Microvascular surgery stands a glowing testament of human potential to dream and to achieve the impossible. It demands a fine balance of surgical precision and knowledge of regional anatomy under magnification. Its is a surgery done under magnification, with the use of loupe or operating microscope and precised instruments to anastomose vessels nerves, lymphatics. The technique to repair small, severed nerves and vessels has made a major impact to reconstruct and restore the form and function to individuals impaired by trauma, cancer, postburn, and congenital deformity.

Microvascular surgery had its foundation laid by Alexis Carrel with his studies on vascular anastomosis influenced by the work of Jacobson, Harry J. Buncke, often called “the father of microsurgery,” remodeled his garage into a laboratory and with the help of his wife, Constance, a dermatologist, worked on microvascular anastomoses. His first successful replantation of rabbit ear on vessels of diametra as small as 1 mm in 1964 opened the gates for the advancements in the field of microvascular surgery in leaps and bounds and by the next half century, plastic surgeons truly earned their names, with their ever-improving ability to mold tissues at will.

Microvascular surgery today is an invaluable tool in a reconstructive surgeon’s armamentarium and enjoys a wide range of clinical applications ranging from isolated and composite-free tissue transfers, transplantations, and has an established role in other disciplines such as neurosurgery, urology, gynecological surgery, ophthalmology, otolaryngology, and oncosurgery allowing for soft tissue coverage and function after trauma and postoncologic resections.

Although the number of centers where microsurgical work is being practiced has significantly improved, there is a wide hiatus in need for quality training and the availability of training facilities. The learning curve of microvascular repair is steep and any novices should achieve a 90% successful repair rate in laboratory and vascular repair before attempting a free tissue transfer.

In the reconstructive ladder, microsurgery is not a first choice, but it can offer the reconstructive surgeon a technique to achieve complex reconstruction with composite-free tissue transfer from distant sites; microsurgery becomes the best option for closure of the defect where coverage for skin, mucosa and bone, and during postoperative period radiation is required; these cannot be reconstructed using more traditional techniques such as primary closure, healing by secondary intention, skin grafting or local or regional flap transfer. Microsurgery is providing new ways of reconstruction in these patients.

With the ever evolving technology and finer instrumentation, surgeons ventured into newer realms such as supermicrosurgery dealing with vessels of <0.8 mm in diameter and lymphatic microsurgery which, a century ago, could have been deemed next to impossible. The introduction of perforator concept aided in the design of newer flaps and lesser donor site morbidity. The availability of vascular couplers and clips and superior diagnostic imaging modalities made the surgery fast and precise. Innovations in technology aid in better flap monitoring with newer devices such as implantable Dopplers and infrared devices. All these advances reflect in significantly improved survival rate of free and composite tissue transfers.

The recent availability of embracing robotics in microsurgery comes with a lot of benefits: small incisions, the ability to manipulate instruments three dimensionally, and at the same time providing superior magnification. Robotics also increase the motion scaling at the same time helps with tremor filtration, a huge advantage while doing precision work.

The future of microvascular surgery is bright and clear. Developments in immunosuppressive medications and the ongoing research in minimizing transplant rejection are set to play a pivotal role in tissue transplantation. With the encouraging results in face and hand transplantation, microvascular surgeons are going to be in the drivers’ seat in the future of tissue allotransplantation.
