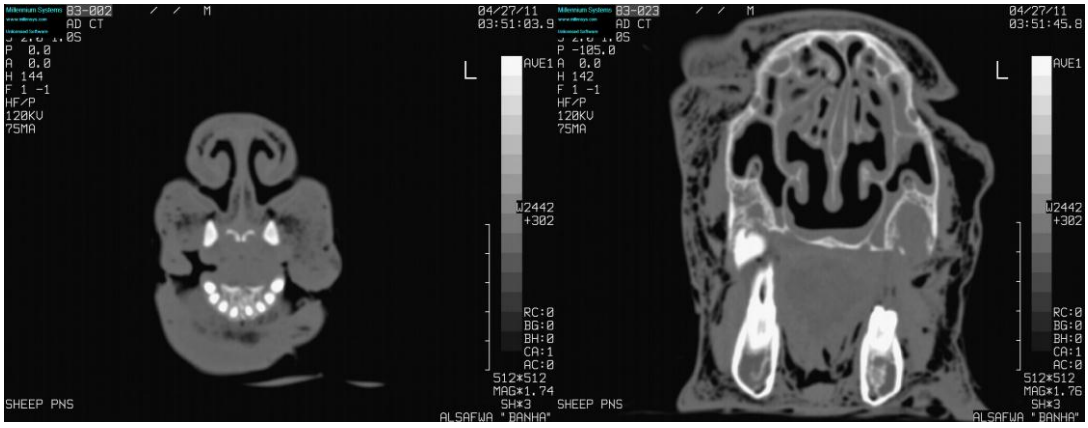
Results

This study was carried out on fourteen (14) heads Elrahmani (old Nerwigean type) above 6 months in age in the period from June to November 2010.

Coronal CT scan was done to 4 heads showing that, the nasal cavity was triangular in shape with its base directed inferiorly formed by the hard palate, the cavity was narrow anteriorly and became wider as we go posteriorly, and this is shown in figure (10).



A B

Figure (10) CT scan of sheep nose coronal sections: A; anterior section, B; posterior section

Nasal cavity was found to contain nasal septum in the centre extending from the hard palate inferiorly to the nasal bone superiorly, the septum appeared to have bony part toward the hard palate and the rest was cartilaginous (figure 11), the septum was found to lose its contact with the hard palate posteriorly, It divided the cavity into two symmetrical halves, this is shown in figure (12).

Each half contained three projections (conchae) from the lateral wall, the dorsal nasal concha appeared in more anterior level than the other and was located under the floor and started as simple projection and it became progressively larger and bullous as we go posteriorly, this is shown in figure (12).

The ventral nasal concha appeared after dorsal one, it appeared as one basal lamella it run medially and then divided into two lamellae (ventral, dorsal) each one turned upon it to enclose sinus. The middle nasal concha appeared at more posterior level between ventral and dorsal concha and appeared to be formed by basal lamella and its origin appeared at the most posterior part of the cavity and contained two sinuses one dorsal and one ventral, this is shown in figure (11).

There were 4 nasal meati dorsal nasal meatus above dorsal nasal concha between it and roof of the nose, ventral nasal meatus below ventral concha between it and the floor of the nose. Middle nasal meatus lied between dorsal and ventral nasal conchae anteriorly; posteriorly it divided into two passages ventral and dorsal by the appearance of the middle concha. Common nasal meatus lied between nasal septum and the turbinate and communicate with ventral nasal meatus, figure (11). CT scan also showed maxillary, frontal, palatine and lacrimal sinus; maxillary sinus lie lateral to the cavity excavating maxilla become larger as we go posteriorly, figure (12), it was communicated with the palatine sinus which was excavating hard palate and appeared more anterior to the maxillary sinus, figure (11). The frontal sinus appeared at posterior level at the same level of appearance of the orbit it was lying above the orbit and it is divided into lateral and medial compartment, figure (13).

