Prospective Analysis of Etiologies of Nose Defects in a Tertiary Care Referral Centre

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ABSTRACT
The purpose of the study was to analyze the various causes of nasal defects seen in practice by plastic surgeons in the Department of Plastic Surgery, in a tertiary care North Indian Hospital. The study included all patients of any age and sex presenting to the outpatient department or emergency department with nose defects. The patients were enquired about the cause and history of their nasal defects. The most common etiologies of nasal defects seen were skin tumors of the nose, the most common one being the basal cell carcinoma (BCC) followed by squamous cell carcinoma (SCC), and congenital naevus. Both the malignancies BCC and SCC were seen in older age. While BCC was significantly more common in males, a specific gender preference could not be concluded in SCC. Trauma was the next most common cause and included road traffic accidents, assaults, and animal bites. These were more commonly seen in the youth and less commonly in geriatric or pediatric populations. Other less common causes of nasal defects included postburn lesions.

KEYWORDS: Nasal Defects, Etiologies, Basal Cell Carcinoma, Advanced Age.

1. INTRODUCTION

The importance of the human nose is well known in terms of function, facial esthetics, and complexity of structure. It serves as an initial conduit for inhaled air, acts to humidify and filter off particulate contaminants, has an olfactory function, and also aids in phonation. The nose is structurally composed of nasal bones and cartilages. It has a nasal septum which separates the nostrils. These structures together give the shape of the nose.

Disfiguration due to nasal defects causes serious effects on a person's work and social life, besides functional impairment. These defects are caused due to myriad of etiologies which are broadly: infective, inflammatory, toxins, trauma, and tumors [1].

Infective causes include bacterial infections, such as syphilis, mycobacteria, rhinoscleroma, leprosy, actinomycosis, and fungal infections such as aspergillosis and rhinomucormycosis. Inflammatory causes include sarcoidosis, foreign body granuloma, Wegner's granulomatosis, and Systemic lupus erythematosus (SLE) [1]. Toxin-induced nasal damage has been studied, especially in those consuming cocaine through nasal route for recreational purposes. Cocaine along with caustic additives damages nasal tract resulting in defects that range from small perforations to destruction of mucosa, cartilage, and even bone [2].

The most important causes of nasal defects in modern times are trauma and skin cancers. Traumatic causes include accidental sharp and blunt trauma, animal bites, or surgical wounds. Skin cancers of the nose include basal cell carcinoma (BCC), squamous cell carcinoma, and less commonly other types such as melanoma, sweat gland adenocarcinoma, neuroblastoma, and lymphomas.

The significance of knowing the etiology behind each nasal defect that the plastic surgeon is supposed to deal with lies in choice of reconstructive option, a knowledge of the disease process involving the surrounding tissue, excision of tumor free margins, and follow-up for recurrences [3].

1.1. TUMORS OF THE NASAL SKIN

The occurrence of most benign and malignant lesions of facial skin is dependent on exposure to ultraviolet rays of the sun. The prominent location of the nose predisposes it even more for such tumors. The prominently noticeable location is an important reason for their presentation, early in the course of disease. The most common one encountered is the BCC, followed by

squamous cell carcinoma, melanoma, and other less frequent histopathological varieties [4]. Basal cell cancers are considerably more common in the western world, specifically in people with white skin. Even though the incidence in Asian population is much lower, these cancers are an important cause of nasal skin defects in this population [5]. This skin malignancy arises from basal cells of the epidermis or follicular structures. These are further identified to have the following histological subtypes: pigmented, cystic, superficial multicentric, morphea-like, and nodular-ulcerative. It mostly involves patients of advanced age; however, rare involvement in children is seen associated with genetic defects such as xeroderma pigmentosum or basal cell nevus syndrome [5]. BCC is less aggressive tumor and has a low risk of metastasis. It is well managed with cryosurgery, LASER microsurgery, local excision or Moh's Micrographic Surgery with a minimum of 2 mm of safety margin [6].

