

**Indications and outcomes of orbitotomy in a tertiary hospital in North-Central Nigeria**Ramyil AV<sup>1</sup>, Tenmang PE<sup>2</sup>, Wabare SZ<sup>1</sup>, Gondim KS<sup>3</sup>, Wade PD<sup>2</sup>**Abstract**

**Background:** Orbitotomy is a surgical procedure that helps with having access to the tight orbital space for different purposes. The orbit can be accessed through several incision/approaches, and it can be done for both children and adults if indicated. In most cases, the outcome of orbitotomy is good. The study seeks to determine the indications, possible complications and the outcomes of orbitotomy in a tertiary hospital in north-central Nigeria.

**Method:** This was a retrospective study spanning a 10-year period from 2011 to 2020. Hospital records of patients who had orbitotomy were retrieved and data collected for the indications and outcomes of orbitotomy. Statistical analysis was done using Statistical Package for Social Sciences (SPSS version 23). Frequencies, simple percentage, fishers exact and chi-square were used to compare proportions.

**Results:** A total of 28 patients medical records were retrieved and analyzed Orbitotomy was performed in all age groups, however, 21(75%) out of the 28 cases were done in individuals

less than 30 years of age. More males had orbitotomy 15(53.6%), and there was a slight predominance of the left eye 15(53.6%). The commonest presentation seen was proptosis 15(53.6%), while dermoid cyst was the commonest etiology in 39.3%. Computed tomographic scan was useful in clinching the diagnosis while histological examination helped in confirming the diagnosis. More than half (75%) of the patients had a transcutaneous incision, and there was no drop in visual acuity following orbitotomy. The commonest complication was eyelid scar in 15(53.5%) patients.

**Conclusion:** Orbitotomy is a safe procedure with good visual and cosmetic outcome, with the transconjunctival approach being more cosmetically acceptable.

**Key Words:** Orbitotomy, Outcome, Complications

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**Introduction**

The bony orbit is a pyramidal structure housing the eye ball and the rest of the orbital soft tissues. It is composed of fairly strong rim and walls namely inferior, medial, superior and the lateral walls. The orbit has a volume of about 30mls with an anteroposterior diameter of 40mm from the base which is anteriorly located to the apex posteriorly. The base of the orbit is about 35mm in height and 40mm in width.<sup>1</sup> An orbitotomy usually allows access to a specific area of the anterior 2/3 of the orbit.<sup>2</sup> The orbit has a complex anatomical structure. It is made up of seven bones namely: frontal bone, maxillary bone, lacrimal bone, sphenoid bone, ethmoid bone, zygomatic bone and nasal bone, the orbital cavity contains the globe, nerves, blood vessels, lacrimal gland, extraocular muscles, tendons, trochlea as well as fat and other connective tissues. Having access to the orbit can be challenging hence careful planning is essential in accessing it.<sup>2,3</sup> The orbit can be accessed through different surgical techniques viz anterior orbitotomy, medial orbitotomy and lateral orbitotomy.<sup>3</sup> The type of incisions

made for various orbitotomies is determined by the location of the lesion in the orbit, this can be transcutaneous, transconjunctival or endoscopically.<sup>4</sup> The lid incisions around the orbital rim include Kronlein, direct brow, sub-brow, Lynch and inferior rim incisions other eyelid incisions are sub-ciliary vertical lid split, sub tarsal, and upper lid crease.<sup>4</sup> An orbitotomy is mostly indicated to access the orbit for biopsy of a lesion, removal of a lesion, removal of foreign body, fat or bony orbital decompression, and orbital fracture repairs.<sup>5,6,7</sup> Orbitotomies can be done in both children and adults without craniotomies with good cosmetic outcomes and visual recovery.<sup>8</sup>

Outcomes of orbitotomy can be amazing and dramatic; studies have suggested possibility of spontaneous visual recovery after orbitotomies, perhaps depending on the level of visual affectation when the patient presents.<sup>9,10</sup>

To the best of the authors' knowledge there is paucity of data on orbitotomies in Nigeria. This study aims to bridge the gap and provide information on the indications for orbitotomies, the outcomes, possible complications and the common approaches used.

**Method**

This was a retrospective study reviewing all the clinic, ward and theater registers to identify patients who had orbitotomies done over a period of 10 years from January 2011 to December 2020. Hospital folders of patients who had orbitotomies were reviewed. Patients' folders with incomplete information were excluded. The frequency,

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indications, common site of pathology, type of incision, complications, and the visual outcomes of the patients were noted. The age, gender, laterality, presenting complaints were also recorded.

Data was analyzed using SPSS package version 23 (SPSS inc. Illinois, Chicago). Continuous variables such as age were reported as mean and standard deviation while categorical variables like the outcomes were represented in frequencies and percentages. A p-value of <0.05 was considered as statistically significant. Approval/consent to carry out the study was obtained from the ethical review committee of Jos University Teaching Hospital before the commencement of this study.

