CLINICAL VIGNETTE

Buprenorphine for Rescue Analgesia for Acute Postoperative Pain

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Introduction

Acute postoperative pain management is routinely achieved with oral and intravenous (IV) opioid medication, along with multimodal adjuncts.[1-3] When this standard approach to pain management does not work, other options are considered. Buprenorphine is commonly used for opioid use disorder and chronic pain management,[4] but frequently for acute pain therapy. This case demonstrates use of a single dose of buprenorphine to manage acute postoperative pain after surgical excision of a thigh mass.

Case Report

An 85-year-old male was scheduled for excision of left thigh mass. His past medical history was significant for osteoarthritis and chronic back pain, but he was not taking any opioids. The patient reported prior history of minimal pain relief or no benefit from the following medications: hydrocodone/acetaminophen, morphine, oxycodone, cyclobenzaprine, naproxen, gabapentin, tramadol, methocarbamol, diazepam, ramelteon, and bupropion XL.

The patient first noticed the left thigh mass several years ago but it was not painful and he did not seek care. About 2 years ago, the mass started to hurt periodically and ultrasound and tissue biopsy found what was likely a low-grade myxomatous tumor. Surgery was scheduled for further tissue sampling and removal of the mass.

He underwent excision of left thigh mass under general anesthesia. Standard IV induction with fentanyl 50 mcg, lidocaine 50 mg, Propofol 110 mg was administered prior to placement of laryngeal mask airway (LMA) size 4 for airway management. Cefazolin 2 grams was given for prophylactic antibiotics along with dexamethasone 4 mg and ondansetron 4 mg for antiemetic prophylaxis. The patient exhibited an increase in blood pressure and heart rate increased with incision at initiation of surgery and he received two doses of fentanyl, totaling 75 mcg. Additional doses of fentanyl were administered throughout the case for a total of 200 mcg of fentanyl for the whole case. Time from incision to removal of LMA was one hour and seventeen minutes. Surgery involved resection of and 8 cm intramuscular left thigh mass within vastus intermedius muscle. After 8 cm incision through skin fat and fascia, the quadriceps musculature was identified and muscle fascia was entered. The tumor was circumferentially dissected, mobilized, and removed in its entirety with grossly negative margins. The wound was irrigated and closed in layers over a Jackson-Pratt drain with compression dressing placed over the top. Patient was emerged from general anesthesia, was extubated asleep, with good spontaneous ventilation, and taken to post anesthesia care unit (PACU) in stable condition with no apparent complications.

In PACU, patient complained of poor pain control despite receiving additional fentanyl 50 mcg, hydromorphone 0.4 mg, oxycodone 15 mg, and IV acetaminophen 1 gram. Nursing noted patient to be drowsy and sleepy, but reported minimal pain relief. Patient again stated that opioid pain medications have never worked for him and refused additional pain medication.

The acute pain service was contacted to consider a peripheral nerve block. Consent of regional anesthesia was not discussed prior to surgery and concern for ability to consent was an issue. Discussion regarding a nerve block was still discussed with the patient and family at bedside. The patient expressed preference not to undergo another procedure, along with lack of preoperative consent and not proceed with a regional block.

Buprenorphine was discussed as an alternative to help manage the patient's acute postoperative pain, which he agreed to. Patient received buprenorphine 2 mg sublingual. After less than one hour he reported "pain is getting better", from 9/10 to 4/10. Patient reported subjective feeling of being hot and flushed, but remained afebrile. He developed nausea, for which an additional dose of ondansetron 4 mg, followed by promethazine 6.25 mg was given, with successful response.

He was transferred from PACU to the floor. On postoperative day 1, patient reported good pain control 0/10 after the single dose of buprenorphine and did not require any additional pain medications.

Patient was seen for postsurgical follow up 2 weeks after procedure and reported only mild incisional pain, controlled with acetaminophen.

Discussion

Acute postoperative pain management can be challenging. Poor pain control after surgery can have undesired consequences: unstable hemodynamics, delayed wound healing,

inadequate rehabilitation, prolonged hospitalization and poor patient satisfaction.[1,4]

Postoperative pain is an important measurable factor that can help determine when a patient is discharged and significantly influences the patient's overall surgical experience.[5] Effective postoperative pain control is usually achieved with opioid and non-opioid multimodal therapies, but when it is not controlled, other modalities need to be considered.

This patient reported poor pain control after surgery to remove a left thigh mass despite standard therapy of opioids and acetaminophen. His history is significant for prior ineffective pain control with various opioids. Consideration for post-op regional anesthesia was considered but not performed due to multiple factors. Excellent pain control was achieved with a single dose of buprenorphine. The patient experienced nausea and felt hot and flushed, which are common side effect of buprenorphine.[4]

Buprenorphine has unique pharmacological properties that may explain why adequate pain control was achieved when other opioid medications were not effective. Buprenorphine has high affinity to mu, kappa, and delta opioid receptors. It also has slow dissociation from those receptors, with long duration of analgesia.[4] Although buprenorphine is classified as a partial agonist, clinical studies report buprenorphine produces the same or greater analgesia than full agonists, like morphine, fentanyl and oxycodone.[6]

Patients responses to different levels of pain and different types of opioids varies greatly. What may be painful for one patient is not always painful for another. Likewise, certain pain medications may work on a majority of patients, but not work on all patients. Genetics is one reason for this variability.[7]

Genetic variations of mu opioid receptors (OPRM1) show different genotypes require different opioid doses to achieve adequate pain control. The variant G allele has frequency of 10% to 48%. Studies report the GG homozygous variant genotype requires the highest opioid dosage, followed by AG, and the lowest in AA genotype.[7]

The majority of drugs are metabolized by the cytochrome p450 system including opioid metabolism via CYP2D6. Genetics determine if a patient is normal, poor, intermediate, rapid, or ultra-rapid metabolizer. Poor metabolizers are more likely to tolerate severe acute postoperative pain. Buprenorphine is metabolized by a different cytochrome p450 enzyme, CYP3A4.[7] So poor metabolizers of CYP2D6 would expect to have normal response from buprenorphine. This may explain why this patient received pain relief from buprenorphine when other opioid pain medications did not help. He has not undergone genetic testing.

Patients with history of resistance to standard opioids and subsequent inadequate pain control, along with patients with high sensitivity to opioids, could be considered for genetic testing.[7] As genetic testing is more accessible and less expensive it may help develop a more tailored approach to pain management.

It was interesting that buprenorphine had such a profound benefit. Buprenorphine is more commonly used for opioid use disorder and chronic pain[4] and less commonly for acute pain management. Further studies are needed to confirm what was observed in this patient with history of opioid resistance who received great pain relief with a single dose of buprenorphine.

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