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Case Report

CASE REPORT

# Epidural dexmedetomidine infusion in a patient with chronic opioid use and intractable pain following abdominoperineal resection

Mathew P. Silvaggio[1,*], Melanie K. Toman[2] and Braden Peters[3]

[1]Department of Anesthesia, Faculty of Health Sciences, McMaster University, Hamilton, ON, Canada, [2]Department of Anesthesia, Lakeridge Health, Oshawa, ON, Canada, [3]Faculty of Medicine, Northern Ontario Medical School, Lakehead University, Thunder Bay, ON, Canada

*Correspondence address. Department of Anesthesia, Faculty of Health Sciences, Hamilton Health Sciences, McMaster University, 237 Barton Street East, Hamilton, ON L8L 2X2, Canada. Tel: +1-416-333-7922; Fax: +1-905-577-8223; E-mail: silvaggi@hhsc.ca

## Abstract

Dexmedetomidine is a selective alpha 2 adrenergic agonist with known analgesic properties. Its perioperative use is associated with reduced pain scores and an opioid sparing effect. Management of postoperative pain in patients with a history of chronic opioid use can be challenging. Multimodal analgesia is recommended although the perioperative use of dexmedetomidine has not been extensively studied in this patient population. We present a case of intractable abdominal pain following open abdominoperineal resection in a patient with rectal cancer and a history of chronic opioid use. Following the introduction of dexmedetomidine into the patient's postoperative epidural solution, a noticeable decline in reported pain scores and use of breakthrough analgesia was appreciated. The analgesic efficacy of epidural dexmedetomidine in patients with a history of chronic opioid use warrants further study.

## INTRODUCTION

Dexmedetomidine is a highly selective alpha 2 adrenergic agonist with known sedative, anxiolytic and analgesic properties [1]. The perioperative analgesic use of dexmedetomidine has been examined demonstrating benefits with intravenous, intrathecal and epidural administration [2–4]. Of particular interest is its opioid sparing effect [2] as its use is not associated with significant apneic episodes [1]. Managing postoperative pain in patients with a history of chronic opioid use can be particularly challenging as their dose–response to analgesics can be heavily altered [5], and escalating doses of opioids in themselves can cause opioid-induced hyperalgesia [6]. We report the analgesic use of dexmedetomidine in an epidural infusion postoperatively in a patient with a history of chronic opioid use and intractable postoperative pain following abdominoperineal resection (APR).

## CASE REPORT

A 48-year-old male presented with a diagnosis of rectal cancer for a laparoscopic-assisted APR. His only comorbidity was chronic abdominal pain related to his diagnosis. He was managing his pain with the use of illicit opioids calculated between 350 and 500 mg oral morphine equivalents daily, taken as a combination of hydromorphone, hydromorph contin and oxycodone. He had been consuming opioids for ~4 months prior to presenting for APR. He was brought to the operating room and a pre-induction thoracic epidural was placed at the level of T8. Induction of anesthesia was uneventful, and maintenance was achieved with a volatile anesthetic, ketamine infusion of 0.3 mg/kg/hour IV and thoracic epidural infusion of bupivacaine 0.125%, hydromorphone 10 mcg/ml and epinephrine 1: 200 k infusing at 14 mls/hour. Approximately 2 hours into the case

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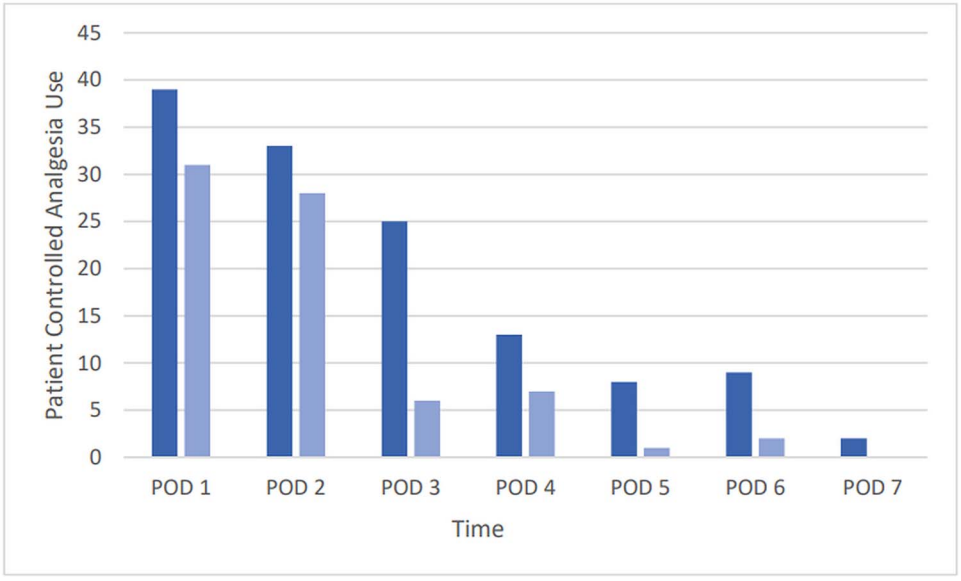


