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AN ANALYTICAL STUDY OF PATIENTS UNDERGOING TRANSNASAL ENDOSCOPIC SURGERIES OF ANTERIOR SKULL BASE AND SELLA REGIONS ATTENDING GGH, KAKINADA

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ABSTRACT
Background: Traditional surgical approaches to the anterior skull base often involve craniotomy and an extended hospital stay. As experience with endoscopic skull base surgery has grown the techniques and equipment have been found to be adaptable to treat lesions of the anterior skull base. A minimally invasive endoscopic approach theoretically offers the advantage of avoiding the drawbacks of extensive external surgery by minimizing the recovery time and hospital stay. Anterior skull base lesions and sella lesions include Pituitary adenoma, CSF rhinorrhoea, Meningocele, Meningoencephalocele, Meningiomas, Tumours of Nose and PNS with intracranial extension, Lesions of Nasopharynx with intracranial extension, fungal sinusitis with intracranial extension, Mucoceles of PNS with skull base erosion. **Materials and methods:** In this study, A total of 30 patients who presented with the Anterior skull base lesions and Pituitary adenomas, who filled the inclusion criteria, were chosen for the study. For all the cases a detailed history was collected and necessary evaluations were done. **Results:** Among the lesions involving the anterior skull base, Fungal sinusitis involving the anterior skull base constitute the most frequent lesion (43.3%) followed by CSF rhinorrhoea (26.6%), Pituitary adenomas (13.3%), Mucocele of PNS (6.66%), Meningoencephalocele (3.33%), ONB (3.33%), JNA with ASB involvement(3.33%) in decreasing order. **Conclusion:** Lesions involving the anterior skull base are most common being the fungal sinusitis with anterior skull base erosion.

KEYWORDS: CSF (Cerebro Spinal Fluid), PNS (Paranasal Sinus), ONB (Olfactory Neuroblastoma), JNA(Juvenile Nasopharyngeal Angiofibroma), ASB(Anterior Skull Base), FRS(Fungal Rhino Sinusitis).

INTRODUCTION
The earliest skull base surgeries are open techniques like Craniotomies done only by Neurosurgeons that were associated with greater mortality and morbidity, so were the Endo microscopic approaches. The transcranial approach provides a 3D view associated with brain retraction, nerve manipulation, post-op scars with greater mortality and morbidity. It was the evolution of Endonasal Endoscopic procedures that the Anterior skull base lesions secured quite accessible with better outcomes. It is a minimally invasive procedure that provides a Panoramic view with angled endoscopes which provides accurate localization due to great illumination and magnification.

Anterior skull base lesions and sella lesions include Pituitary adenoma, CSF rhinorrhoea, Meningocele, Meningoencephalocele, Meningiomas, Tumours of Nose and PNS with intracranial extension, Lesions of Nasopharynx with intracranial extension, fungal sinusitis with intracranial extension, Mucoceles of PNS with skull base erosion, etc.,

AIMS AND OBJECTIVES
To study the etiology of patients with Anterior skull base and sella lesions their presenting clinical features and to assess treatment modalities and outcomes of patients after surgical management.

Materials and methods
Inclusion Criteria
In this study, 30 patients presented to the Otorhinolaryngology Department, Government General Hospital, Kakinada with symptoms and signs of Anterior skull base and sella lesions and underwent Transnasal endoscopic surgeries from November 2019 to October 2021 were evaluated, clinical data collected and analyzed.

Methods of collection of data

A total of 30 patients who presented with the Anterior skull base and sella lesions, who filled the inclusion criteria, were chosen for the study. For all the cases, a detailed history regarding decreased vision, watery nasal discharge, headache, facial pain, Proptosis, epistaxis, nasal obstruction, history of head injury or any previous surgery, and history of bleeding diathesis and cardiac disorders uncontrolled hypertension, diabetes was carefully noted. All the subjects underwent endoscopic examination, haematological studies, radiological evaluation and Ophthalmological assessment.

