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A COMPARATIVE LITERATURE REVIEW: ANATOMY OF THE FOETAL SKULL

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ABSTRACT

Introduction: The fetal skull is the most difficult part of the baby to pass through the mother's pelvic canal, due to the hard bony nature of the skull. It protects the brain Understanding the anatomy of the fetal skull and its diameter will help you recognise how a labour is progressing, and whether the baby's head is 'presenting' correctly as it comes down the birth canal. According to Acharya Sushrut six bones are present in the head. These bones separate in intrauterine life & the movement of these bones is helpful at the time of delivery. Afterward these bones attach with each other keeping mark on it & these are called as sevani. Conclusion: The skull is formed by several bones joined tightly together by joints called sutures. In the fetus and newborn, spaces called fontanels exist between some of the skull bones on the top of the baby's head. As per Ayurveda there are six bones present in the head. These bones separate in intrauterine life & the movement of these bones is helpful at the time of delivery.

KEYWORD: Skull bones, Sevani, Pelvis, Fontanelle, Sutures, Landmarks of Fetal Skull.

INTRODUCTION

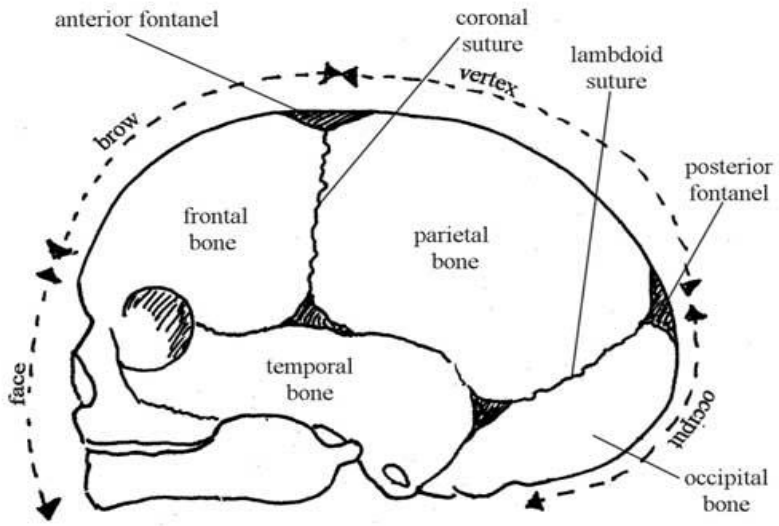
The skull bones encase and protect the brain, which is very delicate and subjected to pressure when the fetal head passes down the birth canal. Correct presentation of the smallest diameter of the fetal skull to the largest diameter of the mother's bony pelvis is essential if delivery is to proceed normally. But if the presenting diameter of the fetal skull is larger than the maternal pelvic diameter, it needs very close attention for the baby to go through a normal vaginal delivery.

Fetal head molding is important for adapting the fetal head to the birth canal during vaginal delivery; however, excessive deformation of fetal head may lead to severe complications. Although labor force is one of the major factors which cause deformation of the fetal head, its effect on fetal head molding has not been quantitatively investigated yet.

The fetal skull is the most difficult part of the baby to pass through the mother's pelvic canal, due to the hard bony nature of the skull. Understanding the anatomy of the fetal skull and its diameter will help you recognise how a labour is progressing, and whether the baby's head is 'presenting' correctly as it comes down the birth canal. This will give you a better understanding of whether a normal vaginal delivery is likely, or if the mother needs referral because the descent of the baby's head is not making sufficient progress.

FETAL SKULL BONES

The skull bones encase and protect the brain, which is very delicate and subjected to pressure when the fetal head passes down the birth canal. Correct presentation of the smallest diameter of the fetal skull to the largest diameter of the mother's bony pelvis is essential if delivery is to proceed normally. But if the presenting diameter of the fetal skull is larger than the maternal pelvic diameter, it needs very close attention for the baby to go through a normal vaginal delivery.



It consists of vault, face and base
The vault is composed of

- 2 frontal bones separated by the frontal suture,
- 2 parietal bones separated by the sagittal suture,
- The occipital bone separated by the lambdoidal suture from the parietal bones, while the coronal suture separates the frontal from the parietal bones.

Each of the 2 parietal bones is separated from the temporal bone on each side by the temporal suture.
The face is the area from the junction of the chin and neck to the root of the nose and supra-orbital ridges.

