Perioperative Care of Free Flap Patients

Aurora Vincent, MD¹ Raja Sawhney, MD² Yadranko Ducic, MD, FRCS(C), FACS³

¹Otolaryngology, Head and Neck Surgery, Madigan Army Medical Center, Tacoma, Washington

²Facial Plastic and Reconstructive Surgery, Otolaryngology Head and Neck Surgery, University of Florida, Gainesville, Florida

³Otolaryngology and Facial Plastic Surgery Associates, Fort Worth, Texas

Address for correspondence Yadranko Ducic, MD, FRCS(C), FACS, Department of Facial Plastic and Reconstructive Surgery, Otolaryngology and Facial Plastic Surgery Associates, 923 Pennsylvania Avenue, Suite 100, Fort Worth, TX 76104 (e-mail: yducic@sbcglobal.net).

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Abstract

Microvascular free tissue transfer is an indispensable reconstructive option in head and neck reconstruction. Flap failure is relatively rare, but it is nonetheless very morbid and psychologically devastating to patients when it does occur. Further, complications after free tissue transfer to the head and neck remain common. There are numerous ongoing debates about various facets of preoperative, intraoperative, and postoperative care of patients undergoing free flap reconstruction of the head and neck, all ultimately searching for the optimal treatment algorithm to further improve flap success, minimize complications, and maximize patient outcomes. Herein, the authors review current literature surrounding optimal preoperative nutritional support, intraoperative vasopressor use, perioperative fluid management, use of antithrombotic agents, antibiotic use, and other facets of the care of head and neck free flap patients to provide a guide to surgeons.

Keywords

- free tissue transfer
- perioperative care
- head and neck reconstruction

Microvascular free tissue transfer is an indispensable reconstructive option in head and neck reconstruction. Since it was first introduced and developed in the 1970s,¹ it has expanded to include numerous flap types and options to satisfy nearly any reconstructive challenge. Techniques of flap harvest and inset have been refined, such that flap survival rates today are commonly 95 to 99%.^{1–5} Despite the relative rarity of flap failure, it is nonetheless very morbid and psychologically devastating to patients when it does occur. A delay in flap success can delay adjuvant therapies for cancer, can increase risks to patients by necessitating a second surgery, and increase overall costs of care.² Urgent re-exploration of a failing flap has estimated salvage rates of 50 to 85%,^{1,6} and these rates are higher the sooner flap compromise is discovered. Further, there is evidence that success rates of a second flap attempt after a failed first attempt are lower at 73%.

Even though surgical techniques have vastly improved over the past few decades, complications after free tissue transfer to the head and neck remain common.^{3,7} Minor complications after free tissue transfer, for example, include wound dehiscence, infection, fistula, and donor-site problems, while major

complications include flap failure, pneumonia, and cerebrovascular accidents. A recent study found that more than 27% of patients will experience a minor complication after surgery, and 6% of patients will suffer a major complication.⁷ Mortality has been estimated to occur in as many as 1.5% of cases before leaving the hospital after free flap transfer to the head and neck.³

There are ongoing debates about various facets of preoperative, intraoperative, and postoperative care of patients undergoing free flap reconstruction of the head and neck, all ultimately searching for the optimal treatment algorithm to further improve flap success, minimize complications, and maximize patient overall outcomes. Herein, we review current literature surrounding care of head and neck free flap patients to provide a guide to surgeons.

Preoperative Considerations

There are many opportunities to optimize patient outcomes before going to the operating room. Preoperative education, for example, has been suggested to have an important, positive effect on clinical outcomes after reconstruction.⁸ Major head

and neck surgery can be psychosocially taxing, beyond the distress of dealing with a cancer diagnosis. Taking time to adequately educate patients about what to expect can alleviate some of these stresses. Overall, however, there are few studies that adequately evaluate the value of preoperative education of head and neck patients or how to best manage psychosocial issues.