**Figure 1:** PCA use POD 1–7. Dark blue—delivered attempts. Light blue—denied attempts.

the surgeon converted to an open technique with a mid-line laparotomy incision. Hydromorphone boluses of 0.5 mg were given at the anesthesiologist discretion for a total dose of 4.5 mg over 5.5 hours. Surgical resection was successful and emergence was uneventful.

The patient was seen twice daily by the Acute Pain Service (APS) who managed his postoperative analgesia. His epidural was continued at 16 mls/hour and an intravenous patient-controlled analgesia (PCA) was initiated for breakthrough pain. The PCA solution was a combination of hydromorphone 0.5 mg/ml plus ketamine 0.2 mg/ml with the following settings: bolus of 0.5 mg hydromorphone with a 6-minute lockout to a maximum dose of 5.0 mg/hour hydromorphone (2.0 mg of ketamine). His surgeon requested strict nil per os (NPO) and nothing per rectum, limiting the adjuncts available for pain control.

The morning of postoperative day (POD) 1, the patient reported his pain as 9/10 on the numeric rating scale (NRS). The pain was described as a deep abdominal burning sensation. His level of sensory blockade was T6 to L1 bilaterally. He had received a total of 10.5 mg of hydromorphone and 4.2 mg of ketamine PCA solution with 18 denied attempts overnight. In an attempt to further optimize his pain control, the epidural was bolused 5 mls and the basal rate was increased to 20 mls/hour. Post epidural bolus, his NRS was 8 and he felt some relief. Reassessment of his epidural block level noted no change in coverage. At this time, a basal rate was added to his PCA of 0.5 mg/hour hydromorphone and 0.2 mg/hour of ketamine, and the remainder of his PCA settings were left unchanged.

On the morning of POD 2, the patient again rated his NRS at 9. His PCA usage including denied attempts from overnight can be seen in Fig. 1. His epidural was changed at this time to a more concentrated solution of bupivacaine 0.2%, hydromorphone 10 mcg/ml and epinephrine 1: 200 k. A 5-ml epidural bolus was given and the basal rate of 20 mls/hour was maintained. That afternoon, his NRS was rated 7 with little change in his PCA usage. At this time, a 5 mg bolus of preservative-free morphine was given epidurally.

The morning of POD 3, the patient rated his NRS at 8 noting only small reduction in pain overnight. Concerningly, the patient was refusing to ambulate because of discomfort. At this time, the APS decided to add dexmedetomidine 1 mcg/ml to the epidural solution. A 5-ml epidural bolus was given and a basal rate of 20 mls/hour was continued. That afternoon, the patient rated his NRS at 7, with a noticed reduction in the number of denied attempts in his PCA (Fig. 1).

Between POD 4 and POD 7, a noticeable decline in the patient's PCA use can be seen (Fig. 1). Further, a downward trend in his NRS score is also noted during this interval (Fig. 2). Over this time, his epidural was titrated down while maintaining an NRS of 5 or less and was eventually discontinued on POD 7. His PCA basal rate was discontinued on POD 5 and PCA discontinued on POD 7 entirely. Additionally, the patient was able to begin ambulation and physiotherapy on POD5. The patient was successfully transitioned to an oral analgesic regimen before being discharged from hospital.

