

Anesthesia and Perioperative Care in Reconstructive Transplantation

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KEYWORDS

- Anesthesia • Perioperative care • Reconstructive transplantation
- Vascularized composite allografts

KEY POINTS

- Anesthetic management in reconstructive transplantation (RT) requires a thorough knowledge of solid organ transplant anesthesia as well as regional anesthesia strategies in microvascular surgery.
- Anesthetic protocols must be customized for individual RT procedures (eg, upper extremity, craniofacial) for proactive prevention of common complications and aggressive intervention during these complex procedures.
- The RT anesthesiologist must prepare for the perioperative effects of induction immunotherapies, immune risks of the large antigenic burden and microbial load, overwhelming ischemia-reperfusion injury, significant electrolyte imbalances, drastic hemodynamic shifts, massive blood loss, and extended anesthesia times among a host of intraoperative and postoperative challenges.
- RT procedures require intensive intraoperative monitoring of hemodynamics and coagulation, large-volume resuscitation requirements (with induced hypotension and intraoperative cell salvage), maintenance of supranormovolemic status before allograft revascularization, timed utilization of pneumatic tourniquets, and aggressive antimicrobial prophylaxis.
- Optimal anesthesiology management in RT involves close partnership and coordination with the surgical team to plan for and address inherent demands, risks, and challenges unique to these procedures.

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RECONSTRUCTIVE TRANSPLANTATION

Reconstructive transplantation (RT) is an emerging domain, including but not limited to extremity, craniofacial, genitourinary, tracheal, or abdominal tissue allografts (**Box 1**). Vascularized composite allografts (VCAs) derived from deceased or living-related donors are now defined by specific criteria (**Box 2**) under Organ Procurement and Transplantation Network (OPTN) policy guidelines.¹ Since most VCA are primarily vascularized, they are deemed as solid organs for donation and transplantation.

Per the latest reports, there are 53 VCA programs approved by the United Network for Organ Sharing (UNOS) and OPTN, located at 24 RT centers in the United States.² These programs are distributed across 11 geographic regions spanning 58 organ procurement organizations that facilitate VCA donation and allocation. Most VCA programs are approved for upper extremity, head and neck, or abdominal wall VCA. A few programs are approved for genitourinary transplantation (eg, penile or uterine) and lower extremity transplantation.

ANESTHESIA IN RECONSTRUCTIVE TRANSPLANTATION

RT is a multidisciplinary specialty that integrates the tenets of transplant surgery with those of reconstructive surgery.^{2,3} Thus, the anesthetic management of these challenging and complex VCA procedures mandates a thorough understanding of the principles and practice of transplant anesthesia,⁴ and regional anesthesia strategies as applicable to microsurgical reconstruction.⁵

Unlike solid organ transplantation (SOT), RT procedures involve significant microsurgical reconstruction. The primary intraoperative goals of regional anesthesia for RT are to maintain global and local hemodynamics and homeostasis, as well as

Box 1

Approved list of body parts classifiable as vascularized composite allografts per United Network for Organ Sharing Vascularized Composite Allograft committee designation

Upper limb, including but not limited to any group of body parts from the upper limb or radial forearm flap

Head and neck, including but not limited to face, including underlying skeleton and muscle, scalp, larynx, trachea, thyroid, or parathyroid gland

Abdominal wall, including, but not limited to symphysis pubis and other vascularized pelvic elements

Genitourinary organs, including but not limited to uterus, internal or external male and female genitalia, or urinary bladder

Lower limb, including but not limited to pelvic structures that are attached to the lower limb and transplanted intact, gluteal region, vascularized bone transfers from the lower extremity, anterior lateral thigh flaps, or toe transfers

Adrenal gland

Spleen

Musculoskeletal composite graft segment, including but not limited to latissimus dorsi, spine axis, or any other vascularized muscle, bone, nerve, or skin flap

From Gorantla VS, Plock JA, Davis MR. Reconstructive transplantation: program, patient, protocol, policy, and payer considerations. In: Subramaniam K, Sakai T, editors. Anesthesia and perioperative care for organ transplantation. New York: Springer New York; 2016. p. 554; with permission.

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