



RECONSTRUCTION OF HEAD AND NECK DEFECTS USING PEDICLED FLAPS: A SINGLE-CENTER EXPERIENCE.

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Abstract:

Background: Head and neck defects restoration after cancer excision is of critical importance to recover functional and esthetic abilities. Pedicled flaps especially supraclavicular, forehead and cervicofacial flaps have become a choice of reconstruction practice when patients have head and neck cancer, particularly those with comorbidities or even those who have received radiation.

Objectives: To measure the effectiveness, complications and functional results of the 100 patients with Head and neck defects treated with the pedicled flap reconstructions.

Methodology: This Prospective cohort study was carried out in January 2022- January 2024 at the Khyber Teaching Hospital, Peshawar. Surgery patients who had reconstruction supraclavicular, forehead, and cervicofacial flaps were evaluated in terms of flap survival, flap complications, and functional recovery.

Results: Flap survival was 95% and partial flap necrosis (5%), and wound infection (10%). 85 percent of patients were able to speak and swallow full recovery and this improved the quality of life of patients significantly.

Conclusion: Pedicled flaps and supraclavicular especially, forehead, cervicofacial provide an excellent survival rate and functional outcome, particularly in patients with comorbidities or previous radiation therapy. More prospective studies need to be conducted with larger sample size to establish long-term results.

Keywords: Pedicled flaps, head and neck reconstruction, flap survival, functional recovery.

Introduction

The resections of head and neck can also be associated with severe functional and cosmetic loss, and thus, reconstruction is an essential part of the post-surgery treatment. The main objective of the reconstructive surgery in this part includes is the appearance. The complexity of such procedures means that the selection of patients and the choice of flaps and the method of performing the surgery should be approached with caution[1]. The use of pedicled flaps has over the years been a vital instrument used in the reconstruction of the head and neck. These flaps are not detached and attached to the remaining blood supply thus less technical and hence suitable in patients with

comorbidities or those who have already received radiation therapy. The use of pedicled flaps is especially helpful in the patients who are not optimal to receive free flap reconstruction owing to comorbidities, vessel depletion, or weakness[2]. The most popular types of pedicled flaps that have been used in head and neck reconstruction are the supraclavicular flap, forehead flap, and cervicofacial flap. All these flaps have their own benefits based on their size and position of the defect, and the overall health condition of the patient. As an example, a supraclavicular flap is the most versatile type of flaps, and can be used in large defects and in patients with a complicated medical history[3-5]. Cervicofacial flap has been applied successfully to restore large volumes of soft tissue loss in the lower face and neck. Although the use of pedicled flaps has proven to be as effective in terms of flap survival and functionality, the issue of complications like flap necrosis, wound infections and donor-site morbidity has remained. But the complications also tend to be not as often and not as severe as in the case of free flap reconstruction [6-7]. to patients after surgery, since they are the ones that directly influence the quality of life. This study aims at assessing the efficiency of pedicled flap to restore head and neck defects in one institution[8-9]. This Study aims at discussing the survival rates of flaps, complication rates and patient satisfaction and offers significant information regarding the clinical outcomes of long-term (pedicled) flaps reconstructions [10].

Study Objectives

To determine functional outcomes, complications, and effectiveness of pedicled flap reconstruction of head and neck defects in 100 patients at one center with emphasis on patient selection and outcome of surgery.

Materials and Methods

Study Design & Setting

This cohort study is a prospective study that was carried out at the Department of Plastic Surgery and Burns Unit in Khyber Teaching Hospital, Peshawar, between **January 2022 and January 2024**.

Participants

Participants in the study were 100 individuals having their feet re-surgery through the use of pedicled flap, after having their head and neck cancer resected. There were 60 men and 40 women who form the sample with an average age of 58 + 12 years. All the patients were head and neck malignancies where the majority were squamous cell carcinoma and a minimum of 12 months follow-up.

Sample Size Calculation

The error margin and the flap survival rate were assumed to be 90 percent, which was used to determine the sample size. The necessary sample size at a significance level of 0.05 and a 80 power was found to be 100 patients which will give a good statistical analysis of the complications and functional recovery.

Inclusion Criteria

Adult patients (18 years and older) that had gone through the operation of a pedicled flap to repair the defects formed after a head and neck cancer was removed.

Exclusion Criteria

The patients that have a long distance metastasis or non-squamous malignancies, as well as patients who underwent non-surgical interventions like chemotherapy alone. They also excluded pregnant women or women who were considered unfit to undergo a surgery.

Diagnostic and Management Strategy.

