



Abstract: 5325

Safety/QA/QI Projects

Continuous Peripheral Nerve Blocks for Burn Management: A Retrospective Study of Outcomes and Complications in 281 Burn Patients

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Introduction

Continuous peripheral nerve blocks (cPNBs) are commonly utilized for pain control following surgery and trauma.¹ cPNBs provide excellent postoperative analgesia for days following surgery, prevent or limit adverse side effects from opioid analgesics, and may reduce the transition from acute to chronic pain following surgery.² Burns are associated with intense pain and high rates of transition from acute to chronic pain. Opioids have historically been the mainstay of analgesia for burn patients; however, opioid analgesics are associated with increased incidence of hyperalgesia in the burn population.³ As burns are often isolated to one or more extremities and require prolonged and intense analgesia, cPNBs would seem an ideal analgesic modality in this population and may potentially facilitate bedside burn debridements that would otherwise require general anesthesia in the operating room.

Surprisingly little has been reported in the literature regarding the use of regional anesthesia for inpatient burn management. Although there is increasing interest in utilization of regional anesthesia for burns,⁴ there is a paucity of data for outcomes and complications. Although catheter infection rates have been extensively documented in the trauma and orthopedic patient populations, burn patients may be at increased risk of catheter site infections.⁵ Additionally, burn patients often require intense analgesia for weeks, and there is no data on infection rates in perineural catheters left in situ for such long duration. To give insight on outcomes and complication rates of cPNBs in burn patients, we reviewed all burn patients from an American Burn Association Regional Burn Center who were treated with a cPNB from 2018-2023.

Materials and Methods

This protocol was reviewed by the UC San Diego Institutional Review Board (IRB #802158) and found to be exempt under Category 4. All patients admitted to the burn ward who received a continuous infusion of ropivacaine between January 1, 2018 and July 1, 2023 were reviewed. Patients who received a cPNB for any reason other than management of acute pain related to burns were excluded to produce the final data set. The January 2018 cutoff date was chosen as this was the time at which it became common to utilize cPNBs for burn management at our institution.

Demographic and comorbidity data were collected for each patient. Daily notes by the regional anesthesia and burn teams were reviewed for each patient to determine location of nerve block (e.g., sciatic, femoral, infraclavicular, etc.), if patient was receiving antibiotics unrelated to a catheter infection, duration catheter was left in situ, whether a hand bolus of lidocaine was required to supplement the block prior to bedside debridements, if an infection was identified (infection was defined as requiring medical or surgical treatment at catheter site), reason for catheter removal and number of burn related surgeries during the hospitalization. For each patient in which a perineural catheter infection was identified, the treatment for infection and any long-term sequelae were documented.

Results/Case Report

A total of 347 patients admitted to the burn ward received cPNBs during the reviewed period. Sixty-six patients were excluded due to receiving regional nerve blocks for non-burn related purposes (i.e., orthopedic trauma, vascular surgery, and chronic non-healing wounds, non-burn related skin grafts). Demographic and comorbidity data for the 281 patients who received cPNBs for burn related acute pain are documented in Table 1. As many patients had more than one catheter placed, the final analysis included 480 individual perineural catheters with block locations shown in Figure 1.

Six perineural catheter site infections were identified in total (Table 2). Although many patients had more than one perineural catheter in situ, no patient had catheter related infections at more than one site. The overall incidence of catheter infections was 1 infection per 80 perineural catheters placed in burn patients. With only a single exception, all perineural catheter related infections resolved with antibiotic therapy. The one patient who required surgical debridement of the catheter site in addition to antibiotics had no other long-term sequelae related to the infection.

Most catheters were removed as a result of the ending of therapy desired by the patient and/or burn surgery team (Figure 2). A small number of catheters were left in place if minor erythema was noted at the site, but catheters were generally discontinued if erythema at the site was noted (Table 3). The mean [SD] number of surgical procedures required for burn management was 1.6 [2.2]. 33% of patients required no surgical procedures as bedside debridement using the nerve block was sufficient; however, 52% of patients required at least one hand delivered bolus by the regional anesthesia team.

Discussion

Burn patients often experience intense pain that has historically been treated primarily with opioids.³ However, there has been a recent surge in interest for managing burn patients with regional anesthetics.⁴ The results of this retrospective study suggest that cPNBs offer a safe and effective analgesic modality to supplement or, in some cases, replace opioid analgesics. The intense analgesia associated with peripheral nerve blocks may also allow surgical debridements that would otherwise be done in the operating room to be performed at bedside. Indeed, 33% of patients in our review needed no operative debridements as their cPNB provided sufficient analgesia. 52% of patients required hand bolusing by the regional anesthesia team prior to bedside debridement, suggesting that this practice should be incorporated into burn catheter management protocols. Despite concerns of increased susceptibility to catheter related infections in burn patients, this study suggests that perineural catheter infections in burn patients are rare and easily managed when they occur.

Although evaluation of the safety and efficacy of regional anesthetics for acute pain management in burn patients would ideally take the form of randomized clinical trials, the well documented analgesic benefits of cPNBs would likely make such studies highly unappealing to potential participants.¹ Additionally, the extreme heterogeneity of burn patients in terms of burn distribution, analgesic requirements, and

comorbidities would make such investigations challenging.

