

# Infective complications after free flaps reconstruction in patients affected by head and neck cancer

## Our experience on 77 cases



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**Infective complications after free flaps reconstruction in patients affected by head and neck cancer. Our experience on 77 cases.**

*AIM: The success rates of free flaps in patients undergoing head and neck cancer (HNC) surgery are very high (95%-97%) but the development of a surgical site infection (SSI) can put flap viability at risk. The aim of our study is to identify the risk factors for SSI in patients undergo free flaps reconstruction after head and neck cancer removal.*

*MATERIAL OF STUDY: Seventyseven patients (44 male and 33 female) from April 2006 to April 2015 admitted at the Department of Maxillofacial Surgery of the University of Naples "Federico II" were included in this study. All the patients underwent free flap reconstruction for HNC.*

*RESULTS: A microbiological analysis in 32 patients with signs of SSIs was performed, and 27 (35%) patients showed positive culture results, 5 patients were false positives.*

*DISCUSSION: SSIs are one of the most common nosocomial infections that increase medical costs. HNC surgery frequently requires opening of the mouth floor, oropharynx, nasopharynx, or proximal esophagus, and these areas are likely to be contaminated by local microbionics. Positive significant correlation between long operation timing and SSIs.*

*CONCLUSION: Was observed the factors contributing to postoperative infections for patients affected by head and neck tumor. 35% of our study population developed an SSI (27/77). The most commonly discovered pathogen was MRSA (Methicillin-resistant Staphylococcus aureus). Were examined sex, cardiovascular disease, blood loss more than 560 mL, and a long operation time  $\geq 6$  hours were significant risk factors for SSI.*

**KEY WORDS:** Free flaps, Head and neck cancer, Infective complications

### Introduction

Although the success rates of free flaps in patients undergoing head and neck cancer surgery are very high

(95% - 97%), the development of a surgical site infection (SSI) can reduce the functional outcomes, resulting in considerable postoperative morbidity and lengthened hospital stay<sup>1</sup>. The development of SSI in these patients can lead to wound dehiscence (Figs. 1a, b), development of fistulae, sepsis, and in some cases even to death<sup>2</sup>. This improve hospitalization timing, increases health costs, and may postpone administration of adjuvant therapy, which, in turn, may increase the risk of tumor recurrence<sup>1-3</sup>. Therefore, it is hardly surprising that SSI alone has been considered a factor that negatively influences the prognosis of head and neck cancer

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patients<sup>2</sup>. In addition, post-operative infection is the main cause of reconstruction failure after head and neck cancer surgery<sup>3</sup>. Antibiotic prophylaxis dramatically reduces the risk of postoperative infection<sup>2</sup>. However, other factors are also important for the prevention of SSI, such as preoperative care, technical skills of the surgeon, methods for reconstruction and drainage, and post-operative care<sup>4</sup>. Several other factors have also been studied such as age, wound infection risk classification, time duration of surgery, cancer pathology, length of hospital stay, tumor (T) and lymph node (N) stage, complexity of the procedure, blood transfusion, previous radiotherapy and chemotherapy, and nutritional status, but there is not a consensus or a clear definition of a high-risk group<sup>3,4</sup>. Furthermore, head and neck cancer patients are frequently heavy alcohol and tobacco users, have other comorbidities, and underwent major surgeries that involve bone exposure or resection and the use of titanium reconstruction plates and complex reconstruction methods such as microvascular-free flaps or myocutaneous flaps<sup>5</sup>. The exposure of the wound to saliva and tracheal secretion are other peculiar characteristics. The role of oral hygiene or precarious dental status in the risk of development of SSI is still not clear, neither is the efficacy and safety of tooth extraction during tumor resection surgery. In this population, in addition to the economic advantages by reducing the hospital stay, decreasing the risk may also allow the performance of adjuvant radiotherapy at an adequate interval, which may have a potential influence on locoregional control of the disease and survival rates<sup>4</sup>. The main objective of this study is to identify the risk factors for SSI in patients submitted to free flaps reconstruction for head and neck cancer.

TABLE I

Radial forearm free flap	Fibula free flap	Antero-lateral thigh free flap	Iliac crest free flap	TOT.
51	18	4	4	77

## Material and Methods

This study included patients who underwent free flap reconstruction for HNC from April 2006 to April 2015 admitted to the Department of Maxillofacial Surgery of the University of Naples "Federico II". We have treated 77 patients, 44 male, 33 female. Surgical procedures included tracheotomy, neck dissection, tumor resection and free flap reconstruction.

