:* easy and complete internal rotation; wide pubic arch reduces perineal tears. Ideal for vaginal delivery.
- **Android** – It is the masculine type of *pelvis* & having following features: Present in 20% of females. The inlet is Heart shaped (or triangular) - due to prominent sacrum. The *pelvis* funnels from above downwards (convergent sidewalls). Ischial spines are prominent with sacrum inclining forward. Oblique OP\ occipito lateral position of fetus is common. Mode of delivery – Difficulty in vaginal delivery with more chances of perineal injuries as there is difficulty in engagement. Limited space at the inlet & progressively lessens down the *pelvis*, owing to the funneling effect of the side walls, sacrum, and pubic rami. There is restricted space at all levels. Fetal head engages in transverse or oblique in asynclitism, leads to extreme molding. *Labor:* Deep transverse arrest is common; arrest of descent is common at the mid *pelvis*, arrest as OP with failed rotation, delivery with difficult forceps,

narrow pubic arch leading to major perineal tear. Delivery by C- section is ideal.

- **Anthropoid** – It resembles with *pelvis* of anthropoid ape. Present in - 25% of women. Pelvic inlet is long oval. AP diameter > transverse diameter. Long & narrow sacrum. Straight pelvic sidewalls. Fetal head can engage in OA or OP, flexion can be delayed. *Labor:* More chances of face to pubis delivery. Prognosis is good.
- **Platypelloid** – Also known as Flat *pelvis*. Following features are present in this type of *pelvis*: Uncommon in both sexes - 5 % of women. Pelvic inlet appears slightly flattened. Transverse diameter is greater than AP diameter. Sacral promontory pushed forwards. Mode of delivery - Fetal head engages in transverse diameter with marked asynclitism. - once engagement occurred then no difficulty in vaginal delivery. C- section is better option. Prognosis: Poor, CPD, delay at inlet.

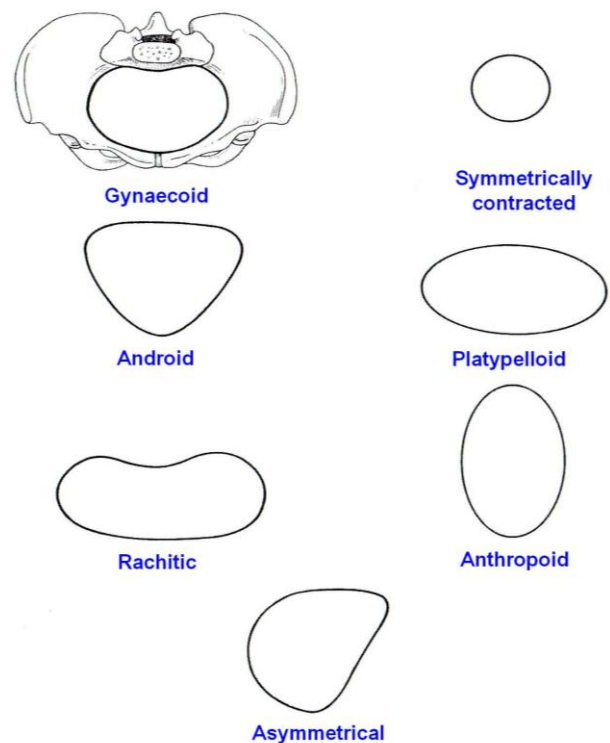


Diagram no.-2 (Pelvic Variations and its Abnormality)

CPD - In this condition, the capacity of *pelvis* is inadequate to allow the fetus to enter the birth canal.

- Causes – Small *pelvis* & Non gynaecoid *pelvis*.
- Degree of disproportion and contracted *pelvis*
 - ✓ Severe – Obstetric conjugate < 7.5cm.
 - ✓ Borderline – Obstetric conjugate between 9.5 & 10cm & AP & transverse diameter of inlet are reduced.
- *Labor* in contracted *pelvis*
 - ✓ Minor degrees do not create much problems.

- ✓ In case of moderate & severe
 - Induction of labor
 - Elective caesarean at term
 - Trial *Labour*.

Effects of contracted *pelvis* on pregnancy and labor

❖ Pregnancy

- Incarceration of retroverted uterus in flat *pelvis*
- Abdomen is more pendulous in multigravida
- More chances of malpresentation
- More chances of unstable lie.

❖ Labor

- Chances of PROM
- Chances of cord prolapse increases
- Slow Cervical dilatation
- Prolonged or Obstructed *labor*
- Increased risk of operative interference.

DISCUSSION

- ✓ The *Stree Sroni* is well adapted for the process of *prasava* (childbirth). In addition, it contains, supports & protects the pelvic viscera. Pregnancy & childbirth appear to be associated with an increased risk of developing *pelvic floor* disorders.
- ✓ *Acharya Sushruta* emphasizes on the knowledge of anatomy of body. One should have a good knowledge about anatomy of body, then only he should go for any treatment or surgical procedure.
- ✓ शरीरे चैव शास्त्रे च द्रष्टव्यः स्याद्विशारदः ! (सु. शा.-७/५१).
- ✓ In classics also, it is mentioned in the reference of *mudha garbha*, that sometimes after complete formation (maturity), the fetus is not able to come out even after reaching its passage (*pelvis* & vagina). The *Sroni vikara* which are responsible for *mudha garbha* can be considered as pelvic inlet contraction & pelvic outlet contraction. A sound knowledge and understanding of the anatomy of the *Stree Sroni* is necessary to assess a woman's progress in *prasava*.
- ✓ The knowledge of shape and capacity of female *pelvis* can reduce maternal & fetal mortality & morbidity. Thus the *pelvic floor* is a sophisticated anatomical and functional unit, with a complex interaction of multiple structures. It needs further practical research to strengthen the concept.

CONCLUSION

The *pelvis* is the bony canal through which the fetus has to pass during childbirth. The human female *pelvis* undergoes adaptations that are of obstetric importance. These adaptations develop chiefly in childhood, puberty & pregnancy. It is therefore of great importance to determine the diameters of this canal and therefore the childbearing capacity of the mother. Childbirth is an important event in a woman's life. Vaginal childbirth is the most common mode of delivery and it has been associated with increased incidence of *pelvic floor* disorders later in life. Understanding the importance of

the *Pelvic floor* during childbirth is helpful to prevent childbirth-related injury and improving *pelvic floor* function in the future. The various dimensions of the *pelvis* are therefore particularly significant in the context of childbirth and the successful passage of the fetus through the bony *pelvis*. The Gynaecoid is considered as the most common type of female *pelvis*. The size and shape of the bony *pelvis* can affect the ease or difficulty of delivery. A narrow *pelvis* gives more difficulty than a broader one, by obstructing the descent of the fetus. Certain landmarks in the anatomy of the *pelvis* are commonly used to estimate the descent of the baby during *labor*. The muscles of the *pelvic floor* support all the abdominal and pelvic organs from below – that is why it's called a floor.

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