IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 22, Issue 4 Ser.2 (April. 2023), PP 01-08
www.iosrjournals.org

Nasal Bone Fracture: Clinical Profile and Its Management

L Chensangba[1], Vephizo Keyho[2], Puyam Sobita Devi[3], Saurabh Shukla[4], Badaiahun Nongrum[5], Aida Sanasam[6]

1. *MS ENT, Dept. of ENT RIMS Imphal (author)*
2. *Senior Resident, Dept. of ENT RIMS Imphal (corresponding author)*
3. *Professor, Dept. of ENT RIMS Imphal*
4. *PGT, Dept. of ENT RIMS Imphal*
5. *PGT, Dept. of ENT RIMS Imphal*
6. *PGT, Dept. of ENT RIMS Imphal*

Abstract: *Facial trauma can be considered one of the most devastating aggressions due to the possibility of deformities, the emotional consequences and the economic impact of it causes on the health system. Nasal bone fracture is the most common type of facial. Radiographic plain x ray is a common procedure for imaging of suspected cases, CT scans is a valuable tool if the patient has extensive maxillofacial trauma. Acute management of nasal fractures is evaluated within 2 to3 hours, before significant oedema occurs or after 3 to 5 days, to allow oedema to resolve. In general, closed reduction before 14 days in adults, and within 10 days for children. Long standing traumatic nasal deformities require formal septorhinoplasty. STUDY DESIGN: Cross-sectional study, INCLUSION CRITERIA: Patients of all age groups above 1 year of age with nasal bone fractures EXCLUSION CRITERIA: 1) Patients unwilling to give consent, 2) Children under 1 year of age.*

Date of Submission: 22-03-2023 Date of Acceptance: 05-04-2023

I. INTRODUCTION

Facial trauma can be considered one of the most devastating aggressions due to the possibility of deformities, the emotional consequences and the economic impact of it causes on the health system. Nasal bone fracture is the most common type of facial fracture, and the third most common fracture of human skeleton, it occurs frequently because the nasal bone is located at the forefront of the face. They are often associated with other fracture of the facial skeleton. Treatment of nasal fractures was first recorded 5000 years ago during the early pharaonic period in Ancient Egypt.[1] Prevalence of nasal bone fracture ranges from 39 -50% of all facial fracture, male gender is more commonly involved than female gender, the peak incidence is in the 20 -30 years of age group.[2] The main aetiologies of nasal fractures are due to falls, violence, road traffic accidents and sport injuries.[3]

The external nose is a triangular pyramid like object supported by a framework of cartilage and bone- is covered externally by skin subcutaneous tissue, muscle and has an inner lining of mucous membrane and granular structures.[4]

The supporting framework of the external nose is composed of bony skeleton provided by nasal bones, frontal processes of the maxillae and nasal part of the frontal bone and a cartilaginous framework consisting of upper border of quandrangular cartilage/septal cartilages, upper and lower lateral cartilages. They are supported by the nasal spine of the frontal bone and by the perpendicular plate of the ethmoid, both of which groove the bones. The nasal bone is wedged-shaped, usually convex and smooth on its outer surface and concave and roughened internally.[4] The nasal cartilages are composed of hyaline cartilage which may be ossified and consist of upper lateral cartilages, lower lateral cartilages, lesser alar cartilages and septal cartilage. The various cartilages are connected with one another and with the adjoining bones by perichondrium and periosteum. The septal cartilages lie within the nose and divided the two nasal cavities with other components of the nasal septum.[5]

Pathophysiologyical factor that leads to fracture involving nasal bone:

1. Because of their more prominent and central position in the face.
2. These structures are also pretty brittle and poorly withstand force of impact.
3. The ease with which the nose is broken may protect the integrity of the neck, eye and brain, thus it acts as a protective mechanism.
4. The nasal bone is composed of two parts, a thick superior portion and a thin inferior portion, the intercanthal line demarcate these two portions, fracture commonly occur below this line.