Next, patient comorbidities can have an effect on flap outcomes. Multiple studies have found an increased surgical complication rate in patients with diabetes mellitus, older age, female gender, malnutrition, anemia, and nicotine intake.^{2,3,5,7} Further, patients with advanced cancer can have hypothyroidism affecting postoperative healing if left uncorrected. Many of these factors can be optimized or improved before surgery, but others, such as a history of radiotherapy, age, advanced cancer stage, or chronic kidney disease, cannot necessarily be altered prior to surgery, but they can guide planning and prognostic education of the patient.

Nutritional Considerations

Adequate nutrition before and after head and neck free flap surgery has been demonstrated in numerous studies to improve outcomes. An estimated 35% of head and neck cancer patients present in a state of malnutrition,⁹ and the Enhanced Recovery After Surgery (ERAS) Society strongly recommends that all patients undergo a comprehensive preoperative nutritional assessment.⁸ This assessment should pay particular focus to the degree of dysphagia a patient has and his or her risk of refeeding syndrome. ERAS also recommends that preoperative nutritional support should be started in patients with malnutrition, as small improvements prior to surgery can decrease adverse events after surgery, such as wound healing problems and infection.^{10,11}

Some studies have investigated whether specific “immunonutritional” feeding regimens are superior to other feeding regimens in optimizing patients for surgery.¹¹ In general, though, these studies have had variable designs and mixed results. Thus, current best-evidence literature supports that standard enteric nutritional support is sufficient.⁸

Studies have also investigated the necessity of the classic fasting period before general anesthesia and suggest that 8 hours of fasting before major head and neck surgery is unnecessary. Recent recommendations from ERAS support allowing clear liquids up to 2 hours before surgery and solids up to 6 hours before surgery, as doing so further bolsters the nutritional status of patients without increased anesthetic risks.⁸

Appropriate nutrition is important to maintain postoperatively in addition to leading up to surgery. In general, an oral diet provides the best nutrition and should be the first choice for patients who tolerate it. When oral feeding cannot be established, tube-feeding should be initiated within 24 hours after surgery.⁸ Placement of a gastrostomy tube can also be considered, both pre- and postoperatively, and can be particularly useful when a prolonged nutritional support is anticipated or when expected adjuvant therapies may worsen or cause dysphagia.⁸

Surgeons are often wary of restarting an oral diet soon after free flap transfer to the head and neck, especially when reconstruction involves the oral cavity and pharynx. The theoretical risk is that early oral intake could compromise new suture lines and increase the risk of fistula formation. However, studies suggest that an early return to an oral diet is ultimately advantageous. A recent systematic review by Aires et al, for example, included four randomized controlled trials that examined the safety of early oral feeding.¹² In 180 patients, the studies found no increase in pharyngocutaneous fistula rates in those patients who received early oral feeding following total laryngectomy. Similarly, other studies suggest that a return to oral feeding earlier than 6 days following free flap oral cavity reconstruction does not increase orocutaneous fistula formation nor flap-related complications.¹³ Further, they found that the duration of hospital stay was diminished in the early feeding group.¹³ Overall, studies clearly recommend and demonstrate the importance of pre- and postoperative nutritional support. Ultimately, nutritional interventions should be individualized to each patient and are best developed in consultation with the multidisciplinary team.

Transfusion Considerations

Patients who are not anemic at the time of free flap surgery have been found to have better outcomes.⁵ Specifically, *preoperative* hemoglobin values below 10 g/dL have demonstrated to be a significant predictor of flap failure and thrombosis.⁵ Also, a recent literature review suggested that a hematocrit of 30 to 40% with normovolemic hemodilution is ideal to optimize patient outcomes.¹ Other studies, however, have shown that *intraoperative* blood transfusion is associated with higher rates of overall complications, medical complications, the need for postoperative transfusion, and the need for reoperation. Transfusion can increase blood viscosity and immunosuppression, thus leading to decreased blood flow and flap compromise from poor perfusion.¹ Studies also suggest a link between blood transfusions and increased wound infections. A study by Rossmiller et al found that a postoperative transfusion trigger of hematocrit less than 25% decreased both transfusion rates and the total units of blood transfused without increasing flap-related or patient complications.¹⁴ The practice pattern of the authors is to transfuse for a hemoglobin less than 8 g/dL, and we have not observed increased complications with this cutoff. Overall, the head and neck surgeon should transfuse with caution and, perhaps, more ideally in the preoperative period only.

