Preface

Robotics in Plastic Surgery

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It is my privilege to guest edit this issue of *Seminars in Plastic Surgery*, dedicated to the topic of robotic applications in plastic surgery. Originally, robotic surgical research was funded by NASA and the military to facilitate remote operations in forward areas and near-space, where surgical subspecialists are in short supply. It turned out that these remote applications were not immediately practical, and the technology was licensed to Intuitive Surgical (Sunnyvale, CA), maker of the DaVinci, for minimally invasive, on-site surgery. The company designed the first generation surgical robot for minimally invasive cardiac surgery.

Although this application never gained a strong foothold, a group of innovative urologists applied the platform to prostate surgery, and the modern era of robotic surgery was born. As the readers are well aware, robotic surgery has come to dominate minimally invasive applications in many of the surgical subspecialties. Plastic surgeons do not often engage in minimal access surgery, so we are relative latecomers to robotic surgical technology. Despite this, robotic plastic surgery has begun to gain momentum in several key areas that we will feature in this issue.

Minimal access is only one, albeit important benefit of the surgical robot. The other is precision and in plastic surgery, almost everything we do requires high levels of precision. The robot has 100% tremor elimination, and up to 5:1 motion scaling, endowing it with superhuman precision. Robotic microsurgery has emerged as the quintessential example of how this can be applied to benefit our specialty and patients. In this issue, we highlight both the learning curve of robotic microsurgical training and the advantages of robotics in a busy, microsurgery practice.

Much of what plastic surgeons do is reorganization of the skin itself, making incisions a necessary evil. Despite this generality, there are green-field opportunities to perform minimally invasive procedures in plastic surgery. In this issue

of *Seminars*, we highlight robotic harvest of the latissimus dorsi muscle and rectus abdominis muscle as examples of procedures where traditionally long incisions can be reduced to virtually nothing. In addition, we feature robotic surgery of the brachial plexus as an example of how treatment paradigms can change. In this case, the ability to not only explore, but perform minimally invasive nerve repair and grafting may allow early exploration and repair to replace watchful waiting as the primary approach to closed brachial plexus injuries.

Transoral robotic surgery is a unique area that has been developed by head and neck surgeons to treat early-stage cancer. By attaining locoregional surgical control without a mandibulotomy, both surgical morbidity and high-dose chemoradiation can be avoided. Transoral robotic reconstructive surgery has an important role in reconstructing minimally invasive resections by providing access to complex and severely physically constrained oropharyngeal anatomy. This pioneering work in head and neck oncology has paved the way for robotic applications in pediatric cleft and velopharyngeal surgery, where space is at a premium and precision is a must.

Robotic plastic surgery is still in its infancy, but we are close to entering the steep part of a curve that will provide us with smaller, more organic machines, augmented reality systems, surgical decision algorithms, much higher levels of precision, life-like haptics, and processing speeds beyond our wildest imaginations. This is a very exciting time to be a robotic plastic surgeon. The articles in this edition of *Seminars in Plastic Surgery* represent some of the early forays into this new discipline. I invite the reader to allow his or her imagination to wonder, not only to the present applications in robotic plastic surgery, but to the amazing possibilities that lie in the future.

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