**Results**

**Age -Sex Distribution of patients who had orbitotomy**

There were 15(53.6%) male and 13(46.4%) female patients who had orbitotomy for different pathologies at the facility between January 2011 and December 2020. The age range of these patients was 9 months to 65 years, with a median age of 15 years. Majority of the cases 21(75%) were below age 30 years as shown in table 1.

Table : Age-Sex Distribution of patients

Age of patients (years)	Sex		
	Female (%)	Male (%)	Total (%)
< 10	4(30.8)	5(33.3)	9(32.1)
10-19	4(30.8)	3(20.0)	7(25.0)
20-29	4(30.8)	1(6.7)	5(17.9)
30-39	0(0.0)	3(20.0)	3(10.7)
40+	1(7.7)	3(20.0)	4(14.3)
Total	13(100.0)	15(100.0)	28(100.0)

$\chi^2 (f) = 5.411, p = 0.262$   $f =$  Fisher's Exact Test

**Laterality**

Left eye was involved in 15(53.6%) and right eye in 13(46.4%) patients; none was bilateral. There was no significant difference in laterality.

**Clinical presentation**

Protrusion of the eye was the commonest presenting complaint seen in 53.6% (15 patients). Other presenting complaints are as shown in figure 1 below.

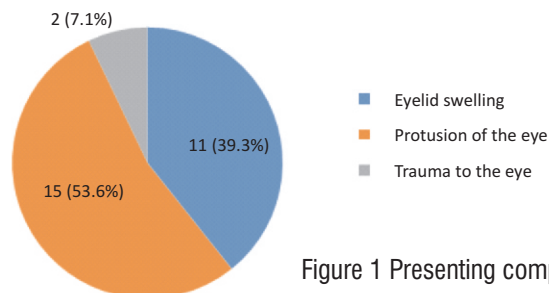


Figure 1 Presenting complaints

Majority of the patients had proptosis which was seen to be more common in males 8(53.3%, p=0.604) as shown in table 2. Though this difference was not statistically significant.

Table 2: Relationship between sex and presenting complaints

Presenting Complaint	Sex		
	Female (%)	Male (%)	Total (%)
Eyelid swelling	6(54.5)	5(45.5)	11(100.0)
Protrusion of the eye	7(46.7)	8(53.3)	15(100.0)
Trauma to the eye	0(0.0)	2(100.0)	2(100.0)
Total	13(46.4)	15(53.6)	28(100.0)

$\chi^2 (f) = 1.707, p = 0.604$   $f =$  Fisher's Exact Test

**Clinical Investigations**

Computer tomography scan of the orbit was the most common investigation done for 25(89.3%) patients in the study. Histology helped in confirming the diagnosis in (26) 92.9%. Details as shown in table 3.

Table 3 Clinical Investigations

Examination	f	%
CT Scan	25	89.3
MRI	1	3.6
Biopsy	2	7.1
Total	28	100.0

Histology	f	%
Yes	26	92.9
No	2	7.1
Total	28	100.0

Table 4 Diagnosis/Aetiology

Diagnosis	F	%
Deep Dermoid Cyst	11	39.3
Deep Dermoid Cyst (Recurrent)	4	14.3
Intraorbital Foreign Body	2	7.1
Lacrimal Gland Pleomorphic Adenoma	1	3.6
Lacrimal Gland Pleomorphic Adenoma(Recurrent)	1	3.6
Orbital Carvenous Hemangioma	1	3.6
Orbital Cellular Angiofibroma	1	3.6
Orbital Cyst	1	3.6
Orbital Embryonal Rhabdomyosarcoma	1	3.6
Orbital Fibro Lipoma	1	3.6
Orbital Neurofibroma	1	3.6
Orbital Schwannoma	1	3.6
Orbitocranial Neurofibromatosis	1	3.6
Orbital meningioma.	1	3.6
Total	28	100.0

**Diagnosis**

The most common diagnosis was dermoid cyst (39.3%), others included orbital carvenous haemangioma (14.3%), intraorbital foreign body (7.1%), orbital cyst (7.1%). Other diagnosis are shown in table 4 above.

Out of the 11 cases of dermoids seen, more than half 6(54.5%) were seen in males (p=0.047). All cases of cavernous haemangioma were seen in females. Deep dermoid was more common in individuals less than 20 years of age (Table 5).

