

Reconstruction Of Maxillofacial Defects: A Retrospective Institutional Study

Research Article

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Abstract

This study aims to evaluate the maxillofacial defects and the types of flaps employed to reconstruct the lost framework of head and neck among patients treated in our institution. This hospital-based retrospective study was done at the Department of Oral and Maxillofacial Surgery, Saveetha Dental College, Chennai, Tamil Nadu, from the case record of patients who underwent resection followed by reconstruction for various pathologies from July 2019 to March 2020. Consecutive case records of all the patients who had reconstructive surgeries for maxillofacial defects were included in the study. Various parameters of the patients were retrieved from the patient digital data registry and recorded. All patients underwent surgeries for defects in the maxillofacial region followed by reconstruction. Descriptive statistics and a regression model were used to assess the relationship between the site of defect and the type of flap used. Pearson's chi square test was done to test the association between categorical variables. The study was analysed using the IBM Statistical Package for the Social Sciences (SPSS) Statistics, version 20.0 and results obtained. A total of 47 patients aged more than 6 years were studied, with the average age being 51.68 +/- 13.4 years. In our study out of 47 patients, 11 were female and 36 were male. Majority of patients who underwent surgery belonged to 41-60 years of age followed by 61-70 years of age. 89.4% of patients underwent surgery for oral Squamous cell carcinoma which included both males and females. A statistically significant association between the type of defect encountered and the reconstructive technique employed was present. Chi square test; $p < 0.001$. Within the limits of this study, the predominant pathology for which resection is carried out among patients is oral squamous cell carcinoma which is seen mostly in the middle aged group. Males were mostly affected by pathology than females. Reconstructive surgery with flaps is the most common type of management. Free fibula flap was 9.31 times more likely to be employed for defects in the mandible. With an increase in complexity and size of the maxillofacial defect, the type of reconstructive surgery also varies.

Keywords: Maxillofacial Defects; Reconstructive Surgery; Oral Squamous Cell Carcinoma; Oral Submucous Fibrosis; Free Flap; Fibula Flap.

Introduction

The human body acquires facial defects as a result of diverse types of insults. They include trauma from road traffic accidents or surgical resection of diseased tissue due to neoplasms, infection, and necrosis involving defects of both hard and soft tissue. [1-4]. Not only are they challenging to reconstruct but they also require surgical skill and sound knowledge in anatomy [5, 6].

Head and neck cancer is a big global health issue which is definitively managed by complete microscopic surgical excision followed by reconstruction [7-10]. Thus, choosing the right reconstruction technique is crucial while treating these patients [11] [12]. Operative techniques and perioperative management have also greatly improved the overall success of the surgical procedure [13, 14].

There is no one panacea reconstructive option for every defect

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Received: October 07, 2020

Accepted: November 22, 2020

Published: November 25, 2020

Citation: R Rajashri, M P Santhosh Kumar, Kathiravan Selvarasu. Reconstruction Of Maxillofacial Defects: A Retrospective Institutional Study. *Int J Dentistry Oral Sci.* 2020;7(11):1090-1093. doi: <http://dx.doi.org/10.19070/2377-8075-20000216>

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and each technique has advantages and disadvantages [15-18]. In some cases, a vascularized free flap is the ideal choice while in some cases, local flaps can provide equivalent, or superior, functional and esthetic results [19]. Multiple algorithms have been showcased to address the various defects and their reconstruction [20, 21].

This study aims to evaluate the maxillofacial defects and the types of flaps employed to reconstruct the lost framework of head and neck among patients treated in our institution.

Materials and Methods

Study design and study setting

We conducted a hospital-based retrospective case-control study at Saveetha Dental College, Department of Oral and Maxillofacial Surgery, Chennai, Tamil Nadu, from July 2019 to March 2020. The study was initiated after approval from the institutional review board. (SDC/SIHEC/2020/DIASDATA/0619-0320).

Patient Population and Data Collection

This is a retrospective study based on analysis of patient records. All the patients who had reconstructive surgeries of maxillofacial defects were included in the study. Patients with missing or incomplete data, and patients managed by adjuvant non surgical therapies were excluded from the study. The study design was observational (cross-sectional survey). The parameters that were studied included:

- Age
- Gender
- Site of Maxillofacial Defect
- Etiology
- Type of surgical correction: reconstructive surgery using flap or primary closure or use of other materials to achieve closure.
- Type of Flaps used

In our study, 42 patients were diagnosed with oral squamous cell carcinoma, 2 patients with oral submucous fibrosis, 1 patient with ameloblastoma, 1 patient with congenital deformity and 1 patient with post traumatic deformity. The treatment plan for all the patients was discussed with a multidisciplinary team. The maxillofacial defects were classified based on a new classification system which classified the composite defects according to two factors: the elements and distribution of the missing tissues which led to 4 types as follows:

Type A: Only elements of soft tissue missed in a close one-block pattern.

