Ultrasound-Guided Popliteal Sciatic Nerve Block for an Ankle Laceration in a Pediatric Emergency Department

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Abstract: Although ultrasound-guided peripheral nerve block has recently been introduced into pediatric emergency departments, knowledge of its use is limited. We present here a case demonstrating the safety and effectiveness of ultrasound-guided popliteal sciatic nerve block for a pediatric spoke injury in a pediatric emergency department setting.

Key Words: point-of-care ultrasound, popliteal sciatic nerve block, lacerations

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CASE

An otherwise healthy 6-year-old boy injured his left ankle after it was caught in the spokes of a bicycle wheel. He presented with a large left ankle laceration. Upon arrival at our ED, the patient complained of severe ankle pain and refused to bear weight.

On physical examination, his vital signs were appropriate for his age. The patient had a 7-cm laceration extending from the midposterior to the lateral side of the ankle without active bleeding or an Achilles tendon tear. The patient did not experience numbness in his toe or plantar area, and his dorsalis pedis artery pulse was normal. The range of motion of his ankle was slightly limited owing to severe pain (8 on the visual analog scale). To avoid administering large doses of narcotics for pain and subcutaneous lidocaine for laceration repair, the treating team elected to perform ultrasound-guided popliteal sciatic nerve block (UGPSNB) for management of this injury. A pediatric emergency physician who had undergone ultrasound training for 2 years performed the UGPSNB with administering an 8-mL (0.4 mL/kg) injection of 1% lidocaine. Ten minutes after the injection, the patient’s pain lessened significantly (1 on the visual analog scale). The ankle x-ray did not disclose any fractures or foreign bodies. Wound irrigation and laceration repair were painless for the patient, and the procedure was performed without narcotics and additional local anesthetic injections. After the procedure, the patient was discharged without any complications.

ULTRASOUND TECHNIQUE

Point-of-care ultrasonography was performed in the following way: a 6 to 13 MHz high-frequency linear transducer was placed transversely in the popliteal fossa with the patient in a prone position (Fig. 2). The popliteal artery and vein were visualized. The common peroneal and tibial nerves are located superficial and lateral to these vessels (Fig. 3). When the transducer was slid cephalad and from the lateral side of the leg toward the confluence of the common peroneal and tibial nerves, the sciatic nerve was visualized as an oval, honeycomb structure (Fig. 1). The skin was sterilized with an alcohol wash. Under ultrasound guidance, a 23-gauge needle (60 mm in length) was inserted in-plane and from the lateral side of the popliteal fossa toward the nerve. Ten minutes after the injection, the patient’s pain lessened significantly (1 on the visual analog scale). The ankle x-ray did not disclose any fractures or foreign bodies. Wound irrigation and laceration repair were painless for the patient, and the procedure was performed without narcotics and additional local anesthetic injections. After the procedure, the patient was discharged without any complications.

ULTRASOUND FINDINGS

Point-of-care ultrasound demonstrated the sciatic nerve as an oval, honeycomb structure in the distal femur superficial and lateral to the popliteal artery and between the biceps femoris and semimembranosus muscles (Fig. 1).

FIGURE 1. Point-of-care ultrasound through the popliteal fossa. Two oval, honeycomb-like structures, the common peroneal nerve and the tibial nerve, can be seen lateral and anterior to the popliteal artery and vein. CPN indicates common peroneal nerve; PA, popliteal artery; PV, popliteal vein; TN, tibial nerve.
The mechanism of ultrasound-guided peripheral nerve block (UGPNB) in children. The ultrasound technique increased the success rate with a risk difference of -0.11 (95% confidence interval, -0.17 to -0.05) compared with the traditional blind technique. Moreover, the number of studies on UGPNB in pediatric EDs has recently been increasing. Turner et al demonstrated that an ultrasound-guided femoral nerve block provided effective pain control for pediatric patients with femoral fractures. Frenkel et al reported that an ultrasound-guided forearm nerve block provided effective pain control for pediatric forearm injuries without sedation. These studies showed that UGPNB may allow avoidance of unnecessary sedative and narcotic use and may be useful for pediatric patients who are unable to undergo procedural sedation due to their nothing-by-mouth status or previous adverse reaction to sedative medications. Furthermore, as in the presented case, UGPSNB may be useful for cases in which the dose of local anesthetics approaches toxic levels owing to the size of the wound.

Comlications of peripheral nerve block are nerve injury, local anesthetic toxicity, hematoma formation from vessel puncture, and puncture site infection. Although the literature reporting the complication rate of UGPNB is limited, in patients who underwent regional anesthesia, the Pediatric Regional Anesthesia Network demonstrated that the overall complication rate of popliteal sciatic nerve block with and without ultrasound was only 0.6%, and no systemic toxicity was recognized.

Although nerve injury is a serious complication, and studies of the neurological complication rate in pediatric UGPSNB are scarce, no neurological complications were encountered in the Pediatric Regional Anesthesia Network study. The mechanism of nerve damage is mechanical, chemical, or ischemic and mainly caused by direct needle trauma due to the injection of local anesthetics. The symptoms of popliteal sciatic nerve injury are pain, paresthesia, and motor dysfunction including the loss of plantar flexion or drop foot. Nearly 90% of patients with a sciatic nerve injury experience immediate onset of symptoms, and the duration of the action of lidocaine is 1 to 2 hours. Hence, if patients experience prolonged numbness or motor dysfunction, nerve injury should be suspected. If any of these symptoms occurs, its cause should be clarified before the patient is discharged. The prognosis of patients with nerve damage is good; the spontaneous recovery rate is 84%, and the symptoms mostly resolve within a few months. Therefore, if neurological symptoms persist, proper orthopedic follow-up is important. In addition, real-time ultrasound guidance is effective in preventing vessel punctures leading to local anesthetic toxicity and nerve injury because the method allows the amount of local anesthetics and intrafascicular or intraneuronal injection to be reduced through direct visualization of the injury.

The sciatic nerve extends from the sciatic plexus to the common peroneal nerve and tibial nerve is seen lateral and anterior to the popliteal artery. PA indicates popliteal artery; ScN, sciatic nerve.

CONCLUSIONS

We present a case of a child with a large ankle laceration in which UGPSNB was used successfully to provide analgesia for pain control and anesthesia for wound repair.

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REFERENCES