Flap Considerations

There are many options for musculocutaneous, fasciocutaneous, and osteocutaneous free flap reconstruction of the head and neck, but not all flap options are appropriate for all patients. Flap planning is important to minimize intraoperative surprises and maximize postoperative flap performance. First, different flaps have different tissue components, allow for harvest of different amounts of tissue bulk, and allow for harvest of different lengths of the flap pedicle. Next, the recipient vessels in the neck should also be considered, as

some studies suggest that venous anastomosis to the internal jugular vein (IJV) leads to lower rates of thrombosis and flap compromise than anastomosis to the external jugular vein (EJV), though the authors have not found this to be the case in their practices.⁴ Studies have also suggested that use of a vein graft can increase the risk of thrombosis by five times.¹⁵ Other studies do not demonstrate an increased risk from using a vein graft, and in general, studies have not demonstrated a consistent difference in outcomes after end-to-end anastomosis compared with end-to-side anastomosis.^{4,15} There is a risk, however, if a small pedicle vein is connected to a large recipient vessel, such as the IJV, in an end-to-side fashion, as the high-flow of the larger vein can lead to back flow of the recipient vein and potentially compromise flap outflow. This is less of a risk with medium or larger pedicle veins. Ideally, vessel size mismatch should be avoided when possible.

Cephalic vein transposition can also be performed, especially for vessel-depleted necks when direct anastomosis to the IJV or EJV is not possible.¹⁶ In their review of 29 cases of cephalic vein transposition, Chan et al found that the cephalic vein can provide substantial venous length, easily reaching multiple locations in the neck.¹⁶ They did not observe any flap failures.¹⁶

Next, some flaps allow for simultaneous extirpation and harvest, thus shortening overall operative times. Prolonged operative times, specifically longer than 18 hours, have been significantly associated with increased rates of free flap failure.³ Finally, donor-site morbidity varies among different flap options. Ultimately, many studies agree that care of head and neck free flap patients, including choice of flap source, should be individualized.

Tracheostomy Considerations

Patients may require tracheostomy at the time of free tissue transfer to maintain a secure airway at the time of surgery and in the immediate postoperative period. Some authors suggest that the decision to perform tracheostomy is dependent on the presence of severe comorbidities, tumor stage and location, alcohol consumption, the planned extent of resection, and whether or not a bilateral neck dissection is performed.^{17,18}

Others advocate a low threshold for primary tracheostomy, finding postoperative care simpler and safer.¹³ In general, tracheostomy is a low-morbidity procedure for adults.⁸ However, having a tracheostomy is also associated with longer hospital stays and increased costs of care.⁸ Many studies report that patients can often be successfully decannulated within 2 week after surgery, but reports vary on the appropriate pathway to decannulation. Nearly all studies agree that a patient should pass a capping trial prior to decannulation.⁸ Some suggest that surgical closure of the stoma at the time of decannulation limits the duration of hospital stays and associated cost savings, faster swallowing rehabilitation, and fewer long-term tracheal complications.¹⁹ Ultimately, there are no definitive guidelines for which patients should receive a tracheostomy, when decannulation should occur, and if surgical closure of the stoma warranted.