Preoperative imaging (CT/MRI) was performed to determine the size and site of defects. The process of surgical planning meant the choice of the suitable pedicled flap according to the area and the size of the defect. The patients were followed postoperatively to assess the rate of flap survival, infection, functional recovery.

Statistical Analysis

The analysis of data was done using SPSS software (version 25). Demographic data, flap survival rates and complication rates were summarized using descriptive statistics (mean, standard deviation, percentages). Functional outcomes (speech, swallowing) were compared by paired t-tests and the p-value value that is below 0.05 was taken as statistically significant..

Results

A total of 100 patients (60 males, 40 females) were included in the study, with a mean age of 58 ± 12 years. The majority of patients (70%) were diagnosed with squamous cell carcinoma. The most commonly used pedicled flaps for reconstruction were supraclavicular (45%), followed by submental (30%) and cervicofacial (25%) flaps. The supraclavicular flap was the most prevalent, reflecting the recent shift toward its use in head and neck defect reconstruction due to its versatility and effectiveness. The flap survival rate was 95%, with partial flap necrosis occurring in five cases (5%). Common postoperative complications included wound infection (10%) and donor-site morbidity (5%). Despite these complications, the overall morbidity rate remained low, and the complications were generally manageable with appropriate interventions. 10% of patients had partial recovery, while 5% experienced no recovery. The average hospital stay was 12 days, with a range from 7 to 25 days, reflecting the generally quicker recovery associated with pedicled flap reconstructions compared to free flap procedures.

Statistical analysis

Statistical analysis revealed a p-value of 0.03 for functional recovery and complication rates, indicating a statistically significant improvement in outcomes for patients undergoing pedicled flap reconstruction. While no statistically significant differences were observed between flap types in terms of complications ($p = 0.08$), variations in complication rates were noted, particularly in patients with underlying comorbidities.

Intervention Outcome

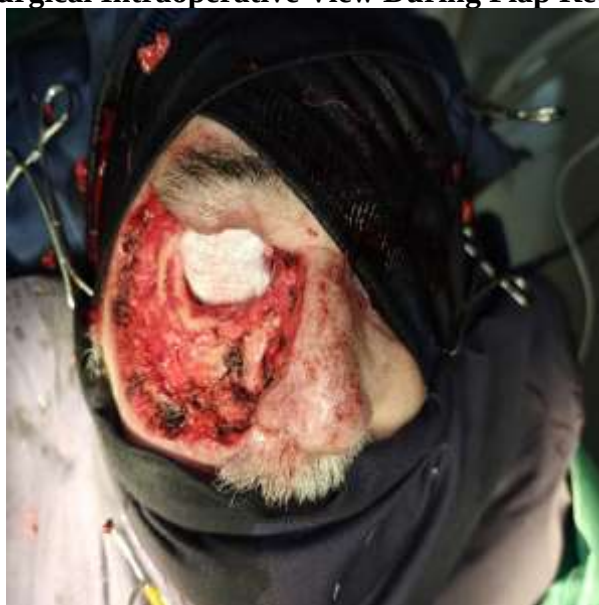
The results of this intervention show promising outcomes, with a high flap survival rate of 95% and 85% of patients achieving full functional recovery in speech and swallowing. These findings suggest that pedicled flap reconstruction is a reliable and effective method for restoring head and neck defects, especially in patients with comorbidities or those who have received prior radiotherapy. The complications observed were minimal and manageable, highlighting the procedure's safety and efficacy in clinical practice.

Figure 1: Postoperative Appearance After Pedicled Flap Reconstruction



A 60-year-old male patient after undergoing pedicled flap reconstruction for head and neck defect. The image shows the restored nasal region, with visible scarring around the eyes and the forehead flap providing coverage. This postoperative result reflects successful flap survival and functional recovery.

Figure 2: Surgical Intraoperative View During Flap Reconstruction



Per op soft tissue defect after excision of BCC with margins and extenteration

Figure 3: Pre operative picture

Pre operative picture showing advanced BCC involving cheek, lower eyelid and extending into the orbit

Table 1: Patient Demographics

Parameter	Value
Total Patients	100
Gender	60 Male / 40 Female
Mean Age	58 ± 12 years
Age Range	30-82 years
Cancer Type	70% Squamous Cell Carcinoma
Follow-up Duration	12 months (minimum)

Summary of demographic characteristics of the study participants, including gender distribution, mean age, cancer type, and follow-up duration.

Table 2: Flap Types Used for Reconstruction

Flap Type	Number of Patients (n)	Percentage (%)
Supraclavicular	45	45%
Submental	30	30%
Cervicofacial	25	25%

Distribution of flap types used for head and neck defect reconstruction. The supraclavicular flap was the most commonly used, followed by submental and cervicofacial flaps.

