Computed Tomography of Para-nasal Sinuses (CT scan)
Basics & Image Interpretation

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Basics:

- Successful functional endoscopic sinus surgery (FESS) depends on successful preoperative interpretation of CT scan.
- The CT scan (coronal, axial & sagittal) is the gold standard investigation in all preoperative cases. It gives detailed bony anatomy of the area and serves as a "road map" for the operating surgeon.
- Usually only a plain CT study is necessary. Contrast enhanced CT scans of the paranasal sinuses are reserved for tumors & suspected pyoceles.
Magnetic resonant imaging (MRI) scans are useful in cases of optic nerve injury, tumors & fungal infection of paranasal sinuses, especially to detect intracranial extension, involvement of soft tissues of the face & to differentiate tumors from secretions.

A combination of plain CT with T2 weighted MRI images is a better noninvasive option in cases of CSF rhinorrhea.

3-D reconstructed scans help in cases of tumors & craniofacial anomalies.
It is advisable to:

1) do CT scan after antibiotic course so that acute inflammation is not mistaken for chronic mucosal diseases.

2) ask the patient to blow his nose to clear out loose secretions prior to the CT scan.

Study of Scout film gives idea about slice thickness (either 1mm or 3mm).

Most of the anatomical details can be seen well in coronal sections.
Axial scans allow us to study certain structures e.g. the pterygopalatine fossa, Rosenmuller fossa & the optic nerve.

A sagittal reconstruction is useful to study the region of the frontal recess & lateral nasal wall.

Dental fillings show many artefacts in coronal sections. So, axial film can be taken & coronal reconstruction obtained.
Basic paranasal sinus study would include bony & soft tissue windows of 3mm cuts taken anterior to posterior in the coronal plane. 1mm cut is used for adequate evaluation in certain cases e.g. optic nerve injury or CSF rhinorrhea.

The coronal sections are routinely read from anterior to posterior & the axial sections from inferior to superior.
Image Interpretation

Scout film – 3mm slice thickness

Scout film – 1mm slice thickness
Coronal sections
Anterior cut showing frontal sinus and nasal bones
Cut showing interfrontal septum, scalloping of frontal sinus
The septal tubercle (*)
Agger nasi cells (A), nasolacrimal duct (arrow), middle turbinate not yet visualized
The olfactory fossa. Anterior attachment of middle turbinate seen (arrow)
The ethmoidal bulla and supraorbital cell (arrow)
Osteomeatal unit

Osteomeatal unit (close up view)
Drainage of frontal recess – medial to infundibulum on the right and into the infundibulum on the left
Accessory ostium in the left posterior fontanelle
Maxillary sinus appears triangular in anterior cuts (arrow: infraorbital nerve)
Anterior ethmoid artery. Beaking of lamina papyracea seen on the left. Orbitocranial canal seen on the right (arrow)
The ground lamella (arrow). Intermediate attachment of middle turbinate
Posterior attachment of middle turbinate (arrow)
Posterior ethmoidal cells (astrix). Inferior orbital fissure (arrow)
Fat intervening between lamina papyracea and medial rectus anteriorly (arrow)
Medial rectus in direct contact with lamina papyracea posteriorly (arrow)
Bilateral sphenoid ostia (arrows)
Orbital apex (arrow), sphenoid dominance (left), pterygoid processes (P)
Vidian canal (thin arrow), foramen rotundum (thick arrow), and optic nerve (curved arrow)
Sphenopalatine foramen (arrow)
Torus tubaris (T), fossa of Rosenmueller (arrow), adenoids (A)
Foramen ovale
Axial sections
Nasolacrimal duct (arrow)
Fossa of Rosenmueller (arrow), EO – Eustachian tube opening
The ground lamella (arrow)
G: ground lamella, B: bulla, R: retrobullar recess, U: uncinate process (close up view)
The orbit in axial section
Lamina papyracea in lower section of the orbit
Crista galli (thick arrow), foramen cecum (thin arrow)
Sagittal sections
Sagittal reconstructed CT scan

Schematic representation of the sagittal CT scan
THANK YOU

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