Original Article

Combined Transfacial and Transcranial Approach for Tumours of the Nose and Paranasal Sinuses with Intracranial Extension

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ABSTRACT:

OBJECTIVES: To describe the importance of craniofacial approach in extensive tumours of the nose and paranasal sinuses with intracranial extension.

MATERIALS AND METHODS: This is a retrospective study and descriptive analysis of craniofacial approaches to extensive tumors of the nose and paranasal sinuses that were carried at Usmanu Danfodiyo university teaching Hospital Sokoto Nigeria over a nine year period(July 1999 to June 2008).

RESULTS: Out of 111 patients seen with tumours of the nose and paranasal sinuses during the period, 29(26.1%) were radiologically reported through computerised tomographic scan to have intracranial extension.Twenty-four(82.8%) were males while 5(17.2%) were females. Twentyfive(86.2%) patients underwent transfacial approach(modified lateral rhinotomy). Intraoperative findings in these cases only warranted the repair of dural tear in 6 cases through the transfacial approach who had anterior skull base invovlement while 4 had combined transcranial and transfacial approaches(anterior craniofacial resection).Therefore only 10(34.5%) patients of all the radiologically reported cases of intracranial extension were confirmed intraoperatively to have intracranial extension(5males ,5females) with an age range of 1 ½ to 60years and mean age of 34.1years.One patient had orbital exenteration also carried out.
Four out of 10 patients are alive after a minimum period of 2 years follow up due to extensive intracranial spread and late presentation of the patient.

CONCLUSION: Extensive tumours of the nose and paranasal sinuses with suspected intracranial extension requires not only computerized tomographic scans to assess the extent of the tumour but also a combined transfacial and transcranial approach to successfully resect the tumour.

KEYWORDS: Sinonasal tumours,Intracranial extension, Transfacial approach, craniofacial resection

INTRODUCTION:

Sinonasal tumours may be benign or malignant. They can grow far beyond the confines of the nose and paranasal sinus if patients do not present early due to the concealment of the nose and paranasal sinuses spaces. Sinonasal malignancies have an incidence of 0.5-1 per 100,000 per year,and account for 0.2-0.8 percent of all malignancies and 3 percent of upper aerodigestive tract neoplasms [1-3]. In Japan and in parts of Africa, the rates are more than twice that of USA and UK [4]. In south western Nigeria, maxillary cancers have been reported to be 28.7% of orofacial cancers in Lagos [5]. In north western Nigeria nasal and paranasal sinus malignancies have been reported to be 5.3% of all head and neck cancers [6] .In the western world, most sinonasal malignancies develop in the fifth and sixth decades of life but in many parts of Africa they occur in lower decades of life [6-7].

Tumors of the nose and paranasal sinuses may extend intracranially and pose surgical challenge if they are to be removed. Apart from thorough clinical evaluation which must be carried out to determine the extent of intracranial spread, computerized tomographic(CT) and Magnetic resonance imaging(MRI) scans are invaluable in showing the details of intracranial extension [8].These guide the surgeon in the approach to such tumours whether transfacially,transcranially or in combinations.

Surgery for tumours of the nose and paranasal sinuses range from simple excisional biopsies to extensive surgical procedures requiring complex endoscopic sinonasal surgery, reconstructive surgery, neurosurgical, ophthalmological intervention and prosthetic replacement. [15,7,9-14].

Ketcham et al reported the first combined transcranial and transfacial resection of a paranasal sinus tumour [15] . Proper access can be gained into the anterior cranial fossa, the ethmoidal labyrinth, the sphenoidal sinus, the nasal cavity,and the antrum .Craniofacial resections are still relevant with various modification of approaches in various centres all over the world [1-4,7,10-15].

In this paper anterior craniofacial resection through a combine transfacial and neurosurgical approaches were found to be effective method in surgical removal of extensive tumours of the nose and paranasal sinuses with intracranial extension.

MATERIALS AND METHODS

This is a retrospective study and descriptive analysis of

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craniofacial resections for extensive tumors of the nose and paranasal sinuses with suspected intracranial extension that were carried out by the otorhinolaryngologists and the neurosurgeons at Usmanu Danfodiyo University Teaching Hospital Sokoto Nigeria out of all the cases of tumours of the nose and paranasal sinuses seen in the instituition over 9 years(July 1999 to June 2008).

All patients were evaluated with CT scan of the nose, paranasal sinuses and the brain.

Inclusion criteria of cases for combined transfacial and transcranial approach was CT report of intracranial extension. Surgical approaches were planned based on the CT and clinical findings. Patients who were operated were primarily T4 from the 1997 edition of UICC/TNM classification of tumours of the nose and paranasal sinuses. The otorhinolaryngologists usually proceeded first transfacially(Lateral rhinotomy) with modification of incisions for the intracranial extension. If however there were difficulties with this approach,the transcranial approach usually with the bicoronal incision was carried out in combination with the transfacial approach.

Patients who had dural tear were patched with fascia lata from the lateral aspect of the thigh.Transfacial and transcranial surgical wounds were closed after the nasal cavity of the operated side was packed with antibiotic impregnated gauze which was removed on the 2nd or 3rd post operative day.

Patients were nursed 30 degrees head up on parenteral broad spectrum antibiotics postoperatively for 72hours before commencement of oral broad spectrum antibiotics for one week .They were then discharged between the 8th and 10th post operative day after the removal of stictches. All malignant cases were referred for postoperative radiotherapy. Patients who had very extensive tumours considered inoperable or too ill to withstand any extensive surgical procedures were excluded from surgery and offered palliative measures.

RESULTS

Out of 111 patients seen with tumours of the nose and paranasal sinuses during the period ,29(26.1%) were radiologically reported through computerised tomographic scan to have intracranial extension. Twentyfour(82.8%)were males while 5(17.2%) were females. Twentyfive(86.2%) of these patients underwent transfacial approach(modified lateral rhinotomy).Intraoperative findings in these cases only warranted the repair of dural tear in 6 cases through the transfacial approach who had anterior skull base invovlement while 4 had both transcranial and transfacial approaches (anterior craniofacial resection).

Therefore 10(34.5%) patients of all the radiologically reported cases of intracranial extension were confirmed intraoperatively to have intracranial extension accounting for 9% of all cases of tumours of the nose and paranasal sinuses seen during the period. Five were males while five were females with an age range of 1 ½ to 60years and average age of 34.1years.

One patient also had orbital exenteration carried out. Four out of 10 patients are alive after a minimum period of 2 years follow up due to extensive intracranial spread and late presentation of the patient.

Figures 1,2, 3 show clinical pictures and CT scans of patient.Tables 1-3 show the CT findings and the histological reports of the sinonasal tumours with suspected intracranial extension.

TABLE 1: Patients with Sinonasal Tumours in Uduth Sokoto with CT Report

CT SCAN REPORT OF INTRACRANIAL EXTENSION	**29(26.1%)**
No CT SCAN REPORT OF INTRACRANIAL EXTENSION	**82(73.9%)**
TOTAL	**111(100.0%)**

TABLE 2: Histological Characteristics of the 29 Lesions with CT Report of Intracranial Extension

BENIGN LESIONS	**No**
Inverted papilloma	5
Mucocele	5
Neurofibroma	3
Angiofibroma	2
Invasive fungal lesion	2
Graulomatous lesion	2
TOTAL BENIGN	**19(65.5%)**

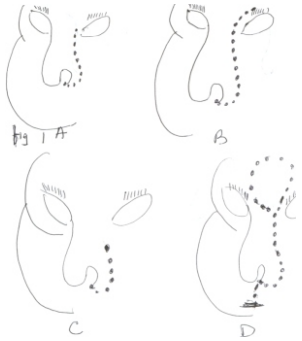
MALIGNANT LESIONS	**No**
Squamous cell CA	4
Plasmacytoma	2
Olfactory neuroblastoma	1
Epidermoid carcinoma	1
Chondrosarcoma	1
Haemangiopericytoma	1
TOTAL MALIGNANT	**10(35.5%)**

TABLE 3: Histological Characteristics of the 10 Cases who had Craniofacial Resection

BENIGN LESIONS	No	MALIGNANT LESIONS	No
GRANULOMATOUS LESION	2	SQUAMOUS CELL CARCINOMA	1
INVASIVE FUNGAL LESION	1	EPIDERMOID CARCINOMA	1
HARMATOMA	1	CHONDROSARCOMA	1
ANGIOFIBROMA	1	HAEMANGIOPERICYTOMA	1
		MIDLINE RETICULOSIS	1
TOTAL	5		5