Squamous cell carcinoma occurs in areas of skin damage or burn scars as exophytic or ulcerative varieties. Chronic ultraviolet rays exposure and immunosuppression are risk factors, and it is much more common in men than women [7]. Incisional biopsy is performed for diagnosis and evaluation for need of neck dissection depending upon lymph node status is done as cervical lymph node metastasis is common [6]. Treatment of choice is micrographic-controlled surgery with tumor-free margins of 4 mm for lesions less than 2 cm and that of 6 mm for tumor size more than 2 cm [7].

Melanoma arises from uncontrolled proliferation of degenerated melanocytes and may develop from pre-existing melanocytic nevus [6]. It is a highly aggressive tumor and is associated with poorer prognosis when compared to other skin cancers. It is more common in females. Treatment consists of excision with tumor-free margins of 10 and 20 mm for tumor thickness less than and more than 2 mm, respectively [7].

1.2. TRAUMATIC LESIONS OF NOSE

Trauma to the nose can occur due to accidental, homicidal, or suicidal causes. Accidental blunt trauma to the midface is of common occurrence and invariably involves the nose, as it is naturally a protruding structure [8]. Animal bites are also common cause of nasal trauma and more so in children [9]. In a study by Kesting *et al.*, most of these bites were caused by dogs, and nose is a commonly affected area in animal bite injuries involving the head [10].

2. METHOD(S)

The study was conducted in the Department of Plastic Surgery, in a North Indian tertiary care hospital. This was a study including all patients of any age and sex presenting to the outpatient department or emergency department with nose defects. The patients were enquired about the cause and history of their nasal defects. Frequency of occurrence of all causes was assessed and their distribution according to age and sex was noted. A written informed consent was taken from all patients that they were all fully informed about the research and their pictures may be used for publication.

3. RESULTS

A total of 20 patients with nasal defects were studied between the period October 2018 and November 2020 in our Department of Plastic Surgery.

Table 1: Patient distribution according to age and sex.

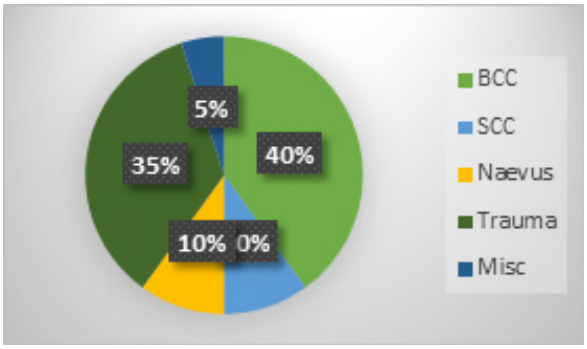
Age	Male	Female
0–10 years	0	0
11–20 years	1	1
21–30 years	4	2
31–40 years	1	0
41–50 years	2	2
51–60 years	3	0
61–70 years	3	1
Total	**14**	**6**
Percentage (%)	**70%**	**30%**

The total number of patients studied was 20, out of which 14 (70%) were males and 6 (30%) were females. Age range of patients was 14 to 70 years that for males being 14 to 70 years and that for females being 18 to 68 years.

Table 2: Patient distribution according to etiology of nasal defects.

Etiology		No. of Patients	% Patients
Trauma	Accidental (Road traffic accident)	3	15
	Animal bite	3	15
	Assault	1	5
Tumor	Congenital benign naevus	2	10
	Basal cell carcinoma	8	40
	Squamous cell carcinoma	2	10
Miscellaneous	Postburn	1	5

Graph 1: Etiologies of nasal defects.



A major proportion of patients had their nasal defects subsequent to resection of tumors. Out of 20 patients, 12 patients had tumors, benign, and malignant, out of which 10 had malignancy, i.e. (50% of total). Seven patients had traumatic injuries, i.e. (35%). One patient had defect due to burn injury.

Maximum number of patients were those with malignancy, most being BCC, with 8 patients (40% of total patients) and 2 patients (10%) with squamous cell carcinoma. All patients with malignancy were biopsy proven.