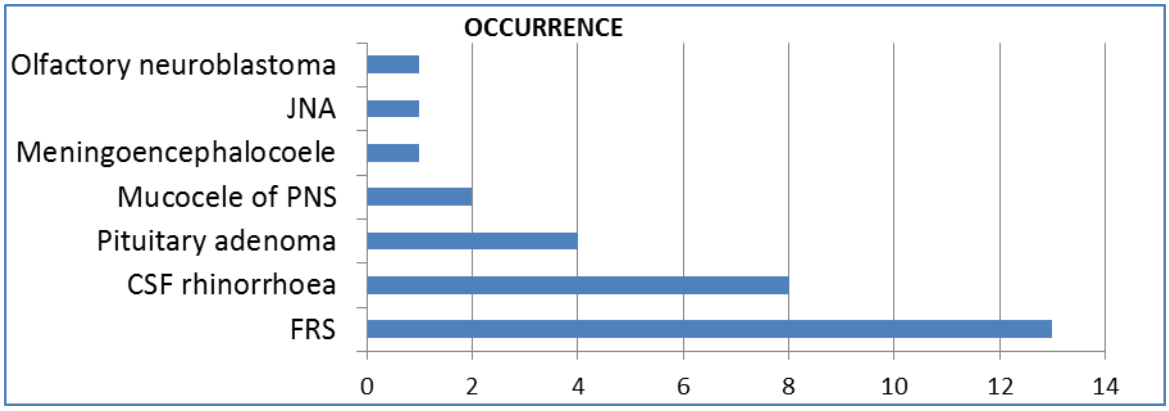
RESULTS

The study was conducted in 30 patients who admitted in Otorhinolaryngology, Government General Hospital, Rangaraya Medical College, Kakinada and underwent Trans nasal endoscopic surgeries for various anterior skull base and sella lesions during the study period November 2019 to October 2021, who had given consent for the study.

Table 1: Various anterior skull base lesions (ASBs) and their Prevalence.

S.no.	Condition	No.of cases	Percentage
1.	Pituitary adenoma	04	13.3%
2.	CSF rhinorrhoea	08	26.6%
3.	Fungal Rhinosinusitis with ASB involvement	13	43.3%
4.	Mucocele of PNS with ASB involvement	02	6.66%
5.	Meningoencephalocele	01	3.33%
6.	ONB with ASB involvement	01	3.33%
7.	JNA with ASB involvement	01	3.33%
TOTAL		30	100%

Among these 30 patients of Anterior skull base lesions and pituitary adenomas,Fungal sinusitis involving the anterior skull base constitute the most frequent lesion (43.3%) followed by CSF rhinorrhea (26.6%), Pituitary adenomas (13.3%),Mucocele of PNS (6.66%), Meningoencephalocele (3.33%),Olfactory neuroblastoma (3.33%), JNA (3.33%) with ASB invovlvement in decreasing order.



Graph 1: Bar chart Showing Prevalence of various Anterior skull base lesions and Pituitary adenomas.

Aetiopathogenesis addressed

Most common etiology addressed is fungal invasion

Table 2: Various aetiopathogenesis for anterior skull base lesions(ASBs).

S.NO.	AETIOPATHOGENESIS	NUMBER
01.	Fungal Aetiology	13 (43.3%)
02	Idiopathic	08 (26.6%)
03	Tumours	06 (20%)
04	Trauma	02 (6.6%)
05	Congenital	01(3.3%)
TOTAL		30(100%)

i. FRS With ASB Involvement

It is the most common type of ASB lesion for which Transnasal endoscopic surgery was performed in our study.

Sex Distribution

Out of 13 patients with FRS with ASB involvement, Females (61.5%) were more than Males (38.5%)

Age Distribution
Patients presented with FRS with ASB involvement were of age ranging from 26 to 51 years.

Table 3: Age distribution in FRS with ASB involvement.

S.NO.	AGE	NUMBER	PERCENTAGE
1	25-35	7	53.84
2	36-45	3	23.08
3	46-55	3	23.08
	Total	13	

Types of FRS With ASB Involvement
Table 4: Types of FRS with ASB involvement.

