Case Report

MORPHINE OVERDOSE IN A PATIENT USING PATIENT CONTROLLED ANALGESIA (PCA) - A CASE REPORT

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ABSTRACT:

Background: Good post-operative pain control is crucial to the success of the surgery and the well-being of the patient. Pain relief after surgery is the most important concern amongst patients. The term, PCA, refers to on-demand, periodic intravenous administration of opioids, which can be operated by the patient to administer self- medication. The use of PCA has improved control of pain in the immediate period after surgery. The use of these advanced machines with a high degree of complexity has led to the addition of new sources of errors including programming errors.

Case Description: A twenty-one years old male patient with a confirmed diagnosis of a soft tissue tumor "angiomatoid fibrous histiocytoma", was enlisted for excision of the tumor tissue with groin nodes clearance along with pedicled posterior tibial artery propeller flap. Initially, epidural was used for postoperative analgesia. However, due to continuous motor blockade, the decision was made to discontinue the epidural and use PCA morphine for controlling postoperative pain. Due to an error in setting up of the electronic device, 45 mg of morphine was administered to the patient instead of 1 mg bolus. After an interval of five minutes post-drug administration, the patient complained of nausea, headache, and vertigo.

Practical Implications: On duty nurse immediately alerted the anesthesia team about the morphine overdose. The patient was shifted to the surgical extended care unit for monitoring of the cardiac and respiratory function. The patient's haemodynamic parameters remained within the normal range and no airway intervention was required.

Recommendations: Based on this incident, regular training of the anesthesia trainees should be carried out and software of the PCA devices should be adjusted to minimize errors when complex parameters are entered.

Key Words: Analgesia, Surgery, Anesthesia

INTRODUCTION:

Inadequate pain relief in the post-operative period is associated with serious outcomes which can lead to hypertension, ischemia of the myocardium, ineffective deep breathing, delayed healing of the surgical wound, psychological disturbances, and development of long-term pain implications. Pain relief after surgery is the most common concern of every patient enlisted for a surgical procedure. Even though we fully appreciate the need for adequate postoperative analgesia, this area of perioperative care requires a lot of meticulous work to meet the desired standards.[1]

Patient-Controlled Analgesia (PCA) refers to on-demand, intermittent intravenous administration of opioids, which can be operated by the patient to administer self-medication. This technique enables a patient to administer the pre-programmed dose of medication by a simple click of a button attached to a computerized infusion pump.[2]

The use of PCA pumps has improved the level of patient comfort. The use of these devices is not without shortcomings, like medication errors and setting up errors. The input of inappropriate concentration of drugs, the volume of boluses, and lockout interval are a few examples. These errors can result in either inadequate or excessive

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administration of a drug, leading to fatal patient outcomes.[3]

Data from the US Food and Drug Administration (FDA's) Manufacturer and User Facility Device Experience (MAUDE) database showed that "operator errors were responsible for 6.5% whereas programming errors were associated with 81% of intravenous patient-controlled analgesia related complications. The other linked errors involve pump malfunction in the form of malfunctioning wires and damaged drug containers".[4]

CASE HISTORY:

A male patient, aged 21 years, with a confirmed diagnosis of a soft tissue tumor, "angiomatoid fibrous histiocytoma", was enlisted for excision of tumor tissue and clearance of the groin nodes along with posterior tibial artery propeller flap. Previously, the patient has had multiple uneventful surgeries under general anesthesia. There were no associated medical conditions. The patient's physical activity was reduced due to pain. Anesthesia plan for the procedure included general anesthesia and lumbar epidural. The course of the procedure remained unremarkable. After surgery, the patient was shifted to the post-anesthesia care unit (PACU) with an epidural infusion of 0.125% bupivacaine. Later the patient was transferred to the ward after stabilization.

On the following day, the patient complained of paresthesia and weakness in his left leg. The anesthesia team reviewed the patient and stopped the epidural infusion. Four hours later, the patient was again reviewed by the anesthesia team, at which time the motor loss was still persistent. At this point, it was decided to replace epidural with PCA morphine for postoperative pain relief.

An epidural catheter was removed and an electronic PCA device was set up by the anesthesia resident on call. Past midnight, the patient experienced pain for which the patient activated the PCA device as instructed. Following this, the patient received 45 ml of morphine rather than the desired volume of 1 ml. Five minutes post-infusion of morphine, symptoms of nausea, and vertigo were reported by the patient.

MANAGEMENT:

Anesthesia trainee immediately attended the patient and found the patient to be fully conscious having stable hemodynamics with a respiratory rate of 10 breaths/min. The patient was shifted to the surgical extended care unit (SECU) for monitoring. On later evaluations, the patient was found to be pain-free. Therefore, PCA morphine was discontinued and regular oral analgesics with intravenous boluses of morphine, as per need, were started.

An error in the setting up of the electronic PCA pump was identified as the cause of the unintended administration of a large dose of morphine to the patient. Subsequently, steps were taken to ensure that these mistakes are minimized. Re-education of anesthesia trainees was carried out. Along with this, biomedical engineers of the concerned device were contacted with the aim of resetting of the device software. The volume of the bolus that can be administered at one time was limited to 1 ml. Preset protocols were designed which can be used for each patient without the need to enter complex parameters. However, password-protected flexibility was provided to meet special requirements.

DISCUSSION:

The quality of care catered by any healthcare institution depends upon the consideration given to patient safety. Amongst medical errors, drug errors are the most common errors encountered. It includes errors during the administration of medications with the potential to cause fatal harm.[5,6]

All institutions, who offer PCA to their patients should have established policies regarding the administration of this service.[7] These policies should include: identification of appropriate patients, standardized order sets for drug orders, detailed documentation,

use of checklists, use of standardized pumps throughout the organization, reporting of adverse events if any along with details of appropriate monitoring.[8-10]

Monitoring the degree of sedation in patients using PCA is another important aspect of patient safety. Sedation monitoring scales are useful tools in the identification of those patients who may be overly sedated. In those patients, who are receiving supplemental oxygen, the use of capnography may be a more sensitive tool in identifying respiratory depression as compared to oxygen saturation alone. Some hospitals have also introduced bar codes for patients and medications which are dispensed from the pharmacy. These codes need to be matched before any medication is administered.[11,12]

These policies should also consider a pathway for the regular audit of the entire process and corrective actions to ensure delivery of safe and efficient services to the patients.[8-10]

CONCLUSION:

The Quality and safety of health care provided by any health organization to its patients depend upon the development and implementation of guidelines for clinical practice. These guidelines should be detailed, appropriately designed and pretested before their inclusion in the policies of a health care system.[7]

For ensuring safe and efficient delivery of PCA services, a task force consisting of all stakeholders i.e. members of acute pain services, nursing managers, line managers, pharmacy leadership, quality improvement, and any other members as deemed necessary, should be formulated. This task force should be charged with the responsibility of identification of the current need for provision PCA, a systematic review of current evidence, and formulation of transparent plans for implementation of the decided policies.

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MAB: Conception of work and design
AWK: Drafting and reviewing article

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