A framework summary of the flaps used in these patients is reported in Table I.

The mean patient age was 57.6 years (range 15-68). All patients included in the study received prophylactic antibiotics 30 minutes before surgery, and all surgical sites were disinfected with povidone iodine (Betadine©) before incision. We used cefazolin sodium 2 g/day and clindamycin 1.2 g/day intraoperative and postoperative. All patients were moved to Intensive Care Unit for awakening assisted. The patients received routine postoperative care. SSI was defined as the presence of purulent drainage from the wound or the presence of an orocutaneous or pharyngocutaneous fistula regardless of origin (including flap failure). First, we examined whether they had postoperative infection or not, and the kind of infections. When SSI was diagnosed, we carried out a buffer

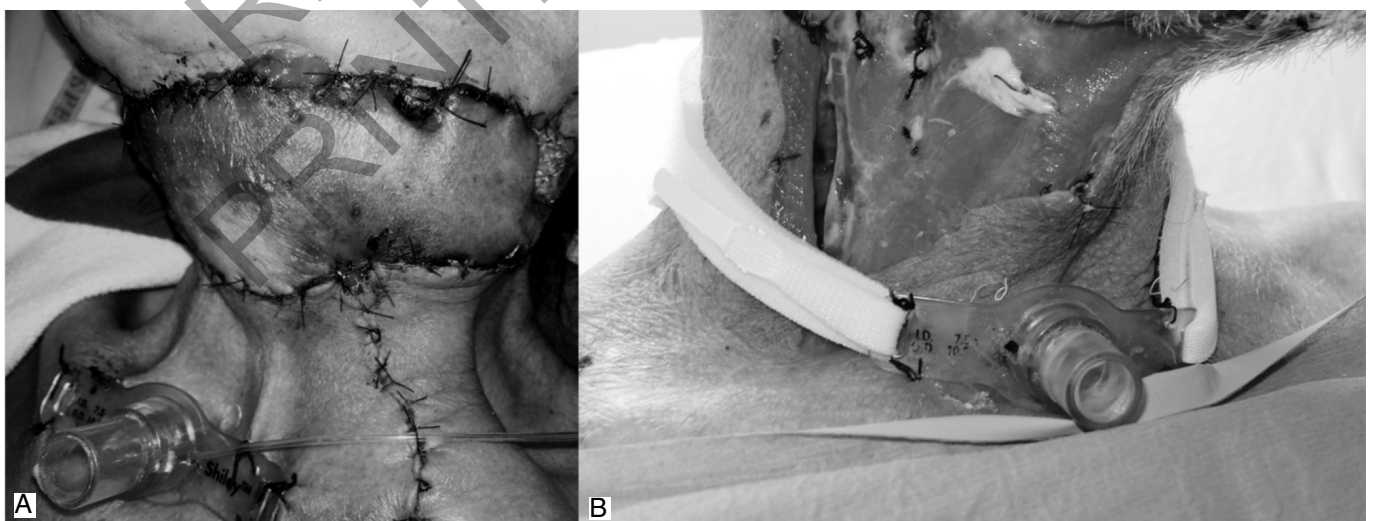


Fig. 1: A) wound dehiscence; B) wound dehiscence.

of SSI and sent for bacterial culture. Initially prompt antibiotic therapy was given empirically and, as soon as possible, according to the antibiogram of the cultured bacteria.

## Results

A microbiological analysis was performed in 32 patients with signs of SSIs on 77 patients, and 27 (35%) patients showed positive culture results, 5 patients were false positives. Nine patients had polymicrobial infections (9/27, 33%). A total of 92 bacteria isolates from 27 patients with SSIs included 47 gram-positive organisms (51.5%), 41 gram-negative organisms (43.5%), and 5 *Candida* species (5.4%). The most frequently isolated pathogen was *Staphylococcus aureus* (30/92, 32.6%), followed by *Klebsiella pneumoniae* (13/92, 14.1%), *Pseudomonas aeruginosa* (11/92, 12.0%), and *Enterococcus* species (11/92, 2.0%). Twenty-eight of the *S. aureus* isolates were methicillin-resistant *S. aureus* (MRSA) (93.3%). The most common organisms associated with superficial incisional and deep incisional SSIs were *S. aureus*, followed by *K. pneumoniae* and *P. aeruginosa*.