5. Nasal bone undergo fracture in its lower portion, and the upper portion is seldom involved in the fracture line, this is because of the upper portion of the nasal bone is supported by its articulation with the frontal bone and frontal process of maxilla.[6]

Patients usually presented with the history of trauma in emergency department with pain, swelling of dorsum of nose, epistaxis, nasal obstruction, deformity, ecchymosis, and in severe injuries it causes cerebrospinal fluid (CSF leak), hyposmia/anosmia and septal haematoma.[7] Diagnosis can be made by thorough history and physical examination, such as tenderness, crepitation, deviation of nose and mobility of fracture fragments. Although radiographic plain x ray is highly controversial for clinical decision of nasal bone fracture in the emergency department, it is a common procedure for imaging of suspected cases. Computed tomography (CT) scans have greater sensitivity and specificity, however, radiation exposure, high price, and lack of impact on management do not justify their use in diagnosing isolated nasal bone fractures. It can be a valuable tool if the patient has extensive maxillofacial trauma.[8]

Management of nasal bone fracture depend upon type of injury and extend to the neighbouring structures. Acute management of nasal fractures is evaluated within 2 to3 hours, before significant oedema occurs or after 3 to 5 days, to allow oedema to resolve. In general, closed reduction before 14 days in adults, and within 10 days for children. Long standing traumatic nasal deformities require formal septorhinoplasty. Reduction of fracture nasal bone is done under local anesthesia in minor OT and general anesthesia in major OT. Closed reduction is usually reserved for simple non comminuted fracture and the primary goal is to minimize deformity and functional impairment.[9] Open reduction is performed for certain nasal injuries which cannot be sufficiently managed with a closed reduction, comminuted fracture with severe loss of nasal support, severe septal injuries and injuries with considerable soft tissue damage should be addressed with full exposure as the advantages of open reduction.[10]

The need for the study is to estimate prevalence of nasal bone fracture to provide the necessary information for preventive action aimed at reducing the incidence of nasal injuries and provide proper management before any complication.

OBJECTIVES

1. To determine the prevalence of nasal bone fracture in patients attending OPD, emergency and admitted in the department Otorhinolaryngology RIMS, Imphal.
2. To assess the correlation between clinical and radiological finding of nasal bone fracture.
3. To study treatment modalities and post-operative follow up complication of fracture nasal bone.

II. MATERIALS AND METHODS

STUDY DESIGN: Cross-sectional study

STUDY SETTING: Department of Otorhinolaryngology, Regional Institute of Medical Sciences, Imphal, Manipur.

DURATION OF STUDY: September 2019 to August 2021.

STUDY POPULATION: All facial trauma patients with nasal bone fracture attending OPD and Emergency and admitted in the department of Otorhinolaryngology, RIMS, Imphal.

INCLUSION CRITERIA:

Patients of all age groups above 1 year of age with nasal bone fractures.

EXCLUSION CRITERIA:

1) Patients unwilling to give consent.
2) Children under 1year of age

SAMPLE SIZE:194

PROCEDURES:

Informed written consent about the purpose of the study was obtained from the patients.

Plain x-ray for lateral nasal radiography were taken to see the nasal bone fracture and CT scan was done only in selected cases with high suspicious with x-ray radiography shows negative report and also with suspected associated fracture.

Closed reduction were done for simple, non comminuted fracture under local or general anaesthesia. Open reduction was performed for certain nasal injuries which can't be sufficiently managed with a closed reduction, comminuted fracture with severe loss of nasal support, severe septal injuries under general anaesthesia.

Methods: Detail history of each case regarding the responsible object of the fracture, the direction of force, the timing of injury, presenting symptoms and previous history of surgery/injury were recorded. General physical examination, systemic and local examination were carried.

The conservative treatment consists of elevation of the head and use of cold compresses in the periorbital and nasal region, analgesics and antibiotics. The patients were discharged with advice to report back within 3-4 days for reduction. The patients were reviewed after 3-4 days and reductions were done for those swelling had already subsided. If swelling persists, the reduction was postponed and reduction were done on later date. Reduction was

usually carried out within 3 -7 days in children and 5 -10 days in adults. For those with severe signs and symptoms with any of septal involvement, were admitted and complete routine investigation were done and treated surgically by septoplasty for any involvement of the septum.

