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COMPARATIVE EVALUATION OF CHIMERIC ANTEROLATERAL THIGH FLAPS AND STANDARD ALT FLAPS FOR MAXILLA-ALVEOLAR EXCISION REPAIR IN PATIENTS WITH HEAD AND NECK CANCER

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ABSTRACT

Background: When oral malignant lesions appear at a locally advanced stage, the maxillary cavity is typically left open during the intricate surgical resection. Concerns including further operations, delayed adjuvant therapy, extended hospital stays, flap necrosis, fistula formation, and/or poor healing are brought on by the maxilla's continuous production. Several approaches have been tried to get rid of this, but each has its own challenges.

Aim: The purpose of this study was to compare the chimeric anterolateral thigh flap with the standard ALT flap for the reconstruction of maxilla-alveolar excision in patients with head and neck cancer.

Methods: In order to determine the benefits of reconstruction for maxillo-alveolar resections using chimeric ALT with VL (vastus lateralis) that were treated at the Institute throughout the specified study period, the study evaluated 80 individuals. These 40 participants were compared to another 40 age and gender-matched controls in the study, where standard ALT was used for reconstruction. The duration of adjuvant therapy, length of hospital stay, postoperative secretions, adequate maxillary sinus fill, intraoperative ease, and postoperative complications were analyzed using the modified Clavien-Dindo classification.

Results: The study's findings demonstrated that chimeric ALT and VL provide more mobility for simple maxillary cavity plugging. Subjects in the chimeric arm with shorter mean hospital stays experience fewer problems. Adjuvant treatment was administered to the majority of individuals within their ideal time frame.

Conclusion: The current study comes to the conclusion that chimeric ALT combined with vastus lateralis muscles is a dependable option for reconstructing complex deformities, especially in cavities with dead areas like the maxillary sinus. Effective maxillary sinus plugging for primary surgery improves patient outcomes and needs to be performed on a regular basis.

Keywords: ALT flap, chimeric anterolateral thigh flap, head and neck cancer, maxilla-alveolar resection, surgical resections

INTRODUCTION

The head and neck area is the most common site of cancer in Indian individuals, accounting for 25% to 30% of the total cancer burden in the Indian healthcare system. Patients typically present to medical professionals with advanced malignant lesions due to prevalent cultural, educational, and socioeconomic factors. Because the lesion has a three-

dimensional structure that allows for the optimal repair, surgical constraints in such advanced cases typically leave people with complicated abnormalities that need to be taken into consideration.[1]

Maxillary sinus integrity is typically lost in patients undergoing maxilla-alveolar resections, and free flaps are thought to be the best option for reconstructing these abnormalities. However, when reconstructing these flaws, care must be given to ensure that the maxillary sinus cavity is effectively obliterated. If not, persistent maxillary sinus secretion will lead to poor wound healing, fistula formation, wound gape, and loss of flap closure. Delays in adjuvant therapy, longer hospital stays, and a heavy load on the healthcare system will all result from this.[2]

Musculocutaneous flaps, deepithelialized flap paddles, and non-vascularized fat are only a few of the techniques that have been tried to accomplish sufficient obliteration of the maxillary sinus cavity and prevent any related issues, each with its own set of restrictions. The advantages of chimeric flaps included the convenience of setting a single vascular anastomosis and the benefit of two vascularized tissue subunits with independent freedom of movement.[3]

The maxillary sinus cavity is typically obliterated in Indian tertiary healthcare facilities using either fat from the flap or the de-epithelized end of the flap. High rates of complications, such as wound gaping, wound infection, and profuse maxillary discharge from the neck, have also been documented. Flap failures are another consequence of these issues.[4]

Many patients experience delayed wound healing, necessitating subsequent treatments including debridement and resuturing under general or local anesthesia, which prolongs hospital stays. The anterolateral thigh (ALT) flap and VL (vastus lateralis) are routinely harvested for maxillary sinus filling in order to get rid of this.One The purpose of this study was to compare the effectiveness of VL alone against chimeric ALT flap with VL in reconstructing oral cancer etiology in patients who had bialveolar resection with the maxillary sinus left open.