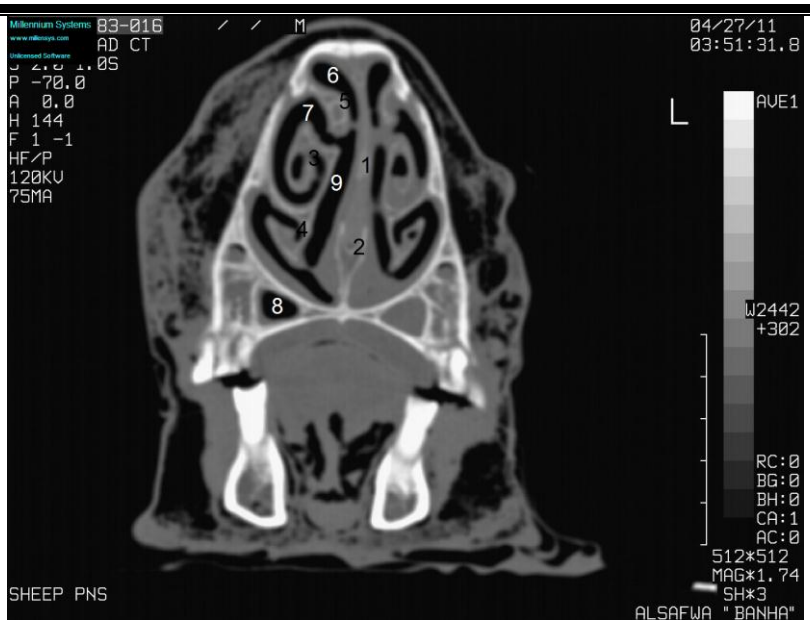


Figure (11) CT scan coronal section at the level of 2nd premolar tooth showing:1; nasal septum(carilagenous part), 2; nasal septum(bony part, 3; dorsal spiral lamella of ventral concha, 4; ventral spiral lamella, 5; dorsal nasal concha, 6; dorsal meatus ,7; middle nasal meatus, 8; palatine sinus, 9; common meatus

Figure (12) CT scan coronal view at the level of last molar tooth showing: 1; maxillary sinus (lateral compartment) 2; nasal septum 3; ventral nasal concha 4; dorsal nasal concha. 5; middle nasal concha 6; middle meatus, 7; maxillary sinus (medial compartment) 8; common meatus 9; dorsal conchal sinus. 10; dorsal meatus

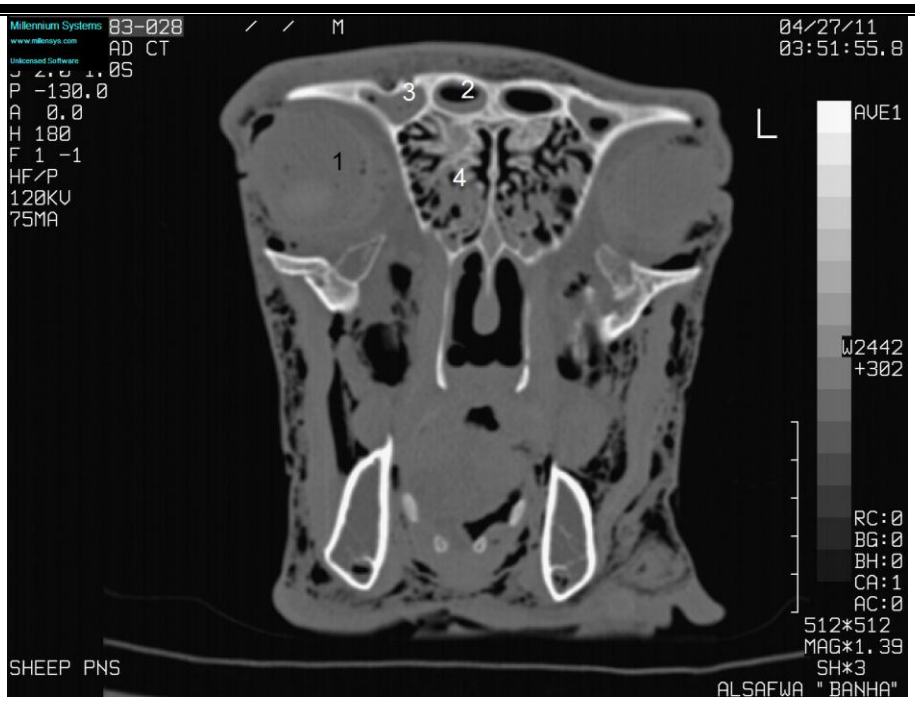


Figure (13) CT scan coronal section at the level of orbit showing:
1; orbit 2; medial compartment of frontal sinus 3; lateral compartment of frontal sinus 4; ethmoid meatuses

Anatomical dissection was done to 6 heads both sagg+itally and coronally, saggital section showed the conical shape of the nasal cavity with length ranging from 16-20cm .It is narrow anteriorly and wide posteriorly, the nasal septum which divided nose into two halves, it extended from the hard palate ventrally to nasal bone dorsally. It has two parts bony part which was posterior and ventral that consisted of perpendicular plate of ethmoid bone and Vomer respectively and the rest is cartilaginous. It lost its contact with the hard palate at the level of the first molar tooth, Figure (14).