## DISCUSSION

Dexmedetomidine has been established as an effective co-analgesic agent via multiple routes of delivery [2–4]. Postoperative dexmedetomidine epidural infusions have been shown in thoracotomy patients to be associated with lower pain scores and significantly reduced PCA use [7]. This same finding has been demonstrated in patient's undergoing laparotomy for abdominal cancer surgery [3] and colonic resection [8]. Further, in these studies, it was also shown that patients receiving epidural dexmedetomidine had significantly increased time to first postoperative analgesic request [3] and significantly reduced time to first flatus and bowel movement following surgery [8].

We present the postoperative epidural use of dexmedetomidine in a patient with rectal cancer and opioid dependence, a population group where dexmedetomidine has not been specifically studied [6]. Patients with a history of significant opioid use are often excluded from studies adding to the challenge of research informed perioperative pain management in this population [5]. It is known that inadequate postoperative pain control is associated with adverse events including myocardial

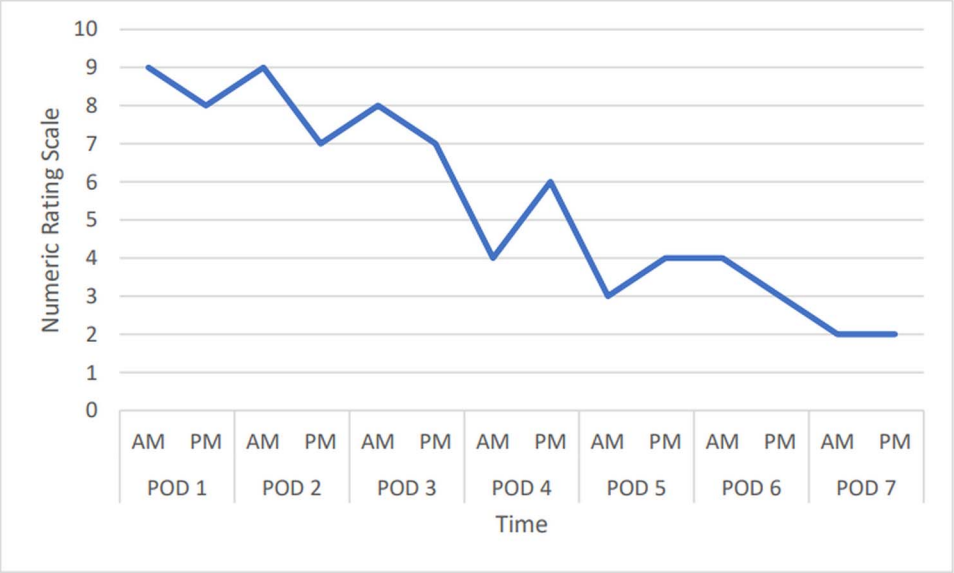


**Figure 2:** NRS pain score from POD 1 to 7.

ischemia, impaired respiratory function and thromboembolic events [6]. Escalating doses of opioids in these patients has been associated with opioid-induced hyperalgesia [6], and a multimodal approach to pain management is recommended to reduce opioid escalation [5, 6].

In our case, we considered it reasonable to trial the addition of dexmedetomidine to the patient's epidural solution as his pain was seemingly refractory to his mainly opioid-based regimen. Furthermore, opioid-induced hyperalgesia was felt to be a significant contributor to the etiology of the patient's refractory pain, and thus, additional opioid analgesia would unlikely be effective while increasing the risk of adverse effects. The relatively rapid response of the patient's pain to the epidural dexmedetomidine is consistent with what has been previously reported in the literature. Adverse effects associated with the use of dexmedetomidine include reduced cardiac output, hypotension, sedation and reduced respiratory rate [1]. None of these effects were noted in any significance in our patient by bedside nursing according to APS monitoring protocols.

In summary, we report a case whereby the use of epidural dexmedetomidine in an opioid-dependent patient produced rapid control of the patient's refractory postoperative pain from an APR. Further studies with a larger sample size are required to elucidate the role of neuraxial dexmedetomidine in postoperative analgesia for opioid-dependent patients.

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## CONFLICT OF INTEREST STATEMENT

We report no conflicts of interest.

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## ETHICAL APPROVAL

No ethical approval was required.

## CONSENT

Patient consent was obtained before writing this case report.

## GUARANTOR

Mathew P. Silvaggio.

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