MATERIALS AND METHODS

The purpose of the current study was to compare the chimeric anterolateral thigh flap and the standard ALT flap for the repair of maxilla-alveolar excision in patients with head and neck cancer. The Institute's Department of Plastic Surgery provided the study subjects. Before participating in the study, all subjects and school administrators provided written and verbal informed consent.

The study evaluated 550 patients treated with ALT flaps for head and neck reconstruction due to oral cancer. Participants who met the following inclusion criteria were included in the study: those who were older than 18 years, had only soft tissue reconstruction or marginal mandibulectomy, or had posterior segmental mandibulectomy (Brown class Ic and class IIc mandibulectomy) for mandibular defects, and subjects undergoing surgery for the first time and as Brown class IIb maxillectomy, either with or without a mandibular deformity, is the initial therapeutic method. Subjects with defec6s that required either a large flap or two free flaps that required skin grafting at the donor site, patients who had previously undergone surgery for head and neck pathology, subjects who had received neoadjuvant chemotherapy, subjects who had previously received radiation, and recurrent cases were all excluded from the study.

The participants were then split into two groups based on the type of flap employed for reconstruction: the ALT only group and the chimeric group. As usual, chimeric ALT was performed. After matching for age, defect type, defect size, comorbidities, and age, 40 participants from each group—78 in the ALT only group and 52 in the chimeric group—were ultimately included.

Data from interviews and examinations, department case files, and hospital electronic medical records were gathered using a pre-made proforma. Using the modified Clavien-Dindo Classification for free flaps in head and neck reconstruction, information was gathered and analyzed regarding the duration of adjuvant therapy, length of hospital stay, postoperative secretions from the neck and suture lines, adequacy of maxillary fill, intraoperative ease, and postoperative complications.[5]

Using a 3 cm radius circle in the middle of the midpoint of the line connecting the anterior superior iliac spine to the superolateral border of the patella, the thigh perforator was preoperatively defined using a Doppler device at the standard site. The primary tumor was removed, the flap was raised, and the neck nodes were examined.

A linear primary incision was made around 2.5 cm medial to the perforator marker, allowing for distal and proximal extension as necessary depending on the perforator's availability. Perforators were identified and then dissected according to usual procedure until the pedicle was adequately dissected. Precautions were taken to protect the rectus femoris and VL nerves. Distal outflow to the VL muscle was maintained during chimeric flap harvesting, and the necessary chimeric muscle was taken in accordance with it. The maxillary sinus mucosa was carefully removed. De-epithelialized flap edge or fat from the flap for maxillary sinus obliteration in the ALT-only group. VL muscle was utilized as a filler in the chimera group to eliminate any dead space in the maxillary sinus.

After measuring the size of the defect, the quantity of muscles taken was determined by the filler's requirement. After making perforations in the maxillary wall and surrounding tissues, the muscle was sutured into the maxillary sinus. Microvascular anastomosis was performed after inset. In every instance, a French suction drain with a single tube was positioned behind the sternocleidomastoid muscle.

Pinprick was used to clinically evaluate the flap after surgery every two hours on the first day and every six hours for the following five days. Except for the prevention of deep vein thrombosis, none of the subjects received regular prescriptions for blood thinners or anticoagulants. Every day, the number of secretions from the neck was measured in gauze.

Serous discharge was seen as a mild and typical postoperative event; if it did not decrease, increase, or convert into a purulent, mucoid, or salivary discharge, it was deemed a complication and treated appropriately. Oral liquids were typically started on the fifth postoperative day after patients were mobilized on the first postoperative day. On the seventh day following surgery, all of the subjects were released without experiencing any complications that would have prevented the same. When output was less than 20 mL in a 24-hour period for two days in a row, the drain was removed. After being discharged, the subjects were monitored in the outpatient plastic surgery department twice a week for two weeks, then once every fifteen days for a month and once every three months after that.