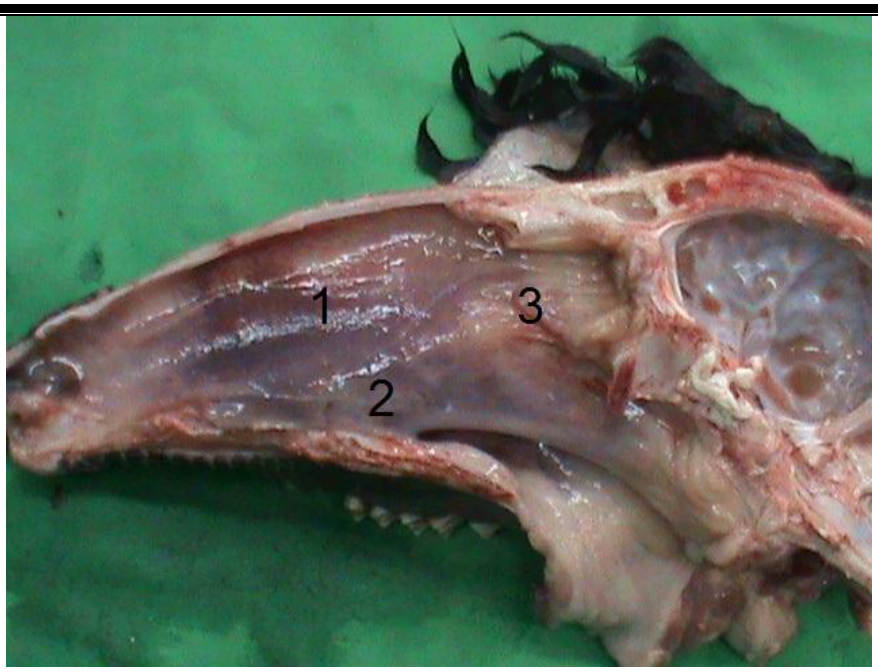


Figure (14) saggitaly dissected sheep head showing: 1; septal cartilage, 2; vomer bone, 3; perpendicular plate of ethmoid

The lateral nasal wall was occupied by three elevations (conchae) the dorsal nasal concha below the roof of the nose extending from perpendicular plate of ethmoid posteriorly to the level of first cheek tooth it was wide in the middle and narrowed towards both ends and it was solid in the anterior part and more bullous in the posterior part.

Ventral nasal concha was lying below dorsal nasal concha anteriorly and below middle nasal concha posteriorly. It was broader than dorsal concha its length ranged from 10-14 cm.

The middle nasal concha was lying between dorsal and ventral one extending from the level of the second premolar tooth; it divides the middle meatus into two passages (ventral and dorsal).

Three passages (meatuses) was found to lie between these conchae; dorsal meatus above the dorsal nasal concha, Ventral nasal

meatus below ventral nasal concha and it was the largest of each and in its posterior end, it was found to communicate with middle meatus to form common passage leading to the nasopharynx. The middle nasal meatus was lying between dorsal and ventral concha anteriorly and was found to bifurcate by the middle nasal concha at the level of second premolar tooth into ventral and dorsal passages above and below middle concha, figure (15)

