

**EXTERNAL FRONTO-ETHMOIDECTOMY IN
MANAGEMENT OF SINUS DISEASE; TECHNIQUES FOR
MAINTAINING FRONTO-NASAL DUCT PATENCY**

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fronto-nasal duct

- Hour glass shaped
 - ostium of frontal sinus
 - the duct
 - ethmoidal infundibulum
- Drains into hiatus semilunaris (middle meatus)
- Ostium and frontal recess referred to as Fronto Nasal Duct(FND) or Frontal Outflow Tract(FOT)



Goals of Sinus Surgery

1. Eradication of disease e.g. Mucocele
2. Drainage
3. Ventilation of the involved Sinus
4. Minimum Morbidity
5. Prevention of Recurrence



Current Trend

- Surgical Procedures Less Invasive
- Emphasizing more of Surgical Drainage and Ventilation over Ablation
- Maintenance of Function with Minimal Intervention
- Better Cosmesis



Trans Nasal Endoscopic Fronto-Ethmoidectomy

- Preservation of Frontal Sinus Mucosa
- Preserves Sinus Architecture
- Maintenance of Patent Frontal Recess
- Better Clinical Outcome
- Leaves no Facial Scarring



External Fronto-Ethmoidectomy (EFE)

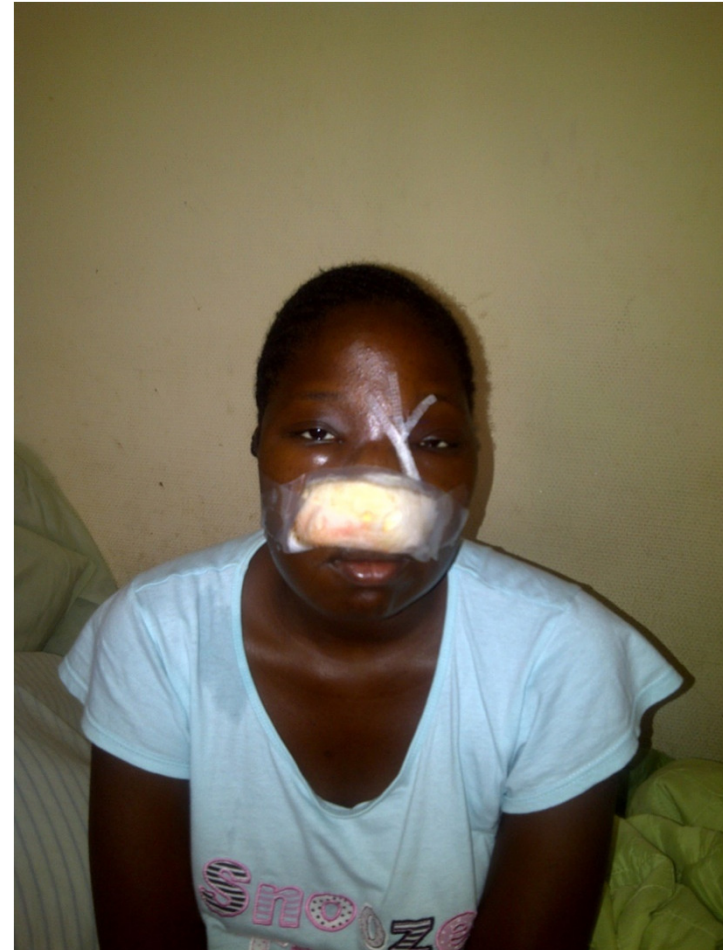
- Open procedure for removing disease in the fronto-ethmoidal sinus complex
- Success limited by the common problem of maintaining fronto-nasal duct patency
- Still relevant as a veritable tool in contemporary management of sinus disease

EFE in Contemporary Management of Sinus Disease

- Failed Endoscopic Approach
- Difficulty in using Endo Nasal Approach due to Nasal Pathology
- Extensive Disease
- Fistula Tract already present: Fronto-cutaneous or Ethmoido-cutaneous fistulae
- Recurrence/Previous Surgeries-restricts endoscopic visualization and access
- Combined approach-External approach under Endoscopic control

External Fronto-Ethmoidectomy; Techniques

- Lynch-Howarth approach
- Killian Method
- Reidel Method
- Lothrop or Chaput-Meyer approach
- Advantage of open procedure: provides excellent visualization of interior of sinus-enables surgeon to correct a variety of problems