RESULTS

In order to repair maxilla-alveolar resection in patients with head and neck cancer, the current study compared the normal ALT flap with a chimeric anterolateral thigh flap. In order to determine the benefits of reconstruction for maxillo-alveolar resections using chimeric ALT with VL (vastus lateralis) that were treated at the Institute throughout the specified study period, the study evaluated 80 individuals.

These 40 participants were compared to another 40 age and gender-matched controls in the study, where standard ALT was used for reconstruction. The average age of research participants in the ALT and chimeric groups was similar, at 62 and 64 years, respectively. In ALT, there were 80% (n=32) males and 20% (n=8) females; in the chimeric group, there were 75% (n=30) males and 25% (n=10) females. 60% (n=40), 90% (n=36), 5% (n=2), 5% (n=20), 0, 0, 45% (n=18), and 25% (n=10) of the subjects from ALT and 50% (n=10), 80% (n=32), 0, 10% (n=4), 0, 5% (n=2), 30% (n=12), and 20% (n=8) of the study subjects, respectively (Table 1).

According to the features of the mandibular defects in the study participants, 16 individuals from the ALT and chimeric groups had a Brown classic I c mandibular defect. Six individuals from the ALT and chimeric groups had brown classic II c mandibular defects, six from the ALT group and eight from the chimeric group had marginal mandibulectomies, and twelve from the ALT group and ten from the chimeric group had no defects. (Table 2).

According to the study's findings, six participants from the ALT group and four from the chimeric group had Grade I problems as determined by the Modified Clavien-Dindo classification of complications. Six participants from the ALT group and two from the chimera group were in grade II; two and four subjects from the ALT and chimeric groups, respectively, were in grade IIIa; six subjects from the ALT group were in grade IIIb; and four subjects from the ALT group were in grade IIIc. No subjects from the ALT or chimeric group were observed in grades IVa and IVb (Table 3).

When the study participants' postoperative characteristics were evaluated, it was observed that the ALT group's mean postoperative hospital stay time was 18.5 days and was 12.1 days in chimeric group respectively. The ALT group's mean hospital stay duration ranged from 10 to 33 days, while the chimeric group's ranged from 5 to 18 days. In 85% (n=34) of the ALT participants and 100% (n=40) of the chimeric group, respectively, adequate and successful adjuvant RT was performed (Table 4).

DISCUSSION

In order to evaluate the benefit of reconstruction for maxillo-alveolar resections using chimeric ALT with VL (vastus lateralis) that were treated at the Institute throughout the specified study period, the current study evaluated 80 participants. These 40 participants were compared to another 40 age and gender-matched controls in the study, where standard ALT was used for reconstruction. The average age of research participants in the ALT and chimeric groups was similar, at 62 and 64 years, respectively.

In the ALT group, there were 80% (n=32) males and 20% (n=8) females, while in the chimeric group, there were 75% (n=30) males and 25% (n=10) females. In 60% (n=40), 90% (n=36), 5% (n=2), 5% (n=20), 0, 0, 45% (n=18), and 25% (n=10) of the ALT subjects and 50% (n=10), 80% (n=32), 0, 10% (n=4), 0, 5% (n=2), 30% (n=12), and 20% (n=8) of the study subjects, respectively. These findings were similar to those of earlier research by Dandekar M et al. (2017) and Han Y et al. (2023), in which the authors evaluated participants undergoing maxilla-alveolar reconstruction using demographic information equivalent to our study.