Closed reduction at minor OT: The case was first anaesthetized with 4% xylocaine with adrenaline by applying cotton pledgets at different sites, beneath the nasal dorsum, the posterior edge of the middle turbinate, along the septum and the floor of the nose and allowed to wait for 10 minutes and POP cast was prepared. The patient was laid down on the operating table and then draped. Injection xylocaine 2% with adrenaline (1: 100000) was given by pointing at different sites to block the supratroclear nerve, infraorbital nerve, greater palatine nerve and the nasal tip. This could be done either intranasally or extranasally. Then the distance of the nostril rim to the nasafrontal angle was measured, and the walsham's forceps was inserted to a point about 1cm less than the measured distance to disimpact the fracture fragment of the nose. The surgeon now moves to the head end of the patient, using index and thumb the surgeon knead the nasal bone fragment into position. The septal cartilage was elevated using Ashe's forceps. The nasal cavities were packed with ointment impregnated gauze. The reduced nasal bones were stabilised using a POP cast.

Closed reduction under general anaesthesia: This was done in a case of patient without much septal deformity and in a case of anxious patient. Under general anaesthesia, , reduction of the nasal bone fracture was carried out by using Walsham's and Ashe's forceps, following the same procedure as that of reduction under local anaesthesia

Reduction Septoplasty: After preparing the patients, freer's or killian's incision was made. The mucoperichondrial flap was elevated and then between the cartilage and the perichondrium an anterior tunnel was made on both sides. Inferior tunnels when necessary. A deviation due to tension in the septum, or an inferior edge that had slid along the spine or a maxillary crest, was corrected by removing an inferior cartilageous strip. Dislocation due to fractures can be dealt intraseptally by mobilization or resection of the septum. After doing septoplasty, reduction of the nasal bone fracture was carried out by using Walsham's and Ashe's forceps, following the same procedure as that of reduction under local anaesthesia.

DATA MANAGEMENT AND STATISTICS ANALYSIS:

All the data will be entered and analyse using software IBM, SPSS version 21. Statistical analysis will be performed with the appropriate statistical tests such as Chi-square test for categorical values and student t-test for methodical values. Descriptive statistics like mean, percentage and ratio will be used for socio demographic variables like age, sex, occupation etc. A p-value of 0.05 or less will be considered significant

III. RESULTS AND OBSERVATION

Table 1: Gender- Frequency distribution of patients studied

Gender	No. of Patients	%
Female	43	22.2
Male	151	77.8
Total	194	100.0

Out of 194 patients, 77.8% were males and 22.2% were females with an M:F ratio of 3.6:1.

Table 2: Age in years–Frequency distribution

Age in Years	No. of Patients		%
	male	female	
1-20	25	7	16.5
21-40	100	21	62.4
41-60	20	13	17.0
61-80	6	2	4.1
Total	151	43	100.0

Mean ± SD: 32.25±13.07

Out of 194 patients, the median age of the patients was 32.25 years majority of the patients were in the age group of 21-40 years.

Table3: Occupation-Frequency distribution

Occupation	No. of Patients	%
Unemployed	88	45.4
Students	51	26.3
Employed	49	25.3
Construction workers	2	1.0
Employed(retired)	2	1.0
Other activity	1	0.5
Todder	1	0.5
Total	194	100.0

Out of 194 patients, majority were i.e., 88 cases (45.5%) were unemployed followed by students 51 cases (26.3%).

Table 4: Cause of nasal bone fracture- Frequency

Cause Of Injury	No. of Patients	%
RTA	100	51.5
Assault	44	22.7
Fall	24	12.4
Fight	1	0.5
Hit by fallen object	1	0.5
Injury in work place	1	0.5
Personal accident	12	6.2
Sports injury	11	5.7
Total	194	100.0

Out of 194 patients participated in the study, most common cause of injury is Road traffic accident (RTA) 51.5%, followed by Assault (22.7%) Fall (12.4%).

