Oral Biology
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Lecture - 01
Craniofacial anatomy - Part 1

Good day, dear participants here, we are today to learn about Craniofacial Anatomy. This is Doctor Ramya here, to give you a precise overview of what craniofacial anatomy is all about.

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So, this lecture is in 2 parts the part 1 and part 2. In part 1 we would be reading about the cranium and the face and part 2 would be about in depth about the facial bones and further about the sinuses, the foramina and the sutures.

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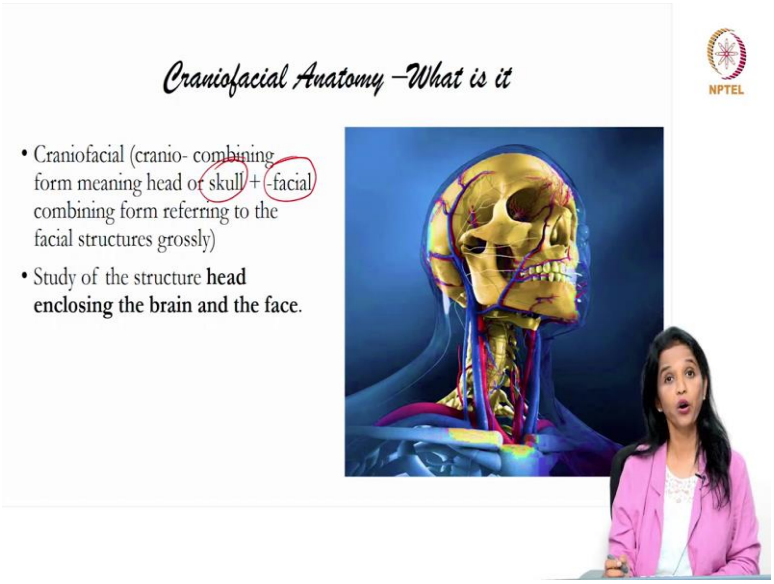

So, now we go on to learn about what is craniofacial anatomy all about and what is it. So, the word craniofacial means that it is actually referring to the head together that is the head or the skull and you have the skull and the face combining together to give that beautiful name. So, you have your skull and the face combining to form the craniofacial anatomy. And study of this craniofacial region is what we are going to do today.

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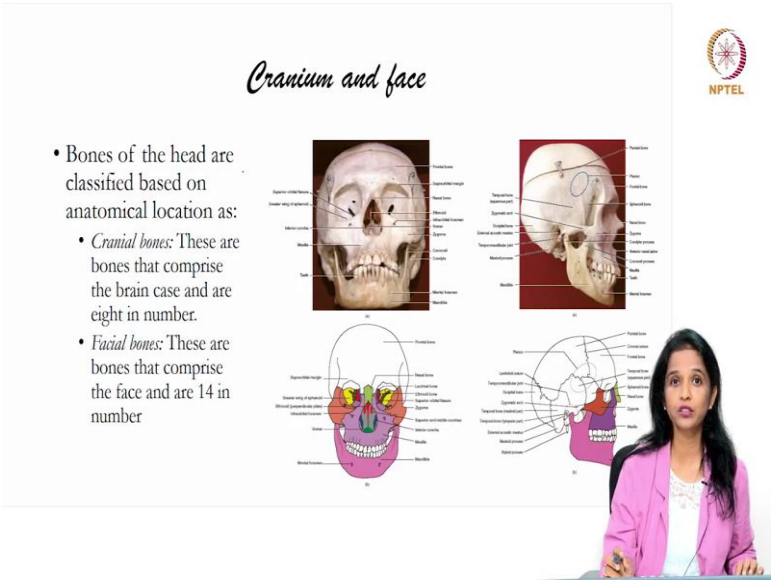

And this picture is here to denote the cranium and the face. So, you can see that there is a frontal view here and then we have the lateral view here the frontal view as the name

suggests shows both the facial bones at large and a few parts of the cranium as well. The colored areas of the figure refer to the facial bones and the non- colored areas are the ones which are actually representing the cranial bones. So, these are very important. So, how many bones does the cranium contain? So, the cranium bones are actually 8 in number, and then the facial bones are about 14 in number.