S.NO.	TYPE OF FRS	NUMBER	PERCENTAGE
1	Acute Invasive FRS with ASB involvement	2	15.38%
2	Chronic invasive FRS with ASB involvement	7	53.84%
3	Chronic granulomatous FRS with ASB involvement	1	7.70%
4	AFRS with ASB involvement	3	23.08%

Most common FRS in our present study is Chronic invasive (53.84%) followed by AFRS(23.08%) , Acute invasive FRS(15.38%) and Chronic granulomatous FRS with ASB involvement (7.70%).

a. Chronic Invasive FRS With ASB Involvement
Sex Distribution
Out of 7 patients with Chronic invasive FRS with ASB involvement, Females (57.14%) are more than males (42.86%)

Age Distribution
Patients presented with Chronic invasive FRS with ASB involvement were of age ranging from 31 to 51 years. Most people were of 30-40 years.

b. AFRS With ASB Involvement
All 3 patients were females with their age ranging from 26 to 35 years. All 3 patients are recovered without any complications and recurrence.

c. Acute Invasive FRS with ASB Involvement
2 patients of acute invasive FRS with ASB involvement were males with their mean age 47 years.One patient died postoperatively after 3weeks due to Comorbidities and Renal failure. Another patient recovered completely without any recurrence.

d. Chronic Granulomatous FRS With ASB Involvement
In our present study, Only one female patient of age 28 years were diagnosed with chronic granulomatous FRS with ASB involvement.Patient recovered completely without any complications and recurrence.

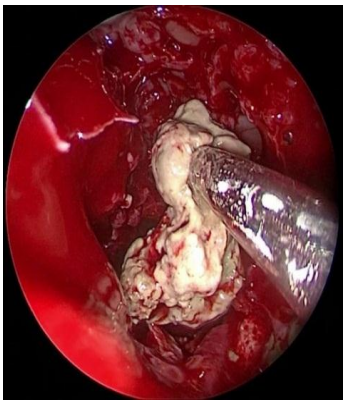
Intervention and Outcome
Meticulous Endoscopic sinus surgery was performed and 12 patients are recovered without any complications and recurrence, 1 patient with acute invasive FRS with ASB involvement died postoperatively due to renal failure and other co morbidities.

ACUTE INVASIVE FUNGAL SINUSITIS

FIG1: PREOP PICTURE

FIG2: INTRAOP PICTURE





Chronic Invasive Fungal Sinusitis
Fig 3: Frontal Glow postoperatively Fig 4: Preop Fig 5: Intraop picture.

II. CSF Rhinorrhoea
It is the 2nd most common ASB lesion in the present study

SEX Distribution
Out of 8 patients, 4 patients (50%) were females and 4 patients were males (50%).

AGE Distribution
8 CSF rhinorrhoea patients were of age ranging from 24 to 54 years, most common between 37 to 54 years of age (5 patients) and between 20-36 years (3 patients)

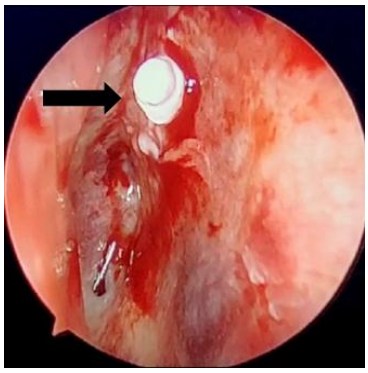
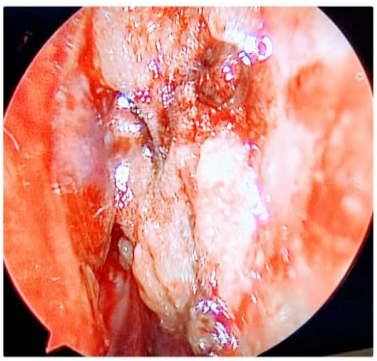
Aetiology of CSF Rhinorrhoea
Most common etiology is Idiopathic or Spontaneous

Table 5: Etiology of CSF Rhinorrhoea.

