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Analysis of the Etiology and Extent of Maxillary Defects: A Single Center Observational Study

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Background: The rehabilitation of maxillofacial defects poses a challenge to the clinicians due to the complex anatomy of the region and limited treatment options available. A thorough understanding of the pattern and extent of maxillary defects is essential for a combined surgical and prosthetic rehabilitation. Aim: The aim of this study is to analyze the etiology and extent of maxillary defects based on a single center's experience. Material and methods: A total of 105 patient records from March 2023 to June 2024 were included in the study. The data observed and analyzed includes: etiology of defects, pattern of defect, extent of defect. The extent of defect was recorded in terms of alveolus [A], buttress [B] and soft tissue [S]. The pattern and extent of defect was expressed as: A / S / AS / AB / ABS with prefix for unilateral and bilateral. Results: A total of 105 patients were assessed based on the records of the stipulated time period. Of these only alveolar defects were seen in 40 patients, only soft tissue defects in 12 cases, combination of alveolar and soft tissue defects in 11 patients, alveolar and buttress defects in 20 patients and complex defects involving all three components in 22 patients. Conclusion: The current study analyzes the etiology and extent of the defects of the maxillary region and aids in the rehabilitation of maxillary defects both surgically and prosthetically.

Keywords: Buttress, maxilla, defect, rehabilitation.

1. Introduction

Maxillofacial defects pose a challenge in reconstruction because of the anatomic complexity of the region and the need for a skilled surgical team. Further, the reconstruction should be site specific and should rehabilitate the patient both anatomically and functionally. The reconstruction of maxillary defects is also more difficult than that of mandibular defects (1). Carcinomas involving the hard palate, maxillary sinus, and nasal cavity will require maxillectomy, causing dysfunction of the stomatognathic system and thus affecting the patients' quality of life (2). The other common etiologies for maxillary defects include post

traumatic defects , and syndromic involvement of the maxillary arch. Such significant defects can lead to a sequelae of events such as formation of oronasal fistulas, loss of support for the cheek and lip, aesthetic defects in the middle third of the face and functional impairment (4,5). Hence, the rehabilitation of these patients becomes extremely important considering the physical, physiological and psychological aspects of the quality of life of such patients. The commonly used rehabilitation methods for maxillary defects includes obturators, zygomatic implants and free grafts or free flaps. Patient specific implants is an emerging treatment option for the reconstruction of maxillofacial defects.

The existing literature lacks solid evidence on the basis for the selection of an appropriate treatment plan depending on the type of maxillary defect. The current classification systems for maxillary defects focus only on the quantity of structure lost in terms of horizontal or vertical component rather than on the quality of the defect. The major aim behind any rehabilitation or reconstruction is the distribution of forces i.e. to act as a substitute for the buttresses of maxilla.

The aim of the current study is to analyze the etiology and extent of maxillary defects based on a single center's experience.

2. MATERIALS AND METHODS

This study is a retrospective cohort study carried out at the Saveetha Dental College and Hospitals, Chennai, Tamil Nadu, India. A total of 105 patients who reported to the department of Oral and Maxillofacial Surgery from September 2021 to June 2023 were included in the study. No specific exclusion criteria was adopted.

Parameters assessed

1. Etiology of defect - post mucormycosis, benign pathology, malignancies, post traumatic defects, syndromic defects and not otherwise specified.

2. Extent of defect - A denotes the alveolar defect, B denotes the buttress involved and S denotes the soft tissue defect.

The defects are represented as a combination of the above three components involved as A / S / AS / AB / ABS with prefixes for unilateral [U] and bilateral [B].

This representation of defects can be further elaborated as follows:

A

Defects involving only the maxillary alveolus - unilateral or bilateral.

S

Only soft tissue mucosal defects of maxilla.

AS

Alveolar defect combined with a soft tissue mucosal defect.

AB

Defects involving the maxillary alveolus with nasomaxillary or zygomaticomaxillary buttress or involvement of both buttresses.

ABS

Defects involving all the three components - alveolus, buttress and soft tissue, that can be unilateral or bilateral.

3. RESULTS

The final samples size of the study is 105 [N=105].