Techniques For Maintaining Fronto-Nasal Duct Patency

A. FLAPS

- ***Sewell-Boyden Flap***

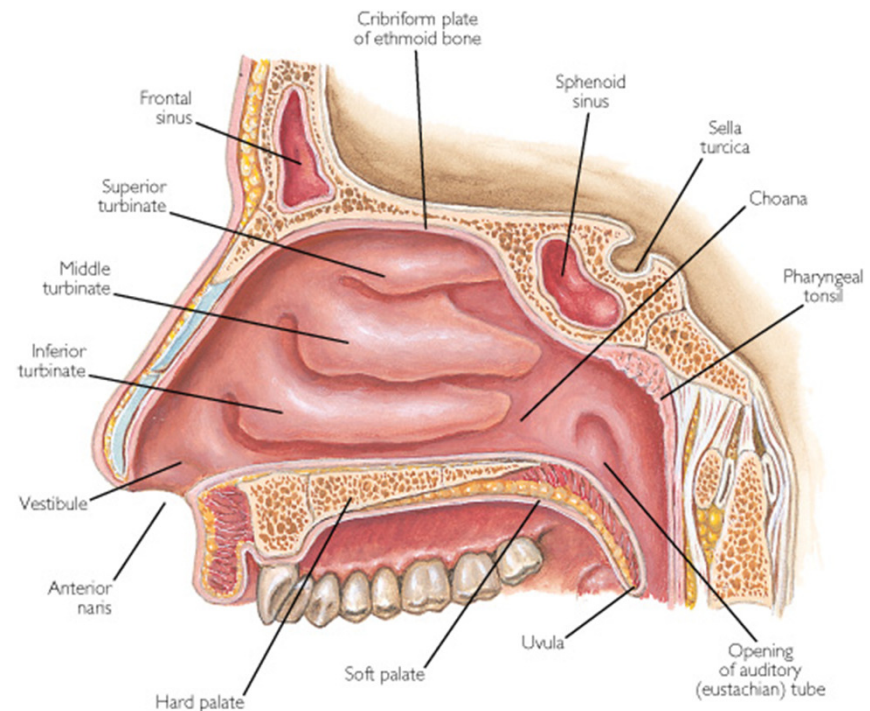
- Rotating distal end of sinus mucosa laterally and superiorly on itself

- 1-2 cm wide, 2-3cm long

- ***Axillary Flap approach as advanced by Peter Wormald***

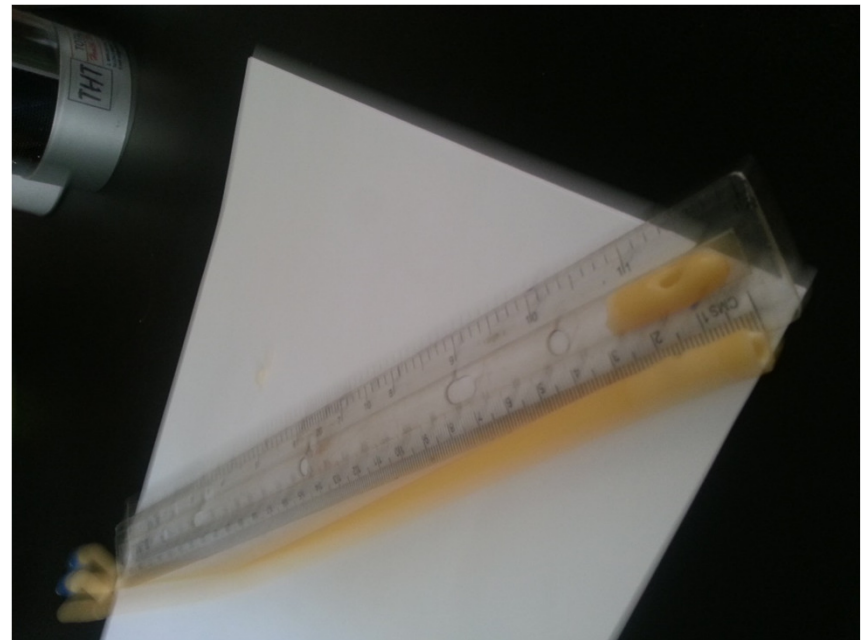
- Endoscopic approach

- Mucosa carefully wrapped around opening of frontal sinus ostium



STENTS

- Foley's Catheter-Long or Amputated
- Endotracheal Tube
- Corrugated Rubber Tube
- Silastic Tube
- Rubber Tubbing+/- multiple side holes
- Rolled Sheet
- Balloon Catheter / dilator devices



Doubly Amputated Foley's Catheter with Secured Balloon Channel- IMOGU's TECHNIQUE

- 1st Presented@ West African Conference of Otolaryngologists 1998
- Standard Lynch Ext Fronto-ethmoidectomy
- Size 24FR self retaining Foley's Catheter is introduced trans nasally and guided through the fronto-nasal duct created into the frontal sinus cavity



Imogu's technique (cont)