SEX	ETIOLOGY		NUMBER
	Idiopathic (75%)	Trauma (25%)	
FEMALES	04 (100%)	00	04
MALES	02 (50%)	02(50%)	04
Total	06	02	08

Among 8 CSF rhinorrhoea patients in this study group, in 6 patients (75%) the cause is idiopathic and in 2 patients (25%) the cause is trauma. Among all 4 female patients of CSF rhinorrhoea, the cause is idiopathic and in among 4 male patients in 2 of them cause is idiopathic and in remaining 2 cause is trauma.

Intervention and outcome
All 8 CSF rhinorrhea patients are managed by Transnasal endoscopic CSF leak repair with HBF. One patient had recurrence after 1 year (12.5%), remaining all 7 patients (87.5%) had no recurrence or complications.

CSF RHINORRHOEA INTRAOP PICTURES

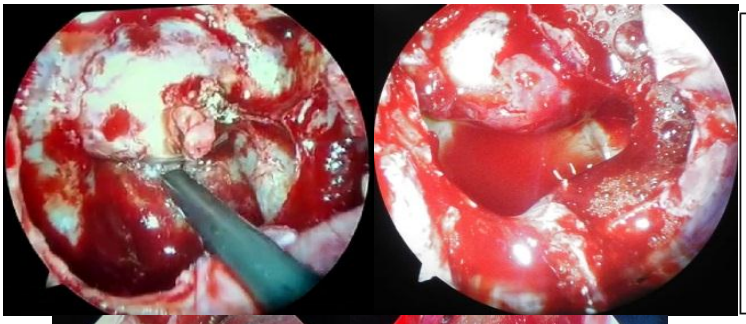
FIG 6: PREOP PSEUDO MENINGOCELE (BLACK ARROW)

FIG 7: POSOP IMAGE AFTER COMPLETE CLOSURE

ii. Pituitary adenoma
Sex distribution
Out of 4 patients with Pituitary adenoma in the present study, 2 are males (50%) and 2 are females (50%).

AGE Distribution
4 Pituitary adenoma patients were of age ranging from 17 to 70 years, most common between 51 to 70 years(2 patients), 11 to 30 years(1 patient), 31 to 50 years(1 patient).

Intervention and Outcome: All 4 patients of Pituitary adenomas are non-functional and managed by Endoscopic Endonasal Trans sphenoidal hypophysectomy and all patients are recovered completely without any complications and recurrence.



ENDOSCOPIC ENDONASAL TRANSSPHENOIDAL HYPHOPHYSECTOMY

FIG 8: COMPLETE EXPOSURE OF SELLA

FIG 9: INTRAOP APPEARANCE OF TUMOUR

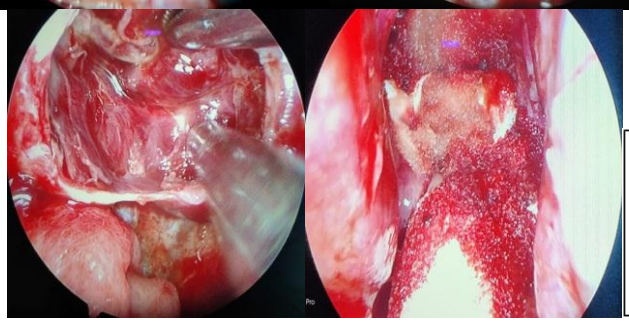


FIG 10: CAVITY AFTER COMPLETE TUMOUR REMOVAL

FIG 11: AFTER COMPLETE CLOSURE

iii. Mucocele of Pns With ASB Involvement

Sex Distribution

Out of 2 patients with Mucoceles of PNS with ASB involvement, one patient is female (50%), one patient is male (50%).

Age Distribution

The mean age of two patients of Mucoceles of PNS with ASB involvement is 26.5 years.

Aetiology of Mucocele of PNS With ASB Involvement

Both the mucoceles are idiopathic in aetiology in present study.