Type B: Only elements of soft tissue missed but in a wide separate-block pattern.

Type C: Both elements of soft tissue and bone missed in a close one-block pattern.

Type D: Both elements of soft tissue and bone missed but in a wide separate-block pattern.

This classification helps in understanding the features of the defects and for selection of a specific reconstructive technique [22]. The type of reconstructive surgery was categorized based on the

type of closure with/without the use of flap or synthetic materials.

Statistical analysis

Descriptive statistics and a regression model were used to assess the relationship between the site of defect and the type of flap used. Pearson's chi square test was done to test the association between categorical variables. The exposure variables include age, gender, etiology, mode of surgical correction, site of defect and type of flaps. The dependent variable was the reconstructive technique. Covariates were controlled to increase the validity of the study. Odds ratio (OR) and 95% confidence interval (CI) were used to assess the type of defect sustained and the type of flap employed. The type of flaps chosen were further analysed by using ordinal logistic regression. Logistic regression analysis was utilized to control the confounding variables. The study was analysed using the IBM Statistical Package for the Social Sciences (SPSS) Statistics, version 20.0 and results obtained.

Results and Discussion

Of the total 47 patients recruited into the study, 11 were female and 36 were male. Patients were grouped based on their age. One was within childhood age (0-9 years), five were within young adulthood (20-40 years), twenty eight were within middle age (40-60 years), and thirteen were within elderly age (60 years and above) Majority of patients who underwent surgery belonged to 41-60 years of age followed by 61-70 years of age with male predilection. (Figure 1).

Pathologically, 89.4% had Squamous cell carcinoma with 17 patients presenting in gingivobuccal sulcus, 10 patients in tongue, 10 patients in both maxilla & mandible, 1 patient in the hard palate and 4 patients in buccal mucosa. 4.3% patients presented with dysplasia associated with oral submucous fibrosis and 2.1% patients affected by ameloblastoma, post traumatic and congenital deformities each. Oral squamous cell carcinoma is the main cause for the surgery both in males and females with males showing a slightly higher predilection. (Figure 2).

Of the total 47 patients, 13 (4 female, 9 male) patients had no reconstruction with flap, while 34 (9 female, 25 male) patients had reconstruction with flap. The flaps employed were Pectoralis major myocutaneous flap (n=10), followed by Free fibula flap (n=7), Radial forearm flap (n=5), Loco regional rotational flap (n=3), split skin graft (n=3) and medial sural microvascular flap (n=1). Two patients underwent repeated surgeries due to flap failure at different intervals during follow up. One patient achieved closure with the help of collagen membrane. The remaining patients underwent primary closure. All the patients were followed up and there was no morbidity or mortality. Association between type of reconstructive surgery and type of maxillofacial defect was evaluated. Chi-Square test was done and the results were statistically significant. p value: 0.001(<0.05) Hence proving presence of a statistically significant association between the type of defect encountered and the reconstructive technique employed. (Figure 3). However, a logistic regression analysis showed that mandibular defects were 9.31 times more likely to undergo reconstruction with flap than the defects of maxilla and other regions. The odds for the need for reconstructive surgery with flaps were not signifi-

Figure 1. Bar chart depicting the gender wise distribution of patients in age categories. X axis denotes age of the patients in categories and Y axis denotes number of patients who underwent surgery gender wise. Majority of patients who underwent surgery belonged to 41-60 years of age followed by 61-70 years of age with male predilection.

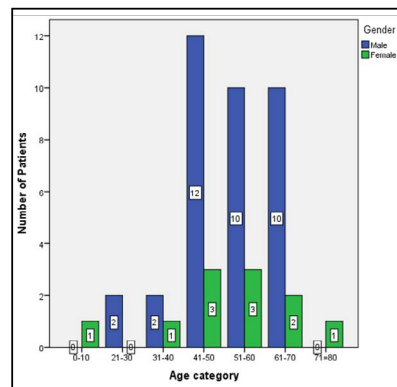


Figure 2. Bar chart depicting gender wise distribution of etiology for surgery in patients. X axis denotes etiology for surgery and Y axis denotes the number of patients who underwent surgery gender wise. Oral squamous cell carcinoma is the main cause for the surgery both in males and females with males showing a slightly higher predilection.