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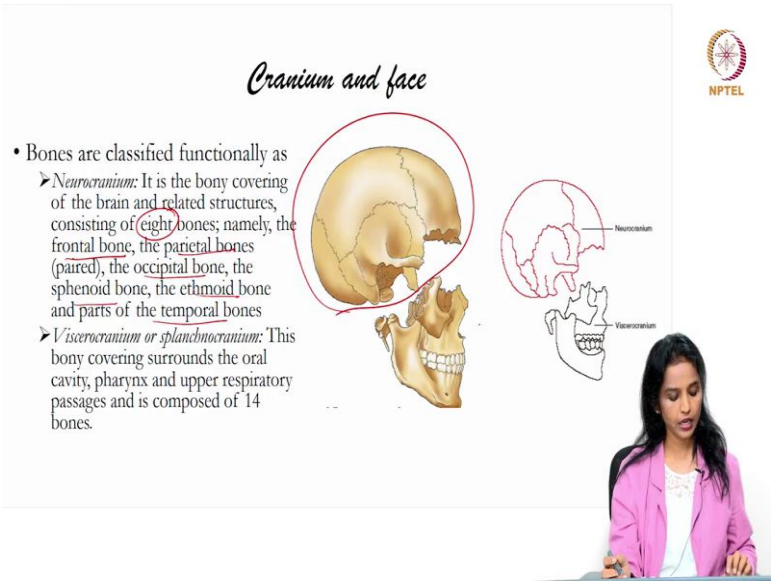

So, though the area looks smaller the number of bones in the face are more in number. And now we move on to a broad classification of what the cranial bones mean or the craniofacial bones are classified functionally into two. So, we have the neurocranium and the viscerocranium, the viscerocranium is also known as the splanchnocranium.

So, this neurocranium as the name beautifully suggests encloses the brain which is the most important or the vital part of the entire human body as such. And this part of the neurocranium actually is containing eight bones and that eight bones is constituted by your frontal bone, the parietal bone, occipital bone, sphenoid bone, ethmoid bone and parts of the temporal bone.

So, all that goes into making this particular part which is so, beautifully represented in this particular picture. So, you can see that the cranial bone is actually disoccluded and kept separately. So, what is here down is under is your facial bones. So, what actually forms this top part or the cranial part is actually made up of eight bones and the ones at the lower part that is the facial region is made up of 14 bones.

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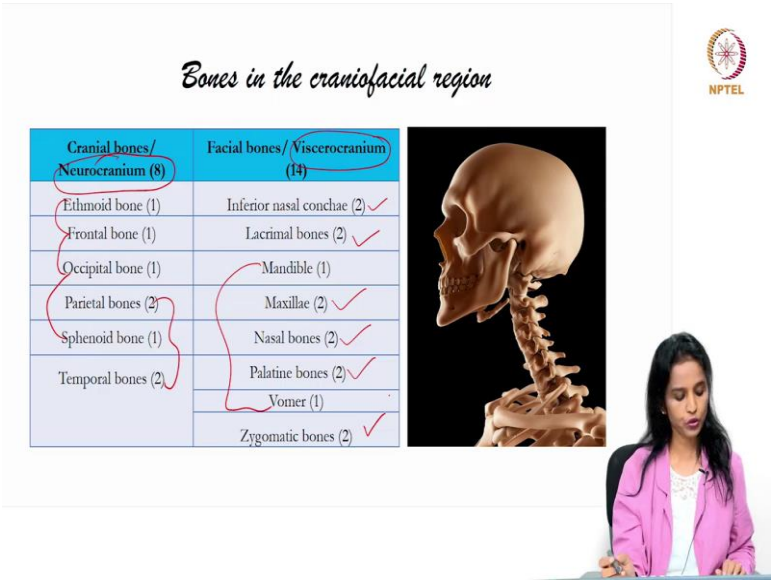

So, now we go on to know what is this 8, and what is this 14 all about. So, we can see that the cranial bones which actually constitute the neurocranium is 8, and what constitutes the viscerocranium or this splanchnocranium is 14 in number. So, put together how does this eight come? So, we have unpaired bones four in number and two are paired in number.