## Discussion and Comments

SSIs are one of the most common nosocomial infections that increase medical expenses<sup>6</sup>. Patients with SSIs tend to have increased morbidity and mortality<sup>6</sup>. Multivariate analysis revealed that old age, male sex, cardiovascular and diabetic disease, blood loss during the operation of more than 560 mL, previous chemotherapy, and type of surgery were especially related in SSI<sup>7</sup>. Major surgery for HNC frequently requires opening of the mouth floor, oropharynx, nasopharynx, or proximal esophagus, and these areas are likely to be contaminated by organisms residing in the mucosal surfaces<sup>7</sup>. We also observed a significant correlation between surgical timing and SSIs<sup>6</sup>. If the operation time is prolonged, there are more chances for exposure to microorganisms in the mucous area; thus, allowing for more chances for infection<sup>6</sup>. The patients with head and neck malignant tumors sometimes have preoperative chemotherapy<sup>7</sup>. When large defects of tissues are given by the dissection of the primary tumors, they need more extensive surgery involving the reconstruction by free flap or local flap and so on, which usually lead to increased intraoperative blood loss<sup>8</sup>. These factors, blood loss and preoperative chemotherapy, are considered to influence local and general states of the patients, and to result in postoperative infection<sup>8</sup>. All surgeries in this study were clean-contaminated and involved opening of the mucosa in the oral cavity or oropharynx or tracheobronchial tree. In a similar recent study by Lee et al.<sup>7</sup>, early postoperative hypoalbuminemia was found to be the only independent risk factor

for the development of SSI in patients undergoing major HNC surgery.

## Conclusion

We examined the factors contributing to postoperative infections for patients with head and neck tumor. 35% of our study population developed an SSI (27/77). Multivariate analysis showed that male sex, cardiovascular disease, blood loss during the operation of more than 560 mL, and a long operation time  $\geq 6$  hours were significant risk factors for SSI. Lastly, the most commonly discovered pathogen was MRSA. Based on our results, we are able to predict certain groups of patients who are at high risk of developing SSIs after major HNC surgery. Preventive measures or close monitoring in these patients may be required to reduce the likelihood of SSIs.

## Riassunto

Il tasso di successo dei lembi microchirurgici rivascolarizzati nei pazienti sottoposti a chirurgia oncologica del distretto testa-collo (HNC) è molto elevato (95% - 97%) ma lo sviluppo di un'infezione del sito chirurgico (SSI) può mettere in pericolo la vitalità del lembo. Lo sviluppo di SSI in questi pazienti può portare a deiscenze delle ferite chirurgiche, fistole, sepsi fino alla necrosi del lembo. Tali sequele possono esitare in semplice aumento dei tempi di ospedalizzazione, con tutte le conseguenze socio-economico-sanitarie del caso, fino al possibile rischio di morte del paziente. L'obiettivo principale del nostro lavoro è stato quello di identificare i fattori di rischio per lo sviluppo di infezioni nei pazienti sottoposti a ricostruzione mediante lembi microchirurgici rivascolarizzati per il carcinoma del distretto testa-collo. Dall'aprile 2006 all'aprile 2015 presso l'U.O.C. di Chirurgia Maxillo-Faciale dell'Università degli Studi di Napoli "Federico II" sono stati sottoposti a ricostruzione con lembi microchirurgici rivascolarizzati 77 pazienti, 44 maschi, 33 femmine, età media 57,6 anni. Tutti i pazienti sono stati sottoposti al medesimo protocollo farmacologico pre e post operatorio. In 32 casi nel post operatorio si sono evidenziati segni e sintomi di infezione per cui è stata effettuata un'analisi microbiologica: 27 pazienti su 77 totali (35%) hanno mostrato risultati positivi di coltura, 5 pazienti sono stati falsi positivi. I patogeni più frequentemente apprezzati sono stati in ordine decrescente *Staphylococcus aureus* meticillino resistente 93,3%, seguito da *Klebsiella pneumoniae* (14,1%) e *Pseudomonas aeruginosa* (12%). Un'attenta analisi della letteratura unitamente alla nostra esperienza ha evidenziato come le principali cause imputabili ad una sovra infezione siano: età avanzata, sesso maschile, patologia cardiovascolare, perdita ematica intraoperatoria > 560 ml, tracheotomia con risveglio assistito in rianimazione ed

procedure chirurgiche invasive con aumento dei tempi chirurgici. La conclusione della nostra analisi è che l'utilizzo dei lembi microchirurgici rivascolarizzati deve seguire delle precise indicazioni al fine di evitare che un buon planning chirurgico possa essere vanificato da complicanze perioperatorie prevedibili alla luce delle comorbidità.

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