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COMPLEX REGIONAL PAIN SYNDROME OF THE FOOT AND ANKLE: TREATMENT AT THE EARLY ONSET WITH AN ANESTHETIC ANKLE BLOCK

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Background: Complex regional pain syndrome (CRPS) is a potentially severely painful and debilitating disorder that frequently affects an extremity after surgery or even a minor injury. Treatment of CRPS can be challenging, and due to some patients' co-morbidities, treatments may be limited.

Case Report: Retrospective review of 20 patients who were diagnosed with CRPS of the foot and/or ankle early (within 45 days of onset) and who were adjunctively treated with ring-type ankle blocks of bupivacaine with dexamethasone. Patients who benefited from the treatment were monitored for 12 months.

Conclusion: When CRPS of the foot and/or ankle was diagnosed early and adjunctively treated with one or two 2 ankle blocks of bupivacaine with dexamethasone, the condition resolved completely for 18 of the 20 patients (90%). The ankle block is a simple, safe treatment with the potential to assist in alleviating CRPS of the foot and/or ankle when the condition is diagnosed early.

Key words: Ankle, ankle block, complex regional pain syndrome (crps), foot, local anesthesia

BACKGROUND

Complex regional pain syndrome (CRPS) is a chronic neuropathic pain condition that generally affects an extremity following surgery or trauma—even minor trauma—and can potentially spread to other extremities and become disabling. The disorder involves autonomic and inflammatory abnormalities. With CRPS, the afflicted person experiences pain that is greater in magnitude and/or duration than would be typically expected from the surgery or traumatic inciting event (1-3). The pathophysiologic mechanism underlying CRPS is not fully known, but it is believed that the inciting event—considered an injury—triggers abnormal processes in both the peripheral and central nervous systems, causing dysfunctional neuroplasticity and an excessive immune and inflammatory response (1,4-6).

While the inciting injury that causes CRPS cannot always be identified, the literature suggests that it is believed to be a nerve injury, and in some cases, even a trivial one (7-9). There are 2 subtypes of CRPS: type 1, in which the specific nerve injured is uncertain, and type 2, in which the injured nerve is identified (5). The majority of patients diagnosed with CRPS appear to have type 1, though it has been suggested that some type 1 CRPS patients are routinely misdiagnosed as type 2 (10,11).

No matter the determination of the syndrome type, treatment for CRPS is the same. It includes physical therapy; anti-inflammatory, neuropathic (i.e., gabapentin), biophosphonates, the antioxidant ascorbic acid and/or narcotic medication; and sympathetic nerve blocks or continuous regional anesthesia or trigger point injections (1,5,12-14). In the late stages, other treat-

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ments include implantation of a spinal cord stimulator, sympathectomy, or controversially—amputation of the limb (3,15-18). In CRPS type 2, where the nerve has been determined, there has been success with targeted nerve procedures such as decompression or denervation (11,19-21). However, regardless of the treatment prescribed, one of the most vital factors in improving the outcome of CRPS is its early diagnosis and the start of treatment as early as possible (22-25).

A hypothesis, based on the early diagnosis and treatment of CRPS, combined with the potential beneficial effect of sympathetic blocks for the treatment of CRPS and the analgesic effects of adding dexamethasone to bupivacaine for nerve blocks, showed that early diagnosis of CRPS of the foot and/or ankle and immediate adjunctive treatment with a ring-type anesthetic block of of the ankle consisting of bupivacaine mixed with dexamethasone may be beneficial (26-30). No case series or study considering this treatment regimen for CRPS of the foot or ankle was found in the literature. Nonetheless, the results of this approach are now reported in the form of a case series review.

CASE REPORT

Study Design

This retrospective, single-center case series identified patients diagnosed with CRPS who underwent adjunctive treatment with a ring-type anesthetic block of bupivacaine mixed with dexamethasone ("ankle block"). Personal identifying information was removed to maintain confidentiality. The patients' records were reviewed to select those individuals for the study based on the inclusion and exclusion criteria.

The inclusion criteria were: (1) CRPS of one foot and/or ankle diagnosed using the Budapest criteria (31,32); (2) an identifiable inciting event (e.g., surgery or trauma); (3) diagnosis and administration of the ankle block within 45 days from the inciting event; and (4) monitoring of the patient for a minimum of 12 months after the ankle block.