Intraoperative and Perioperative Considerations

Anesthetic Considerations

Anesthesia providers play an important role in the care of free flap patients, and many studies have investigated various facets of anesthesia care and how it affects flap outcomes. First, there is moderate evidence that it is important to avoid hypothermia. Specifically, providers should maintain body temperature above 35°C at all times and above 37°C during free tissue transfer.⁵ Hypothermia can be caused by patient exposure during surgery and has been associated with vasoconstriction, potential flap compromise, and increased postoperative complications.¹ Baer huggers, often used intraoperatively to maintain patient temperatures, can also be used postoperatively to protect against cold rooms and hypothermia. Next, there is debate about whether the duration of anesthesia has a significant impact on flap outcome; a recent retrospective review of fibular free flap transfer in head and neck reconstruction found longer anesthetic times were not associated with flap complications.²⁰ However, a study by Ishimaru et al found a significant association between very long surgery times (more than 18 hours) and flap complications.³

Studies have also investigated the effects of specific anesthetic agents on flap outcomes. A recent literature review demonstrated that sevoflurane has protective effects for endothelium and ischemia-reperfusion injury. Sevoflurane primes human endothelial cell progenitors and can promote vascular healing,⁵ and thus may be a superior agent during free flap cases.

Finally, in regard to pain management, numerous reviews suggest that epidural supplementation of general anesthesia correlates with lower rates of microvascular complications, improved flap survival, and improved overall outcomes.⁵ Epidural anesthesia and regional blocks are not applicable for all flap transfers, but they may be a useful consideration when a flap is harvested from the upper or lower extremities.

Vasopressors

It is generally recommended that hypotension be avoided. However, there is debate about the use of vasopressors and excessive use of crystalloid or colloid agents and their effects on flap survival. Many surgeons are wary about the use of vasopressors during or after free flap surgery, primarily because of the thought that vasoconstriction caused by such agents could compromise the flap blood supply. A recent literature review suggested that surgeons should avoid vasoactive agents, as while they can increase cardiac output, they can also cause vasoconstriction and decrease flap perfusion.¹ Many studies have investigated intraoperative use of vasopressors, however, and in general, they have not demonstrated any deleterious effects. For example, Haughey et al retrospectively reviewed the use of vasopressors during reconstructive surgery in 139 patients and found by multivariate analysis that patients who received vasopressors during surgery did not have statistically significant differences compared with nonrecipients in terms of flap complications.²¹ Another retrospective review of 169 head

and neck free flap transfers also showed that flap outcome in patients who received vasopressors intraoperatively did not differ significantly from those who did not.²² Various studies have also investigated specific vasoactive agents and have found that dobutamine, specifically, is a preferable intraoperative inotropic agent that can have positive effects on flap perfusion.¹ There now exist three studies with level 2B evidence suggesting that vasopressors do not increase the risk of flap-related complications, and a recent literature review suggested that, so long as patients are not fluid overloaded, then use of vasopressors seems to be safe.^{2,20} Further, vasopressor use may be preferable compared with fluid overload as a method to maintain adequate blood pressure and tissue perfusion.²

Fluid Administration

Studies have investigated the effects of crystalloid and colloid fluid supplementation. Ultimately, the goal of the provider is to avoid hypotension and maintain flap perfusion while avoiding fluid overload which can have very negative effects on flaps.¹ First, many studies have compared crystalloids and colloids, but no obvious conclusions have emerged on which fluid type, if either, is superior in terms of patient outcomes.¹ Both crystalloids and colloids have associated risks; hemodilution with crystalloids has been shown to cause hypercoagulability, while colloids have been associated with a hypocoagulable state,¹ neither of which is ideal for a free flap patient. Most free flap surgeons prefer a mix of crystalloid and colloid administration, but the ideal supplemental amount remains debated.