So, we have four unpaired and one; I mean two are paired. So, they are very very important. So, among the cranial bones which constitute the neurocranium we have four unpaired bones and two paired bones. So, these four unpaired bones are your ethmoid bone, frontal bone, occipital bone and sphenoid bone. The paired bones are your parietal and temporal bone.

And further we move on to the viscerocranium or this splanchnocranium which is made up of 14 bones and here we have only two bones which are unpaired. So, the unpaired bones which may go into making the viscerocranium are your mandible and the vomer. We have paired bones termed as the inferior nasal conchae, the lacrimal bones the maxillae, the nasal bones palatine bones and the zygomatic bones so, put together they account to about 14 in number.

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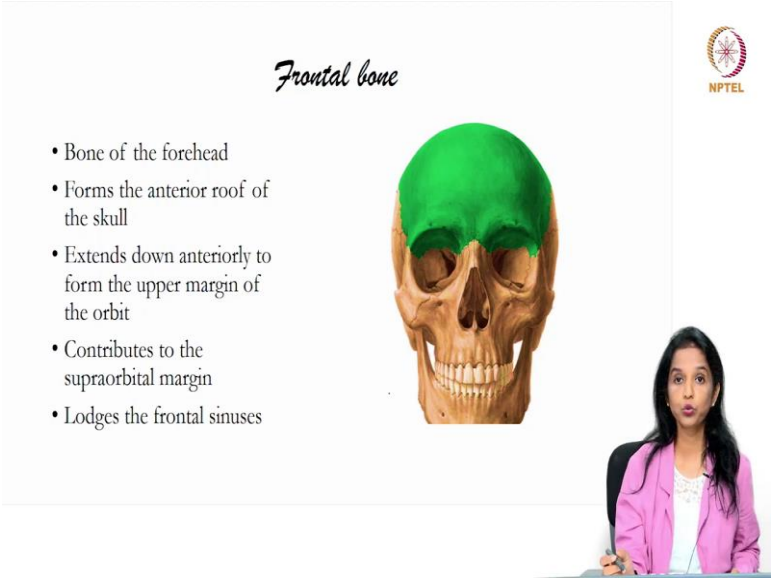

And then now we move on to learning the individual part of the bones. So, the first part of this lecture today would be about your learning the cranial bones. So, the first one the largest one or the most important part of the cranial bone is your frontal bone. So, what has this frontal bone made of? So, you can see that it is. So, beautifully shaded here to highlight the frontal bone it forms the anterior roof of the skull.

So, it is actually at the front. So, this is the anterior roof of the skull and this part is actually what makes your frontal bone. It extends down anteriorly and forms the upper margin of the orbit. So, it forms the upper margin of the orbit and forms the anterior roof of the skull. And it also contributes to the supraorbital margin.

So, the upper orbital margin is also called as supraorbital margin and another important thing is you have two frontal sinuses in this particular region. So, sinuses are nothing but their hollow spaces filled with air. So, why are these sinuses present? Most of the skull bones or craniofacial bones do have some form of sinuses because they tend to actually lighten the weight of the bone and also aid in the conductivity of sound.

So, it actually lightens the entire craniofacial region and also helps in sound conduction and modulation. So, frontal bone as already said is the part of the cranium and it actually forms the anterior roof of the skull and it also contributes to the formation of the supraorbital margin. So, this is your orbit and this is your upper orbital margin. And then we also know that it occupies, it actually has two sinuses that is your frontal sinuses.

