TRAUMATIC brachial plexus injury (TBPI) is relatively uncommon, occurring in just over 1% of trauma patients.1 While the incidence may be low, the impact TBPI can have on patients and society is substantial. These injuries predominantly affect young male patients in their peak employment years, and a sizable proportion of patients who suffer TBPI may not be able to return to work even after surgery. Needless to say, the lifelong psychological and physical morbidity of TBPI carries substantial socioeconomic weight.

The peripheral nerve responds to injury through a process of Wallerian degeneration followed by regeneration.4 The ultimate degree of recovery is dependent on the amount of disruption to the nerve. In a seminal work, Sunderland described 5 grades of peripheral nerve injury based on damage to the nerve’s architecture.13 Grades 1 and 2 often recover well on their own, but more severe injuries to the nerve have a more guarded prognosis, with almost no recovery expected for grades 4 and 5. The pathophysiological basis for this impaired recovery is disruption to the endoneurium, perineurium, or epineurium. Damage to these structural components prevents proper regeneration, as the growing nerve fibers are no longer guided towards their target, with resulting attrition and misdirection of nerve fibers.12 Sharp laceration or avulsion injuries are considered Sunderland grade 5 and surgery is typically performed as soon as possible for these patients.3 Severe blunt and stretch injuries to the peripheral nerve present a challenge to surgical decision-making, as there is often a combination of Sunderland grades within the same nerve. Although these injuries do not typically transect the nerve, there is enough damage to the structural connective tissue layers that there is little chance of appropriate nerve regeneration. This leads to a neuroma in continuity.12

While allowing nature to take its course may result in a favorable functional outcome, many patients fail to improve after TBPI.8 Surgical intervention may help these patients to regain improved function after TBPI. Surgical options include neurolysis, interpositional nerve grafting, and/or nerve transfers. Unfortunately, there is significant variability from surgeon to surgeon regarding the choice of operation and the appropriate timing of surgical treatment, with limited consensus.2

In the current issue of the Journal of Neurosurgery, Martin and colleagues present their article, “Timing of surgery in traumatic brachial plexus injury: a systematic review.”10 In this paper, the authors have correctly identified an area of controversy in peripheral nerve surgery: does early surgical intervention for traumatic blunt or stretch injuries to the brachial plexus affect outcome? Disagreement on the topic exists because although animal models have demonstrated that delayed nerve repair dramatically hampers the regenerative capacity of the injured nerve,6 it is believed that surgery performed too early will impede spontaneous recovery, which may be superior to the surgical outcome.9 Hence, the authors sought to thoroughly summarize the existing data on the topic as they have done in this systematic review.

First, Martin and colleagues should be commended for their thorough review of the topic. They conducted this systematic review in adherence to PRISMA guidelines, and report their findings in a comprehensive, yet accessible manner. Their search criteria returned 1161 citations, of which 43 were eventually included in the review. Unsurprisingly, only 7 of the studies included were prospective trials. Because of tremendous heterogeneity in the published works, the authors appropriately did not perform a meta-analysis on their data. Nonetheless, they did perform a valuable qualitative synthesis and report several interesting findings.
Of the included studies, participant demographics were as expected; the majority of participants were young (median age 28 years) males (89.15%). Operations performed included nerve transfers, nerve grafts, and neurolysis alone or in combination. Median time to surgery was 6 months. The authors found that patients operated on before 6 months had a better recovery, when assessed by the Medical Research Council (MRC) muscle grading system, than those who waited for longer than the 6-month median. This trend seemed to continue in the studies that assessed the effect of operating on patients even earlier than 6 months, with one paper (that captures the European Medical Research Council (MRC) muscle grading system, than those who waited for longer than the 6-month median. This trend seemed to continue in the studies that assessed the effect of operating on patients even earlier.

The senior author (R.M.) of this editorial has personally altered his practice over the last 20 years to surgically explore all patients with TBPI failing to improve earlier, often by 3–4 months, and no later than 6 months, a trend that is evident in most peripheral nerve surgery centers. Correspondingly, it is incumbent upon surgeons and other medical practitioners to refer patients who sustain TBPI without delay to a peripheral nerve expert.

In conclusion, this systematic review is a useful addition to the existing literature on surgical timing for TBPI. Published studies seemingly support early surgical intervention for these injuries; however, the most valuable contribution this paper makes may be highlighting the need for more robust trials to determine the optimal management of patients with TBPI. That, in itself, is a considerable accomplishment, and for it the authors deserve to be thanked.

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Disclosures
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Response
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Even though TBPIs are not common, they often have disabling physical and psychological consequences as excellently highlighted by Eagles and Midha.2,4 Whereas some advocate delayed surgery, especially in case of potential recovery, others argue that early surgery results in better outcomes.1,3 We reviewed all available evidence and found that delays beyond 6 months significantly deteriorate recovery. However, pooling of all accessible individual-level patient data showed that even better results are noted in patients operated on within 3 months after injury. Unfortunately, due to large heterogeneity among studies and unclear preoperative deficits in many studies, a full meta-analysis could not be performed. Interestingly, Pondaag et al. found in a recent prospective study that all
5 TBPI patients operated on within 2 weeks after injury recovered to an MRC grade 4 biceps power. During the same time period only 54% of their patients operated on after 2 months’ delay recovered to the same muscle grade. This might further indicate that the widespread practice of waiting for at least 2–3 months should be reconsidered. However, more prospective studies on the ideal timing of traumatic plexus lesions are needed. Ideally, large trials need to be conducted to evaluate ideal candidates for early intervention.

References