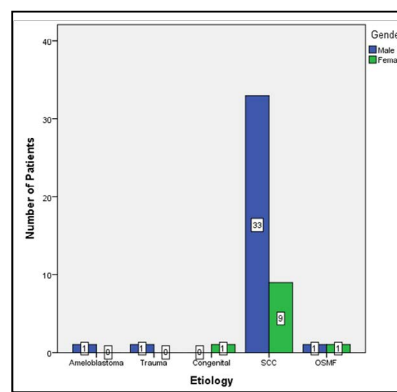
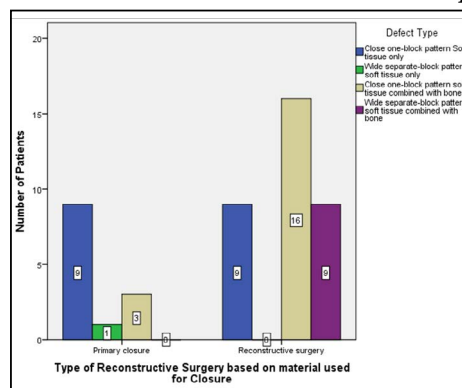


Figure 3. Bar chart depicting association between type of reconstructive surgery and type of maxillofacial defect. X axis denotes type of reconstructive surgeries performed for patients and Y axis denotes number of patients with various maxillofacial defect type wise. Chi-Square test was done and the results were statistically significant. Pearson's Chi Square value: 36.72, DF:14, p value: 0.001(<0.05) Hence proving presence of a statistically significant association between the type of defect encountered and the reconstructive technique employed.



cant with respect to other defect types.

In our study, the age range of the patients was 6 to 71 years, and the mean age was 51.68+/-13.49 years. The shortest hospital length of stay was one day, while the longest was 20 days. Overall, there is no relationship between age, gender and type of defect with the type of surgery performed. The descriptive statistics showed that most of our study population were in the middle-age group and predominantly of male gender. Males represented the majority across multiple studies observed [23-25]. According to our study, Mandibular defects were 9.31 times more likely to undergo reconstruction with flap than the defects of maxilla

and other regions. Unfortunately, the sample size for this study is small, which is a limitation of this study design. If a larger sample size were used, there might have been some significant differences between the type of defects and mode of reconstructive surgery. Also, unequal gender distribution may be responsible for the mild gender differences in the type of reconstructive surgery.

A plethora of flaps are available in the maxillofacial region that can be used to reconstruct defects caused by maxillofacial trauma, burns, carcinoma, congenital defects, pathologies like cysts etc [6]. Cancer ablative surgeries account for the majority of the defects according to this study. Reconstruction of these maxillofacial de-

fects depends on the timing of diagnosis and status of the existing structures along with the size and location of the defect [26]. Clinical evaluation of composite oral and maxillofacial defects is an important step in the reconstruction of these defects [27]. Free flaps are the gold standard for reconstruction of the mandible, tongue and floor of the mouth. The most preferable option for reconstruction of complex mandibular defects, as well as for tongue and floor of the mouth is reconstruction with Free fibula flaps, due to ease of harvesting the flap, and as it presents excellent functional outcomes. The bone reconstruction includes the fibular and iliac crest free flap, and for soft tissue reconstruction includes the anterolateral thigh, the radial forearm free flap, and the nasolabial island flap [28]. The results of this study were in agreement with the previous available literature. It is evident from many studies that men of the middle-aged group commonly undergo reconstructive surgery for various pathologies of the oral cavity and jaw.

There is a paucity of literature regarding utilization of the classification and the type of reconstructive surgery employed. A larger sample size in future studies will be useful to propose a proper treatment plan for various maxillofacial defects.

Conclusion

Within the limits of this study, the predominant pathology for which resection is carried out among patients is oral squamous cell carcinoma which is seen mostly in the middle aged group. Males were mostly affected by pathology than females. Reconstructive surgery with flaps is the most common type of management. Free fibula flap was 9.31 times more likely to be employed for defects in the mandible. With an increase in complexity and size of the maxillofacial defect, the type of reconstructive surgery also varies.

Acknowledgements

This study was supported by Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai.

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