



Complex Regional Pain Syndrome After Traumatic Foot Injury Refractory to Continuous Peripheral Nerve Blocks and Nerve Resection

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Introduction

- CRPS type II results from direct nerve injury, featuring severe pain, sensory hypersensitivity, and trophic changes in surrounding areas
- Current management with functional restoration, gabapentin nerve desensitization, and opioids has limited efficacy with risks of opioid dependency
- Continuous peripheral nerve blocks (CPNBs) provide effective, targeted analgesia

Case

- 34-year-old male presented after accidental shotgun wound to left medial plantar foot
- Endured several surgeries and procedures to repair fractures, debride the wound, excise neuromas, place tissue graft and repair nerves
- Despite surgical interventions and multimodal analgesia, he continued to report severe foot pain
- CRPS II diagnosed at 18 months after initial injury; tibial and saphenous nerve CPNBs were performed with initial full pain resolution
- Analgesia following initial CPNBs continued to be transient, requiring stepwise escalation
- Increasing infusion concentrations and rates along with adjuncts provided complete, but increasingly transient, relief
- Final attempt of medial plantar nerve resection was unsuccessful, with patient subsequently committing suicide prior to an elective below-knee amputation

Discussion

- CPNBs provide effective analgesia for many conditions, typically including CRPS
- Diminished analgesia despite extensive therapeutic modifications suggest local anaesthetic resistance
- Improving buffering ability with bicarbonate and analgesic duration with dexmedetomidine does not overcome true LAR (presumed diagnosis)

References

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The combination of CRPS and local anesthetic resistance (LAR) is a terrible combination with dire consequences.

Multiple long-term CPNBs, dramatic dose escalations, and many off-label interventions were not enough for this patient.

Time after Injury	
18 months	Tibial and saphenous CPNBs bolused with 0.25% bupivacaine (10 mL and 8 mL, respectively) each followed by infusion of 0.125% bupivacaine up to 14mL/hr Blocks provided adequate analgesia, but relief was reduced after one week. Blocks removed at 14 days.
21 months	Popliteal sciatic and saphenous CPNBs bolused with 0.5% bupivacaine (20mL and 15mL, respectively) each followed by infusion of 0.125% bupivacaine up to 14mL/hr Blocks provided adequate analgesia, but relief was reduced after one week. Blocks removed at 10 days due to catheter site infection.
23 months	Popliteal sciatic and saphenous CPNBs bolused with 0.5% bupivacaine (mL doses unavailable) each followed by infusion of 0.25% bupivacaine up to 14mL/hr Blocks provided adequate analgesia, but relief was reduced after 6 days. Blocks removed at 11 days.
24.5 months	Popliteal sciatic CPNB bolused with 0.5% bupivacaine (27mL) followed by infusion of 0.25% bupivacaine up to 14mL/hr Block provided adequate analgesia, but relief was reduced after 4 days. Block removed at 14 days.
25.5 months	Popliteal sciatic CPNB more proximal to prior placement bolused with 0.5% bupivacaine followed by infusion of 0.25% bupivacaine up to 14mL/hr Block provided adequate analgesia, but relief was reduced after 4 days. Block removed at 7 days.
28 months	Popliteal sciatic and saphenous CPNBs bolused with 50mcg dexmedetomidine and 0.5% bupivacaine (mL doses unavailable) each followed by infusion of 0.25% bupivacaine up to 14mL/hr IV bolus of dexmedetomidine 100mcg given prior to CPNB placement. Blocks provided adequate analgesia, but relief was reduced after 3 to 4 days. Blocks removed at 10 days.
36 months	Popliteal sciatic and saphenous CPNBs each bolused with 10:1 ratio of 0.75% bupivacaine and 8.4% bicarbonate (25mL total) each followed by infusion up to 14mL/hr Blocks provided adequate analgesia, but relief was reduced after 3 to 4 days. Blocks removed at 14 days.
37.5 months	Popliteal sciatic and saphenous CPNBs bolused with 75mcg dexmedetomidine and bupivacaine 0.75% (mL dose unavailable) each followed by infusion of 0.75% bupivacaine up to 14mL/hr Blocks provided adequate analgesia, but relief reduced after 2 to 3 days. Blocks removed at 13 days.
39 months	Popliteal sciatic and tibial CPNBs bolused with 75mcg dexmedetomidine and bupivacaine 0.75% (30mL total) each followed by infusion of 0.75% bupivacaine up to 14mL/hr Blocks provided adequate analgesia, but relief reduced after 2 to 3 days. Block removed at 12 days.
40 months	Popliteal sciatic and tibial CPNBs bolused with 75mcg dexmedetomidine and bupivacaine 0.75% (30mL total) each followed by infusion of 0.75% bupivacaine up to 14mL/hr Blocks provided adequate analgesia, but relief reduced after only 16 hours. Blocks removed after 3 days.

