ORIGINAL RESEARCH

Outcome and Complications of Microvascular Free Flap Head and Neck Reconstruction Analysis of 200 Cases

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ABSTRACT

Introduction: Microvascular free flap transfers have become a preferred reconstructive technique; however, rare complications may still prove devastating.

Objective: The objective of this study was to evaluate the clinical outcomes in patients undergoing different microvascular free flap reconstructions.

Patients and Methods: This study analyzed the surgical outcome and complications of 200 microvascular free flaps head and neck reconstruction. In most cases, reconstruction was undertaken after resection of a malignant tumor. Four types of free flap were performed as follows: Anterolateral thigh (80%), radial forearm (15%), fibula (4%), and jejunum (1%). The superior thyroid artery and the external jugular vein were commonly used as recipient vessels for anastomosis. Patient-related characteristics (age, sex, diagnosis, comorbidity, level, tumor stage, defect site, primary versus secondary reconstruction, and history of surgery, radiation therapy, or chemotherapy) and the incidence of perioperative complications were recorded prospectively.

Results: Nine patients required emergency surgical reexploration and the overall flap success rate was 95.3%. Venous thrombosis was the most common cause for reexploration. Other complications included wound infection (12.5%), wound dehiscence (15%), partial flap necrosis (2.5%), fistula formation (9.5%), and bleeding (1.5%). Recipient and donor site morbidity was limited and considered acceptable.

Conclusion: Microsurgical free flap is shown to be a valuable and reliable method in head and neck surgery. It can be used safely and effectively with minimal morbidity in selected patients. The reconstruction can be performed by appropriately skilled surgeons with acceptable outcomes. Success rate appears to increase as clinical experience is gained. We conclude that early reexploration should be the first choice for the management of vascular compromised flaps.

Keyword: Free flap, Head and neck region, Microvascular.

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INTRODUCTION

Head and neck cancer is the sixth common cause of cancer with an estimated worldwide incidence of over 600,000 new cases annually.[1,2] Surgery for tumors of head and neck can cause significant soft tissue, bony, and skin defects. This may result in functional impairment such as speech and swallowing deficits. Thus, the reconstruction of extensive defects after resection has always been challenging.

The development and refinement of microvascular surgical techniques have improved the reported overall success rates to between 94 and 99%; however, rare complications may still prove devastating.[3-6] Complications of microvascular free tissue transfer can be classified into recipient site or donor site complications, and a number of authors have reported factors associated with the development of such complications. When vascular thrombosis is detected, surgical reexploration is undertaken to salvage the flap.[3,4]

The aim of this study was to assess the incidence and causes of complications in patients undergoing microvascular free flap reconstruction for surgical defects of the head and neck. We identified the variables that influence both medical and reconstructive complications by analyzing a series of 200 consecutive free flap reconstructions.

PATIENTS AND METHODS

In this retrospective analysis, a total of 200 consecutive free flap procedures were performed in 200 patients for reconstruction of defects in the head and neck region at Government Cancer Hospital, Indore, between 2000 and 2017.

There were 135 men and 65 women in our series. The mean age of patients was 45.4 years. The patient characteristics are detailed in Table 1. The ALT flap was the flap most often harvested in our patients (n = 160). The RF flap was the second most used after the ALT flap (n = 30), followed by the fibula myocutaneous flap (n = 8) and the jejunum flap (n = 2).

The buccal mucosa was the site most commonly involved (n = 62), followed by tongue (n = 42), lip

Table 1: Clinical data analyses of the patients who underwent free flap for reconstruction

Variables	Number	Rate (%)
Gender		
Male	135	67.5
Female	65	32.5
Age (years)		
<45	91	45.5
≥45	109	54.5
Flap types		
ALT flap	160	80
RF flap	30	15
Fibula myocutaneous flap	10	5
TNM classification		
I+II	60	30
III+IV	140	70
Local recurrence		
Yes	15	7.5
No	185	92.5
Distant metastasis		
Yes	42	21
No	158	79

Table 2: Perioperative medical complications

Medical complication	Number of occurrences (%)
Respiratory	24 (12.0)
Cardiac	19 (9.5)
Infectious	23 (11.5)
Neurological	3 (1.5)
Vascular	4 (2.0)
Perioperative death	3 (1.5)

(*n* = 35), gum (*n* = 20), jaw bone (*n* = 18), floor of the mouth (*n* = 8), the oropharynx (*n* = 7), hypopharynx (*n* = 5), sublingual gland (*n* = 2), and larynx (*n* = 1).

The most common tumor diagnosis was squamous cell carcinoma (*n* = 177; 88.5%), followed by salivary gland carcinoma (*n* = 11; 5.5%), sarcoma (*n* = 5; 2.5%), undifferentiated carcinoma (*n* = 4; 2%), and odontogenic carcinoma (*n* = 2; 1%). Clinical staging was performed according to the seventh edition of the UICC/AJCC TNM staging system.[3,5] The tumor stages were as follows: Stage I in 15 patients (7.5%), Stage II in 45 patients (22.5%), Stage III in 58 patients (29%), and Stage IV in 82 patients (41%).