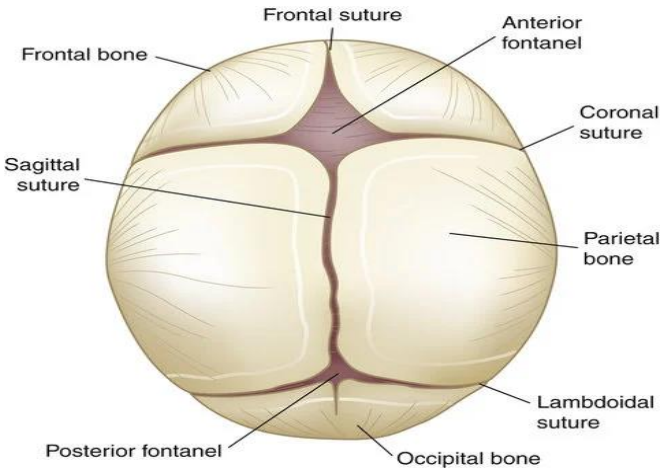
The vertex is the area of the vault bounded;

- anteriorly by the anterior fontanelle and the coronal suture,
- posteriorly by the posterior fontanelle and lambdoidal suture,
- laterally by 2 lines passing by the parietal eminencies.

The brow is the area from the nose and supra-orbital ridges to the anterior fontanelle and coronal suture.

THE FONTANELLES
These are 6 areas lie at the meeting of the sutures. Four fontanelles lie at the anterior and posterior end of the temporal sutures on each side and have no obstetric importance. The anterior and posterior fontanelles are important to diagnose:

- the vertex presentation,
- the position of the occiput,
- the degree of flexion of the head.



Anterior Fontanelle (Bregma)	Posterior Fontanelle (Lambda)
Large, and lozenge-shaped.	Small and triangular.
Its floor is membranous.	Its floor is bony.
Surrounded by 4 bones.	Surrounded by 3 bones.
(2 frontal and 2 parietal).	(2 parietal and occipital).
The floor is completely ossified 1.5 years after birth.	The floor is completely ossified at full term.
The surrounding bones are not overlapping during moulding.	The surrounding bones are overlapping during moulding.

SUTURES

Sutures are joints between the bones of the skull. In the fetus they can 'give' a little under the pressure on the baby's head as it passes down the birth canal. During early childhood, these sutures harden and the skull bones can no longer move relative to one another, as they can to a small extent in the fetus and newborn. It is traditional for their names and locations to be taught in midwifery courses. You may be able to tell the angle of the baby's head as it 'presents' in the birth canal by feeling for the position of the main sutures with your examining fingers.

DIAMETERS OF FOETAL SKULL

Longitudinal diameters

Suboccipito-bregmatic = 9.5cm

- from below the occipital protuberance to the centre of the anterior fontanelle (bregma).
- It is the engagement diameter in occipito-anterior with complete flexion.

Suboccipito-frontal = 10 cm

- from below the occipital protuberance to the anterior end of the bregma.
- It is the engagement diameter in occipito anterior with incomplete flexion.
- It is the diameter that distends the vulva in occipito anterior if the head is allowed to extend after crowning.

Occipito-frontal = 11.5 cm

- form the occipital protuberance to the root of the nose.
- It is the engagement diameter in occipito-posterior position.
- It is the diameter that distends the vulva in face to pubis delivery.
- It is the diameter that distends the vulva if the head extends before crowing in occipito anterior.

Submento-bregmatic = 9.5 cm

- from the junction of the chin and neck to the centre of the bregma.
- It is the engagement diameter in face presentation when the head is completely extended.

Submento-vertical =11.5 cm

- from the junction of the chin and neck to the vertical point which is a point on the sagittal suture midway between anterior and posterior fontanelles.
- It is the engagement diameter in the incompletely extended face.
- It is the diameter that distends the vulva during face delivery.

Mento-vertical =13.5 cm

- from the tip of the chin to the vertical point.
- It is the engagement diameter in brow presentation. As it is longer than the largest diameter of the pelvic brim, the head cannot enter the pelvis.

Transverse diameters

Biparietal =9.5 cm

- between the 2 parietal eminencies.

Subparietal supraparietal = 9cm

- from below one parietal eminence to above the opposite eminence.
- It is the engagement diameter in case of asynclitism.

Bitemporal = 8 cm

- between the anterior ends of the temporal sutures.

Bimastoid = 7.5cm

- between the tips of the 2 mastoid processes.

Certain regions and **landmarks in the fetal skull**, which have particular importance for obstetric care because they may form the so-called presenting part of the fetus — that is, the part leading the way down the birth canal.