- Balloon tested to fit and fill the frontal sinus cavity
- Balloon inflated with air/water
- Balloon channel of catheter is identified as a white line along the edge and tied with 20 silk just above the level of the nasal vestibule
- Catheter doubly amputated- 1st at the tip and just below the ligature.
- Removal after 6 weeks by removing ligature thus balloon deflates and tube pulled out



Characteristics of doubly amputated Foley's catheter

- Catheter body length:9cm
- 2.5cm of tip is amputated
- New tip 0.5cm from upper edge of balloon section
- Catheter working length: 5cm
- Outer diameter: 8mm
- Width of balloon @ widest point when fully inflated:3cm
- Balloon volume:30mls
- Inflation pressure resistance: 12 atmospheres
- Balloon channel=white streak at medial edge
- Catheter Material:latex silicon coated
- Balloon: Semi-compliant



ADVANTAGES

- Balloon fills frontal sinus cavity thus no haematoma collection
- Balloon anchors stent into sinus cavity
- Irrigation of sinus cavity done using 10 ml syringe via the intact irrigation channel of the catheter
- Cosmesis and compliance- 6 weeks retention
- Early Work Resumption
- No need for re-positioning or re-insertion



Fronto-Nasal Duct Size Amongst Nigerians

STUDY DESIGN

- Preliminary report
- On going prospective study
- Measuring length and latero-medial diameter of FND amongst consecutive adult Nigerians attending the National Hospital Abuja, Nigeria with no nasal pathology requiring CT scan of the skull/head & neck for other reasons other than sinus disease
- Jan 2015- March 2015

Research Questions

1. Is there a difference in the length and diameter of FND between male and female Nigerians
2. Is there a difference in the length and diameter of FND in different age groups amongst Nigerians
3. Is there a difference in FND parameters in Africans compared to other reported Non-african races
4. Final size of FND attained 6-months post removal of stent and averages b/w 60-75% of size at removal - what size of catheter is necessary to create an adequate size FND on healing

Inclusion criteria

- Adults 18yrs and above
- Native Nigerian
- No nasal symptoms on presentation
- No nasal/sinus pathology on CT scan

EXCLUSION

Subjects below 18 years of age
Caucasians/Asians/non African
race

Evidence of sinus disease



method

- Axial/coronal views of ct scan showing paranasal sinuses
- Length of FND measured in mm
- Latero-medial diameter of FND measured in mm @ mid point
- Measurements done using soft ware developed by dept of radiodiagnosis NHA