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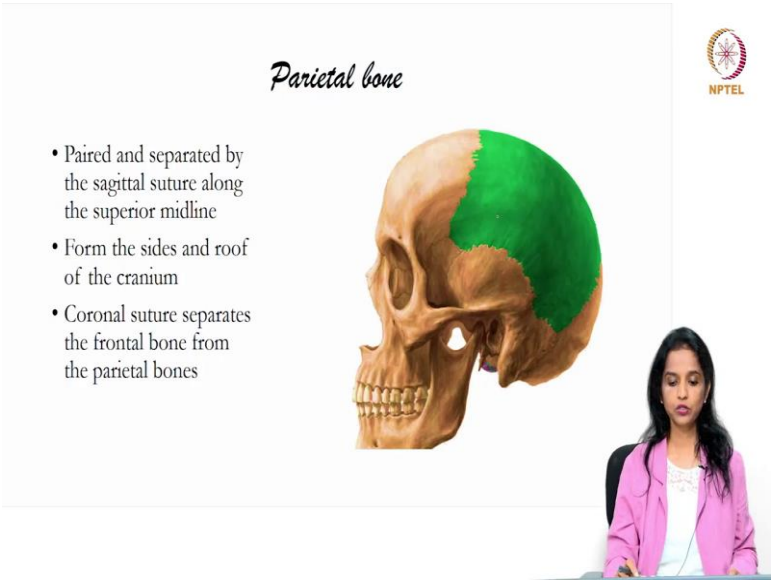

So, this is very important and then we go on to the parietal bone. Parietal bone as the name suggests is on the sides. So, what we saw earlier was the frontal. Then we have on the side. So, parietal bone is actually paired in number. So, there are two parietal bones what we saw earlier was one frontal bone and the next one is two parietal bones.

So, one on either side you have paired parietal bone and they actually are meeting at the center point. So, this center point or the midline is actually called as the sagittal plane. So, there is a joining area of the parietal bone and that inter digitation of the two parietal bone is called as your sagittal suture. So, the suture which is present in the sagittal plane is called the sagittal suture, and the parietal bones are joined at the sagittal suture.

And then further we know that the parietal bone has to join in front with your frontal bone. So, the frontal bone and the parietal bone interdigitates at a suture called as coronal suture. So, what was seen first was your sagittal. And then now we are talking about the coronal plane. So, this is a sagittal plane and this is the coronal plane. So, at the coronal plane we have another suture called as coronal suture and it is at that suture, we have the merging of your parietal bone and the frontal bone.

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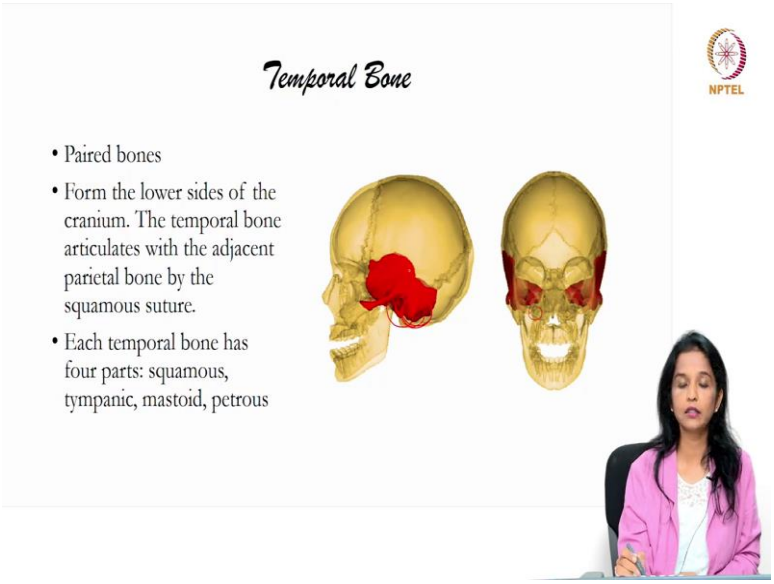

And now we move on to another bone, that is your temporal bone and they are paired. And this forms the lower side of the cranium you can see that so far; we saw the frontal and the parietal. Whereas, now we are seeing the temporal bone so, these forms the lower part of the cranium.