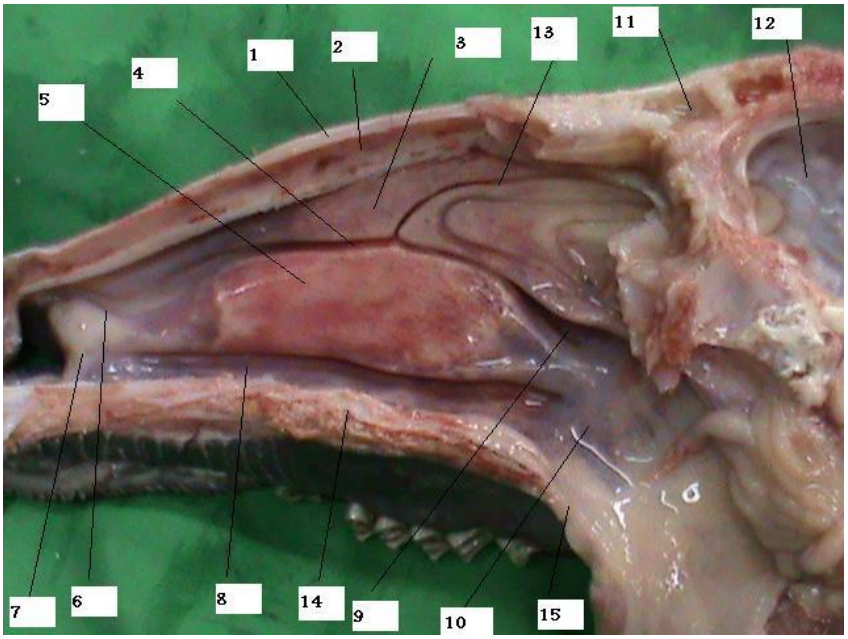


Figure (15) sagitally dissected nose of sheep

1-nasal bone,2- dorsal nasal meatus,3- dorsal nasal concha,4- middle nasal meatus, 5- ventral nasal concha, 6- alar fold,7- basal fold, 8- ventral nasal meatus, 9- middle nasal meeatus split caudally,10- choana, 11- lateral frontal sinus,12- cranial cavity,13- middle nasal meeatus split caudally, 14- palatine process of maxilla and horizontal plate of palatine bone, dorsal to them cut edge of vomer, 15- soft palate

The middle nasal concha was removed using ordinary scissor and its bone appears delicate and easily to remove and after removal the opening of maxillary and frontal sinus appeared,the opening of maxillary sinus was partially covered by the uncinate process which was hook like in shape projecting from the lateral wall, figure (16).In saggital section the frontal sinus appeared above the cranial cavity excavating the frontal

bone , it opens in the middle meatus behind the maxillary ostium, figure (16).

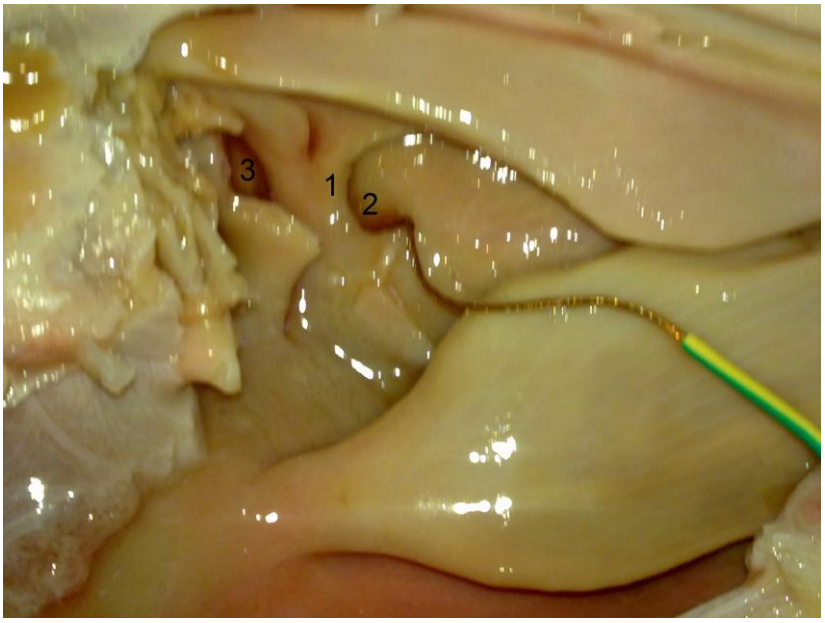


Figure (16) opening of paranasal sinuses: 1; uncinate process, 2; nasomaxillary aperature, 3; opening of frontal sinus

In coronal dissection 2cm section was cut until reaching 10cm from nares and it was found that the height of the nasal cavity is about 8-10cm with maximal width ranging from 7.5-9 cm.Nasal septum completely separating nasal cavity into two halves and it was bony in its inferior part (Vomer bone) and cartilaginous in its anterior part (septal cartilage) the cartilage was covered by mucoperichondrium. Each halve of the cavity contained two nasal turbinate (ventral-dorsal) .The ventral nasal concha originated from lateral wall by basal lamella and inside the cavity the basal lamella was divided into ventral and dorsal lamella (spiral lamella), each one was curved dorsally laterally and then ventrally to form sinus or recess. Dorsal nasal concha was not divided and contained sinus (dorsal nasal sinus). The cavity contained four nasal meati; common, dorsal, ventral and middle nasal meati. Figure (17)

