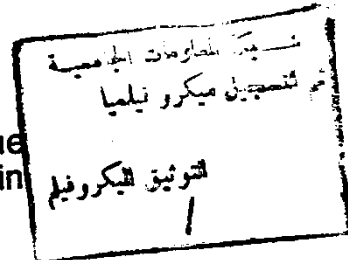


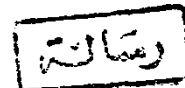
**THE RELATIONSHIP BETWEEN THE FRONTAL
SINUS DRAINAGE PATTERN AND THE PATHOGENESIS
OF FRONTAL SINUSITIS**

THESIS

submitted for partial fulfilment of the
requirements for the M.D. degree in
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INTRODUCTION



INTRODUCTION

Actually the demands of modern surgery of the paranasal sinuses, aimed more and more at functional preservation and restoration, have recently prompted a revival of anatomic investigations in this field.

At the present time, computed tomography provides an alternative method for studying craniofacial anatomy, not at all inferior to the classic dissection. Present radiographic study of sinus anatomy proceeds from close cooperation between the radiological and the clinical team and is mainly intended for surgical purposes.

AIM OF THE WORK

- 1- Study of the anatomical variations of the frontal sinus and the frontal sinus drainage with microscope to determine the percentage of different patterns of drainage in the cadavers of adult Egyptian population.
- 2- Study of the frontal sinus drainage in normal C.T scans and C.T scans with ethmoiditis $\pm$ frontal sinusitis to determine the relationship between frontal sinusitis and the type of drainage of the frontal sinus
- 3- Study of the frontal sinus drainage endoscopically during FESS and a trial to determine the relationship between frontal sinusitis and the pattern of frontal sinus drainage.



REVIEW OF LITERATURE



DEVELOPMENT OF THE FRONTAL SINUS

Development of the frontal sinus is initiated in the fourth fetal life.

At birth, the sinus has a little clinical relevance, often being indistinguishable from the anterior ethmoidal cells.

Postnatal growth is slow, and at one year the sinus is barely perceptible anatomically.

Usually after the fourth year, the frontal sinus begins to invade the vertical portion of the frontal bone; in most children over six years of age it can be demonstrated radiographically.

By the age of 12 years, the frontal sinus is still somewhat smaller than adult size, with growth being completed before 20 years age (Van Alyea, 1951).

Relation of development of the frontal sinus to its pattern of drainage : -

Drainage of the frontal sinus is variable, as determined by the embryological development. The lateral nasal wall develops from furrows that are separated by ridges; the furrows become the meatuses and the ridges become the conchae (Kasper, 1936).

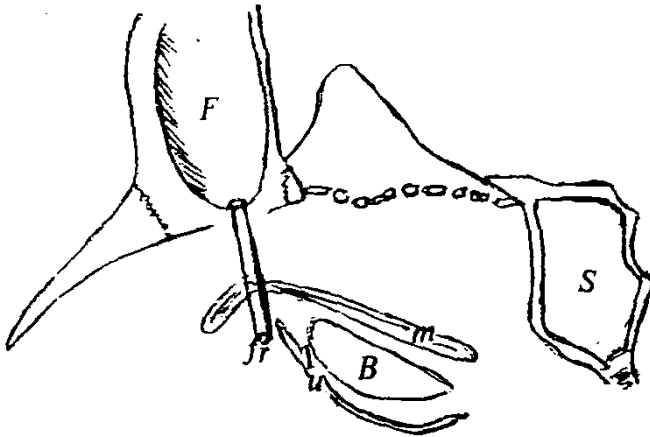


Fig. (1): Frontal sinus is draining in the frontal recess. It may be through an ostium or a duct.

F = Frontal sinus. u = uncinate process.
 fr = frontal recess. m = middle turbinate.
 B = Bulla ethmoidalis. S = Sphenoid sinus.

