AEJ ANESTHESIA EJOURNAL
Volume 8- No. 5 2020

Perioperative Dexmedetomidine for Analgesia During Burn Excision and Grafting

Amy Ybarra, BSN, RN

Affiliation:
Texas Christian University

Funding/Conflict of Interest Disclosure:
None

KEYWORDS: burn anesthesia; burn analgesia; dexmedetomidine

Abstract

Patients with superficial burns normally do not require surgical intervention, however, burns that are deep and large, require numerous procedures for excision and skin grafting (EG).[1] One of the challenges with these patients lies in their multi-faceted, but common theme of pain, which is confounded not only by high inter-patient variability and unpredictability[1,2], but by pain from the initial injury, by wound care pain and by the new, postoperative pain from EG procedures.[1] This case report details the utilization of dexmedetomidine as an adjunct for analgesia during EG for a severely burned patient. Findings are consistent with the evidence and reveal on the day dexmedetomidine was used, the patient had lower post-operative pain scores, lower postoperative Richmond Agitation Sedation Scores (RASS), and it was the only day the patient did not require any postoperative PRN pain medication administration. Although limited evidence exists specifically related to the use of intraoperative dexmedetomidine for EG of severe burns, this case report suggests a promising role for the addition of this a_2 agonist as a multi-modal approach to caring for this complex population.

Perioperative Dexmedetomidine for Analgesia During Burn Excision and Grafting

Amy Ybarra, BSN, RN, Texas Christian University

Introduction

- Pain is a common factor among burn patients[1]
- Burn pain is multifaceted; includes initial injury pain, wound care pain, new pain from excision and grafting (EG)[1]
- Burn pain produces both hyperalgesia and allodynia[2]
- Increasing narcotic doses and tolerance is common but may fail to provide adequate relief and may result in opioid-induced hyperalgesia[1,2,3]

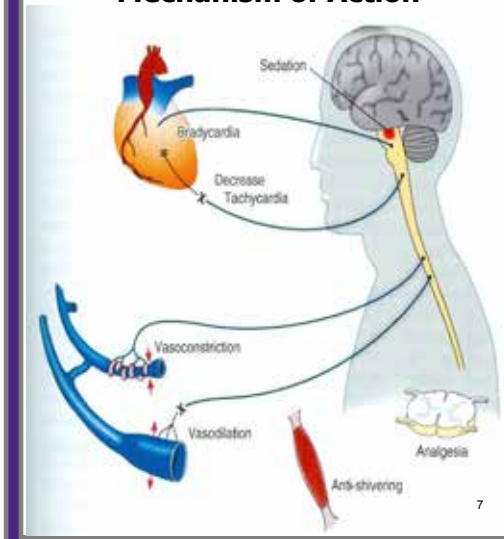
Research

- There is limited research. One study details dexmedetomidine intraoperatively for EG, 4 others detail its use for burn wound care sedation or non-burn care.
- Provided enhanced analgesia, decreased surgical stress response, reduction of total opioid consumption in non-burn surgical patients.[4]
- Produced positive patient perception, decreased post-operative pain and opioid requirements in moderately burned patient study.[4]
- Produced improved sedation and thus better tolerated burn wound care in pediatric burn patients.[5]

Dexmedetomidine

- Alpha-2 adrenergic agonist[6]
- Acts on preganglionic sympathetic neurons resulting in inhibition of norepinephrine release.[6]
- Highly selective for α_2 receptors, numerous in locus ceruleus which plays major role in regulation of memory, arousal, analgesia.[4,6]
- Produces sympatholysis, analgesia, sedation.[6]
- Side effects include bradycardia and hypotension, worse with hypovolemia.[2,6]
- Decreases MAC requirements, opioid requirements, surgical stress response, plasma catecholamine concentrations during anesthesia.[4,6]

Mechanism of Action



Procedure Comparison

Excision & Grafting Procedures	Entire Back	Right Lower Extremity	Bilat LE, Bilat Buttocks, Lower Back	Face, Neck	Upper Back, Bilat UE, Posterior Scalp
Day # from initial injury	27	29	36	41	47
Intraop fentanyl	200mcg	100mcg	100mcg	100mcg	150mcg
Intraop dilaudid	2mg	2mg	0.5mg	0	2mg
Intraop ketamine	30mg	30mg	30mg	0	60mg
Intraop sufentanil	0	0	0	25mcg	0
Intraop dexmedetomidine	0	0	0.3mcg/kg/hr	0	0
Postop pain scores; Mean	3.17	4.17	1.83	3.5	1.25
Postop pain scores; Median	2.5	3.5	0	4	0
Postop pain scores; Mode	2	2,4	0	4	0
Number postop PRN doses	1	4	0	2	1
Postop RASS range	-1 to 0	-1 to 1	-2 to 0	0	-1

