

Under Pressure

Applying Practice-Based Learning and Improvement to the Treatment of Chronic Neuropathic Pain in Patients with Burns

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KEYWORDS

- Burn injury • Chronic pain • Neuropathy • Peripheral nerve decompression
- Practice-based learning and improvement • Core competencies • Learning curve
- Disruptive innovation

KEY POINTS

- Chronic neuropathic pain in patients with burns may have an anatomic cause that is amenable to surgical intervention.
- History and physical examination are critical in identifying the location of potential nerve compression or injury in patients with burns.
- The surgical management of neuropathic pain can serve as a viable model for practice-based learning and improvement in the care of patients with burns.

INTRODUCTION

*Can't we give ourselves one more chance?
Why can't we give love that one more chance?*

—F. Mercury, D. Bowie, 1982

Patients with burns often develop debilitating pruritus, paresthesias, and allodynia, as well as motor dysfunction, despite medical and pharmacologic therapy. Peripheral nerve decompression has emerged as a potentially effective intervention to alleviate these symptoms,¹ but many questions remain, regarding surgical indications, timing, and technique. For example, our own experience

in abdominal wall reconstruction has shown that learning curves contain both incremental and disruptive inflection points,^{2,3} which can represent volatile periods of evolution in the synthesis of surgical algorithms. Phases of technical innovation versus development represent distinctly different periods of learning for surgeons, marked by contrasting periods of feasibility and proficiency.

Practice-based learning and improvement (PBLI) is an educational model that was adopted by the Accreditation Council of Graduate Medical Education in 1999 as one of 6 core competencies designed to help establish the basic skills and attributes of practicing physicians.^{4–6} These competencies, which also include medical

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knowledge, patient care, professionalism, team work and communication, and systems-based practice, were later incorporated by the American Board of Medical Specialties into their program of Maintenance of Certification, to promote and ensure self-directed, lifelong learning.

Because burn care, like all of medicine, is constantly evolving, plastic surgeons are exposed to new information and new clinical scenarios almost daily. PBLI should enable practicing physicians to become efficient, as knowledge is gained, and effective, as this knowledge is applied to real-life situations. As a formal paradigm, PBLI includes 3 components for physicians to pursue:

- Investigate and evaluate physicians' own patient care practices, with rigorous comparison with standard of care, as well as the state-of-the-art care
- Appraise, analyze, and assimilate scientific evidence, both within physicians' individual practices, and across the published literature of their peers
- Improve the practice of medicine by physicians applying new knowledge and by educating all of the stakeholders, including themselves and their colleagues, patients and their families, and other members of the health care team

This article shows the utility of PBLI in the care of patients with burns. Although there are some reports of learning-curve analyses in burn care,^{7,8} surprisingly little is published with regard to the application of PBLI to the care that is provided to patients with burns. As a content area for PBLI, this article discusses a complex, clinical situation that is poorly understood, the development of chronic neuropathic pain and sensorimotor dysfunction after burn injury, but that profoundly affects quality of life and both the trajectory and end points of recovery. The authors' intuition suggested that, over the past 5 years, from 2011 to 2015, the number of procedures we were performing for neuropathic was increasing, and our outcomes were improving, compared with the first 10 years of the senior surgeon's practice, from 2000 to 2010. Specifically, what role does the learning curve play in affecting these outcomes? Can PBLI be applied to measure disruptive versus incremental change, innovation, and subsequent development of a procedure, and attaining competency, proficiency, and ultimately mastery of a set of surgical techniques? In addition, what is the gap in what is known and what needs to be known, in order to provide the best care possible to patients?

METHODS

Patients

The authors performed an Institutional Review Board–approved, retrospective, 2-stage review of all patients needing burn reconstruction who underwent elective, peripheral nerve surgery at the University of North Carolina, by a single surgeon, from 2000 to 2015. The master database was created by first querying the billing records of our practice plan for all current procedural terminology (CPT) codes involving the decompression, neurolysis, transposition, excision, and/or implantation of peripheral nerves, by the senior surgeon (CSH). Next, the authors identified the target group of patients needing burn reconstruction by cross-merging this list with patients with burns admitted to the University of North Carolina Jaycee Burn Center who had been entered prospectively into the National Burn Repository, a registry maintained by the American Burn Association. Asymptomatic patients who underwent nerve decompression, as part of contracture release or exposure of deeper structures, were excluded from this analysis (n = 51 patients).

Data Collection

In addition to using data collected from the billing and admission databases, our electronic medical record (Epic, Verona, WI) was used to obtain the following data points: age, mechanism of injury, size of burn, incidence of escharotomy and/or fasciotomy, time from injury to reconstructive nerve surgery, location and type of nerve surgery, post-operative complications, long-term sensorimotor function, and length of follow-up. Main outcome measures, in terms of efficacy of surgery on nerve dysfunction, were defined as follows: definite improvement (discontinuation of pharmacotherapy and/or nearly complete relief of symptoms), moderate improvement (reduction in pharmacotherapy and/or lessening of symptoms), no improvement, or worsening of symptoms or function. These data points were gleaned from several sources: initial consultation notes, operative notes, postoperative notes, and pharmacologic regimen.

Study Design

The patients were segregated into 2 different cohorts, based on year of surgical intervention: 2000 to 2010 and 2011 to 2015. The groups were selected, using these time points, because the first cohort was initially part of a quality improvement project, to determine baseline information on indications, complications, and

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