Table 5 Distribution of Diagnosis/Aetiology by Age

Diagnosis N (%)	Age group of patients (years)					Total
	< 10	10-19	20-29	30-39	40+	
Deep Dermoid Cyst	6(66.7)	4(57.1)	0(0.0)	1(25.0)	0(0.0)	11(39.3)
Deep Dermoid Cyst Reccurent	0(0.0)	0(0.0)	0(0.0)	1(25.0)	0(0.0)	1(3.6)
Intraorbital Foreign Body	1(11.1)	0(0.0)	1(25.0)	0(0.0)	0(0.0)	2(7.1)
Lacrimal Gland Pleomorphic Adenoma	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(25.0)	1(3.6)
Lacrimal Gland Pleomorphic Adenoma(Recurrent)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(25.0)	1(3.6)
Orbital Carvenous Hemangioma	0(0.0)	1(14.3)	2(50.0)	0(0.0)	1(25.0)	4(14.3)
Orbital Cellular Angiofibroma	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(25.0)	1(3.6)
Orbital Cyst	0(0.0)	0(0.0)	1(25.0)	0(0.0)	0(0.0)	1(3.6)
Orbital Embryonal Rhabdomyosarcoma	0(0.0)	1(14.3)	0(0.0)	0(0.0)	0(0.0)	1(3.6)
Orbital Fibro Lipoma	0(0.0)	1(14.3)	0(0.0)	0(0.0)	0(0.0)	1(3.6)
Orbital Neurofibroma	1(11.1)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(3.6)
Orbital Schwanoma	0(0.0)	0(0.0)	0(0.0)	1(25.0)	0(0.0)	1(3.6)
Orbitocranial Neurofibromatosis	1(11.1)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(3.6)
Orbital meningioma	0(0.0)	0(0.0)	0(0.0)	1(25.0)	0(0.0)	1(3.6)
Total	9(100.0)	7(100.0)	4(100.0)	4(100.0)	4(100.0)	28(100.0)

$\chi^2 (f) = 57.257, p = 0.005$   $f =$  Fisher's Exact Test

**Approach into the orbit**

There were 21 (75.0%) patients who had orbitotomy through the transcutaneous approach, majority of these incision was at the superotemporal region, and this was done under general anaesthesia (20; 71.4%) as shown in Figure 3.

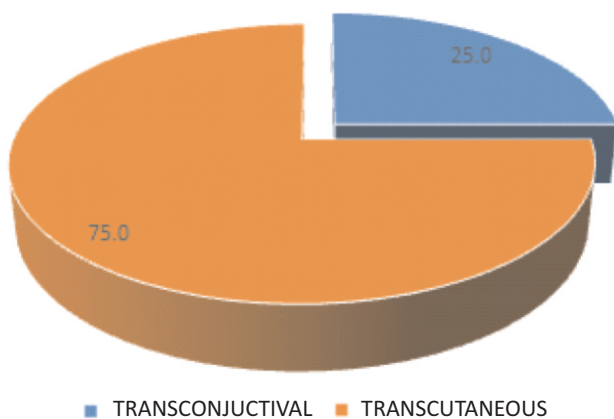


Figure 3 Orbitotomy Approach

**Outcome**

**Extra ocular Motility**

Majority of the patients (20; 71.4%) had normal preoperative and postoperative extra-ocular movement.

Major preoperative and postoperative extraocular movement abnormality was restriction in all directions of gaze seen in 4(14.3%) patients as shown in table 6.

Table 6 Preoperative and Postoperative Extraocular Motility

Extraocular Movement Finding	Preoperative (%)	Postoperative (%)
Limitation in Elevation	1(3.6)	1(3.6)
Limitation of Depression	1(3.6)	0(0.0)
Restriction in Abduction	1(3.6)	1(3.6)
Restriction in Elevation and Abduction	1(3.6)	2(7.1)
Restriction in all Directions of Gaze	4(14.3)	4(14.3)
Normal	20(71.4)	20(71.4)
Total	28(100.0)	28(100.0)

**Postoperative Complications**

Postoperative complications encountered within the first 6 weeks include residual periorbital oedema (3.6%), subconjunctival haemorrhage (3.6%) and esotropia (3.6%). On the other hand the commonest postoperative complication encountered after 6 weeks of surgery was skin scarification from the transcutaneous approach in 15 (53.5%) patients, as seen in Table 7.

Table 7 Postoperative Complications

Complication	Frequency	%
Early (< 6 Weeks)		
None	25	89.3
Esotropia	1	3.6
Residual Periorbital Oedema	1	3.6
Subconjunctival Haemorrhage	1	3.6
Total	28	100.0
Late Post- Op Complications (> 6 Weeks)		
None	10	35.7
Scar	15	53.5
Reoccurrence after 2 years	2	7.2
Incomplete excision	1	3.6
Total	28	100.0

**Preoperative and Postoperative Visual Acuity using WHO standard**

The study revealed that 15(53.6%) patients had no visual impairment before and after operation. Four (14.3%) were blind at presentation, and remained so postoperatively. Overall, 13(46.4%) patients had varying degrees of visual impairment as detailed in table 8.