results

- **MEAN AGE**

Male: 40.7 Years

Female: 36.3 Years

- **MEAN LENGTH OF FND**

Male: 12.3 mm

Female: 11.4 mm

- **MEAN LATERO-MEDIAL DIAMETER OF FND**

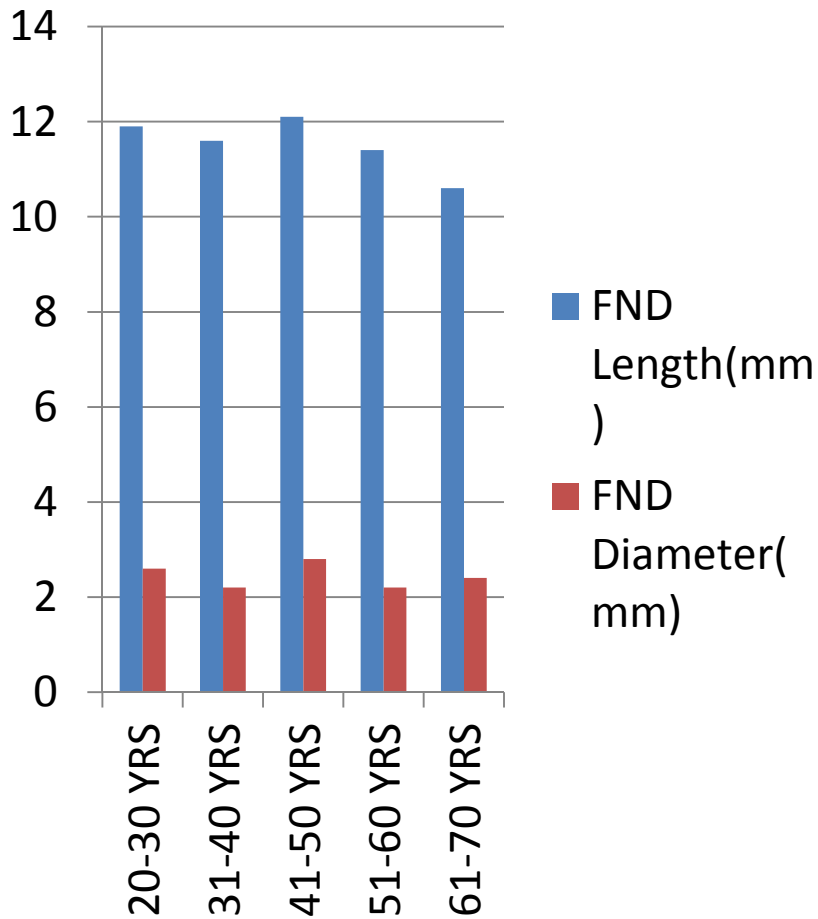
Male: 2.8 mm

Female: 2.6 mm

MEAN FRONTO NASAL DUCT LENGTH AND LATERO-MEDIAL DIAMETER IN NIGERIANS

AGE	FND Length(mm)	FND Diameter(mm)	SEX	n
40.7	12.3	2.8	MALE	n=12
36.3	11.4	2.6	FEMALE	n=18
38.5	11.9	2.7	MEAN	n=30

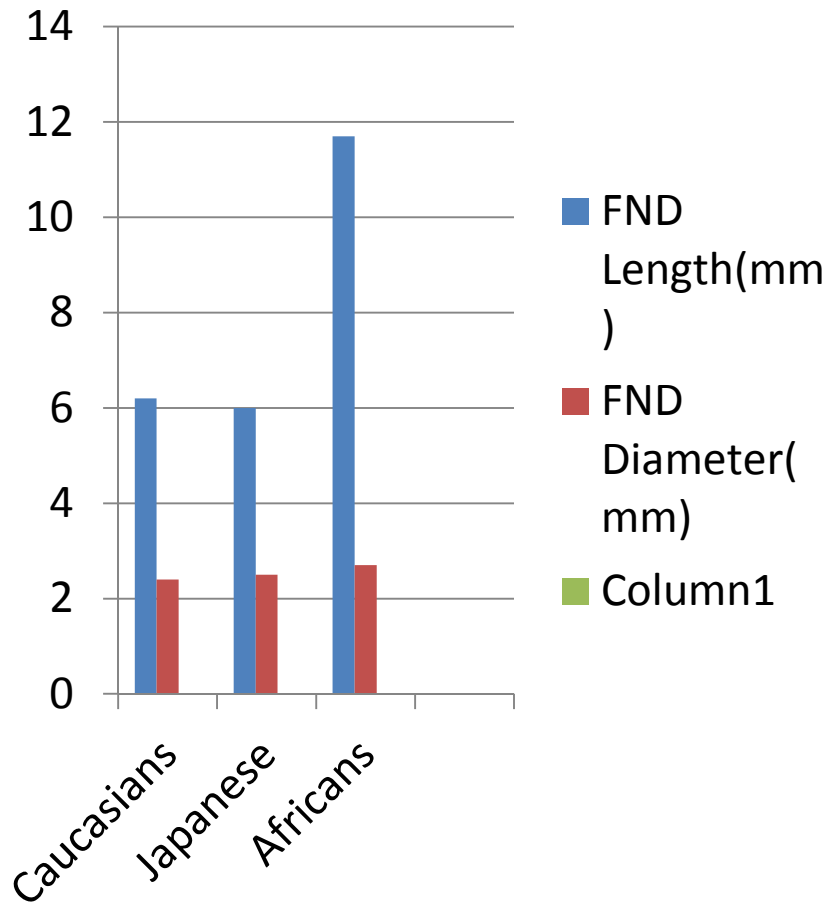
Distribution of FND length and lat-med diameter in age groups



AGE DISRTIBUTION AND MEAN FRONTO NASAL DUCT LENGTH(mm) AND LATERO-MEDIAL DIAMETER(mm)

AGE RANGE	Mean FND Length(mm)	Mean FND Diameter(mm)s	n=	p value
20-30 YRS	11.9	2.6	11	
31-40 YRS	11.6	2.8	8	
41-50 YRS	12.1	2.8	7	
51-60 YRS	11.4	2.2	2	
61-70 YRS	10.6	2.4	2	

Fronto-nasal duct parameters amongst races



COMPARATIVE ANALYSIS OF FRONTO-NASAL DUCT PARAMETERS IN RACES					
LITERATURE REVIEW					
RACE	FND LENGTH(mm)	Mean	Lat-Med DIAMETER(mm)	Mean	n=
CAUCASIANS	3.2-14.9mm	6.2mm	1-5mm	2.4mm	60
JAPANESE	2-10mm	6mm	2-3mm	2.5mm	42
NIGERIANS	8.8-13.7mm	11.7mm	2-4.4mm	2.7mm	30

CONCLUSION

- Minimal Difference in size of FND between male and female Nigerians
- FND size not significantly different in age groups
- FND length is same in caucasians and Japanese and longer in Africans
- FND diameter is about same in all three compared races
- Size 24FR Foley's catheter adequate
- More multi-lateral studies required in Africans to confirm FND parameters



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Thank you

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