Following surgery, flaps were monitored every 2–3 h for 12 h, every 4–6 h for 12–24 h, every 6–8 h for 24–48 h, and 3 times daily thereafter. The perioperative complications were enumerated in Table 2. Data including age, sex, diagnosis, radiotherapy, free flap type, and vessels for anastomosis were analyzed retrospectively. The main outcome measures were complications occurring within 30 days of surgery. Complications were categorized as recipient site or donor site complications in Tables 3 and 4.

Table 3: Recipient site complications

Number of cases	Incidence (%)
Vascular thrombosis (six venous, one arterial)	7 (3.5)
Total flap loss (one radial forearm, one scapula)	2 (1)
Partial flap loss four rectus abdominis, one scapula)	5 (2.5)
Wound infection	25 (12.5)
Wound dehiscence	30 (15)
Fistula formation	19 (9.5)
Cervical hematoma	3 (1.5)

Table 4: Donor site complications

Flap and complication	Number of cases	Incidence, %
Rectus abdominis myocutaneous flap		
Abdominal hernia	3	1.5
Infection	5	2.5
Wound dehiscence	5	2.5
Radial forearm flap		
Partial loss of skin graft Scapula	18	9
Osteocutaneous flap		
Limitation of shoulder motion	29	14.5

RESULTS

Recipient Site Complications

Post-operative vascular thrombosis occurred in seven cases (six venous and one arterial), constituting 3.5% of the entire series. The rate of successful salvage of vascular compromised flap by urgent surgical procedure was 100%. Five flaps were salvaged by surgical reexploration or thrombolytic therapy, resulting in a 71.4% of successful salvage rate in cases of vascular complications. The overall free flap success rate was 95.3% in this series.

The most common complication of the recipient site was wound dehiscence (*n* = 30; 15%), followed by wound infection (*n* = 25; 12.5%) and fistula formation (*n* = 19; 9.5). These cases were treated successfully with local wound care, debridement, and intravenous antibiotic agent.

DISCUSSION

Surgical treatment of patients with head and neck cancer was revolutionized during the 1970s with the development and clinical application of microvascular free flaps and pedicled myocutaneous flaps for head and neck reconstruction.[1,3,4]

Microvascular anastomoses are much less prone to thrombosis when they have an external diameter that exceeds 1 mm, five and all of the flaps used in this series contained nutrient blood vessels with diameters that usually exceeded 2 mm.

In analyzing 250 free flaps, O'Brien *et al*. reported an increased risk of flap failure in patients undergoing jaw reconstruction compared with reconstruction of other defects in the head and neck.[2]

Overall, good post-operative monitoring and early detection of compromised flap perfusion leading to early interventions can result in successful salvage rates of 70% as Brown *et al*. in 2003 showed in 427 free flaps.[1]

It is striking to note the high incidence of primary wound healing in the head and neck in patients who undergo free flap reconstruction. In the present series, the incidence of complications indicative of delayed flap recipient wound healing was very low.

While the incidence of total flap necrosis in pedicled myocutaneous flaps is similar to that reported in recent series of microvascular flap reconstruction, the incidence of partial flap necrosis is consistently higher for regional flaps than that reported for free flaps.

Partial flap necrosis frequently leads to delayed wound healing including salivary fistula formation.

Shah *et al*. reported a 29% incidence of partial flap necrosis in a series of 211 pectoralis major myocutaneous flaps used for head and neck reconstruction,[4] while Schusterman *et al*. reported significant partial flap necrosis in 14% of pectoralis major myocutaneous flaps used for intraoral soft tissue reconstruction.[5]

Ferri *et al*. reported a 14% incidence of salivary fistula formation in a series of 85 pectoralis major myocutaneous flaps used for head and neck reconstruction.[6] In a survey of otolaryngology residents graduating in 1997, 85 respondents reported exposure to 1637 pedicled flap and 870 free flap procedures.[7] This phenomenon is likely secondary to a variety of factors including persisting misconceptions regarding free flap reliability and a lack of surgeons with training in microvascular surgery in some centers.[7-11] In addition, concerns regarding the potential for the development of perioperative medical complications after lengthy surgery may also contribute to a reluctance to consider the use of free flaps.[12-15]

Our findings are very similar to those reported by Singh *et al*., who noted a significant correlation between comorbidity level and the incidence of complications.[3] Singh *et al*. also noted that age older than 70 years was associated with increasing complication severity.

CONCLUSION

A wide range of reconstructive options are available for composite defects resulting from the treatment of head and neck cancer, the efficacy of which depends on the specific anatomy of the defect, planned outcome, the patient's tolerance for donor site morbidity, and the surgeon's training and experience.

In general, the best option is the simplest one that will achieve all of the functional and esthetic goals of reconstruction. In the present study, we confirm that free flaps are extremely reliable in achieving successful reconstruction in the head and neck region. The recipient and donor site morbidity was limited and acceptable.

Careful pre-operative assessment, with particular attention paid to the anesthesiologist's status, history of surgery, and patient age, can help to identify patients who are at high risk to experience perioperative complications. When a compromised flap is identified, surgical reexploration should not be deferred.

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