1. **The vertex** is the area midway between the anterior fontanel, the two parietal bones and the posterior fontanel. A vertex presentation occurs when this part of the fetal skull is leading the way. This is the normal and the safest presentation for a vaginal delivery.
2. **The brow** is the area of skull which extends from the anterior fontanel to the upper border of the eye. A brow presentation is a significant risk for the mother and the baby.
3. **The face** extends from the upper ridge of the eye to the nose and chin (lower jaw). A face presentation is also a significant risk for the mother and baby.
4. **The occiput** is the area between the base of the skull and the posterior fontanel. It is unusual and very risky for the occiput to be the presenting part.

AYURVEDIC DESCRIPTION OF FETAL SKULL

According to Acharya Sushrut six bones are present in the head. These bones separate in intrauterine life & the movement of these bones is helpful at the time of delivery. Afterward these bones attach with each other keeping mark on it & these are called as sevani. Actually there are four bones in adult but in early age there are six bones. Hence Acharya Sushrut has decribed as six bones are present in the skull. They are frontal or Purakapalasthi, parietal or Pashvakapalasthi, Paschakapalasthi orocciptal & Sankhasthi or temporal bone. Sevani word is also mentioned at the time of description of the sandhi, Type of sandhi is given as Tunna Sevani.

Ayurveda divides all joints of the body in eight types. These types of joint are kor, Udukhal, samudga, Pratara, Tunnasevani, vayastunda, mandal & Shankhavarta. Tunna Sevani is a suture type of joint. Tunnasevani is a sevani type joint which is present in the skull. It divides skull into various parts. There are five joints present in it.

Mainly the Tunna sevani type of joint is present in case of skull bone. The bones which are flat means scapula and hip bone has or in case of skull or skull cap. In case of skull or skull cap stitch like joints are available. Especially the Joint when two flat bones meet together having serrate edges is called as Tunna sevani Joint.

The edges of the Joining edges are denticulate appearance. These denticulate process meet each other to form uniform Joint such type of joint is named as Tunnasevani. This is immovable joint. Tunna means tailor or stich like mark of wound. A structure which appears like stitches of tailor or mark on the clothes or mark remains after wound. This mark we can see on the skull not on the skin. Sevanya are not seen on the surface of the body or exterior of the head. It present below the skin. It is present only on the bone or exterior of skull.

Sevanya are not seen on the surface of the body or extension of the head. Hence it is present only on the bone or skull. According to paribhasha koasha sevani means mark remains after wound. Hence Tunnasevani is mark on the skull, or mark like sutures or stitch marks like structure. This mark we can see on the skull. Acharya Sushruta told that Sevani is also called as sivani. Sometime it is called as simant. We can observe the sivani's on the skull. There are coronal suture, sagittal suture, lambdoid & squamous suture present on the skull. Comparative structures against is given in following table. Second meaning of the sevani is said to be folds of skin or mucus folds. This has been seen in case of tongue .The fold present in the midline of tongue then it is called frenulum of the tongue. This is very important structure because in case of any injury to this structure can hamper work tongue and this also creates difficulty in the pronunciation or speaking. If there is congenital shorting of frenulum then there may be sometime protrusion of the tongue. Hence Susruta has suggested preserving this structure.

CONCLUSION

1. The skull is formed by several bones joined tightly together by joints called sutures. In the fetus and newborn, spaces called fontanels exist between some of the skull bones on the top of the baby's head. The position of the sutures and the fontanels can tell you about the angle at which the baby's head is presenting during labour and delivery.
2. The pelvic inlet is the space where the baby's head enters the pelvis; it is larger than the pelvic outlet, where the baby's head emerges from the pelvis. In order to get through the widest diameter of the inlet and the outlet, the baby has to rotate as it passes through the pelvic canal.
3. The vertex presentation (where the top of the baby's head is the presenting part) is the most common and the safest presentation for a normal vaginal delivery. Other presentations carry a much higher risk for the mother and baby.
4. As per Ayurveda there are six bones present in the head. These bones separate in intrauterine life & the movement of these bones is helpful at the time of delivery.
5. Purakapalasthi, Pashvakapalasthi, Paschakapalasthi & Sankhasthi are four bones described in adult life.
6. Sivani is surgically important structure which is preserved at the time of surgery or any injury to it.
7. There are seven number of sivani. Out of five present in the skull. These structures are resembles to coronal suture, sagital suture, Lambdoid suture and squamous sutures.
8. Thus the structures of the sevani are found on skull, skin or mucus membrane. Whatever may be but Susrut told to preserve these structures.

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