A large review by Patel et al of more than 700 free flap transfers in the head and neck found that aggressive fluid resuscitation is an independent predictor for postoperative complications and longer hospital stays.²³ Another recent review found that patients who received more than 5,500 mL of perioperative fluid surplus were three times as likely to suffer from postoperative complications (both medical and surgical) compared with patients who received less fluid volume.²⁰ Additionally, they found that patients who received in excess of 7,000 mL were significantly more likely to develop major postoperative complications.²⁰ Similarly, a different review of 185 free flap transfers to the head and neck found that delivery of crystalloid beyond 130 mL/kg in a 24-hour period increased the risk of postoperative complications.²⁴ That study also found deleterious effects of colloid administration and noted that excessive colloid was an independent risk factor for longer hospital stays, even after accounting for age, comorbidities, and smoking status.²⁴ A third study found fluid administration of more than 6 mL/kg/hour was associated with increased flap failure rates as well as local and systemic complications.²⁵

Zhong et al found a parabolic relationship between crystalloid resuscitation and complications and suggested a "sweet spot" for fluid administration between 3.5 and 6 mL/kg/hour for the first day after surgery.²⁶ The authors advocated for using mean arterial pressure and urine output as guides for titrating fluid supplementation.²⁶ It is theorized that fluid overload will damage endothelium and cause

extravasation and edema. This, in turn, exerts counter-pressure of tissues against the flap pedicle and increases the risk of venous stasis and thrombosis.²⁷ Sigurdson and Thomson also suggested that free flaps may be more sensitive to edema due to disruption of the lymphatic vessels, absence of perivascular autonomous innervation, and a reduced capacity to reabsorb excessive interstitial fluid.²⁸

Many studies have found that normovolemic hemodilution, guided by high cardiac output, normal blood pressure, a hematocrit of 30 to 40%, and urine output above 1 mL/kg/hour, is preferred.¹ Others have suggested that intraoperative fluid administration should not exceed 6 mL/kg/hour. In our practices, we aim to limit excessive fluid administration. When hypotension worsens, we initially give crystalloid fluid boluses, followed by colloid fluid boluses. If both are insufficient to improve the hypotension and, chiefly, a state of hypoperfusion, then we consider limited vasopressor use either with norepinephrine, dobutamine, or dopamine. When using vasopressors, we only give them for as long as necessary; it is imperative there is clear communication between the anesthesia team and operative team so that everyone is aware of when the medication is started and when it is stopped.

Flap Checks

Frequent monitoring of free flaps in the acute postoperative period is important. It is estimated that 80% of free flaps can be salvaged if compromise is recognized soon enough.^{2,29} Thrombosis occurs in 8 to 14% of cases and causes flap failure in 1 to 9% of cases.^{30–32} Flap failure from thrombolysis in the head and neck is commonly venous and not arterial.^{33,34} Studies estimate that 80% of pedicle thromboses occur in the first 48 hours, the majority of which are venous thrombus, but of cases of arterial thromboses, 90% will occur in the first 24 hours.²⁹ The highest risk for vascular compromise is during the first 24 hours, when intimal injury is the highest, and the risk significantly drops after the first 3 days following surgery.²⁹

Following surgery, there is consensus that early flap monitoring should be frequent, gradually progressing to less frequent over time as the risk of flap complications decreases. Many surgeons recommend checking the flap every 30 to 60 minutes for the first 2 to 4 hours, then every 1 to 2 hours for the additional 24 hours after surgery.² The ERAS Society strongly recommends that free flap monitoring should be performed at least hourly for the first 24 hours postoperatively, then continued for the duration of the patient's stay, with tapering of intensity after the first 24 hours.⁸ The ERAS Society also strongly recommends that the method of monitoring should include, at a minimum, clinical examination by staff experienced with free flap monitoring; adjunct monitoring techniques can be considered.

Many flap monitoring protocols and adjuncts have been proposed, and the ideal method is that which detects problems earliest within the constraints of the surgeon's practice environment, and with consideration of the available resources (both human capital and instrument availability).² Some surgeons prefer physician flap checks, but studies have demonstrated that nurse education programs can be effective and do not compromise rates of flap survival.² In

addition to conventional assessments of flaps (physical exam of flap warmth, turgor, capillary refill, color, and Doppler assessment of the vascular pedicle), many adjuncts have been developed including an implantable Doppler, color duplex ultrasound, near-infrared spectroscopy, microdialysis, and LASER Doppler flowmetry.²

