Redefining tomorrow: the evolution of plastic and reconstructive surgery

In the ever-evolving field of modern medicine, plastic and reconstructive surgeons play an essential role as innovators, collaborators, and leaders in various subspecialties such as microsurgery, hand surgery, breast reconstruction, nerve repair and others (1). As Paul Cederna (past president of the Plastic Surgery Foundation) once stated, "*our goal is to give back what was lost—we strive to do the impossible and many times, we achieve that goal*" (2). Plastic surgeons extend beyond traditional bounds of medicine where art meets science, and where surgeons, like sculptors, restore form and function to ultimately enhance patient outcomes and quality of life (3). This significant impact on clinical practice becomes evident when considering that nearly half of the top fifty most-cited papers in the discipline have introduced a novel or modified surgical technique (4). In this editorial, we delve into the polygonal role of the modern plastic surgeon, exploring how their pursuit of excellence has positioned them as leaders in transformative medicine.

As pioneers in their domains, plastic and reconstructive surgeons exemplify leadership in fields that demand outstanding technical expertise and cutting-edge thinking, driving advancements and setting standards of care (5). Venturing into a realm never before explored, Sir Harold Gillies, the father of modern plastic surgery, took action where the science of healing seemed vanquished by the science of destroying for facially disfigured soldiers. While plastic surgery had not yet evolved into a formal discipline, he laid the foundation for future surgeons by refining existing techniques and creating new ones in a brave attempt to restore what war had inflicted (6). Years later, a French team embarked on a similar goal and marked a significant milestone in medical history by performing the first facial allotransplantation. Despite numerous challenges, this initial effort paved the way for over forty patients today (7). In a similar light, Dr. Harry J. Buncke stepped into uncharted territory, revolutionizing surgical techniques by anastomosing less than 1-mm vessels. It is to his first successful "microminiature" reimplantation of a rabbit's ear that we owe free flaps, microvascular transplants, and even nerve repairs (8). His contributions have allowed for tremendous progress in hand reconstruction with breakthroughs such as the supercharged end-to-side anterior interosseous to ulnar motor nerve transfer for intrinsic musculature reinnervation (9). While our initial discoveries mark significant advancements, it's through the process of innovation that they evolve and adapt over time.

Innovation incorporates turning a visionary concept into a practical application that expands our capacity and understanding, a principle vividly embodied by reconstructive surgeons. These physicians are at the forefront of innovation, constantly striving to develop new methods to improve patient care (10). In the face of significant overlap between fields of surgical practice, there is a constant need for plastic surgery to distinguish itself and in turn advance the specialty (11,12). The ideal cycle of translational research involves discovering problems in a clinical setting, engineering solutions, and then implementing these innovations back into surgical application. Bridging this gap was seen when surgical techniques used in major limb amputations had largely remained static until the introduction of targeted muscle reinnervation. Myoelectric prostheses driven by electric signals produced by contracting muscles in the residual limb have allowed for more natural and intuitive movements while simultaneously eliminating common complications following amputations (13,14). Similar technological advancements are seen in the 3D bioprinting of soft tissue engineering and virtual surgical planning using artificial intelligence (15,16). These advancements not only improve surgical precision but also expand the repertoire of treatment options available to patients, particularly in complex cases requiring intricate reconstructive procedures (17,18).

Interdisciplinary collaboration is integral to the practice of plastic surgery. Surgeons work closely with colleagues from various specialties, to provide comprehensive care for patients (19). Overlap between scopes of numerous surgical specialties often combine expertise and efforts towards optimal patient care as a common objective (20). Whether it be to perform intricate lower extremity reconstruction alongside orthopedic surgeons or collaborating with oncologists on complex breast cancer reconstruction, these partnerships enhance patient outcomes and expand treatment options (21,22). Likewise, collaboration with non-medical healthcare professionals is paramount to the attainment of optimal functional results. Most often observed following hand surgery, hand rehabilitation with occupational therapists is a crucial postoperatively step to ensure adequate recovery and return to baseline (23). By working in tandem with other experts, we ensure a holistic treatment approach that addresses both functional and aesthetic concerns, thereby optimizing patient outcomes.

This series of *Annals of Translational Medicine* presents a collection of articles on how the modern plastic and reconstructive surgeon symbolizes the quintessential nature of surgical advancement and occupies a central role in the continuum of patient care, collaboration, and leadership. The firm commitment of the authors to advancing the field, coupled with their expertise in specialized areas, positions them as key members in this contemporary era of medicine. As we journey to explore their latest discoveries, we recognize their collective efforts and contributions to this series.

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