S.NO.	TYPE OF MUCOCELE	CAUSE
1	Ethmoidal	Idiopathic
2	Fronto ethmoidal	Idiopathic

Intervention and Outcome

Both the Mucocele patients are managed by Transnasal endoscopic Wide marsupialisation and recovered completely without any recurrence and complications.

TRANSNASAL ENDOSCOPIC MARSUPILIZATION OF ETHMOIDAL MUCOCELE

FIG 12: PREOP DNE

FIG 13: STRAW COLOURED FLUID AFTER UNCAPPING THE SWELLING

FIG 14: INTRAOP IMAGE SHOWING SAC

FIG 15: AFTER COMPLETE MARSUPILIZATION

FIG 16: PREOP AND POSTOP COMPARISION SHOWING REDUCTION IN PROPTOSIS

iv. Olfactory Neuroblastoma(ONB)

One male patient aged 17 years with ONB with ASB involvement managed by Combined External and Transnasal Endoscopic Resection of tumour and patient recovered without any complications.

Olfactory Neuroblastoma: Combined Endoscopic and External Resection of Tumor

Fig. 17: Preop

Fig. 18: Intraop Endoscopic Image

Fig. 19: External Approach

Fig. 20, 21: Immediate Postop, After Radiotheraphy.

v. Juvenile Nasopharyngeal Angiofibroma (JNA) With ASB Involvement

One male patient aged 16 years with JNA with ASB involvement managed by Transnasal Endoscopic excision of tumour and patient is recovered without any complications and recurrence.

vi. Meningoencephalocele

One female patient aged 1 year with Meningoencephalocele managed by Transnasal Endoscopic excision and reconstruction with HBF. Patient recovered completely without any complications.

Trans Nasal Endoscopic Meningoencephalocele Excision and Repair With Hadad Bassagasteguy Flap (HBF)

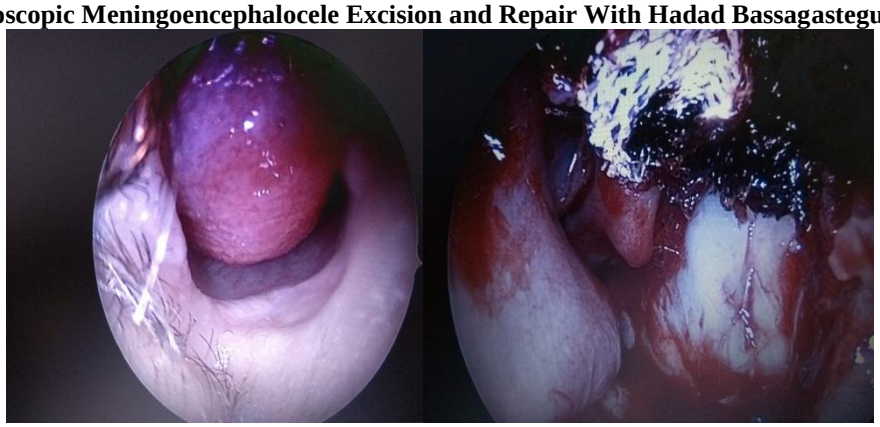


Fig. 22: Preop Image. Fig. 23: postop image.

DISCUSSION

Endoscopic Endonasal operations permit new approaches to deep seated lesions and are characterized by a reduced manipulation of neurovascular lesion and brain parenchyma while at the same time providing improved visualisation. Trans nasal endoscopic procedures for the closure of small and large skull base defects have proven to be reliable and more successful than operations with Craniotomies. The development of new local and regional vascularized flaps like Hadad Bassagasteguy flap (HBF) have contributed to this.

The present study was done from November 2019 to October 2021 in 30 patients Presented with signs and symptoms of anterior skull base lesions who fulfilled inclusion Criteria. This study was done to evaluate symptomatology, etiopathogenesis and the improvement in morbidity and mortality with timely intervention in the study population.