Conventional assessment alone is the cheapest option and often very reliable. A marking stitch on the skin paddle can identify a reliable site for Doppler assessment of the vessels, but evaluation can be difficult in cases of buried flaps.² The implantable Doppler system can be useful for buried flaps. Wax reviewed their experience with more than 1000 flaps that included the implantable Doppler, and they found it had 87% sensitivity to flow problems.³⁵ LASER Doppler flowmetry has been used successfully in breast reconstruction, but it has less frequently been used in head and neck cases, as doesn't work well in moist environments like the oral cavity and pharynx.² While many adjunct have been developed to ease flap monitoring, to date, no monitoring system seems to be able to predict for enhanced flap survival, or salvage rates owing to early detection over any other.²

In our practices, direct observation by a physician has become a limited commodity, especially with the institution of resident work hour restrictions. We have found evaluation by nurses, well versed in the care of microvascular patients, to be invaluable. In our practices, the nursing team evaluates the flap hourly for the first 24 hours and then every 2 hours for the next 48 hours. This is supplemented with multiple daily checks by the surgical team during the same time period. Liberal use of implantable Dopplers in both buried and exposed flaps has also been found to be advantageous. Our protocol becomes more aggressive in cases where intraoperative issues with flap have occurred, such as those requiring revision of the anastomosis.

Thrombosis and Anticoagulation

In addition to flap monitoring for flap compromise, many pharmacologic adjuncts have been used to reduce the risk of thrombosis and flap necrosis. Overall, however, there are no pharmacologic measures that have been proven to reduce free flap anastomotic thrombosis or flap necrosis.⁸

First, many non-pharmacologic measures have been suggested and investigated to prevent thromboses. For example, meticulous microvascular surgery and smoking cessation prior to surgery play an important role in prevention of thrombosis.³⁶ Maintenance of systolic blood pressure above 120 mm Hg and appropriate fluid hydration are recommended despite limited research. Next, maintaining a neutral head position after surgery can prevent kinking or pressure on the pedicle with subsequent compromise of flow. Many surgeons also recommend patients have no ties around their neck (including tracheotomy ties, ties from an oxygen mask, and so on) for a couple of months after surgery, as light pressure can compress venous outflow and lead to flap compromise. This is especially true when the EJV is used for anastomosis. As described above, a poor nutritional status can contribute to poor vessel wall quality and durability, which in turn can contribute to thromboembolytic events.³⁶ Advanced athero-

sclerotic disease, diabetes mellitus, prior radiotherapy, prior neck dissection, and older age can also contribute to poor vessel quality.

Additionally, free flap surgery has an inherent risk of thrombosis due to disruption of the endothelial layer of the vessels. Thus, many antithrombotic medications have been advocated to ameliorate risks of thrombosis. The ideal antithrombotic agent would be easy to administer and have effective anticoagulant activity, while limiting side effects and complications related to perioperative and postoperative bleeding.³⁷ Systemic agents given in the postoperative period include low molecular weight heparin (LMWH), heparin, aspirin, dextran, and prostaglandin E1.^{36,37} Heparin is reportedly the most widely used antithrombotic agent, both systemically and topically.¹ LMWH has been found in a prospective study to significantly decrease the odds of flap failure.¹⁵ A retrospective study comparing perioperative use of aspirin to LMWH, however, found no significant difference in outcomes or complication rates.³⁸ A separate review concluded that postoperative subcutaneous administration of LMWH is as efficient as aspirin and has the additional advantage of preventing systemic thromboembolic events.¹ Unlike LMWH, however, aspirin may cause gastrointestinal bleeding.¹ Therefore, the study recommends the standard postoperative administration of LMWH instead of aspirin until the patient is fully mobile.¹ Disa et al compared three postoperative regimens: dextran 20 mL/hour for 48 hours after surgery, dextran 20 mL/hour for 120 hours after surgery, and aspirin 325mg daily for 120 hours after surgery.³⁹ Their study found no superiority of dextran for either duration compared with aspirin in terms of thrombosis, but dextran was associated with significantly more systemic complications.³⁹ Milrinone, a phosphodiesterase inhibitor, has been investigated as a perioperative antithrombotic agent, but it has not been associated with improved free flap survival or fewer thrombotic events.⁴⁰ A recent large retrospective review including more than 1,700 patients found that early detection of pedicle thrombosis and subsequent surgical intervention, with or without adjunct thrombolytic therapy, are the most important determinants for successful free flap salvage.^{41,42} Further, it found no statistical differences in outcomes between patients who received antithrombotic agents and those who did not.