Figure 1A&B: Showing transfacial approaches

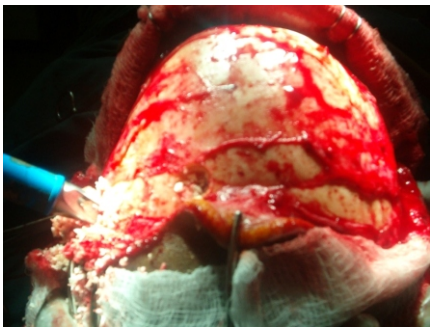
A: DIFFERENT MODIFICATIONS OF TRANSFACIAL APPROACH



B:TRANSFACIAL APPROACH

Figure 2 A&b Showing Transcranial Approach

A: SHOWING TRANSCRANIAL APPROACH



B:SHOWING POST OPERATIVE PICTURE

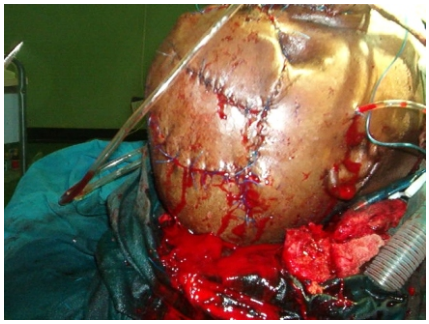
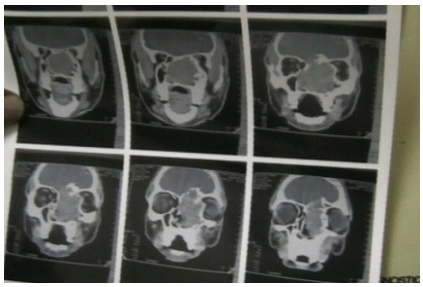
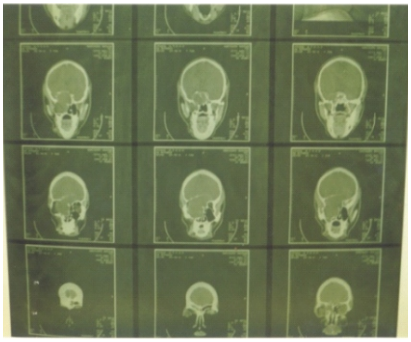


Figure 3: CT Scan of Patients with Tumours of the Nose and Paranasal Sinuses with Intracranial Extension

A



B



DISCUSSION

The inability of the surgeon to completely remove a sinonasal tumour is responsible for the high rate of treatment failures [9]. This is particularly so when intranasal approach is used in tumours occluding the view of the examiner without image guiding system, valid endoscopic facilities and experience or inadequate radiological back up like CT or MRI. It is a well known fact that the first operation is the best and often the last opportunity to cure a disease [16-19]. The first chance at surgery is usually the best opportunity for the surgeon to excise the tumour and achieve tumour free margin as much as possible. In Nigeria, as at the time of this study there was no national health insurance facilities that caters for cases of tumor. Majority(>90%)of our patients usually struggle to bear the cost of one operation making it only possible for us to plan and carry out one operation at one sitting .This is the challenge in most developing nations. Most western nations have free health care services through the national health insurance and can carry out multiple investigative and surgical procedures irrespective of the cost on each patient at no cost on the patient, making it very unusual or rare to see patients with advanced diseases which is still a very common feature in our environment.

Concerns for cosmesis has made transfacial incisions less popular in many developed nations along with advances in endoscopic sinus sugery backed up by interventional radiology and image guiding system. En bloc resection via a combined transcranial and transfacial approach that sometimes includes orbital clearance has greatly improved the results of surgical intervention for tumours of the nose and paranasal sinuses with intracranial extension eroding the cribiform plate and the anterior cranial fossa [20,21] .This approach followed by radiotherapy for malignant cases produces the highest rate of local control and is now considered by many investigators as the standard treatment[1-5,10-21].

Craniofacial resection requires considerable skill and is best carried out where both otorhinolaryngological and neurosurgical facilities exist. CT and MRI scan evaluation though very crucial in planning surgical approaches or in ascertaining the need for interventional radiology also needs considerable experience in both reporting and interpretation of results.Only 10 (34.5%) patients out of the 29 CT reported cases of intracranial extension from various radiological centres were intraoperatively confirmed to have valid intracranial extension in this study.This accounted for 9% of all the 111 cases of tumours of the nose and paranasal sinuses seen during the period .The 29 cases were initially approached transfacially and 25(86.2%) lesions were all resected through a transfacial approach.Six cases required repair of dural tear and this was carried out through the same transfacial approach with modifications of the incision .Our institution has a regional neurosurgical centre and all such cases with tumours of the nose and paranasal sinuses with intracranial extension are seen by the otorhinolaryngologist for opinion and combined surgery.Where clinical and radiological(CT)

evidence were at conflict,the otorhinolaryngologist usually proceeded first.Where the clinical and radiological evidences were not at conflict the combined approach was carried out from the beginning.A Multidisciplinary team seminar therefore is invaluable before surgical resection of extensive tumours of the nose and paranasal sinuses .The ophthalmologist may be required in orbital involvement.

Post operative chemoradiation is critical for better survival after craniofacial resection for malignant lesions. Poverty and long distance to the nearest radiotherapy centres (5-12hours drive) discourages patients who would have benefitted maximally from such services for better survival rates in our environment.Four out 10 patients have remained alive ,after a minimum of 2years follow up.This high rate of mortality could be attributed to very late presentation,advanced stage and reluctance to travel for radiotherapy in malignant cases due to poverty. Howard et al reporting on 308 patients who had craniofacial resection with up to 25 years follow up showed an overall actuarial survival of 65% at 5years and 47% at 10 years follow up [22] . For malignant tumours, in the same study,the 5 year actuarial survival was 59% falling to 40% at 10 years while for benign pathology,the actuarial survival was 92% at 5years falling to 82% at 10 years.They identified brain involvement, type of malignancy and orbital involvement as the 3 most significant prognostic factors.

In conclusion,extensive tumours of the nose and paranasal sinuses with suspected intracranial extension requires not only computerized tomographic scans to assess the extent of the tumour but also a combined transfacial and transcranial approach to successfully resect the tumour .

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