Table 8: Preoperative and postoperative Visual Acuity by WHO category/classification

Visual Acuity	Pre-op VA F (%)	Post-op VA F (%)
No Impairment (6/6-6/12)	15(53.6)	15(53.6)
Mild Visual Impairment (<6/12-6/18)	2(7.1)	5(17.9)
Moderate Visual Impairment (<6/18-6/60)	3(10.7)	2(7.1)
Severe Visual Impairment (<6/60-3/60)	4(14.3)	2(7.1)
Blindness (<3/60)	4(14.3)	4(14.3)
Total	28(100.0)	28(100.0)

**Discussion**

This is the first documented report on the indications and outcomes of orbitotomy in north-central Nigeria.<sup>11</sup> Orbitotomy is not a commonly performed surgical procedure in Nigeria due to paucity of trained ophthalmic plastic surgeons.<sup>12</sup> Most literature available are case reports of orbital lesions managed via orbitotomy.<sup>9,10,11,12</sup> In our study, over a period of 10 years about twenty-eight patients were seen to have benefited from orbitotomy, this could have been more if we had an oculoplastic surgeon prior to 2017 in our center. Out of the twenty eight patients whose record were complete and analyzed, twenty four of them were operated between 2017 and 2020, this remarkable improvement

can only be achieved because of the presence of a trained oculoplastic surgeon in the center. About three quarters of the patients who benefited from orbitotomies for various indications were below the age 30 years from our study, and this agrees with findings of the study by Malarvizhi R et al.<sup>13</sup> in India who also reported about 73% of their patients being below the age of 30 years. This could be as a result of dermoid cyst being the most common indication/aetiology in both studies.<sup>13</sup> Dermoid cyst is a congenital anomaly manifesting from childhood into adulthood with about 70% of cases diagnosed by 5 years of age. It is slow growing, painless and occurs commonly on the head and neck region.<sup>14, 15</sup> Dermoid cyst in this study was more common in males than females in contrast to reports by Pollard ZF et al who found a slight female predominance.<sup>16</sup> However, there's no known reason for this variation. Computed tomography scan is a very important radiological investigation in the diagnosis of orbital lesions. It helps with the localization of the pathology and deciding on the best surgical approach. This is alluded to by other authors who also found that doing computed tomography scan was important in their patient management.<sup>12, 13</sup> Majority of the patients undergoing orbitotomy in our study had surgery done under general anaesthesia, this is probably because most of the patients seen were younger and may be unable to cooperate for local anaesthesia, coupled with the usually prolonged duration of such procedures. This agrees with a study done in Delhi where surgeries were done under general anaesthesia for about half of the patients.<sup>13</sup> Most of the patients in our study had a superior temporal incision done, as the commonest pathology seen in our series was located supero-temporally. This is contrary to other studies that reported a medial or lateral incisions being commoner due to the anatomical locations of their most prevalent pathology.<sup>12,13</sup> In our approach into the orbit we made more transcutaneous incisions in about two thirds of cases. This is in agreement with other studies that also reported the transcutaneous approach being more common. This approach allows one easy access to superiorly and temporally located lesions, it also has some cosmetic benefit when done along the brow or lid creases, though the tranconjunctival approach has better cosmesis with less scarification, good exposure for the surgeon and lesser manipulation.<sup>2,12,13</sup> However, some studies revealed the tranconjunctival approach to be more important in inferior orbital pathology because it gives a better exposure.<sup>17</sup> Though in our study, cavernous hemangioma was successfully removed in 4(14.3%) patients, an endoscopic transnasal approach for cavernous hemangioma was found to be a safe alternative in another study.<sup>18</sup>

The outcome of orbitotomy from our study was good, with the majority of patients having good

extraocular mortality postoperatively. Similarly, a study in Delhi also reported a low complication rate involving extraocular muscles.<sup>13</sup> In the immediate postoperative period, complications were few and resolved within the first week postoperatively, however, eyelid scar was the commonest long term complication occurring in more than half of the patients operated in our study. This is similar to findings in another study which reported postoperative lid scar in more than half of their patients.<sup>13</sup> The reason for this similarity could be due to the fact that most patients in this study also had the transcutaneous incision.

The majority of patients in our study had no visual impairment postoperatively. This is similar to findings from another study that showed that no patient had a drop in vision following the orbitotomy.<sup>13</sup> Those patients in our study who had visual impairment postoperatively, were the same ones whose vision were impaired preoperatively, although there was a varying degree of improvement in the Snellen visual acuity postoperatively. This might be due to the relief of the pressure effect on the globe and the optic nerve.

### Conclusion

Orbitotomy is not a commonly performed procedure in Nigeria due to paucity of specialists. Early diagnosis and timely referral to a tertiary center that has an oculoplastic surgeon is necessary to ensure good outcome following orbitotomy. Detailed examination with appropriate investigations can help to localize the lesion and aid with decision making on the appropriate surgical approach.

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