INPATIENT REHABILITATION WITH A CONTINUOUS SCIATIC NERVE CATHERETER IN A PEDIATRIC PATIENT WITH REFRACTORY LOWER EXTREMITY CRPS II
Rajat Sekhar, MD; Shahryar Mousavi, MD; Donna-Ann Thomas, MD
Department of Anesthesiology, SUNY Upstate Medical University, Syracuse, New York

Abstract:
Pediatric patients with CRPS (complex regional pain syndrome) can be a challenge to treat. The goal of interventional management is to provide restoration of function to the affected extremity. This is complicated by the fact that most children cannot tolerate these procedures without sedation. We describe the case of a 13 years old female who developed CRPS after sustaining a distal fibular fracture. She failed previous non-interventional therapies including medications for pain control and physical therapy. An ultrasound-guided sciatic nerve catheter under anesthetics and administered the patient for intensive inpatient rehabilitation therapy. The catheter had 9 days in patient's leg. She was followed up as an outpatient and significant reduction in VAS (visual analog scale) score and improvement in daily function was noted.

Objectives:
1. Review the diagnostic criteria for CRPS and the challenges involved in diagnosing CRPS in the pediatric population.
2. Discuss the benefits of interventional rehabilitation and complementary medicine in the management of patient's with CRPS
3. Discuss the benefits of peripheral nerve catheter placement in the pediatric CRPS population to facilitate intensive inpatient rehabilitation

Case Presentation:
11 years old female who was referred to the pain clinic for evaluation of right foot pain after sustaining a distal fibular fracture. The fracture was treated non-surgically with 8 weeks of casting. After removal of cast, she complained of unbearable pain in the dorsum of the left foot described as a burning and stabbing sensation. This was also accompanied by alopecia and hypersensitivity in the same distribution. She noticed color changes, swelling and a decreased range of motion of the foot secondary to pain. On physical exam she had left lower extremity edema, dependent rubor, a purplish hue to the skin, decreased ROM and patchy areas of alopecia on the lateral and dorsal aspect of the foot. At this point she was diagnosed to have CRPS based on the clinical findings and the Budapest criteria. She was started on conventional treatments but failed non-interventional therapies including medications, desensitization therapy, and ultrasound-guided nerve blocks, all of which were not able to facilitate secondary to pain. Therefore, more aggressive inpatient treatment plan was drafted involving a multidisciplinary approach.

On the first day of admission, her pain was 10 on a 0 to 10 pain scale. She was then taken to the operating room for placement of an ultrasound-guided sciatic nerve catheter via the popliteal approach under general anesthesia, using ultrasound guidance. The catheter was injected with 20 mLs of 0.25% bupivacaine followed by a continuous infusion at 6 mL per hour for the duration of her hospitalization. She reported complete resolution of her pain post placement of the catheter. The patient was then transferred to the inpatient rehabilitation floor to begin her comprehensive physical therapy. She was also seen by the recreational therapist as well as the rehab psychologist. Her medications were also adjusted to Diclofenac sodium 100mg PO daily as well as Elavil 10mg at night.

Over the next 2 weeks, she noticed tremendous improvement of her leg function. At discharge, she had complete resolution of her pain. She was successfully able to walk greater than 150 feet with complete independence. One week later, she was seen at the outpatient pain clinic, where she was found to have sustained pain relief with significant reduction in VAS (visual analog scale) score. The relief persisted 4 weeks later.

Discussion:
Complex regional pain syndrome (CRPS) is a severe chronic pain condition that most often develops following trauma or surgery, characterized by an abnormal sympathetic nervous system response. CRPS can be divided into two types based on the absence (type 1, much more common) or presence (type 2) of a lesion to a major nerve. The diagnosis of CRPS is based on clinical criteria (Budapest diagnostic Criteria) CRPS is often challenging to treat and can be associated with a prolonged course of severe pain and psychosocial dysfunction for the patient. Although the pathophysiology of CRPS is not completely understood, mechanism such as a neurogenic inflammation, immunological mechanism and the role of the central nervous system have been proposed. The initial phase of the syndrome is characterized by pain, edema, change in skin temperature and color, and tissue edema. These symptoms are often associated with a diminished cutaneous blood flow, which results in few data or reports of its prevalence in the pediatric population. The suggestion that CRPS in children is a different clinical entity than that seen in the adult is probably incorrect. Recent evidence has suggested that the progression of the disease is likely due to endocrine, behavioral, developmental, and environmental factors. Recent studies have also demonstrated that unlike the adult population, about 90% of the cases reported were females in a range of 8 to 14 years, the youngest being 3 years old. There tends to be delay in recognizing the diagnosis, which may be as long as 4 months. In contrast to adults, the response to treatment, particularly exercise therapy with behavioral management will achieve almost 97% remission. Many different treatment approaches have been attempted in children, including nonsteroidal anti-inflammatory drugs, steroids, prostacyclin analog, paracetamol infusion, qtingal or immobilization, transcutaneous electrical nerve stimulation (TENS), sympathetic nerve blocks, and spinal cord stimulation, all with varying degrees of pain resolution and functional restoration. Occupational and physical therapy had the greatest impact on patient’s outcome. Due to the fear of exacerbating the pain, behavioral modifications and desensitization are very helpful. Interventional procedures may be required in severe allopia which prevents physical therapy. Procedures to interrupt the sympathetic nerves may reverse this symptom in a few children. Unfortunately, due to the unavailability of children, continuous analogues techniques such as trans axial peripheral nerve catheters or epidurals for short periods of time are effective and might have to be placed under anesthesia.

Evidence shows the possibility of untreated CRPS being expressed at a new site; it seems to be crucial not to delay all possible measures to contain and achieve a clinical resolution of the syndrome in children. A comprehensive coordinated multidisciplinary approach for the management of CRPS in children will provide the best results. We had a good outcome with this treatment plan involving a continuous peripheral nerve block catheter along with the multidisciplinary approach. This modality should be considered in the treatment of children affected with this disease as it can lead to substantial functional improvement while minimizing the stress of treatment.

References:

To make clinical diagnosis of CRPS, the following criteria must be met:
1. Continuing pain, which is disproportionate to any inciting event
2. Must report at least one symptom in three of the four following categories:
   • Sensory
   • Vasomotor
   • Sudomotor / Edema
   • Motor / Trophic
3. Must display one sign at time of evaluation in two or more of the following categories:
   • Sensory
   • Vasomotor
   • Sudomotor / Edema
   • Motor / Trophic
4. There is no other diagnosis that better explains the signs and symptoms

Demonstrates brawny edema. Reddened thickened skin. Increased nail growth of the great toe (Photos are from Reflex Sympathetic Dystrophy Syndrome Association)