Table 5: Clinical Presentation of nasal bone

Clinical Presentation	No. of Patients (n=194)	%
Epistaxis	127	65.5
Tenderness	146	75.3
Swelling dorsum of nose	120	61.8
Crepitation	86	44.3
Deformity of nose	48	24.7
Nasal obstruction	84	43.3
Injury over the nose	52	26.8
Periorbital ecchymosis	7	3.6
Septal hematoma	3	1.5
Smell disturbance	2	1.0

Most of the patients presented with tenderness over the nose tenderness (75.3%), epistaxis (65.5%), and swelling dorsum of nose (61.8%).

Table 6: CT- scan face and nose- Frequency distribution

CT- scan face and nose	No. of Patients	%
No	186	95.9
Yes	8	4.1
• Bilateral displaced nasal fracture	1	0.5
• Comminuted nasal bone fracture with fracture of right maxilla	1	0.5
• Bilateral displaced nasal bone fracture with fracture of left maxilla	2	1.0
• Bilateral displaced nasal bone fracture with septal fracture	1	0.5
• Undisplaced right nasal bone fracture with left zygomatic fracture	1	0.5
• Bilateral displaced nasal bone fracture with right orbital fracture	2	1.0
Total	194	100.0

Table above show CT-scan face and nose was taken in 8 (4.1%) patients, for two patients CT was done to rule out nasal bone fracture in clinically suspected cases showing X-ray negative finding, 1(0.5%) case undisplaced left nasal bone fracture and 1(0.5%) case bilateral displaced nasal bone fracture.

Table 7: shows correlation between clinical and x-ray findings of nasal bone fractures

Clinical Presentation	X ray Lateral view		Total (n=194)	P value
	Negative (n=104)	Positive (n=90)		
Epistaxis	73 (70.2%)	54 (60%)	127 (65.5%)	0.137
Tenderness	78 (75%)	68 (75.6%)	146 (75.3%)	0.929
Swelling dorsum of nose	60 (57.7%)	60 (66.7%)	120 (61.9%)	0.199
Crepitation	2 (1.9%)	84 (93.3%)	86 (44.3%)	<0.001**
Deformity of nose	1 (1%)	47 (52.2%)	48 (24.7%)	<0.001**
Nasal obstruction	31 (29.8%)	53 (58.9%)	84 (43.3%)	>0.05
Injury to nose	21 (20.2%)	25 (27.8%)	46 (23.7%)	0.215
Periorbital ecchymosis	1 (1%)	6 (6.7%)	7 (3.6%)	0.034*
Septal hematoma	0 (0%)	3 (3.3%)	3 (1.5%)	0.061
Smell disturbance	0 (0%)	2 (2.2%)	2 (1%)	0.126

The correlation of crepitation, deformity of nose and peri-orbital ecchymosis with radiologic evaluation was found statistically significant p-value<0.05.

Table 8: Type of Treatment- Frequency distribution

Type of Treatment	No. of Patients	%
Conservative medical treatment		
❖ Undisplaced fracture	121	62.4
Closed reduction under LA		
❖ Displaced fracture	63	32.5
Closed reduction under GA	4	2
Reduction septoplasty under GA	6	3.1
Total	194	100.0

Table above shows the treatment modalities. 121(62.4%) cases with undisplaced nasal bone fracture were treated conservatively with medical treatment. Closed reduction under local anaesthesia in 63 (32.5%) cases with displaced nasal bone fracture. Closed reduction under general anaesthesia in 4(2.1%) cases and Reduction septoplasty under general anaesthesia in 6 cases (3.1%).

Table 13 Treatment Result in fracture nasal bone

		1ST WEEK		2nd WEEK	
SI.NO	Result	No. of cases	%	No. of cases	%
1	Deformity	-	-	-	-
2	Recurrent epistaxis	24	9	20	8.4
3	Infection	4	1.4	0	0
4	Nasal block	67	28.4	63	23.5
5	Smell disturbance	38	13.3	23	10.4
6	Local pain	60	21.1	24	10.8
7	Correct alignment	190	97.9	190	97.9
8	Incorrect alignment	3	1.6	3	1.6
9	Outcome unknown	1	0.5	1	0.5

Post-operative follow up done in all the patients diagnosed as nasal bone fracture through clinical examination and radiological finding, who had managed conservatively, closed reduction and reduction septoplasty. Nasal block was the commonest complaint presenting in 67(28.4%) cases during the 1st week and 63 (23.5%) cases during the 2nd week.

IV. DISCUSSION:

Nasal bone fractures in the most common type of the bony facial injury, because of the prominent position of the nose on facial skeleton. Over all incidence around 39- 50% in facial trauma, usually associated with other facial fractures. Etiological causes are mainly traumatic injuries either by assault, road traffic accidents, fall, personal injury and sports.

Out of 460 cases diagnosed as facial fractures, we could able to identified 194(42.17%) cases of nasal fractures through clinical examination and radiologically finding, during the study period, therefore prevalence of nasal bone fracture in facial fractures is 42.17% in general population.

The study sample consisted of 151 (77.8%) as males and 43 (22.2%) as females with male:female ratio of 3.6:1, which was similar to study conducted by Hadad H et al[2] (2019) showing male: female ratio as 2.4:1.

The most frequent age group presenting with fracture of the nose was found to be 21 to 30 years in most of the literature, but in present study the most commonly affected age group is 20 to 40 years which is quite similar to study conducted by Pati S et al[11], which show 21- 40 years age group commonly affected.

In most of the study, Assault was the most common cause of fracture nasal bone. but in our study, Road traffic accident (47.8%) represent the most common cause of injury, which is similar to study conducted by Rehman Anees UR et al[12], which shows road traffic accident (62%) most common cause.

In our study most of the patients presented with tenderness in the nose (75.3), epistaxis (65.5), swelling dorsum of nose (61.8%), crepitation (44.3%), nasal obstruction (43.3%), deformity of nose (24.7%) injury over the nose (26.8), periorbital ecchymosis (3.6%), septal haematoma (1.5%), smell disturbance (1.0%) which is similar to study conducted by CIL Y et al[3] with most frequent finding were tenderness (71.1%), followed by swelling in (51.1%), nasal deviation (42.2%) and epistaxis (15.6%).

In our study, x-ray lateral view could able to detected fracture nasal bone correctly in 192 patients out of 194 suspected nasal bone fractures in facial trauma. Unlike other studies, it was found to be very effective and accurate in the diagnosis and management of nasal bone fracture

Regarding associated fractures with nasal bone fractures, Kang et al[13]. have reported 17(9.5%) patients incurred Le fort I fracture, 6(3.4%) patients incurred Le fort II fracture, 2(1.1%) patients incurred Le fort III fracture, 4(2.2%) patients incurred NOE fracture, 33(18.4%) patients incurred ZMC fracture, 18(10.1%) patients incurred maxillary fracture, 44(24.6%) patients incurred orbital fracture, 10(5.6%) patients incurred frontal fracture. In present study, Nasal septum is the most common fracture involved in nasal bone fracture, 40(20.6%) patients constituted septal fracture, 3(1.5%) patients with maxilla fracture (Le fort-ll, 2 patients and Le fort-l 1 patient), 2(1.0%) patients with right orbital fracture, 1(0.5%) patient with left zygoma fracture. The reasons might be because of causes of fractures such as traffic accidents, assault and fall, and so on often lead to stress to the

middle portion of the face because the nasal bone is most protruding structure. Thus, bones closest to the nasal bone have higher rates of associated fractures.