So, the temporal bone actually gets attached or articulated with the adjacent parietal bone by a squamous suture ok. So, forms the lower side of the cranium and the temporal bone articulates with the adjacent parietal bone by the squamoid suture. So, this is very important so, this is your squamoid suture. So, far we have seen three sutures one is your sagittal suture one is actually the coronal suture and then we have the sagittal suture.

Each temporal bone actually has got four parts that is your squamous part, the tympanic part, the mastoid part and the petrous part. So, what is mean by the squamous part? Squamous part is actually a flattened area. So, flattened area is your squamous part and then we have the tympanic region. Tympanic region refers to your region.

So, the one which actually is near or houses your auditory organs is called as the tympanic part of your temporal bone. And then further we have the mastoid region mastoid is this particular region which actually has the mastoid process. And then we have the petrous part which is on the inner aspect.

So, temporal bone is actually forming the lower part of the cranium lower sides of the cranium and it is articulating with the parietal bone at the squamous suture. And then we know that it has got four parts the first part is your squamous part this region is your squamous part, and then we have your tympanic part the mastoid part and then the petrous part at the back.

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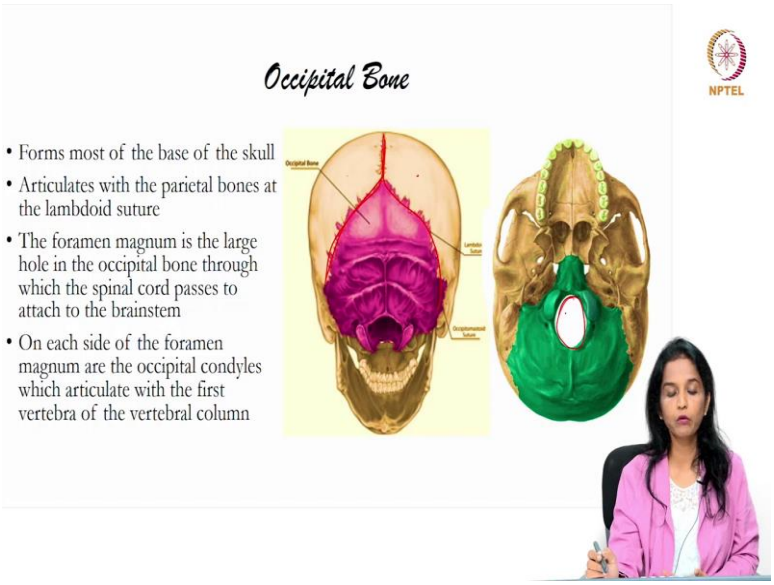

And then further we move on to occipital bone. So, occipital bone almost forms the base of the skull. So, we have this area very nicely highlighted over here the picture shows a very nicely highlighted region that it forms the base of the skull. And it articulates with the parietal bone at the lambdoid suture. So, why is it called as the lambdoid suture? Because it actually has a lambda like appearance.

So, lambdoid suture it merges with the parietal bone. So, what you see here? On top is actually the sagittal bone I mean sorry the sagittal suture. So, you have your parietal bone over here and then the parietal bones are joined together at the sagittal suture and it is joined together with the occipital bone at through your lambdoid suture. And then we have the big foramen magnum which is present in the occipital bone.

So, that is the largest foramen in the body. So, why is it so large? So, the foramen magnum is so large to house your spinal cord which is actually a very important part of the nervous system, and that is actually tail shaped or elongated and it passes through the

entire body part of the main part of the what you say the trunk area and that is a very important control system.

So, that has to exit through this hole and that is why the foramen is very large. On each side of the foramen magnum, you have two condyle like region. So, condyles are the one area which will articulate to the adjacent area on the adjacent bone. So, where does this condyle articulate with? It articulates with the vertebra. So, the vertebral bone starts at the end of your occipital bones at the point of your occipital condyles.

