Journal of Clinical Anesthesia (2017) **36**, 62–66

ELSEVIER

Journal of Clinical Anesthesia

Case Report

The benefits of ultrasound-guided continuous sensory nerve blockade in the setting of burn injury: a case report of bilateral continuous superficial peroneal nerve blockade in a patient with severe sleep apnea

Vladislav Shick MD*, Evan E. Lebovitz MD, Emerson Conrad MD

University of Pittsburgh Medical Center Mercy Hospital, 1400 Locust St, Pittsburgh, PA 15219

Received 1 May 2015; revised 17 December 2015; accepted 4 October 2016

Keywords:
Burn pain management;
Multimodal analgesia;
Obstructive sleep apnea;
Use of regional analgesia to block sensory nerves

Abstract The management of pain after burn injuries is a clinical challenge magnified in patients with significant comorbidities. Presently, burn pain is treated via a wide variety of modalities, including systemic pharmacotherapy and regional analgesia. Although the latter can provide effective pain control in patients with burn injuries, it is relatively underused. Furthermore, the development of ultrasound guidance has allowed for novel approaches and sparing of motor nerve blockade with preference toward sensory-specific analgesia that has not been possible previously. This can result in decreased opiate use and shorter latency to initiation of rehabilitation. In this report, we describe a patient with chronic pain, morbid obesity, and severe sleep apnea who presented with uncontrolled pain resulting from a burn injury to the dorsum of his feet. The treatment consisted of multimodal analgesia and placement of bilateral continuous superficial peroneal nerve catheters, as he underwent skin grafting and postprocedural hydrotherapy. This novel approach allowed for sparing of postprocedural opiates with positive clinical results.

1. Introduction

Burn injury occurs in more than 1 million cases per year in the United States, demanding significant medical attention and resources [1]. The mechanism of burn injury involves direct injury to nociceptors and surrounding structures, inciting key components of neuropathic pain including hyperalgesia and allodynia [2-4]. This type of pain is challenging to treat, as these patients experience both ongoing pain from the injury and subsequent manipulation during wound care and hydrotherapy [5]. Burn patients often require high doses of opioid analgesics and other adjuncts, which increase the likelihood of complications such as sedation and delirium and can cause a delay or limitation in initiation of physical therapy [6-10]. Opiates also engender a significant risk of complications in patients with obstructive sleep apnea [11] and can ultimately increase the cost of care and delay discharge in burn patients [12].

To diminish the negative effects of opiates, a regional analgesia technique can be used. Blocking neuronal transmission via peripheral perineural infusion of a local anesthetic may limit primary and secondary sensitization and spinal windup [13]. Thus, high-quality pain control in burn patients

* Corresponding author. Tel.: +1 917 796 1572.
E-mail address: shickv@upmc.edu (V. Shick).

http://dx.doi.org/10.1016/j.jclinane.2016.10.002
0952-8180/

Fig. 1 Six percent total body surface area second-degree burn to the dorsum of both feet, located in the distribution of the superficial peroneal nerve.

should ideally combine regional analgesia and a dynamic multimodal approach to burn pain. However, because of the nonselective nature of current local anesthetics, perineural injection often results in the blockade of both afferent sensory and efferent motor nerve fibers. Resultant motor blockade can limit physical therapy participation [14]. Current reports of regional analgesia in the setting of burn injuries have been limited to the coverage of donor sites during split-thickness skin grafts and not burn site pain [15-17]. In this report, we present a case of effective sensory-specific nerve blockade using bilateral superficial peroneal nerve (SPN) catheters combined with multimodal analgesia to control burn site pain in a patient with significant comorbidities who presented with bilateral burn injury to the dorsum of the feet.

2. Case report

2.1. Preintervention

The Acute Interventional Perioperative Pain Service team evaluated a 53-year-old man with a body mass index of 41.5 kg/m^2 and a medical history of asthma, diabetes mellitus type II, hypertension, coronary artery disease, severe obstructive sleep apnea, and chronic pain. The patient was scheduled for excision and skin grafting of burns to the bilateral dorsum of his feet. Per the patient's wife, he had been noncompliant with his continuous positive airway pressure (CPAP) mask at home, and she stated that the patient had experienced numerous observed apneic episodes nightly. She also reported that the patient would sleep for only approximately 20 minutes before waking up gasping for breath. He would then sit on the edge of the bed, become somnolent, and then fall off the bed and hit the floor. These falls have resulted in multiple scalp lacerations in the past.

Upon evaluation in the preoperative holding area, the Acute Interventional Perioperative Pain Service team found the patient to be somnolent and arousable only to significant stimulation. He was breathing with long respiratory pauses and developed significant airway obstruction on several occasions, resulting in peripheral capillary oxygen saturation (SpO_2) desaturations below 75% despite 5 L of oxygen delivered via nasal cannula. He had received a dose of 10 mg oxycodone 4 hours prior. His injuries consisted of a 6% total body surface area second-degree burn to the dorsum of both feet, located in the distribution of the SPN (Fig. 1). During the first 4 days of admission, the patient required opiates and benzodiazepines for management of pain and anxiety as detailed in Table. Because of his burn site pain, he was unable to ambulate during this time. His visual analogue pain scores ranged from 6 of 10 to 10 of 10 at rest and exertion, respectively.

2.2. Intervention

After appropriate consent was obtained, standard ASA monitors and oxygen via facemask were applied, and the patient was positioned in the left and right decubitus positions, respectively. Because the patient was already extremely somnolent, we avoided sedation. Using a high-frequency ultrasound probe (linear 6 to 13-MHz transducer; Sonosite Corp, Bothell, Washington, USA), the common peroneal nerve was initially localized at the popliteal fossa and the nerve was traced caudally below the fibular head where the superficial and deep peroneal nerves bifurcate (Figs. 2 and 3). Just distal to the fibular head, the deep peroneal nerve was located with anterior innervation to muscles of the anterior compartment. The SPN was traced to the upper calf (Fig. 4), at which point the nerve was located below the peroneus longus muscle and posterior to the extensor digitorum longus. To avoid the possibility of injuring the deep peroneal nerve and associated vasculature, a posterior approach was used to pass an 18-gauge

Table Daily opiate and benzodiazepine use

Hospital day (24 h)	1	2	3	4	5 (block)	6	7	8	9 (catheters discontinued)	10	11
Hydromorphone, mg	1	0.5	1								
Oxycodone, mg		30	60	40	10		2.5	5			2.5
Tramadol, mg							25	50	100		25
Fentanyl, μg					100					25	
Alprazolam, mg				0.5	0.5						