The common nasal meatus was a narrow passage between nasal concha and the nasal septum. The dorsal nasal meatus was lying above dorsal concha under the roof .the middle meatus was lying below dorsal concha and above dorsal lamella of the ventral concha, at this level there was no middle turbinate yet. The ventral meatus was the wider one and was continuous with the common nasal cavity. At this level the palatine sinus appeared excavating the hard palate, the maxillary sinus was small at this level, figure (17). At the level of third molar tooth the middle concha appeared and the maxillary sinus is larger and was connected with palatine sinus. And at this level the nasal septum loses its contact with hard palate, figure (18). At The posterior part of the nasal cavity the maxillary sinus became larger, and multiple ethmoidal conchae appeared with multiple meatuses between them, figure (19).

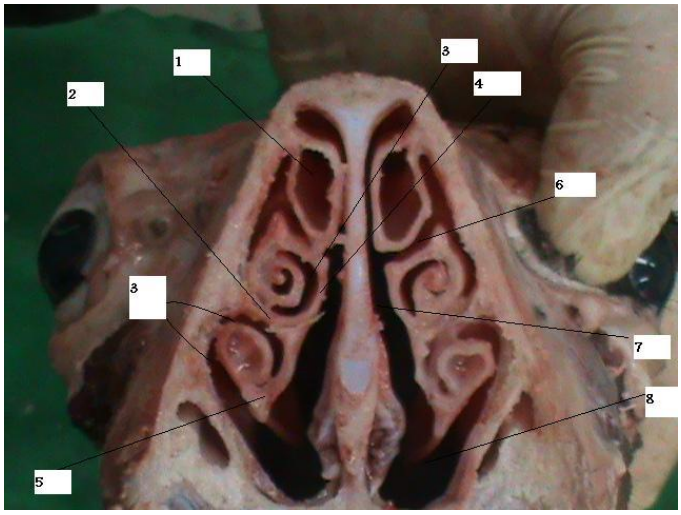


Figure (17) details of conchae in coronal section of the nose

1- dorsal nasal concha 2- ventral nasal concha 3- recesses 4- spiral lamella dorsal part 5- spiral mlamella ventral part 6- middle nasal meatus 7- common nasal meatus 8- ventral nasal meatus

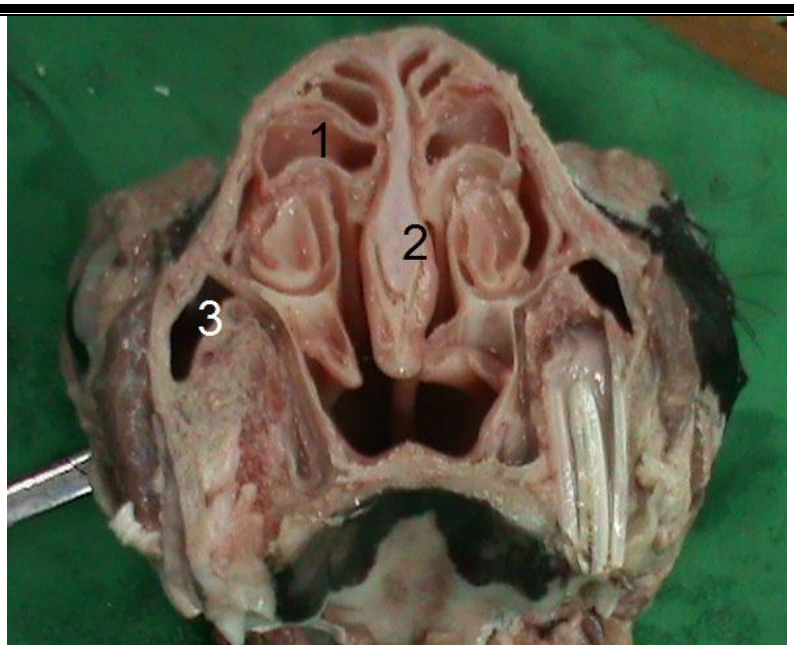


Figure (18) coronal view of the sheep head at the level of the third molar tooth showing: 1- middle nasal concha 2- nasal septum 3- maxillary sinus