According to this study, fungal sinusitis with intracranial extension is the most common Anterior skull base lesion for which Transnasal endoscopic surgery was performed followed by CSF rhinorrhoea, Pituitary adenoma, Mucoceles of PNS with ASB involvement, Tumours with intracranial extension, Meningoencephalocele in the descending order.

Etiology

According to the present study, FRS with anterior skull base involvement (43.3%) is most common type of condition for which Transnasal endoscopic sinus surgery was performed followed by CSF rhinorrhoea (26.6%),which is in contradiction to all studies that were done previously on ASB lesion.

Sex Distribution

The present study shows female predominance (53.33%) in the prevalence of ASBs.

Age Distribution

The present study shows more number of patients in the age group between 26 to 50 years with mean age of 36.43 years.

FRS With ASB Involvement

In this present study FRS with ASB involvement is the most common type (43.3%). It is more common in females (61.5%) with mean age of involvement is 37.16 Years. Most common FRS in our present study is Chronic invasive (53.84%) followed by AFRS(23.08%), Acute invasive FRS(15.38%) and Chronic granulomatous FRS with ASB involvement (7.70%). Chronic invasive FRS with ASB involvement is more common in Females with mean age of involvement is 38.72 years. All 7 patients recovered completely with intervention. AFRS with ASB involvement is seen only in Females with mean age of involvement is 30 years. All 3 patients recovered completely with intervention. Acute invasive FRS with ASB involvement is seen only in males with mean age of involvement is 47 years. out off 2 one recovered and one died postoperatively after 3 weeks due to renal failure. Chronic granulomatous FRS with ASB involvement is seen only in female with mean age of involvement is 28 years.1patient recovered completely with intervention.

CSF Rhinorrhea

In the present study CSF rhinorrhoea Female and Male patients are equal in number. The mean age of the present study is 43.1 years. Most of the CSF rhinorrhoea are spontaneous or idiopathic in nature (75%). Success rate of CSF rhinorrhoea after First attempt of Transnasal endoscopic CSF leak repair is 87.5%.

Pituitary Adenoma

In the present study, Pituitary adenoma female and male patients are equal in number. The mean age of Pituitary adenoma patients is 44.75 years. There is no recurrence and postop CSF leak.

Mucocele of PNS with ASB Involvement

In the present study, Mucocele with ASB involvement, female and male patients are equal in number. The mean age is 26.5 years. The aetiology is idiopathic (100%). There is no recurrence of Mucoceles after endoscopic marsupialisation.

Tumours of Nose and Nasopharynx with ASB Involvement

The Postoperative outcome of the present study in ONB and JNA with ASB involvement recovered without any complications.

CONCLUSION

In the present study

1. Fungal rhinosinusitis with Anterior skull base involvement is the most common condition for which Trans nasal endoscopic surgery was performed.
2. There is a slight Female predominance in the present study (16)
3. Most of the CSF rhinorrhoea patients (6), all the Mucocele of PNS with Anterior skull base involvement (2) are spontaneous or idiopathic in etiology. All the Pituitary adenoma patients (4) are non-functional in the present study.
4. Most people in the present study are in between 26-50 year(Mean age-36.43 years)
5. Every Proptosis patient (particularly unilateral) should be thoroughly examined by Otorhinolaryngologist along with Neurosurgeon and Ophthalmologist.
6. Every headache and Facial pain patient should be thoroughly examined and carefully evaluated.
7. For all Anterior skull base reconstruction in Pituitary adenomas, CSF rhinorroeas, Meningoencephalocele, Hadad Bassagasteguy flap is used.

8. The minimally invasive endoscopic surgery of the cranial base and pituitary fossa is an interactive real time live surgery team effort.
9. The collaborative effort between the Otorhinolaryngologist and Neurosurgeon is critical and valuable in effectively managing pituitary fossa with minimal morbidity. As the tumour is removed from nose, there is no oedema/ cosmetic deformity, doesn't require sublabial or nostril incision, less postop pain, Quick recovery, No Csf leak/ synechia/ septal perforation/ injury to gingiva labial sulcus.

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