So, we have here which is the occipital bone the occipital bone forms the base of the skull and it articulates with the parietal bone on the top at the lambdoid suture. And then we have a very large foramen magnum over here as already said foramen magnum has or allows exit of the spinal cord. The spinal cord is spread through the entire portion of the trunk region and on either side of the foramen magnum we have your occipital condyles which articulate with your cervical vertebra.

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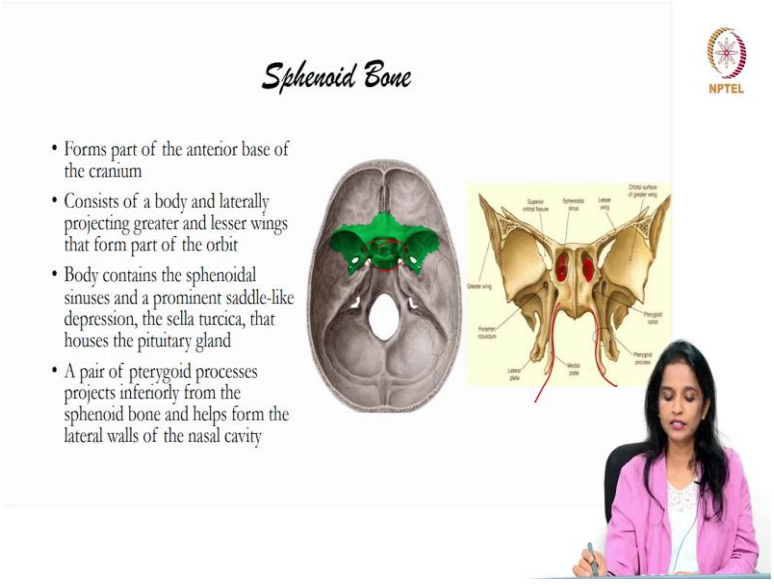

Now, we move on to a very interesting bone that is called as the sphenoid bone. So, this sphenoid bone actually forms the anterior base of the cranium. So, you can see the beautifully shaped sphenoid bone because, the shape of the sphenoid bone is very very unique and the it is also called as the butterfly shaped bone. It consists of a body and then it has two wings on the sides the greater wings and then the lesser wings.

So, it is like this maybe you can think that is there is a greater wing and then the lesser wing. So, there are two wings on the sides of the bone on the body ok. So, the body contains the sphenoidal sinuses like how we saw for the frontal bone. The frontal bone has frontal sinus. Similarly, your sphenoidal bone has sphenoidal sinus. So, you can see the spaces over here the empty hollow space that is your sphenoidal sinuses.

Additionally, they also present a saddle like appearance a seat like appearance that is called as the sella turcica, saddle like appearance you know saddle is a seat and this seat like appearance is present to house your pituitary gland. So, it is a very important location in the cranium and that is actually part of the sphenoid bone and this sphenoid bone houses the sella turcica and on the sella turcica it has the pituitary gland.

So, this particular region is what is called as the sella turcica. And then further we have two pterygoid process projecting inferiorly so, these are the pterygoid process which are projecting inferiorly from the sphenoid bone and helps form the lateral wall of the nasal cavity. So, this is very very important. So, a quick look again a recap of the sphenoid bone. So, sphenoid bone is actually forming the anterior base of the cranium.

And it has a body and then it has wings. So, there is a greater wing and there is a lesser wing attached to the body. And the body also contains your sphenoidal sinuses and then we have a prominent saddle like structure called as sella turcica which houses your pituitary gland. And then further it has pterygoid process projecting down from the sella turcica region and helps form and form the lateral wall of the nasal cavity.