Exclusion criteria consisted of a history of drug or alcohol abuse, or long-term narcotic use (considered to be 60 days or longer); a history of prior CRPS on any extremity; chemotherapy treatment; coagulopathy; systemic neurological or connective tissue problem; peripheral neuropathy; radiculopathy, plexopathy, or sciatica; currently experiencing significant low back pain (rated by the patient as 3 or greater on the visual analog scale) suggesting a possible undiagnosed nerve impingement; infection; or peripheral vascular disease in the affected extremity.

Procedure

Upon diagnosis of CRPS in the foot/ankle, after informed consent was obtained, a ring-type ankle block was performed on the affected limb. A total of 20 cc of bupivacaine 0.5% plain was mixed with 2 cc (8 mg) of dexamethasone. This technique of performing an ankle block is well-described in the literature and is generally safe and relatively easy to perform (33-36). In patients where the anatomical landmarks of their ankle are difficult to identify, diagnostic ultrasound can provide assistance. The ankle block should not be performed on patients with allergy or hypersensitivity to the drugs utilized or those persons who have other conditions that would preclude its safe use.

Patients were instructed to immediately begin range-of-motion (ROM) exercises, were prescribed gabapentin, and instructed to return in one week. The ROM exercises involved gently moving the ankle up and down and side to side 30 times, 4 times a day. However, depending on the extent and nature of the inciting event, these exercises were modified. Physical therapy was also prescribed for patients whose injury or surgery allowed this to be done safely. Gabapentin 300 mg daily was prescribed, although the medication was refused by some patients who cited possible side-effect concerns; others did not take it because the ankle block sufficiently ameliorated their symptoms. All patients were referred to a pain management specialist, though most did not see that physician until after this study determined the ankle block's outcome for each patient. For those patients who did see a pain management specialist during the timeframe of this study, the only additional treatment rendered was a recommendation to increase the dose of gabapentin.

At the follow-up visit, patients who had pain relief and/or a lessening of the signs and symptoms of CRPS were administered a second ankle block using the same medications in the same doses; patients whose CRPS had resolved or had shown no improvement were not given another ankle block. For a patient's CRPS to be deemed resolved, the signs and symptoms must have improved to the degree that CRPS could no longer be diagnosed based on the Budapest criteria (31,32).

RESULTS

A total of 20 patients were found for the case series

who met the inclusion/exclusion criteria, all female, aged 14 to 57 with a mean age of 40.0 and a standard deviation of 12.7 years. CRPS type 1 was diagnosed in 18 patients, and type 2 in the remaining 2. Of these patients, CRPS resolved for 18 (90%). The results are summarized in Table 1.

At the one-week follow-up visit, 14 patients' CRPS had resolved, 4 had improvement and required a second ankle block before seeing their CRPS resolve, and 2 patients had no improvement. All patients who felt improvement related at least 50% less pain. These patients were administered a second ankle block and instructed to return one week later. For the 2 patients who had no benefit from the ankle block, no further block was administered.

The time from the inciting event to the diagnosis and ankle block ranged from 8 to 45 days, with an average of 20 days (standard deviation 10.9). The inciting event was foot/ankle surgery in 18 of the 20 cases and trauma in the other 2 cases. Gabapentin was taken by the patient in 10 of the 20 cases. The ankle block did not result in any significant side-effects or complications. For the 2 patients who received no benefit from the ankle block, the severity of their CRPS had not worsened on their follow-up. Patients who had resolution of CRPS were monitored for at least 12 months to confirm that CRPS did not reoccur.

DISCUSSION

This case series demonstrated that 90% of patients who were diagnosed relatively early (within 45 days of onset) with CRPS of the foot and/or ankle experienced rapid resolution of the condition when adjunctively treated with either one ankle block (70%) or 2 (20%). As such, the findings of this case series offer optimism that CRPS of the foot/ankle can be resolved easily in most cases if the treating practitioner is vigilant in identifying the condition early.

