Neurologic Complications Following Peripheral Nerve Block in Foot and Ankle Surgery

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INTRODUCTION:
It is often challenging to determine the exact cause of nerve injury following peripheral nerve block (PNB). The etiology of pathologic sequelae is likely multifactorial and may be influenced by the type of PNB, choice of local anesthetic and adjuvant, level of conscious sedation during PNB administration, and use of ultrasound guidance or nerve stimulation. This study examines the incidence of postoperative neurologic complications following use of PNB in foot and ankle surgery. The primary goal is to identify the PNB with the greatest neurologic complication rate as reported in the literature and to characterize the symptomatology of these deficits. Additionally, this study will investigate possible risk factors related to block administration.

METHODS:
A bibliography search was conducted in MEDLINE, PubMed, and Cochrane from 2012 to 2023. Included studies were those that analyzed neurologic complications following use of peripheral nerve block in foot and ankle surgery. Studies that included pediatric or pregnant populations were excluded, along with those that involved orthopedic surgeries other than foot and ankle. The Methodological Index for Non-Randomized Studies (MINORS) scale was used to evaluate risk of bias. The primary outcome was complication rate, which included neurologic complications, defined as sensory or motor nerve dysfunction or unresolved pain beyond what would be expected in the postoperative course. Secondary outcome measures included choice of local anesthetic, use of adjuvant, patient position and level of patient sedation during block administration.

RESULTS:
A total of 15 studies met criteria for inclusion. Among 6,014 total patients, 794 reported neurologic complications (13.2%). Of these, 2.9% (175 out of 6,014) had symptoms that remained unresolved at last follow-up. 97% of nerve deficits were sensory (770 of 794), 1.8% were motor (14 of 794), and 1.3% were mixed (10 of 794). Popliteal block had a complication rate of 11.7% (265 of 2,259), the highest of any solitary block; of these patients, 11 developed complex regional pain syndrome. Complication rates for bupivacaine and ropivacaine were 8.8% (243 of 2,778) and 24.1% (330 of 1,367), respectively. Motor complications were greater with Bupivacaine (3 of 243) than ropivacaine (1 of 330). Lastly, comparison of adjuvants yielded complication rates of 24.3% with epinephrine (89 of 267) and 15.5% with corticosteroids (277 of 1,784).

DISCUSSION AND CONCLUSION:
While most neurologic complications after PNB involve transient paresthesia followed by spontaneous resolution, some patients develop long-lasting symptoms resulting in chronic pain and motor compromise. Future randomized controlled trials are needed to examine dose-dependent effects of commonly used adjuvants and local anesthetics and to explore predictors of recovery in patients with self-limited nerve injury. Implementation of a screening protocol to identify at-risk patients should be considered given the prevalence of comorbid mood disorders in those with complex regional pain syndrome and evidence of altered nerve physiology in patients with diabetic neuropathy. While continuation of current risk mitigation strategies is paramount, there is still a gap in knowledge with regard to the effect of previous neurologic dysfunction, such as Bell's Palsy and Guillain-Barre Syndrome, and whether this predisposes to further nerve injury.