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Bisphosphonate Treatment in Pediatric Charcot Neuropathy

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Introduction

Charcot neuroarthropathy (CNA) is a destructive, non-infectious cause of bone and joint destruction in patients with neuropathy. Most literature has focused on adult patients with diabetic peripheral neuropathy and injury to the foot and ankle joints, with limited data on the prevalence of CNA in pediatric patients. Limited case reports and population reviews exist and have noted occasional incidence, mostly represented by populations with spinal dysraphisms or hereditary neuropathies.

Acute CNA may present with pain, warmth, or swelling and may or may not be related to a discrete injury; where chronic CNA is often painless. Diagnosis is usually based on radiographs but may require bone scan or MRI to confirm and rule out other processes. Lab abnormalities may be present, noting increased bone turnover

Treatment of CNA in adults is based on immobilization, with some use of anti-inflammatory medications or surgical reconstruction. The bisphosphonate pamidronate has more recently been investigated as a treatment option. Limited trials have been completed with positive results however more studies are needed to better understand outcomes and optimal treatment population and dosing.

Without literature focused specifically on pediatric patients with CNA, we hypothesized that use of bisphosphonates would be a reasonable treatment option for our patient to reduce swelling and prevent further joint degeneration.

Visit Date (**Treatment)	L Knee Circumference	L Knee Temperature	R Knee Temperature
**11/6/2017	48 cm	35.8 C	34.8 C
12/14/2017	35.8 cm	35.6 C	35.2 C
**1/29/2018	35.2 cm	35.2 C	35.1 C
3/13/2018	35.6 cm	35.6 C	35.4 C
**8/22/2018	42.1 cm	35.5 C	35.3 C

Case Synopsis

CP is a 10-year old young lady with a history of a pilomyxoid astrocytoma of the spinal cord diagnosed in 2013 status post resection, resulting in residual left lower extremity paresis. She continued to be a very active young lady and suffered a left patellar fracture in 2015 with surgical fixation.

CP returned in the summer of 2017 with persistent painless swelling of the left insensate knee and she was diagnosed with CNA of the joint. Full immobilization was not tolerated and no significant improvement was noted with bracing and activity reduction. Pediatric DXA scan completed was within normal limits for age.

After literature review and discussion, decision was made with CP and her parents to trial intravenous pamidronate to reduce swelling and prevent additional damage. Left knee circumference, joint surface temperatures, radiographs, and bone turnover markers were monitored before and during treatment. See chart for measurement data – all lab values (metabolic panel, alkaline phosphatase, bone alkaline phosphatase) remained normal and consistent throughout treatment.

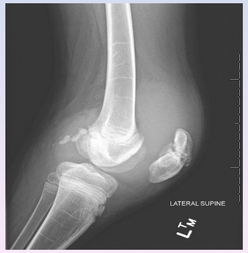
CP showed significant improvement following the initial infusion November 2017. Repeat infusion was completed 3 months later due to continued effusion with maintenance of prior good results. She was quite pleased to be wearing skinny jeans again!

CP returned the summer of 2018 with a wound of her left lateral foot and ankle requiring wound care and activity limitation. During this time, family noted increased swelling of her left knee. No new injury was reported however parents note that CP can be “careless swinging her left leg around”. Follow up assessment noted significantly increased joint circumference and pamidronate treatment was resumed August 2018.

Sept 2017

Mar 2018

Aug 2018



Discussion

Charcot neuroarthropathy is an uncommon but potentially function-limiting injury process with prolonged recovery times in active young people with neuropathies.

Cornerstones of therapy have been based on adult literature and remain immobilization and off-loading, however patients often require surgical intervention despite conservative management.

Literature notes that bisphosphonates may slow or stop bony destruction through inhibiting osteoclastic resorption and may also have anti-inflammatory properties. However studies have been focused on adult CNA and remain very limited and variable in outcomes, often focused on the acute phase versus chronic CNA.

In the case of CP, she had limited to no response to conservative management and the family and team wished to avoid surgical intervention of joint replacement as long as possible, given her young age and activity level.

CP appeared to respond well to IV bisphosphonate use with significant improvement in joint effusion. Currently, we are using joint circumference, effusion, and joint xrays to monitor the joint health as at baseline, CP did not have significant osteoporosis or lab abnormalities in bone turnover markers. Her summer set back is of unknown cause – a probable injury to the insensate joint.

At this time, CP’s course remains uncharted. We continue to follow CP clinically and plan to follow up after her most recent infusion, likely continuing pamidronate infusions every 3-6 months until improvement of the effusion/joint is noted.

Additional research is certainly needed in this area and we hope to continue to add data regarding CP’s continued journey.

References

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