Discussion of “Microsurgical Reconstruction Following Oncologic Resection in Pediatric Patients: A 15-Year Experience” by M. Starnes-Roubaud et al.

Rebecca M. Garza, MD¹ and David W. Chang, MD, FACS^{1,2}

¹The University of Chicago Medicine, Chicago, IL; ²Section of Plastic and Reconstructive Surgery, Department of Surgery, The University of Chicago Medicine and Biological Sciences, Chicago, IL

EDITORIAL

When discussing free tissue transfer in the pediatric patient, there is often a sense of reluctance on behalf of the reconstructive surgeon. Because of real or perceived differences between pediatric and adult patients, surgeons have cited microsurgical technical, patient-related, and emotional factors for this reluctance. These include small vessel size and propensity for spasticity, small body size and associated limitation in donor sites, unpredictability of growth at both the recipient and donor site, and challenges associated with the emotional wellbeing of both the patient and family. In their article “Microsurgical Reconstruction Following Oncologic Resection in Pediatric Patients: A 15-Year Experience”, Starnes-Roubaud et al.¹ assert that “there is a paucity of literature and a knowledge gap regarding the safety and reliability of microvascular reconstruction in children undergoing oncologic reconstructions”. Yet, the authors present a large study with positive outcomes, supported by flap survival, complication rate, and patient long-term survival. This study appears to be a follow-up of a previously published study by Jacob et al., published in *Annals of Surgical Oncology* in 2010, and, as expected, the findings are similar.²

Free flaps are the preferred reconstructive method for a wide variety of pediatric problems, including oncologic, and have been performed successfully for decades. In a study of 433 free flaps in 402 pediatric patients over nearly 30 years, Upton and Guo cited a 99.8% success rate.³ The

authors also cited a minor complication rate lower than that of adult patients undergoing free flaps. Other studies report lower success rates, including the 4.8% flap failure rate reported by Starnes-Roubaud et al. in this month’s issue of *Annals of Surgical Oncology*, and a 2.2% failure rate reported by Jacob et al.² In the trauma or mixed trauma/oncology literature, flap success rates ranging from 85.3 to 96.4% have been observed, with most being at the higher end of that range.^{4–6}

Such acceptable rates of flap success indicate pediatric microsurgery is technically possible, and Upton and Guo, and others, have rejected the notion that pediatric vessels are innately more prone to spasm.³ Instead, anastomotic challenges are more likely due to error in technique or vessel handling, and even with small, spastic vessels, success is possible, as supported by the pediatric replantation literature. Other favorable factors in pediatric microsurgery are the lack of comorbidities, lack of scar tissue, and wound-healing potential. There are, of course, exceptions, with many patients requiring reconstruction for oncologic or congenital reasons with malnutrition, medical problems, and previous chemotherapy and/or radiation. Importantly, Starnes-Roubaud et al. associated neoadjuvant chemotherapy and radiation with increased rates of immediate flap complications, the most common of which was wound infection.

If we accept that microvascular reconstruction is not only feasible but also successful, then we can examine indications in greater depth. In general, defects that require, or would benefit from, free flaps in adults should also be addressed with microsurgery in children and adolescents. There is no better reconstructive alternative than a free flap for many defects, including complex defects of the skull base, head and neck, or mandible.^{7–9} Similarly, upper and lower extremity limb salvage would not be possible in many cases of sarcoma reconstruction without free

flaps,^{10,11} and good functional outcomes with high rates of ambulation are achieved.^{2,5,10,11}

Other benefits of skin, muscle, myocutaneous, fasciocutaneous, and osseous flaps are their characteristic proportional growth with the recipient site, their durability over time, and, oftentimes, superior cosmesis.^{2,3,10} However, growth at the recipient site can prove problematic. In the mandible and lower extremity, free vascularized bone transfers may require revision surgery for malocclusion or limb-length discrepancy.^{5,10,11} Furthermore, with the fibula donor site, although it is uncommon for limb-length discrepancy to result, valgus deformity at the ankle and increased rates of toe flexion contractures, compared with adult patients, have been observed.⁸

Therefore, it is critical to consider issues specific to pediatric patients in regard to microvascular reconstruction. The disease characteristics (i.e. tumor site and pathology), surgical approach, and growth potential of both the donor and recipient site are different than in adults. High patient survival rates, as highlighted by Starnes-Roubaud et al. and others, along with ongoing growth, translate to more surgery for these pediatric patients, with high revision rates, such as the 41% reported by Jacob et al. and 47% reported by Organek et al.^{2,5} Revisions and prolonged rehabilitation can have a significant impact on a child and his or her family.

Discussion of the appropriateness of free flap reconstruction in the pediatric population has spanned decades and is no longer necessary. As a specialty, we have now shifted our attitude away from reluctance and toward acceptance of free tissue transfer as one of many acceptable treatment modalities for congenital, oncologic, and traumatic reconstructions in children. Studies that focus on the unique aspects of pediatric microsurgical care, both

acute and in the long-term, will help stimulate refinements in our current practice. This will allow us to provide even better care for a unique patient population that will benefit greatly in the long term.

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