Traumatic lesions included accidental (RTA) 3 (15%), animal bite 3 (15%), and assaults 1 (5%).

Table 3: Distribution of etiologies according to age and sex of patients.

Age Group	Gender	Trauma	Tumor	Misc.
11–20 years	Male		1	
	Female	1		
21–30 years	Male	3	1	
	Female	2		
31–40 years	Male		1	
	Female			
41–50 years	Male		1	1
	Female	1	1	
51–60 years	Male		3	
	Female			
61–70 years	Male		3	
	Female		1	

In the trauma group, there was almost equal distribution in both genders, 3 males and 4 females; however, the tumor group, constituted mainly by BCC, showed major preponderance in males, 10 in number compared to only 2 females.

Age distribution showed an obvious trend of malignancies being more common in older age groups. There were 4 patients aged 61 to 70 years, 3 aged 51 to 60 years, 2 aged 41 to 50 years, and one each in earlier decades in a total of 12 patients of tumors.

Traumatic etiology was more common in younger age groups, 1 patient was aged under 20, 5 in 21 to 30 years, and 1 aged 41 to 50 years.

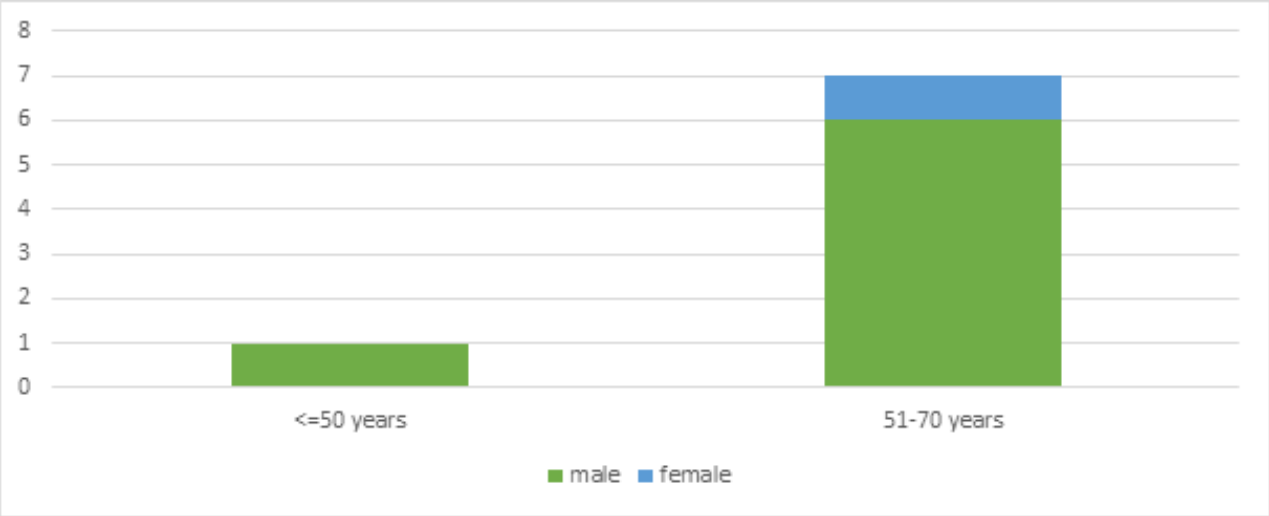
Figure 1: Dog bite in 23-year-old male.

Figure 2: BCC in 60-year-old male.

Table 4: Distribution of BCC according to age and sex.

Age Group	Male	Female
</=50 years	1	0
51–70 years	6	1

Graph 2: Distribution of BCC with age and sex.



BCC was most common in males in the age group of 51 to 70 years in 6 males. Only one male aged less than 50 years and one female aged 51 to 70 years had BCC. Squamous cell carcinoma was seen in only 2 patients one was a 55-year-old male and second was a 46-year-old female and thus an obvious trend toward either gender could not be ascertained.

