

Original Research Article

CT of para nasal sinuses (PNS) - A surgeon's view point

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Abstract

Computerized Tomography of the Para Nasal Sinuses (CT PNS) is mandatory for endoscopic nasal surgery. Study of CT PNS is absolutely essential for undertaking this surgery. The surgeon has to have a plan for reading the CT PNS. Patients undergoing nasal surgery by endoscopic approach are subjected to CT PNS. Patients with nasal symptoms like nasal obstruction discharge from the nose and epistaxis, watering from the eyes undergo imaging of the para nasal sinuses by CT. The points of study of CT PNS are highlighted which are of importance to the surgeon to do safe surgery and prevent complications to the underlying and neighboring important structures. Changes of mucosa, erosion of bony walls and expansion of the sinuses and encroachment into the surrounding areas are noted and are kept in mind while doing surgery to prevent complications and doing safe surgery.

Key words

CT PNS, Endoscopic nasal surgery, Para nasal sinuses, Kero's classification, Concha bullosa.

Introduction

CT PNS is the imaging modality of the para nasal sinuses. Introduction of computerized tomography has revolutionized the approach to nasal diseases. Introduction of the rigid nasal endoscope, the lighting system and the availability of video camera has made a dramatic change in the management of chronic nasal diseases. Endoscopic nasal surgery has

revolutionized the treatment of nasal diseases as the approach to the disease is by the natural openings of the nose. Not only chronic sinusitis, even benign and malignant tumors and deep seated tumors of the base of the skull region are accessible to the nasal endoscope. Introduction of newer techniques of anesthesia in which bleeding during surgery is lessened, by hypotensive anesthesia, ease of display by high definition endoscopes and camera on the monitor and

computer aided navigation systems have made a sea change in nasal surgery by endoscopic approach.

The consequences of these developments results in the surgeon needing to know thoroughly the anatomical lie of the structures and avoiding damage to the surrounding vital structures. It behaves on the surgeon to be able to know the minute details of the scans of CT of para nasal sinuses.

Computerized tomography of the para nasal sinuses is the road map for the surgeon [1]. It clearly depicts the structures as they lie. Because the nasal aperture is the route of entry for surgery, views of CT PNS are also in the same plane, coronal, as the surgery [2]. Small bony laminae in the sinuses which are clearly delineated by CT PNS help in doing functional surgery of the nose by endoscopic approach.

A study of the normal bony pattern of the para nasal sinuses along with the mucosal covering of the bony structures is mandatory before embarking on endoscopic sinus surgery. Variations in nasal anatomical pattern have to be studied and compared with the pathological states in disease conditions.

The normal patterns and the alterations in pathology are compared and a checklist is done. This helps the surgeon in executing planned, safe and functional surgery of the PNS by endoscopic approach.

Materials and methods

All the patients who presented to the ENT OPD of GMC, Nizamabad with complaints of trauma, nasal obstruction, nasal discharge, bleeding, anosmia, swelling around the nose, headache and watering from the eyes were subjected to CT PNS.

The machine used for this CT PNS study was Toshiba make and was a single slice spiral

scanner. This machine gives coronal and axial views.

The CT scans obtained were studied in an organized manner by a checklist. The areas of interest and deviations were noted. Vital details of the adjoining structures and dehiscences liable for surgical complication were noted and reported.

Vital areas like orbital walls, fovea ethmoidalis, carotid artery, optic nerve and anterior ethmoid artery were specially looked for and reported because of their surgical importance.

In this study, patients from June 2013 to May 2015 with complaints of nasal obstruction, discharge, headache, epiphora were included.

Results and Discussion

Total 105 patients of age group 12 to 70 years were included out of which 55 males and 50 females.

Analysis of the scans of these patients was done. The Checklist which was used is given below.

- Sides: right and left side.
- Nasal septum: central or deviated, difficulty in access to surgery.
- Inferior turbinate: normal or hypertrophied.
- Uncinate process: normal, medialised or lateralized or bullous.
- Natural maxillary sinus ostium: patent or obliterated with mucosa.
- Lamina papyracea: dehiscence if any.
- Insertion of uncinated process: to skull base, lamina papyracea or middle turbinate.
- Frontal recess: type of frontal drainage.
- Skull base: height and symmetry of skull base in all sections.
- Middle turbinate: attachments and curvature.
- Ethmoid bulla: normal or torus.
- Kero's classification: depth of olfactory fossa- Type I, II, III.

- Nipple sign for anterior ethmoidal artery.
- Sphenoid: pneumatization, asymmetry, course of intersinus septum, caroticoptic recess.
- Onodi cell: present or absent.

All the CT scans were analyzed based on the above checklist and scans with pathology were compared with normal [3].

The data was listed and pictures of normal and abnormal CT scans were listed. (Photo – 1 to 20)

Photo – 1: Intact nasal pyramid.