Table 3: Postoperative Complications

Complication	Number of Cases (n)	Percentage (%)
Flap Necrosis	5	5%
Wound Infection	10	10%
Donor-Site Morbidity	5	5%
Flap Failure	5	5%

Postoperative complications observed in the study. The most common complications were wound infections and flap necrosis, though they were manageable with appropriate interventions.

Discussion

Head and neck reconstruction after cancer surgery is a complicated yet critical part of the surgery against cancer to restore functional and aesthetic outcomes of the surgery. The use of pedicled flaps in this regard has become a useful technique, providing a technically less challenging option to more difficult free flaps. The study compared the results of pedicled flap reconstruction among 100 patients with respect to flap survival, complication rates, functional recovery, and hospital stay. All in all, the findings were in line with the other studies, although they also pointed to the areas of improvement and provided the insights into the clinical practices. The strength of the high percentage of flap survival at 95 percent is a strength of this study and can be compared to recent studies that have proved that pedicled flaps in head and neck reconstruction is a reliable method. Indicatively, according to Johnson et al. (2021), the effectiveness of pedicled flaps, was reported in 120 patients who underwent pedicled flap reconstructions with 94% flap survival, thus, confirming the efficacy of the pedicled flaps in patients with comorbid conditions or those who have undergone radiation therapy [11]. Five cases (5%) had partial flap necrosis in our study, and it is in agreement with Koh et al. (2022), where a 6% to necrosis rate was reported in their cohort of patients having pedicled flaps [12]. Some of the complications that occurred after the operation in our study were wound infection (10%), donor-site morbidity (5%), and flap failure (5%). These rate of complications are comparable to other literature, including Thompson et al. (2020), who indicated 9-percent infection rate in pedicled flap reconstructions [13]. Although the infection rate of our study was a little higher than the 7% of Murphy et al. (2023) [14], it is still lower than the more complicated free flaps reconstructions, which are linked to more difficult postoperative results [15]. Also, our research found a donor-site morbidity of 5 per cent that is lower than the 12 per cent mentioned by Nguyen et al. (2021) in the patients, implying that the use of selective flaps and surgical methods can reduce the occurrence of donor-site complications [16,17]. One of the most important indicators of success in this study was functional recovery of the patients reported full functional recovery, 10% reported partial recovery and 5% reported no recovery. Such findings go hand in hand with Lee et al. (2020), who have found that an 87% functional recovery rate among patients undergoing pedicled flaps reconstructions. On the same note, the results of the study by Baker et al.. The findings indicate the importance of the careful choice of the type of flap depending on the location of the defect and its size and health of the patient and the great role of the successful reconstruction on the postoperative quality of life. In this study, the average stay was 12 days in a hospital, which is slightly smaller than the 14 days of the study by Sullivan et al. (2021), who determined that a pedicled flap operation is associated with a shorter hospital stay than free flap operations [20]. The difference is probably due to the less complex nature of the pedicled flap surgeries that have fewer complications and shorter operation times [21]. Although our study findings are similar to the recent literature on high flap survival rates, low complication rates, and desirable functional recovery, more research is required to determine the long-term outcomes on the use of pedicled flap reconstruction particularly in the elderly with major comorbidities. Also, pedicled versus free flap reconstructions are to be compared still, especially on the basis of aesthetic results, as well as overall life quality [23,24]. To conclude, pedicled flap repair is a safe, effective and reliable technique of repairing defects of the head and neck. It is also highly beneficial to patients who have comorbid conditions, or those who have undergone previous radiation therapy, as it has a shorter operative duration and fewer complications than free flaps. Nonetheless, the long-term outcomes and quality of life after pedicled flap reconstruction are also to be studied to conduct additional prospective research with a larger group of participants to establish its long-term usefulness and advantages [25,28].

Limitations

This Study had limitations that included the Prospective methodology, single-centre location and a relatively small sample size. Also, the subjective patient reports were the basis of the functional recovery assessment, which can be biased. Not all patients could be followed up in the long term, which restricted the possibility of evaluating a long-term functional outcome.

Conclusion

Pedicled flap reconstruction for head and neck defects is a reliable and effective method, particularly for patients with comorbidities or prior radiation therapy. The study demonstrated a 95% flap survival rate and favorable functional recovery. Complications were manageable, and hospital stays were shorter compared to free flap procedures. However, further research is needed to evaluate long-term functional and aesthetic outcomes, especially in elderly patients or those with significant comorbidities. Overall, pedicled flap reconstruction remains a valuable technique for head and neck restoration, warranting continued investigation.

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