References

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Disclosures

No

Tables / Images

Other

5.8%

Interscalene

0.2%

Subgluteal sciatic

3.9%

Adductor Canal

13.1%

Femoral

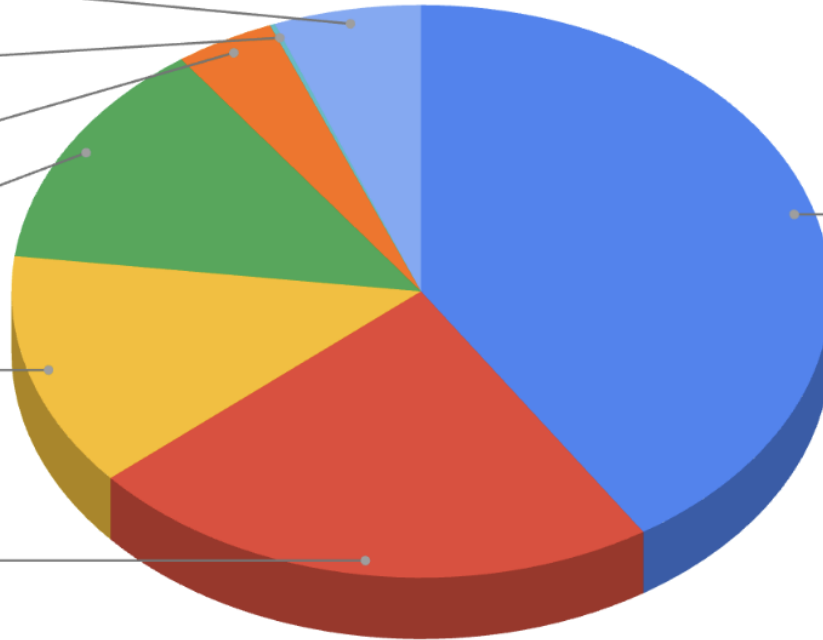
13.3%

Popliteal sciatic

22.8%

Infraclavicular

40.9%



Other

6.5%

Accidental Dislodgement

3.5%

No longer functioning

5.8%

Erythema or infection at cathete...

5.2%

End of Therapy

79.0%

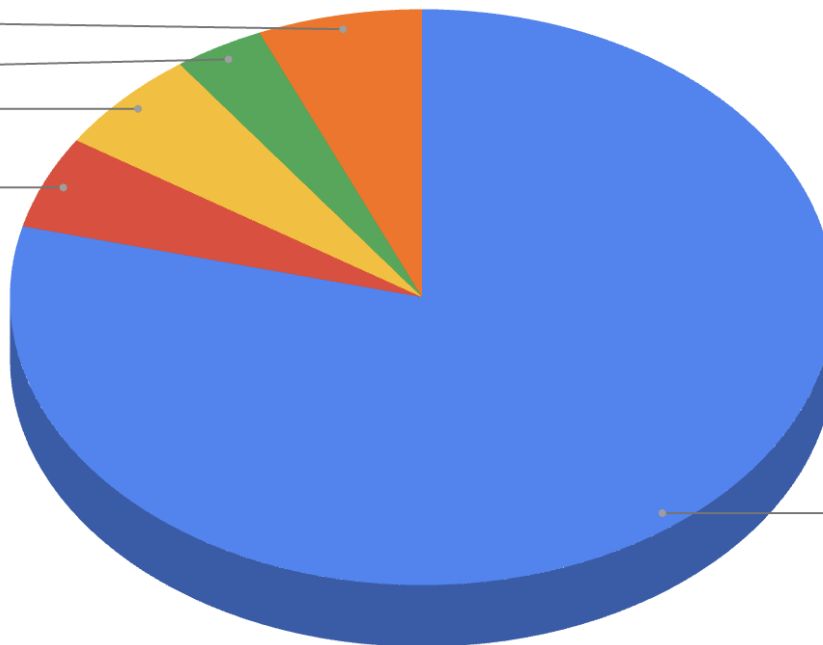


Table 1: Demographic Data

Age (Mean [SD])	41.1 years [\pm 16.3]
Sex	190 Male / 91 Female
BMI (Mean [SD])	28.96 [\pm 6.7]
% Diabetes	16.00%
% Hypertension	23.00%
% Substance use	41.90%
Total Body Surface Area Burned (Mean [SD])	7.28% [\pm 8.48]

Table 2: Perineural Catheter Infections

Age	Diabetes	Hypertension	Catheter Type	Unrelated Antibiotics	Day infection identified	Infection information	Infection Treatment	Long Term Sequelae
53	No	Yes	Popliteal sciatic	Yes	11	Erythema, leakage, and purulence at catheter site.	Antibiotics	No
56	Yes	No	Lateral femoral cutaneous	No	7	Catheter with erythema and induration.	Antibiotics	No
32	No	Yes	Infraclavicular	Yes	8	Erythema, induration, and tenderness noted at site.	Antibiotics	No
32	No	No	Femoral	No	7	Deep and superficial infection at femoral catheter site requiring surgical debridement.	Surgical Debridement, antibiotics	No
51	No	No	Infraclavicular	No	6	Erythema, tenderness and purulence around site.	Antibiotics	No
36	No	No	Popliteal sciatic	Yes	15	Erythema and drainage around catheter site	Antibiotics	No

Table 3: Outcomes in Burn Patients Receiving cPNBs	
Day post-burn catheter was placed	6.94 [\pm 13.3] days
Days catheters left <i>in situ</i>	6.9 [\pm 3.6] days
Catheters with erythema left <i>in situ</i>	6 catheters
% of patients on antibiotics for non catheter-related infection reasons	64%
% of catheters requiring replacement	9.95%
% of catheter patients requiring hand bolus by regional team	52%
Patients requiring no surgical procedures	33%
Mean [SD] number of surgeries per patient	1.6 [\pm 2.2]