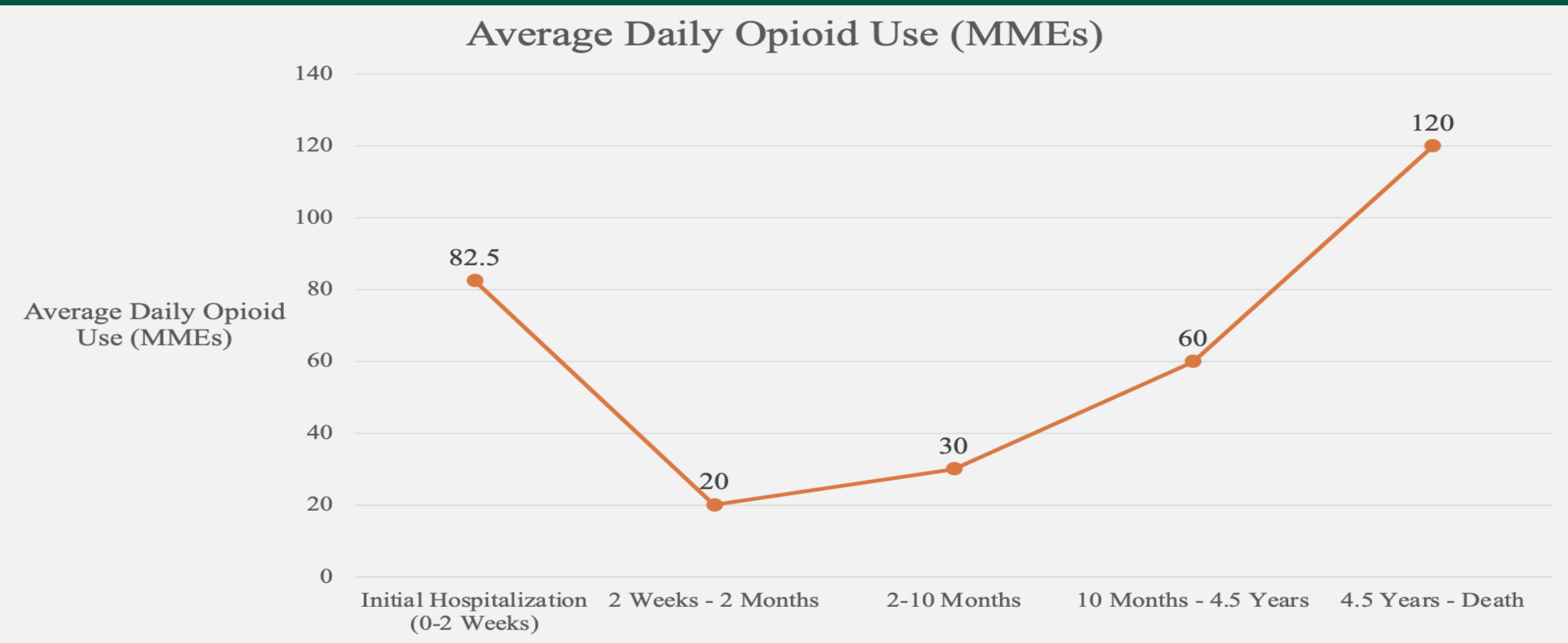
CPNB history and off-label intervention provided over the entire course of care.



A) Left plantar foot wound 14 days after injury with a wound matrix in place. (B) Left plantar foot wound 6 months after injury.

Time after Injury	Procedure
Initial Presentation	Debridement and irrigation
1 week	Debridement and irrigation
1.5 weeks	Wound closure with allograft attempted
2 weeks	Allograft removal and wound covered with wound matrix placement prior to discharge
2 months	Wound matrix removal and placement of split-thickness skin graft
3.5 months	Foreign body removal, neuroma excision
4 months	Foreign body removal
5 months	Neuroma excision
8 months	Neuroma excision with medial plantar nerve buried into surrounding muscle
9 months	Neuroma excision
12 months	Neuroma excision
12.5 months	Neuroma excision
13 months	Neuroma excision with medial plantar nerve buried into surrounding muscle
15 months	Neuroma excision
18 months	Diagnosed with CRPS type II
18.5 months	Neuroma excision
20.5 months	Cadaver nerve allograft placement with neuroraphe of branching of medial plantar nerve and neuroma excision
22.5 months	Saphenous nerve neuroma excision with cadaveric nerve allograft and placement of nerve guard
25 months	Extensive neurolysis of the medial plantar nerve with cadaveric nerve allografting
28 months	Medial plantar nerve exploration with nerve neurolysis and neuroraphe
35.5 months	Posterior nerve exploration, neuroma excision, and repeat neurolysis of the medial plantar nerve with cadaveric nerve allografting
36 months	Lateral and medial plantar nerve neurolysis with foreign body removal
38 months	Left medial plantar nerve proximal segment resection with left saphenous nerve neuroma excision
41 months	Plantar fasciotomy with medial plantar nerve resection
44.5 months	Neurolysis of lateral plantar nerve and saphenous nerve, insertion of common plantar nerve into soleus muscle, neuroma excision
47.5 months	Lower extremity nerve exploration with implantation of proximal stump of left plantar nerve into neighboring muscles
50 months	Exploration of the left tibial nerve, neuroma excision
50.5 months	Ketamine infusion at 0.5mg/kg/hr over 60 minutes
71 months	Patient considering left below the knee amputation
72 months	Patient committed suicide

Patient procedural history over the course of care.



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