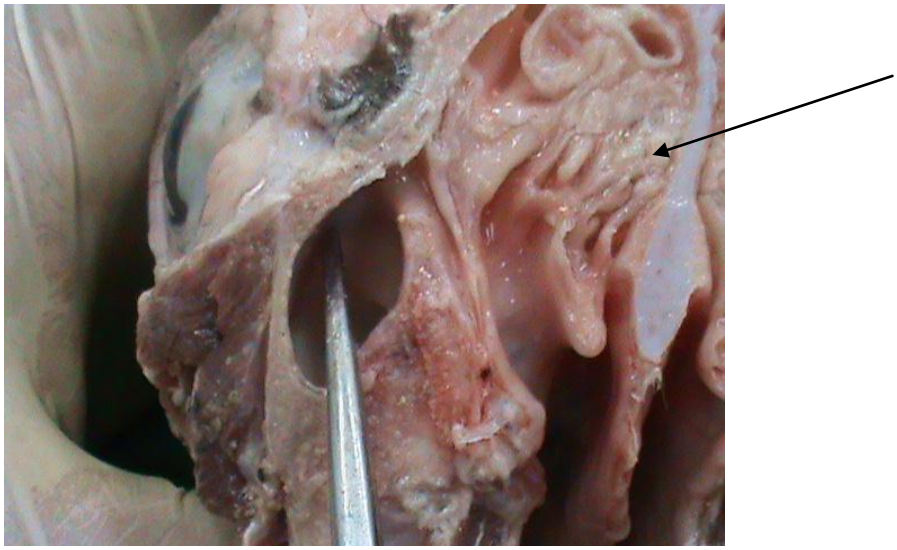


Figure (19) forceps in maxillary sinus and shows: ethmoidoturbinate bone, arrow points to basal lamella of ethmoid conchae

The nasal cavity of the sheep was found to be longer than that of the human and it was narrow in its anterior part so the anterior part about 10 cm from the muzzle was removed to prepare it for endoscopic study .

Endoscopic examination was performed to 4 heads after preparing them. Submucous resection of the septum, (figure 21-22), inferior turbinectomy, (figure20), middle meatal antrostomy, (figure 23), and foreign body removal, (figure 24) were done. It was found that the tissues were soft and easy to remove using ordinary instrument and no need for special instrument. The orbit was found to be not in close contact to the lateral wall. This made endoscopic manipulations to be performed with confidence because there was no fear of injury to orbit.

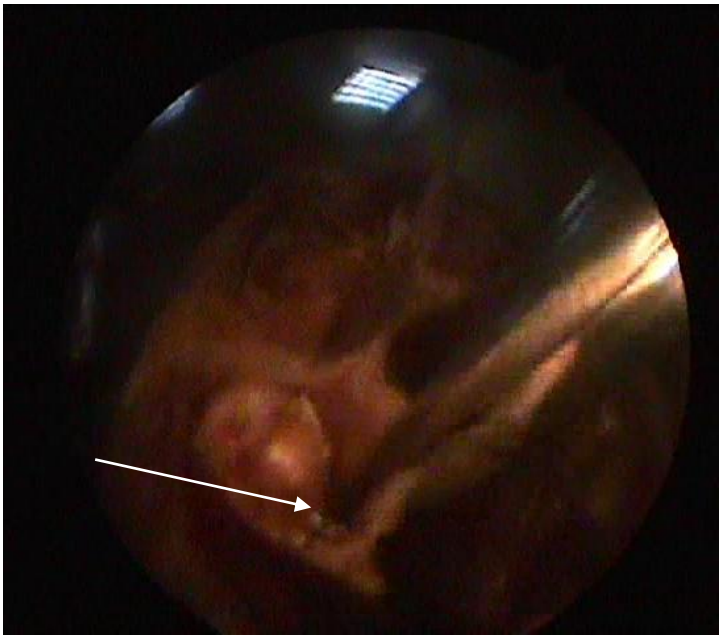


Figure (20) inferior turbinectomy (arrow)