According to the study's findings, 16 participants from each of the ALT and chimeric groups had a Brown classic Ic mandibular deformity, according to the study's features. Six individuals from the ALT and chimeric groups had brown classic IIc mandibular defects, six from the ALT group and eight from the chimeric group had marginal mandibulectomies, and twelve from the ALT group and ten from the chimeric group had no defects. These findings were in line with those of Gong ZJ et al. (2015) and Silva AK et al. (2019), who observed similar mandibular defect features in their separate investigations including participants having maxilla-alveolar repair.

Six participants from the ALT group and four people from the chimeric group had Grade I problems, according to the Modified Clavien-Dindo classification of complications in the two study groups. Six participants from the ALT group and two from the chimera group were in grade II; two and four subjects from the ALT and chimeric groups, respectively, were in grade IIIa; six subjects from the ALT group were in grade III b; and four subjects from the ALT group were in grade III c. There were no subjects from the ALT or chimeric group in grades IVa and IVb. These results concurred with those of Simsek T et al. (2017) and Lin YT et al. (2006) where Complications in study participants evaluated using the Modified Clavien-Dindo classification of complications reported by the authors in their studies were similar to the current study's findings.

Regarding the evaluation of the postoperative features in research participants, it was observed that the average length of hospital stay following surgery was 18.5 days for the ALT group and 12.1 days for the chimeric group. The ALT group's mean hospital stay duration ranged from 10 to 33 days, while the chimeric group's ranged from 5 to 18 days. In 85% (n=34) of the ALT participants and 100% (n=40) of the chimeric group, respectively, adequate and successful adjuvant RT was performed. These outcomes were consistent with those of Scaglioni M.F. et al. (2022) and Cannady SB et al. (2022).where In their individual research, the authors also reported postoperative characteristics in study individuals simila to the current study.

CONCLUSION

The current study comes to the conclusion that, despite its limits, chimeric ALT combined with vastus lateralis muscles is a dependable option for reconstructing complex deformities, especially in cavities with dead areas like the maxillary sinus. Effective maxillary sinus plugging for primary surgery improves patient outcomes and needs to be performed on a regular basis.

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Characteristics	**ALT only n= 40**	**Chimeric group (n= 40)**
Mean age (years)	62 (30-74)	64 (28-71)
Gender		
Males	32 (80)	30 (75)
Females	8 (20)	10 (25)
Medical morbidities		
Alcohol use	40 (60)	20 (50)
Tobacco use	36 (90)	32 (80)
Underweight	2 (5)	-
Morbid obesity	2 (5)	4 (10)
Pulmonary disease	-	-
Cardiac disease	-	2 (5)
Hypertension	18 (45)	12 (30)
Diabetes mellitus	10 (25)	8 (20)

Table 1: Demographic and disease characteristics in two groups of study subjects

Characteristics	**ALT only n= 40**	**Chimeric group (n= 40)**
Brown classic I c	16	16
Brown classic II c	6	6
Marginal mandibulectomy	6	8
None	12	10

Table 2: Characteristics of mandibular defects in study subjects

Grade	**Definition**	**ALT only n= 40**	**Chimeric group (n= 40)**
I	Any deviation from the normal postoperative course WITHOUT the need for pharmacological or surgical, endoscopic, or radiological treatment	6	4
II	Requiring pharmacological treatment (blood transfusions/TPN)	6	2
IIIa	Requiring surgical, endoscopic, or radiological intervention NOT under GA	2	4
III b	Requiring surgical, endoscopic, or radiological intervention under GA	6	-
III c	Partial/ total flap failure	4	-
IV a	Life-threatening complication—single organ failure	-	-
IV b	Life-threatening complication—multiorgan failure	-	-

Table 3: Modified Clavien-Dindo classification of complications in two groups of study subjects

Characteristics	**ALT only n= 40**	**Chimeric group (n= 40)**
Postoperative hospital stay duration		
Mean (days)	18.5	12.1
Range (days)	10-33	5-18
Adequate and successful adjuvant RT n (%)	34 (85)	40 (100)

Table 4: Postoperative characteristics in two groups of study subjects