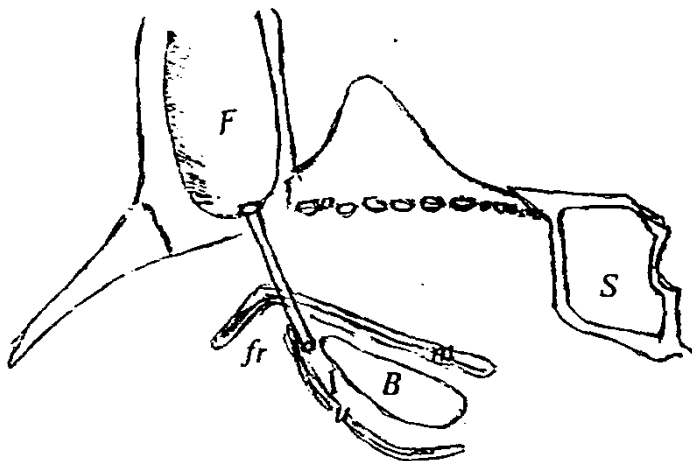


Fig. (2): Frontal sinus is draining in the infundibulum. It may be through an ostium or a duct.

The frontal recess is a deep anterior superior depression in the middle meatus. It is bounded medially by the anterior end of the middle turbinate and bounded laterally the anterior end of the uncinate process with the lateral nasal wall. (Messerklinger, 1978). The infundibulum is the vertical groove between the lateral nasal wall and the uncinate process. It's average depth, depending on the height of the uncinate process, is about 5 mm. (Evans, 1987). The infundibulum is the bottom or the most lateral region of the hiatus semilunaris. (Mosher, 1929).

The frontal sinus may develop ; a) from upward extension of the entire frontal recess into the frontal bone, b) from one of the frontal recess cells, c) from one of the infundibular cells, d) from direct extension of the infundibulum into the frontal bone, or , rarely e) from the ethmoidal bulla. (Kasper, 1936).

Regardless of the frequency of each occurrence, the frontal sinus may develop :

- (1) as an expansion of the entire frontal recess, in which case, its ostium opens directly into the frontal recess of middle meatus (Ritter, 1978). In such a case, the communication between the frontal sinus and the middle meatus can be expected

to be large and roomy (Kaspar, 1936) but this finally depends on the impinging (encroaching) anterior cells. (Rice & Schaefer 1988). (Fig)

- (2) Also it may arise from a frontal recess cell when this occurs a frontonasal duct is formed, which drains into the frontal recess. (Mattox & Delaney, 1985). The frontal recess is a part of the nasal cavity (middle meatus) and hence the name fronto-nasal duct. (Fig)

Zinreich, et al, 1987 mentioned that this communication is not strictly a duct but an internal aperture of hourglass configuration positioned between the sinus and the anterior middle meatus.

- (3) It may also develop from the infundibular cell, the frontal ostium drains above the anterior superior extremity of the infundibulum supposed through a duct, or through infundibular air cell also. (Rice & Schaefer, 1988). The infundibulum is a part of the ethmoid and is not included in the nasal cavity. Therefor, this duct is not a true frontonasal duct. The authors suggest for it the name of "frontoinfundibular duct" . (Rice & schaefer, 1988). (Fig).

- (4) The frontal sinus may develop also from the infundibulum itself as stated by Van Alyea 1941 &

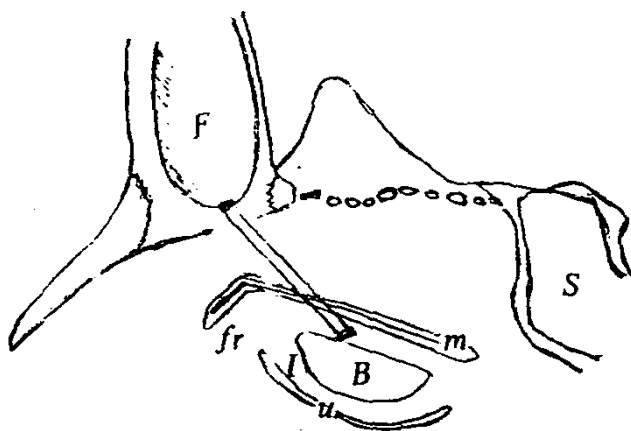


Fig. (3): Front sinus is draining in the suprabullar region.