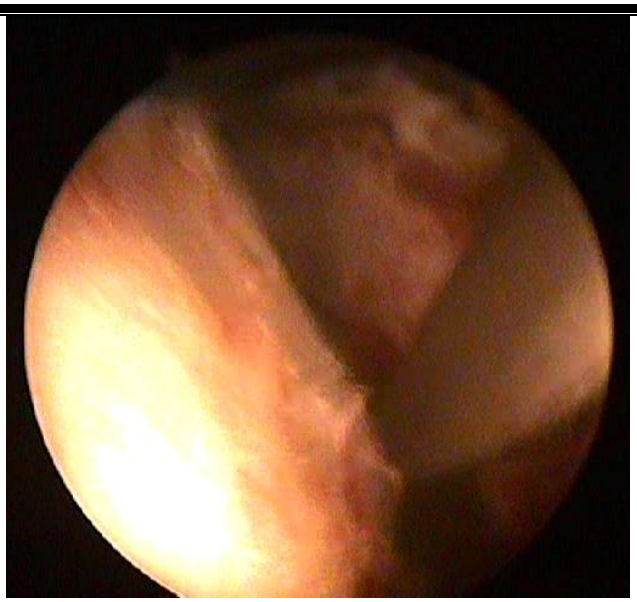


Figure (21) endoscopic elevation of septal flap

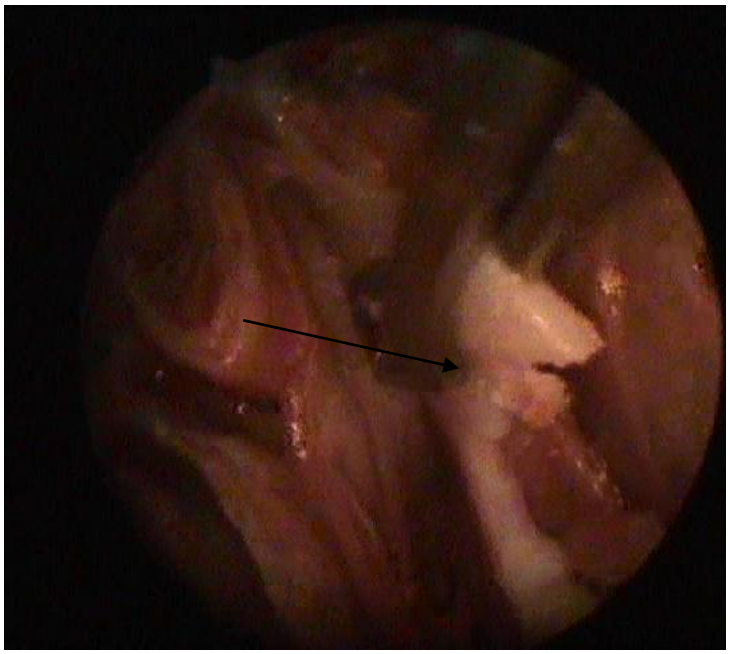
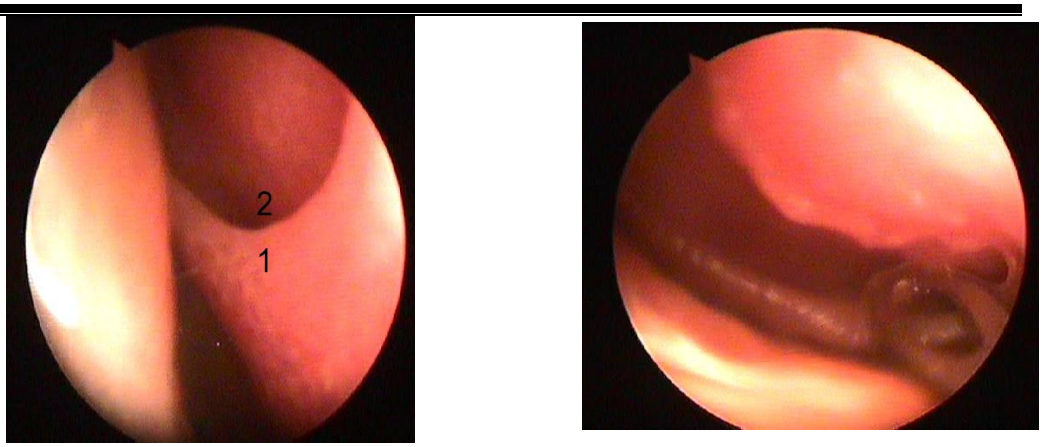


Figure (22) endoscopic resection of septal cartilage (arrow)



A **B**

Figure (23) middle meatal antrostomy. A; nasomaxillary aperature before antrostomy; 1- Uncinate process 2-naso maxillary aperature , B aperature after antrostomy