Most patients had involvement of multiple subunits. The most frequently involved subunit was the sidewall in 12 patients followed by dorsum in 10 patients. The tip was involved in 7, columella in 6, soft triangles in 6, and ala in 7 patients. The nasal defects were partial thickness in 16 patients and full thickness in 4 patients.

Table 5: Distribution of patients according to method of reconstruction used.

Method Used	No. of Patients
Healing by secondary intention	4
Primary closure	3
Full thickness skin graft (FTSG)	4
Split thickness skin graft (FTSG)	2
Nasolabial flap	1
Forehead flap	6

Paramedian forehead flap was used for 6 patients, nasolabial flap for 1, FTSG for 4, STSG for 2 patients, and healing by secondary intention for 4, while primary closure of defects was done for the 3 remaining patients.

4. DISCUSSION

The nose is a central and integral part of the face and human body. Any deviation from normal causes significant functional and psychological morbidity to the patient. There are various etiologies of nasal defects including infection, inflammation, toxins, trauma, and neoplastic, the latter 2 being the most common ones.

A total of 20 patients were included in the study. The mean age of the patients was 42.1 years, ranging from 14 to 70 years. Males constituted 70 % (n = 14) of study population while there were 6 females (30%) in the study.

The most common cause of defect of the nose is the BCC, and is also the most frequently identified neoplasm of the nasal skin [11-13]. Our study has demonstrated similar result of BCC seen in 8 out of 20 (40%) of patients with nasal defects followed by squamous cell carcinoma in 2 patients (10%).

BCC is seen in advanced age group and most patients are aged 40 to 79 years [14-16]. In our study, maximum BCC cases (87.5%) were seen in age group of 51 to 70 years. It is relatively rare in younger age groups (16) which is confirmed in our study, with only one patient less than 50 years presenting with BCC.

Preponderance of BCC in males or females is debatable as some studies have shown that it is 2 times more common in men [17-19], while some have shown it to be more common in females [16]. A recent study in North Indian population showed a female to male ratio of 1:0.57 [5]; however, our study showed a clear predilection of BCC in the male

gender. There were 7 cases (87.5% of total BCC) in males and only one in females, which could be due to more outdoor activity leading to higher sun exposure.

Squamous cell carcinoma and congenital benign naevus were found to be next most common causes of skin tumors causing nasal defects in 10% of total study population each. While squamous cell carcinoma is slightly more common in women according to some studies, the age preference of advanced age groups is evident in almost all studies [20]. Our study showed 50% incidence of squamous cell carcinoma in both sexes, all cases in age group of 41 to 60 years. However, due to the small size of study population being affected with squamous cell carcinoma, the gender predilection could not be ascertained.

The only other neoplastic lesion in our study was a benign congenital pigmented naevus in 2 cases, both in males aged 14 and 24 years. This is more common in younger age groups; however, no conclusive gender predilection has been proven in studies.

Trauma constitutes the next most important cause of nasal defects (7 patients, 35% in our study). Trauma has been seen more commonly in the youth, less commonly in children and older age groups. Out of 7, 5 patients were in the age group 21 to 30 years in our study. Three patients were males and 4 were females and thus gender difference does not appear significant.

5. CONCLUSION

The commonest cause of nasal defects is due to skin tumors, BCC tops the list. Squamous cell carcinoma is the next most common cancer of nasal skin. Both these malignancies are seen in older age due to common etiology of UV rays exposure which gets cumulated as age advances. While BCC is seen more commonly in males, a specific gender preference could not be seen in squamous cell carcinoma. Trauma is the next most common cause of the modern nasal defect. These include accidental trauma, assaults, and animal bites. These are more commonly seen in the youth and less commonly in geriatric or pediatric populations. Other less common causes of nasal defects include benign nevi, postburn lesions, melanoma, infective, and inflammatory lesions.

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AUTHOR CONTRIBUTIONS

All the authors made significant contributions in conception and design of study, collection, processing and interpretation of data, literature review, writing, and reviewing the article.

CONFLICT OF INTEREST

There are no conflicts of interest.

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