When deciding to use an antithrombotic agent, the surgeons should certainly consider the risks of thrombotic events, as well as the risk of hematoma.² Anticoagulation protocols do have risks associated with their use. Aspirin can lead to gastric bleeds, strokes, and bleeding complications. Dextran can lead to severe anaphylactic reactions, kidney damage, pulmonary edema, or respiratory distress. Intravenous heparin can lead to higher rates of hematoma, thrombocytopenia, and other bleeding complications.³⁷ Of note, subcutaneous administration of heparin has not demonstrated the high hemorrhage risk associated with intravenous heparin.³⁷ The hematoma risk in free flap patients has been estimated, in general, around 4.7%, with 22.7% of hematomas causing flap compromise.⁴³ Studies suggest that the patient on standard venous thromboembolism (VTE) prophylaxis after free tissue transfer will have a

VTE risk of 2.1% and a hematoma risk of 11.7%.⁴⁴ Without prophylaxis, the risk of VTE is 7.7%, and the risk of hematoma is 4.5%.² A retrospective review of 261 flaps in patients who received a standard regimen of postoperative aspirin and subcutaneous heparin demonstrated a 5.6% rate of hematoma occurrence and a 2.8% overall flap failure rate.³⁷

Agents given locally to the flap or anastomosis during surgery have also been investigated. A randomized controlled trial by Khouri et al compared intraoperative intraluminal irrigation of vessels with high-dose recombinant human tissue factor pathway inhibitor (rhTFPI), low-dose rhTFPI, and heparin, and found no significant differences in rates of postoperative thromboses.⁴⁵ Similarly, a different prospective study by the same author comparing intraoperative intraluminal heparin irrigation to no irrigation did not find significant differences in terms of flap outcomes.¹⁵

Overall, there are no evidence-based guidelines for the prevention of microvascular thrombosis after free tissue transfer in head and neck surgery. In practice, most surgical patients will receive deep vein thrombosis prophylaxis after surgery. Subcutaneous heparin provides a substantial reduction in the risk of thrombosis without gross systemic side effects, and is perhaps the safest pharmacologic agent to be given after free flap surgery. It may be the ideal agent for perioperative antithrombotic prophylaxis in the majority of patients. Extra anticoagulation is often tailored to individual patients based on comorbidities and risk assessment. We have found the addition of aspirin may be beneficial in select patients, though it does increase the risk of hematoma and therefore is given judiciously.

Antibiotic Use

The use and duration of use of antibiotics in the perioperative period are another area of debate among head and neck free flap surgeons. There are many risks for infection inherent in head and neck free flap surgery; long duration, malnutrition, use of a bone flap, prior radiotherapy, and presence of a tracheostomy all significantly increase infection rates postoperatively.¹³ It has also been suggested that previous chemotherapy, a long preoperative hospital stay, permanent tracheotomy, and presence of a hypopharyngeal or laryngeal cancer increase the risk of infection.⁴ In general, there is consensus that antibiotics in some form and for some duration should be given, as clean-contaminated head and neck oncologic cases have an unacceptably high rate of perioperative wound infections.⁴⁶ Rates of infections for clean-contaminated cases in which patients were not given antibiotic prophylaxis range in the literature from 24 to 87%.⁴⁶ Infection rates for head and neck oncologic free flap patients range in the literature from 8.1 to 41%.^{47,48} Further, perioperative antibiotics given 1 to 2 hours prior to surgery and continued for 24 hours after surgery have consistently demonstrated a significant reduction in wound infections in randomized controlled trials.⁴⁹