Correlation between clinical and x-ray finding of nasal bone fracture, Celik M et al[8]. report correlation of crepitation 155/156 (99.3%), deviation of nasal axis 135/142 (95%) and swelling 103/134 (76.8%) with radiologic evaluation was found statistically significant (p value<0.05), which is similar to our study, we found the correlation of crepitation 84/86 (44.3%), deformity of nose 47/48 (24.7%) and peri-orbital ecchymosis 6/7 (3.6%) with radiologic evaluation was found statistically significant p-value<0.05.

Conservative treatment included 121(62.4%) cases, with undisplaced fracture nasal bone in which there were signs of fracture but with correct alignment.

Surgical intervention was done both under general anaesthesia and local anaesthesia, showing equal treatment result which tallies that of the study done by cook J et al[14] (1990). Surgical intervention included 63 (32.5%) cases with displaced fracture nasal bone under local anaesthesia usually done at minor OT, 4(2.1%) cases with closed reduction under general anaesthesia and 6 (3.1%) cases with reduction septoplasty done under general anaesthesia at major OT.

In 1stweek, Nasal block was the commonest complaint presenting in 67(23.5%) cases followed by local pain 60(21.1%) cases, smell disturbance 38(13.8%) cases, recurrent epistaxis 24(8.4%) cases, infection 4(1.4%) cases and incorrect alignment 3 (1.6%) cases. Nasal block was also commonest complaint in the 2nd week follow up period constituting 63 (28.4%) cases. Cases of local pain in the nose was very common during 1st week of follow up period, but reduced drastically in 2nd week follow up, this might because of reduced inflammation and oedema, local pain commonly seen following reduction septoplasty, closed reduction under local and general anaesthesia.

Smell disturbance was present in 38 cases during 1stweek and 23 cases in 2nd week follow up period, most commonly seen following closed reduction under local anaesthesia, conservative treatment and reduction septoplasty, the cause of smell disturbance might be because of demaged to olfactory epitheium during reduction.

Outcome unknown for 1(0.5%) case with undisplaced left nasal bone fracture associated with zygomatic fracture, patient did not turn up for follow up.

Postoperative complication in case of fracture nasal bone included cosmetic deformity, recurrent epistaxis, haematoma, CSF rhinorrhea, airway obstruction, scar contracture, nasal deformity, saddle nose deformity and septal perforation (McMonagle BA and Michael Gleeson, 2008). In our study there were no such complication, except recurrent epistaxis during the first 2 weeks of postoperative follow up.

V. Conclusion

In the study, total 194 (42.17%) patients with nasal bone fracture were identifies and studied from 460 patients with facial fractures diagnosed, through proper clinical examination and radiological finding, over the duration of two years at Regional Institute of Medical sciences, Imphal.

Most of the patients presented with tenderness over the nose (75.3), epistaxis (65.5), swelling dorsum of nose (61.8%), crepitation (44.3%), nasal obstruction (43.3%), deformity of nose (24.7%) injury to the nose (26.8), periorbital ecchymosis (3.6%), septal haematoma (1.5%), smell disturbance (1.0%)

X- ray nasal bone lateral view taken in all the patients (194) to confirmed nasal bone fracture, out of which 192(99%) patients show nasal bone fracture. CT confirmed nasal bone fracture in 2(1%) patients who were suspected clinically with x-ray negative finding. We used CT scan only in severe facial injury associated with nasal bone fracture and clinically suspected nasal bone fracture with negative x-ray finding.

The prevalence of nasal bone fracture in the study population is 42.17% in facial trauma. More common in male than female, male: female ratio of 3.6:1, the most frequent age group presenting with fracture of the nose was between 20 to 40 years. The most common cause of nasal bone fracture in our study was road traffic accident, followed by assaults. The results of this study can suggest preventive measures such as road safety rules programs, traffic rules programs and drinking and driving campaigns to reduced road traffic accident and violence.

Type I fracture is the most commonest fracture, followed by type II fracture and type III fracture is the least, left side nasal bone was more involved in nasal bone fracture.

In our study, associated fracture with nasal bone fracture, we found that 40(20.6%) patients constituted septal fracture, 3(1.5%) patients with maxilla fracture (Le fort ll -2 patients and Le fort l- 1 patient), 2 (1.0%) patients with right orbital fracture, 1(0.5%) patient with left zygoma fracture.