Graph 1: Represents the different etiologies of maxillary defects

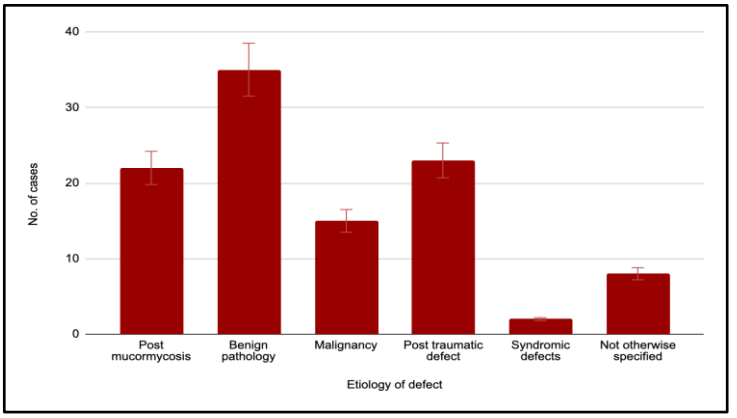
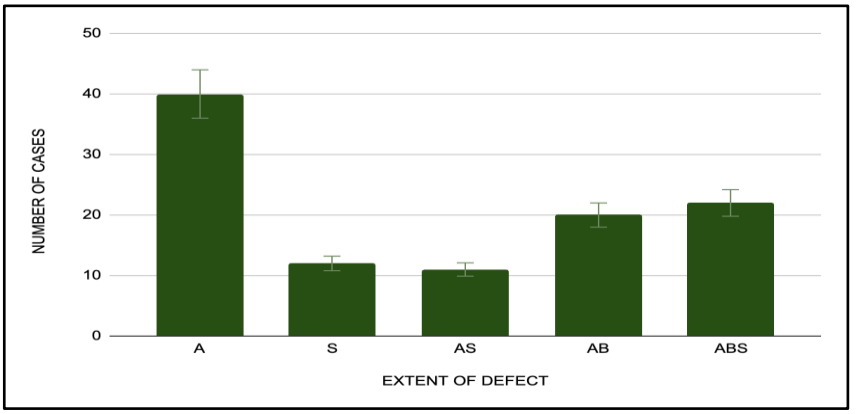


Table 2: Represents the extent of maxillary defects and the number of cases in each category

EXTENT OF DEFECT	NUMBER OF CASES
A	40
S	12
AS	11
AB	20
ABS	22

Graph 2: Represents the different extent of maxillary defects



4. DISCUSSION

Functional rehabilitation of maxillary defects is challenging and requires proper treatment planning for accurate reconstruction of hard and soft tissue components. Initially for post maxillectomy defects, obturator was the treatment modality of choice for rehabilitation. According to Mittal et al., (7) the group of patients rehabilitated with obturators had the least favorable clinical outcomes and quality of life. In the current study, obturator was not included as a rehabilitation modality. Patients with acquired maxillary defects differ from patients with congenital defects because of the abrupt alteration in physiologic processes associated with surgical resection of the maxillae. However, definitive prosthodontic treatment will restore the patient to a normal or near normal level of function (8). For a definitive prosthodontic treatment to be done, the load bearing structures of the maxilla must be adequately rehabilitated. Hence, in the current study, the etiology and extent of maxillary defects were analyzed to form as a basis for decision making regarding the method of reconstruction .

The alveolar bone support decides if the prosthetic rehabilitation will be a fixed or removable prosthesis. In cases where alveolar bone structure was lost, removable prosthesis were adopted as treatment modality irrespective of the surgical rehabilitation modality.

According to Pellegrino et al., (9), in patients in whom immediate reconstruction with a microsurgical bone flap after a subtotal maxillectomy is not possible, zygomatic implants could represent the only available option to obtain stable support for a viable prosthesis. The specific design of zygomatic implants allows their insertion even in cases of large bone defects because they obtain bicortical stability through the malar bone. In the current study, 40 patients had defects involving the alveolus only sparing the buttress and soft tissue.

Okay et al. (10) proposed a classification system as follows: Eight different defects of the hard palate and maxilla were characterized within this classification system. The size and location of the defect, remaining dentition, and palate influenced the design of the microvascular free flap and prosthodontic restoration. However, this classification focuses mainly on the defects involving palatal regions and fails to provide a comprehensive treatment plan for complex maxillary defects. The surgical rehabilitation of maxillary defects must be adequately prosthetically planned and driven for a comprehensive rehabilitation of the patient and a significant improvement in the quality of life (11,12).

The current study reveals that benign pathologies and trauma to the maxillofacial complex are the two most common etiologies for maxillary defects. Majority of the defects involved the alveolus only (n=40) followed by complex defects involving the alveolus, buttress and soft tissue (n=22). The least number of defects involved was seen for the combination of alveolus with soft tissue (n=11).

5. CONCLUSION

The current study takes into consideration the alveolar bone support, buttress of maxilla and the adequacy of soft tissue for planning of rehabilitation of maxillary defects. These three factors are pivotal in the success of the rehabilitation both surgically and prosthetically. Hence, this comprehensive data on the etiology and extent of defects will aid in comprehensive rehabilitation of the patients with maxillary defects also improving their quality of life.

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