Background:
Osteosarcoma patients with coexisting chemotherapy-related neuropathy or tumor-related joint restriction are at increased risk for nerve palsy leading to significant postoperative morbidity. Because of the risk of nerve injury, the use of regional anesthesia in patients undergoing limb-salvage surgery is controversial. Other factors, such as the duration of tourniquet time, may also contribute to neurological complications. We report the case of peroneal nerve injury resulting in postoperative foot drop and neuropathic pain in a pediatric patient undergoing limb-salvage surgery for osteosarcoma resection of the lower extremity following chemotherapy.

Case Report:
A previously healthy 15-year-old 81-kilogram female presented to a sports medicine physician with a one-month history of progressive left knee and thigh pain. X-ray of her distal left femur revealed an osteosarcoma. Chemotherapy was initiated with a 5-week course of cisplatin and doxorubicin. Following chemotherapy, the patient was taken to the operating room for resection of her lesion via a limb-sparing procedure. Following intubation, an epidural was placed at the L3-4 interspace and the catheter was threaded 5 cm into the space. Following a negative test dose, the epidural was bolused with a total of 6 ml of 0.2% ropivacaine administered in fractionated doses over 8 minutes. The case was uneventful. Of note, a tourniquet inflated to 250 mmHg was used during the case with a total tourniquet time of 1 hour and 3 minutes. Upon emergence, the patient’s pain was well controlled with the epidural; however, she had no sensation or motor function in her left foot. The epidural infusion was decreased but she continued to have no motor function or sensation in her left foot; the remainder of her sciatic function was intact. Over the next several days, her sensory function continued to improve and by post-operative day 4, she had regained sensation to dull stimulus on all of her toes with the exception of the areas innervated by the deep peroneal nerve. At the time of discharge, she was able to extend her left knee but was not yet able to move her toes and ankle. Sensation and motor function of the right lower extremity remained intact. At the time of this report, the patient reported some improvement in both sensation and strength in her left lower extremity; however, she has developed neuropathic pain in that extremity for which she has been started on neurontin, oxy codone, oxy contin, and robaxin.

Discussion:
The risk for peripheral nerve injury after lower extremity orthopedic procedures has been shown to be unchanged by the use of regional anesthesia techniques. However, it has been discovered that in rare situations when peripheral nerve injury does occur, complete recovery may be less likely in the setting of peripheral nerve blockade. In this patient, peroneal nerve injury resulted after osteosarcoma resection and there were numerous factors that may have contributed to her nerve injury including preoperative neurotoxic chemotherapy exposure and tourniquet inflation.

Drugs that have been shown to be most effective against osteosarcoma including cisplatin, carry the risk of neurotoxicity; in fact, peripheral sensory neuropathy is the most common dose-limiting problem associated with cisplatin therapy. It is of often not completely reversible and is characterized by painful paresthesias and numbness, loss of vibratory sense, and ataxia. There is no cure but medications such as Gabapentin, Carbamazepine, and tricyclic anti-depressants have been used to treat this chemotherapy-induced neuropathy. Although cisplatin-induced neuropathy could be responsible for this patient’s symptoms, the use of a tourniquet intraoperatively may have also contributed. Nerve injury after prolonged tourniquet inflation results from the combined effects of ischemia and mechanical trauma. Although the safe duration of tourniquet inflation remains controversial, previous investigators have advocated time limits ranging from 1 h to 3 hours. Although severe nerve injury after tourniquet use is rare, the effects of tourniquet inflation may be enhanced by surgical stretch or trauma.

The etiology of this patient’s peroneal nerve injury was multifactorial and likely secondary to the use of neoadjuvant chemotherapy, tourniquet inflation in combination with surgical manipulation, and the use of regional anesthesia. In the future, real-time intraoperative neuro-monitoring of susceptible nerves during surgery may be beneficial as abnormal somatosensory evoked potential (SSEP) findings may influence perioperative decisions and improve outcomes for these patients.

References: