Brachial plexus surgery, the “orphan drug,”
whose time has come

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Patients with brachial plexus lesions frequently develop devastating neurological deficits and experience disabling pain. Brachial plexus surgery demands an exacting anatomical approach to a broad array of lesions, including injuries, entrapments, and tumors. Versatile, innovative, and creative surgeons can address the lesion, restore important function, and reduce pain. Often, this demands a broad multidisciplinary approach to a common problem, targeting not only the peripheral nerve, but also the brain, spinal cord, muscle end-organ, bone and joints, and their complex interactions. Success entails enlisting the talent, energy, enthusiasm, and inspiration of others to optimize the preoperative evaluation, perioperative management, and outcome.

Brachial plexus surgery is in evolution. In the past, patients with brachial plexus lesions may have been treated with amputation or benign neglect, “solutions” that avoid the very nature of the problem. Fortunately, these interventions are rarely offered today, because advances in all aspects of evaluation and management have significantly improved functional results. Important progress in electrodagnostic studies allow evaluation of motor and sensory pathways at the spinal cord/spinal nerve level, whereas imaging allows a more accurate appreciation of avulsive injury to spinal nerve and rootlets or relationships of tumors to nerves. New surgical methods provide a greater number of options for reconstruction—adding new extra- and intraplexal nerve transfer, functioning free muscle transfer, and spinal reimplantation to time-honored methods—enabling surgeons to strive for restoration of hand function. For brachial plexus nerve sheath tumors, a fascicular level resection of tumors and preservation of uninvolved fascicles is now possible. Neuropathic pain may be improved by a dorsal root entry zone lesion procedure.

Current challenges and limitations present novel opportunities. Clearly, more work needs to be done, as there are many remaining unanswered questions. Just as major discoveries have been made in the past several decades, future advances are certainly likely, including further refinements of existing techniques and new innovations. For future progress to occur, it is critical that surgeons be committed not only to providing current state-of-the-art care, but also to continuing to evaluate results, develop innovative new techniques, and participate in clinical and applied basic science research. We must be dedicated to challenging existing assumptions, discovering new interventions, and achieving better functional outcomes.

Longevity, even perpetuity, in this field necessitates the maintenance of interest and excellence among future generations. This entails exposing and teaching our students, as well as motivating them. Currently, few residents are adequately trained in this type of surgery, and fewer still become interested enough to pursue it. Thus, a focus on education is critical for the future.

State-of-the-art operative care, practiced at relatively few centers, is best performed by a team with expertise in spinal, peripheral nerve, microvascular reconstruction, bone and joint techniques, and tendon transfers. The current best practice is a complex multidisciplinary evaluation and intervention requiring cooperative care from neurology, radiology, rehabilitation, pathology, and surgery.

Despite the advances in this field, not to mention the fact that lesions affecting the brachial plexus are not that rare, brachial plexus surgery is, in many respects, the orphan drug of neurological, plastic, orthopedic, and hand surgery. Much good work has been conducted by a relative few, with limited resources. Several pioneers have championed the vision: the art and the science. It is time for a change. We must be the visionaries who inspire others to believe.

This edition of Neurosurgical Focus on Brachial Plexus surgery highlights some of the ongoing controversies and the excitement. For this, we have assembled an international cast of authors from different specialties to tackle these subjects. This issue summarizes our collective excitement for brachial plexus surgery. Hopefully this edition will provide a charge and a change for the future.