Management of Unfavorable Outcomes in Head and Neck Free Flap Reconstruction

Experience-Based Lessons from the MD Anderson Cancer Center

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KEYWORDS

• Surgical flaps • Complications • Microsurgery • Thrombosis • Head and neck free flap • Free flap loss

KEY POINTS

- Microvascular head and neck reconstruction aims to restore form and function and poses unique challenges for the reconstructive surgeon, and complications can be devastating.
- Maximizing success in free flap head and neck reconstruction requires diligent preoperative planning, appropriate flap selection, and precise surgical technique and postoperative monitoring and management.
- Compromised flap perfusion mandates early detection and definitive exploration and intervention to maximize flap salvage rates.
- Complications unrelated to the microvascular anastomosis and perfusion of the flap unfortunately are inevitable; however, appropriate management requires prompt recognition and often aggressive intervention.

INTRODUCTION

Success rates in microvascular head and neck reconstruction are greater than 95% in most high-volume institutions.[1–3] However, despite these high success rates, there remains a percentage of patients who suffer the catastrophic consequence of losing a free flap or other complications even with a successful free flap, which for head and neck defects can be incompatible with life. Patients undergoing reconstruction following tumor extirpation present unique challenges to the reconstructive microsurgeon given the high prevalence of tobacco use, malnutrition, prior or postoperative radiation damage, and history of prior surgeries. However, successful reconstruction is not simply achieving high flap survival rates, but

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is also aimed at optimizing form and function and minimizing nonmicrosurgical complications. These objectives require appropriate flap selection and design, careful preoperative planning and meticulous technique, and diligent postoperative monitoring with a low threshold for definitive operative exploration for any suspicion of compromised flap perfusion. Despite a successful flap and recovery, patients do still suffer from complications. This article provides a synopsis of our approach to maximizing flap success and managing unfavorable outcomes. Many other centers have otolaryngologists performing some or all of the head and neck reconstructions. The head and neck reconstruction experience at The University of Texas MD Anderson Cancer Center is unique in that the plastic surgery department is responsible for all of the high-volume (300–400 free flaps per year) reconstructions, which we hope helps reconstructive microsurgeons worldwide.

DEFECT-SPECIFIC RECONSTRUCTION

Head and neck reconstruction aims to restore form and function and particularly for extensive defects, free tissue transfer represents the best option for achieving the most optimal outcomes. The selection for donor sites largely depends on the extent and type of defect and patient body habitus and available donor sites taking into consideration surgeon comfort and experience. Over the years, we have developed our algorithmic approach to reconstruction of head and neck defects to minimize complications and optimize outcomes, which corresponds with algorithms from other high-volume institutions.[4,5]

At our institution, we favor osteocutaneous free flaps for composite defects of the maxilla or mandible; however, in certain circumstances, soft tissue flaps are used. For example, mandibular defects, with the condyle sacrificed and the defect not extending anterior to the parasymphysis, soft tissue flaps often provide adequate postoperative function.[6] This approach applies to reconstruction following oncologic resection and for cases of osteoradionecrosis (ORN).[7] Similarly for defects involving the maxilla, a soft tissue flap may be sufficient if the alveolar bone defect does not extend beyond the canine tooth; however, for more extensive defects a bony reconstruction is indicated.[8,9]

For mucosal defects of the floor of mouth or inner cheek, we prefer a thin pliable flap, which in our patient population is a forearm-based flap, but occasionally an anterolateral thigh (ALT) flap can be used in thinner patients.[10,11] A similar algorithm is used for reconstruction of glossectomy defects where a thinner more pliable flap, such as a forearm or thin perforator ALT, is used for partial or hemiglossectomy defects, whereas a bulkier flap, such as a combined ALT/vastus lateralis flap or a rectus abdominis myocutaneous (RAM) flap, may be necessary for a subtotal or total glossectomy defect.[12] Reconstruction of extensive defects, such as those involving the tongue and the mandible, may often require the use of two free flaps to restore and optimize form and function, which can be performed safely with excellent success rates and outcomes (**Fig. 1**).[13] Similarly, for through-and-through defects, two free flaps are often necessary for reconstruction of the intraoral defect and provide coverage for the external skin.[13,14]

Reconstruction of pharyngoesophageal defects results in fewer complications and superior function if a portion of the pharyngeal or esophageal wall is preserved.[15] The ALT flap represents our flap of choice for near-total and circumferential defects especially in the setting of prior radiation and surgery where a neck resurfacing may be necessary.[16,17] In such circumstances, an ALT with two independent skin islands is used to reconstruct the pharyngoesophageal defect and provide coverage of the neck (**Fig. 2**). We reserve jejunal free flaps as a second-line option for cervical esophageal defects and the supercharged jejununal conduit for total esophagectomy defects when the option of a gastric pull-up is not possible.[18] In addition to avoiding a laparotomy, our experience is that a fasciocutaneous flap provides superior speech rehabilitation compared with intestinal flaps with comparable swallowing function. In our series of 349 cases, circumferential defects not surprisingly are associated with increased complications including fistula and strictures, and therefore preservation of any viable mucosa is critical for maximizing outcomes and providing patients with a successful reconstruction.[15] Although rare, tracheal defects can also be successfully reconstructed using free tissue transfer,[19,20] and even when coupled to esophageal disease, such extensive defects can still be salvaged with the use of fasciocutaneous free flaps and supercharged jejunal flaps.[21]

Finally, scalp reconstruction is determined based on the size of the defect. Local scalp flaps and rotation flaps are generally used for small defects. Successful reconstruction of larger defects is achieved with either free muscle or fasciocutaneous flaps with equivalent outcomes. For larger defects, the latissimus dorsi muscle with a skin graft is the flap of choice. When defects also require a cranioplasty for reconstruction of the

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