Case Report

Patient Information

- 26-year-old female with a 1-month history of 2nd and 3rd degree burns over 95% of her total body surface area
- ASA 3, 70kg
- Patient had undergone approximately 14 escharotomies and/or excision and grafting procedures in the 6 weeks between her admission and the last compared surgical procedure.
- Each surgical procedure compared in the case report involved excision and grafting of different but similar sites, detailed in the table above. Procedure for case report (red outline) was the most extensive.

Anesthetic Management

- Balanced anesthetic included preoperative midazolam, maintenance sevoflurane, and rocuronium.
- Dexmedetomidine infusion of 0.3mcg/kg/hr was started immediately after induction and discontinued approximately 2 minutes prior to end of procedure. Patient received a total of 175 mcg per infusion.
- Additional intraoperative analgesics included ketamine 10 mg every hour for a total of 30 mg, 50 mcg fentanyl prior to each major surgical stimulation for a total of 100mcg, and a one-time dose of dilaudid 0.5 mg with dexmedetomidine 5 mcg for signs of stimulation.
- Total surgery time was approximately 5 hours.

Discussion and Conclusions

- The excision and grafting detailed for this case report (red outline) was the most extensive EG in this series, including the entirety of bilateral buttocks, lower back, as well as circumferential excision and grafting of bilateral lower extremities from below the ankles to upper thighs.
- In order to minimize data skew from physiologic changes, compared cases were limited to a 20-day timeframe, 9 days prior to and 11 days after the detailed case report procedure. EG sites compared in table.
- Anesthesia and post-operative records were compared from time of initial preoperative medication with midazolam through midnight on same operative day.
- 1 of 5 excision and grafting procedures compared incorporated dexmedetomidine.
- Patient exhibited signs of stimulation only one time during the 5-hour procedure, and was medicated with dexmedetomidine 5 mcg and dilaudid 0.5 mg.
- Postoperative pain scores and Richmond Agitation-Sedation Scale (RASS) were lower with dexmedetomidine.
- No additional postoperative analgesia was required through midnight on operative day when intraoperative dexmedetomidine was used.

References

1. Ray DE, Karlekar MB, Crouse DL, et al. Care of the critically ill burn patient. *Ann Am Thorac Soc.* 2017;12(7):1094-1102. DOI: 10.1513/AnnalsATS.201607-577PS
2. Bittner E, Shank E, Woodson L, Martyn J. Acute and perioperative care of the burn-injured patient. *Anesthesiology.* 2015;122(2):448-464. DOI: 10.1097/ALN.0000000000000559
3. Retrouvey H, Shahrokhi S. Pain and the thermally injured patient—A review of current therapies. *Journal of Burn Care & Research.* 2015;36(2):315-323. DOI: 10.1097/BCR.0000000000000073
4. Jiang, M, Sun Q, Liu G, Qu H, Ma J. Efficacy of dexmedetomidine in reducing post-operative pain and improving the quality of recovery in patients with burn wounds undergoing tangential excision skin grafting. *Experimental and Therapeutic Medicine.*2019;17:1776-1782. DOI:10.3892/etm.2019.7155
5. Pardesi O, Fuzaylov G. Pain management in pediatric burn patients: Review of recent literature and future directions. *Journal of Burn Care & Research.* 2017;38(6): 335-347. DOI: 10.1097/BCR.0000000000000470
6. Flood P, Rathmell J, Shafer S. *Stoelting's pharmacology and physiology in anesthetic practice.* Philadelphia, PA: Wolters Kluwer Health; 2015.
7. Sanders RD, Maze M. Alpha2-agonists and other sedatives and amnestics. In: Evers AS, Maze M, Kharasch ED, eds. *Anesthetic Pharmacolgy: Basic Principles and Clinical Practice.* 2nd ed. Cambridge: Cambridge University Press; 2011:478-492. Doi:10.1017/CBO9780511781933.031