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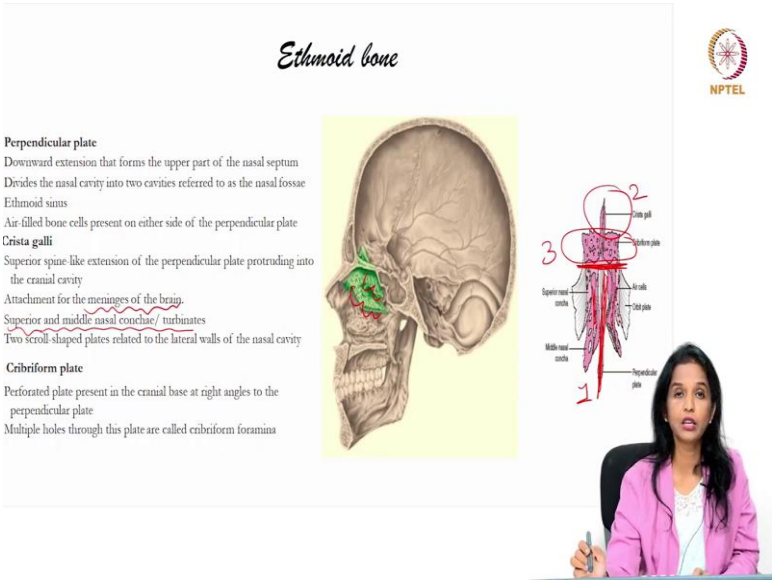

And then we move on to ethmoid bone; ethmoid bone is actually slightly smaller in size, but it is very very intricate very slender in appearance. So, this schematic diagram gives everything about the ethmoid bone. So, there are three major parts of the ethmoid bone the first one is your perpendicular part. So, this is the perpendicular part of the ethmoid bone and then we have the crista galli. And then further the third one is your cribriform plate.

So, first one is your perpendicular plate and then we have the crista galli and then we have the cribriform plate. So, these are the three parts of the ethmoid bone. So, the perpendicular plate as the name suggests is actually just perpendicularly drops down in the perpendicular direction and divides the nasal cavity into two cavities. So, automatically it forms a very important part or the upper part of the nasal septa.

And there are again it actually has the sides of the air- filled bone cells are present on either sides of the perpendicular plate and that is housing your ethmoidal sinuses. So, we can see the ethmoidal sinuses at this particular area. And then we have the crista galli. So, crista galli is a very sharp projected extension of the perpendicular plate protruding into your cranial cavity and this helps in attachment of the meninges of the brain.

So, it is a very important structure and it actually has the superior and the middle conchae turbinates it is attached with the superior and middle concha. And there are two scroll shaped plates extending these are the two scroll shaped plates, which are actually

the superior and the middle concha extending from this particular structure which forms important part of the ethmoid bone.

And then further we have the cribriform plate which is nothing but it is a perforated plate as the name suggests there are some very small holes in the cranial base at right angles to the perpendicular plate. So, we have the perpendicular plate here and this is exactly at right angles and there are some minor perforations in that.

So, these minor perforations are there to what you say convey or connect your olfactory nerve fibers from the anterior part of the cranium and then it actually drops down and touches the nasal mucosa. So, it is a very important part of a sensory system that is smell. So, all this are actually housed inside this ethmoid bone a quick recap of the ethmoid bone.

Ethmoid bone is a very small slender intricate bone and it has three parts or regions. The first one is your perpendicular plate, the second one is your crista galli the third one is your cribriform plate. So, you have your perpendicular plate actually forming the upper part of the nasal septum and then we have your air fill spaces on the sides and then that forms the ethmoid sinus.

And then we have the same perpendicular plate projecting into the cranium that is your crista galli and that crista galli helps in attachment of the meninges of the cranium. And from there it also has two scroll shaped plates that is your superior and middle nasal concha.

Then we have the cribriform plate; cribriform plate is at right angles to the perpendicular plate and that cribriform plate has numerous small perforations. And these numerous small perforations are there to transmit your olfactory nerve fibers hence connecting to the olfactory cortex to the nasal mucosa.

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And with that we are ending the craniofacial anatomy part 1, where we went on to read quickly about the cranial bones.