The study shows that the conservative treatment can be used for the treatment of the fracture nasal bone, provided the normal alignment is maintained and there is no sign of any complication.

The study also shows that reduction of nasal bone fracture under local anaesthesia in type I and type II is equally effective to reduction under general anaesthesia, provided the patient reported early and without any preoperative complication. In this study we conducted reduction septoplasty under general anaesthesia in those cases were the septum involved extensively.

The main complication during 1st two week follow up period were nasal block, local pain, smell disturbance and epistaxis. Most the complication disappeared by 2nd month of follow up period. Thus, nasal bone fracture could be managed effectively either conservatively or surgically without much complication if the patients report on time and cooperative in the management.

REFERENCES:

[1]. Kim D, Holmes S. Nasal fracture, Scott-Brown's Otorhinolaryngoolgy Head and Neck Surgery, 8th edition, 2: 1183-1188, 2018.
[2]. Hadad H, Silva Medeiros JA, Teixeira Colombo L, Rangel Garcia I Jr, Avila Souza F, Marcondes Aranega A. Epidemiological study of nasal fractures.Am J Otolaryngol head and neck surg2019; 2(3):1040-5
[3]. Cil Y, Kahraman. An analysis of 45 patients with pure nasal fractures. Derg 2013; 19 (2):152-6.
[4]. Beekhuis GJ. Nasal fractures, Otolaryngology, Paparella, Shumrick, Gluckman, Meyerhoff: W.B/ Saunders Company Harcourt Brace Jovanovick, Inc. The Curtis Centre Independence Square West Philadelphia, PA 19106, 3rd edition, Vol. III, 1823-1831, 1991.
[5]. Lang J. Clinical anatomy of the nose, nasal cavity and paranasal sinuses Georg Thieme Verlag, Stuttgart, a-f: pp: 7, 15, 19.
[6]. Hathiram BT, Khattar VS, Devane S, Kurup B. Nasal fracture. Atlas of op.Otorhinolargol head and neck surg.2013; 49 (2):403-5.
[7]. Thiagarajan B, Ulaganathan V. Fracture nasal bone. J Otolaryngol 2013;3(1.5):785-8.
[8]. Celik M, Sonmez S, Cilik MM, Aydemir L, Alpaslan MS, Comoglu S. Accordance between clinical and radiologic finding of nasal bone fracture, Istanbul university, Department of Otorhinolaryngology-Head and Neck surgery, Istanbul, Turkey; vol.80: 34-37.
[9]. Chan J, Most SP. Diagnosis and management of nasal fracture. OP Techniq Otolaryngol 2008 (19): 263-6.
[10]. Kim JH, Lee JH, Hong SM, Park CH. Open reduction through an intercartilaginous incision. Acta Oto- laryngological ; vol. 133: 77-81, 2012.
[11]. Dr. sabyasachi pati, Dr.smruti swain, Dr.anindita nayak, Dr.panchauan sahoo, Dr. baidyanath objna. Management of fracture nasal bone by closed reduction in a tertiary care, hospital. Int.J.Adv. Res. 7(9), 1249-1254.
[12]. Anees UR Rehman, Muhammad saleem sheikh, Muhammad farooq bhutta. Epidemiological analysis of fracture nasal bone experience at a tertiary care hospital. PJMHS vol.10,no.3,july- sep.2016.
[13]. Byung-hun kang, Hyo-sun kang. A retrospective clinical investigation for the effectiveness of closed reduction on nasal bone fracture. Maxillofac plast Reconstr Surg. 2019 dec; 41(1):53.
[14]. Cook JA, McRae RD, Irving RM, Dowie LN. A randomized comparision of manipulation of the fractured nose under local and general anaesthesia, clinical Otolaryngology; 15: 343-6, 1990

L Chensangba, et. al. "Nasal Bone Fracture: Clinical Profile and Its Management." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 22(4), 2023, pp. 01-08.