Some studies suggest that short-term (24–48 hours) durations of perioperative antibiotic prophylaxis seem to be as efficient as long-term,⁴ and many studies agree that there is no benefit of antibiotics given beyond 7 days postoperatively.¹³

Next, multiple studies have demonstrated poor coverage from clindamycin given as a single agent and suggest that a different antibiotic or antibiotic combination should be used. Clindamycin has been associated with a significantly higher risk of postoperative infection rates and flap complication rates following head and neck free flap surgery compared with ampicillin–sulbactam.^{13,50} Some authors recommend adding metronidazole or other agents to clindamycin for patients with an allergy preventing use of ampicillin–sulbactam.⁵⁰

The ERAS Society has provided a few strong recommendations based on “high” evidence regarding antibiotic prophylaxis and infection prevention for head and neck free flap patients.⁸ First, antibiotics are not recommended for short, clean head and neck oncologic procedures. In clean-contaminated procedures, however, perioperative antibiotics should be given 1 hour prior to surgery and continued for 24 hours after surgery. Finally, urinary catheters should be removed as soon as the patient is able to void, ideally less than 24 hours after the completion of surgery, and pulmonary physical therapy should be initiated as early as possible after head and neck reconstructions to avoid pulmonary complications.⁸

Other Postoperative Care

The postoperative care of head and neck free flap patients is multifaceted. There are many different wound dressings available to the head and neck surgeon. A recent systematic review suggested there is no compelling evidence to support any particular wound dressings for wounds healing by primary intention, and in general may simply be left uncovered.⁵¹ Next, there is also the option of active or passive drain placement. There is considerable evidence, though, that active drains are more effective than passive drains and can reduce drain-related complications.⁵² That said, the authors have found success using passive Penrose drains in previously radiated neck. The soft tissue of these necks does not expand due to fibrosis of the soft tissue. This can be an issue with the small localized hematomas that often occur in flap patients. In nonradiated patients, the skin can expand, limiting the pressure within the neck. In radiated patients, the pressure may not be relieved by tissue expansion and therefore is instead conferred onto other compressible structures within the neck such as the venous anastomosis. The Penrose drain allows for the egress of blood from the neck. We have not found the same to be true of bulb suction drains.

Historically, postoperative care of free tissue transfer patients occurs in the intensive care unit (ICU). However, there is a growing body of evidence suggesting that uncomplicated free flap patients may be safely cared for outside the ICU, thereby decreasing hospital stays and lowering overall costs.¹³ Success of these surgical units still require nurses highly trained in microvascular patients and relatively low patients-to-nurse ratios.

Lastly, the ERAS strongly recommends early mobilization (within 24 hours of surgery if possible) for patients undergoing major head and neck oncologic surgery.⁸ Though research in its use in head and neck surgery is lacking, studies after abdominal surgery have shown early mobilization can prevent pulmonary complications. The ideal type

and amount of mobilization are undefined, and surgeons must balance risk of microvascular compromise versus the benefits of early mobilization.⁸

Conclusion

Free flap transfer to the head and neck is an invaluable reconstructive option for many patients that is often successful with positive overall patient outcomes. Success of free flap surgery can be further improved and complications minimized by boosting preoperative nutrition. Perioperatively, the use of vasopressors should be minimized and balanced with intravenous fluid support, as excessive use of either can have deleterious flap outcomes. Subcutaneous heparin administration after surgery can decrease the risk of thromboembolytic events without unduly increasing the risks of hematoma, and antibiotics other than clindamycin given for at least 24 hours in clean-contaminated cases and continued for less than 1 week can mitigate the infection risk of patients. Overall, care of head and neck free flap patients is multifaceted and best approached in an individualized fashion for each patient with support from a multidisciplinary team.

Conflict of Interest

None declared.

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