Photo – 2: Fractured nasal bone left side.



Key messages

Areas of interest to make endoscopic sinus surgery result oriented and satisfactory are:

- Lie of the septum - straight or deviated: to make a decision whether septoplasty is necessary.

Photo – 3: Fractured nasal pyramid.



Photo – 4: Straight nasal septum and Inferior turbinate normal.



Photo – 5: Deviated nasal septum and concha bullosa.



- Uncinate process - normal, medialised or lateralized: to make a proper antrostomy and not able to locate the normal ostium

and not to enter the orbit by damaging the lamina papyracea.

Photo – 6: Tuberculum septum.



Photo – 7: Inferior turbinate hypertrophy.



Photo – 8: Normal uncinate process and maxillary sinus.

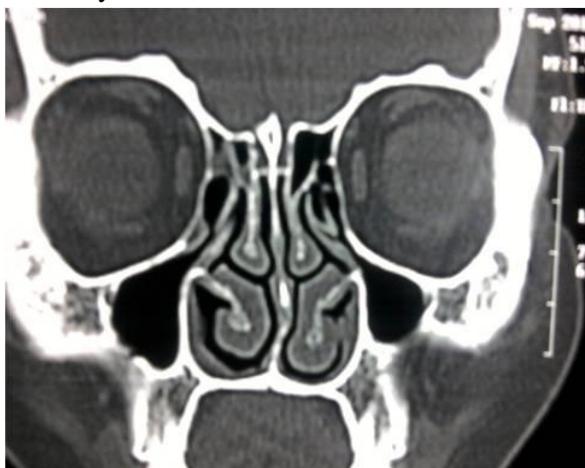


Photo – 9: Agenesis of Maxillary sinus.



Photo – 10: Expansion of Maxillary sinus.



Photo – 11: Concha bullosa.



Photo – 12: Haller's cell.



Photo – 15: Fungal balls.



Photo – 13: Maxillary sinusitis.



Photo – 16: Erosion of walls of maxillary sinus.



Photo – 14: Antrochoanal polyp protruding through accessory ostium.

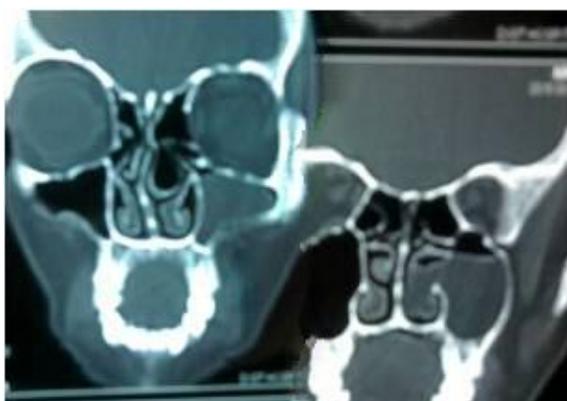


Photo – 17: Infected or hazy bulla ethmoidalis.



- Concha bullosa: obstructing the hiatus semilunaris.
- Cribriform fossa: Not to damage the thin medial lamella of olfactory fossa.

- Anterior ethmoidal artery: Lying in a mesentery or on the roof of the orbit when supraorbital cell is absent.

Photo – 18: Nipple sign of anterior ethmoid artery.



Photo – 19: Erosion of sphenoids.



Photo – 20: Fossa of Rosenmueller obliterated carcinoma.



- Onodi cell: Failure to recognize may lead to not able to localize sphenoid sinus and damage the optic nerve which may be exposed.
- No manipulation in lateral wall of sphenoid sinus.
- Plane of fovea ethmoidalis: As it descends down it comes to be more vertically placed in surgical positions and liable for damage.
- Bare nasolachrial ducts: Can be damaged when anterior margin of maxillary anrostomy is being widened.

The surgeon should have a check list of these special points of note to embark on a safe and successful surgery. This is possible with a firsthand knowledge of the CT PNS of the patient being operated [4].

Conclusion

Study of the CT PNS is mandatory for successful, safe and efficient surgery of the para nasal sinuses and the nasal cavities. It needs detailed and thorough study of the lie of the anatomical structures and variations in embryology and pathology have to be noted. As the para nasal sinuses are bounded by very important structures, both intracranial and extra cranial, and also functionally vital and critical for day to day activities, it is of paramount importance to the surgeon not to damage these structures during surgery. It is a team approach with the radiologist to make out the nuances of the structures in CT scan. A confident surgeon should be able to read the CT scan himself as he is in an advantageous position to know the lie of structures during surgery. Decision to leave structures which should be left alone and not meddled with and structures which have to be operated will be made when personal attention is given to the CT scan of the patient being operated. Thus it is mandatory for the surgeon to be fully well versed with computerized anatomy of the para nasal sinuses.

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