This combination—early diagnosis and adjunctive treatment with an ankle block of bupivacaine with dexamethasone—has not been found in a prior research study or case series. However, studies utilizing local anesthetics regionally—either as a continuous block or a direct injection nerve block, and as a plain anesthetic or in combination with another pharmacologic, including in some cases cortisone— to treat CRPS were reviewed (37-44). A case study was found where a ring-type ankle block of 0.25% bupivacaine plain with triamcinolone was administered (45). In that study, the ankle block was administered 6 months after a vascular injury that triggered onset of CRPS. The treatment provided the patient with 30 days of pain relief. Two subsequent ankle blocks were performed, the first ameliorating the CRPS-related pain for 10 days and the second providing only 3 days of relief. The ankle block in that case did

Table 1. Case Series Data and Outcome

Case	Age	Inciting Event	CRPS Type	Days from Inciting Event to Diagnosis/ Ankle Block	Gabapentin Taken	Days to 1st to 2nd Ankle Block (if required)	Outcome
1	36	Surgery	1	17	300mg QD		Resolved
2	50	Surgery	2	13			Resolved
3	14	Surgery	1	15	300mg BID		No Benefit
4	47	Surgery	1	30			Resolved
5	39	Surgery	1	30	300mg TID	7	Resolved
6	35	Surgery	1	12			Resolved
7	34	Surgery	1	11	300mg BID		Resolved
8	38	Surgery	1	8		7	Resolved
9	25	Injury	1	15	300mg QD		Resolved
10	42	Surgery	1	11			Resolved
11	14	Surgery	1	14	100mg QD		Resolved
12	48	Surgery	1	12		7	Resolved
13	56	Surgery	1	34	300mg BID		Resolved
14	26	Surgery	2	24			Resolved
15	57	Surgery	1	13			Resolved
16	38	Surgery	1	12	300mg BID		Resolved
17	50	Injury	1	45	300mg TID		No benefit
18	40	Surgery	1	42			Resolved
19	54	Surgery	1	33		7	Resolved
20	57	Surgery	1	16	300mg BID		Resolved

QD – daily
BID – twice daily

not provide resolution of the patient's CRPS, but the findings are in part consistent with the results of the presented case series, as it suggests the potential benefit of an ankle block of bupivacaine mixed with a steroid. Local anesthetics have also been injected into scars or as trigger point injections (with dexamethasone) to treat CRPS of the foot and ankle (13,46).

CRPS is considered relatively uncommon, with a population-based study in the United States finding that the syndrome occurred in 5.46 persons per 100,000. Another population-based study in the Netherlands found CRPS occurred in 26 persons per 100,000 (47,48). However, following surgery on the foot and ankle, research found the incidence was 4.36%, with 82.35% of these patients being female (49). Following a fracture of the foot or ankle, one study found the incidence to be 0.3%, and another, using criteria established prior to the Budapest criteria, found the incidence to be 17.9% (50,51). As such, health practitioners who treat foot and ankle problems should be particularly cognizant of the prompt diagnosis and treatment of CRPS and consider an immediate ankle block.

In this case series, 10 of 20 patients started taking a relatively low dose of gabapentin on the date of their initial diagnosis, and while gabapentin can improve CRPS-related pain, the 2 patients who did not benefit from the ankle block were taking gabapentin, and 12 of the 18 patients whose CRPS resolved were not taking it (52-54). This limited case series suggests that gabapentin has no beneficial influence on the ankle block's effectiveness, though this would be an area for additional research.

Because this study was limited by the small number of patients, the findings should be interpreted with caution. Further research should be conducted with a larger sample size and a greater diversity of inciting events. However, due to the minimal risk of complications from the ankle block, when CRPS of the foot and/or ankle is diagnosed early, practitioners should feel confident performing the described ankle block (assuming there are no contraindications). Also, for patients with CRPS of the foot and/or ankle who are not medical candidates for other treatments or procedures, this treatment may be a viable option because of its relative safety. The ankle block should be considered an adjuvant treatment and not a substitute for other treatments or, importantly, for caring for the patient in consultation with a specialist in pain management.

CONCLUSION

This case series suggests that when CRPS of the foot and/or ankle is diagnosed early, it has the potential to be completely resolved by adjunctively treating the condition with a ring-type ankle block of bupivacaine mixed with dexamethasone. Performing the ankle block is easy, safe, and may save the patient from developing chronic, life-altering, debilitating pain.

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