

Available online at www.jsan.org.np

Journal of Society of Anesthesiologists of Nepal



Case Report

Preventable critical incidents in anaesthesia: a retrospective analysis of two anaesthetic mishaps after inadvertent drug administration

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ARTICLE INFO

Article History

Received 19.09.2015

Accepted 09.05.2016

Published 17.09.2016

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Abstract

Drug errors in anaesthesia can be life threatening. In this article, we report two such mishaps of wrong drug administration. A 12-year-old boy was unintentionally injected atracurium instead of diclofenac for pain relief. He became apneic and did not respond to verbal commands. His trachea was intubated and he was mechanically ventilated. After 40 minutes of sedation, mechanical ventilation and stable hemodynamics, extubation of trachea was done. Another patient was also accidentally injected atracurium in the operating room to provide post-operative analgesia at the end of the surgery. Both the cases had favourable outcome because of a high degree of suspicion, prompt diagnosis and early intubation; very crucial steps in such scenarios. This article concludes that the labels should be carefully checked before drug administration, for the right drug and adequate dosage at the right time.

Keywords: drug labelling; hospital incident reporting; medication errors; neuromuscular blocking agents.

How to cite this article: Meena SC, Dulara SC, Meena S, Tripathi A, Nagar J. Preventable critical incidents in anaesthesia: a retrospective analysis of two anaesthetic mishaps after inadvertent drug administration. *Journal of Society of Anesthesiologists of Nepal (JSAN)* 2016;3(2):84-86. <http://dx.doi.org/10.3126/jsan.v3i2.15619>

Introduction

When an unprecedented reaction occurs shortly after the injection of a drug, a possible explanation is an injection of a drug other than the intended one.¹ Drug errors, especially in anaesthesia, can be life-threatening. Drug errors not only include administration of the wrong drug, incorrect

dose and/or through the wrong route, it also includes repetition and omission of drug.² We report two such unprecedented reactions resulting from the accidental intravenous injection of atracurium besylate instead of diclofenac sodium and its successful management.

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Case Report

Case-1

Diclofenac sodium was injected intravenously in a 12-year-old boy for analgesia. But, he developed dyspnea, stopped responding to verbal commands and apnea in less than five minutes. The patient developed cyanosis and peripheral pulsations were absent. Pupils were fixed, dilated and light reflex was absent. Cardiopulmonary resuscitation was started immediately. The trachea was intubated and manual ventilation was started. On further enquiry, it was found that injection atracurium was inadvertently loaded in place of diclofenac as the new batches of the drugs were extremely similar in appearance. [Figure-1]



Figure 1: Similar appearance of atracurium and diclofenac ampoules

Within few minutes of effective ventilation, plethysmography appeared on monitor and SpO₂ also increased to 100%. Propofol infusion was started at 40-50 µg/kg/min. The patient developed spontaneous respiratory efforts after about 35 minutes and propofol infusion was stopped. After proper suctioning, extubation

of trachea was done and the patient was shifted to high dependency unit.

Case-2

Bipolar hemiarthroplasty was started in a 58 years old male under the sub-arachnoid block. Near closure of surgery, injection diclofenac sodium was given in intravenous infusion to avoid positional pain and to provide post-operative analgesia. Within few minutes, the patient became restless and developed dyspnea and became apneic. The intravenous infusion was stopped immediately and the patient was ventilated with 100% oxygen. Injection Pheniramine and Hydrocortisone were given suspecting an allergic adverse reaction. Since the patient had no respiratory efforts, the trachea was intubated after administration of propofol. The patient was kept on mechanical ventilation and propofol infusion was started. On careful examination of ampoule used, we found that atracurium was loaded in place of diclofenac. After 30 minutes, he developed spontaneous breathing efforts. The patient was reversed by neostigmine and glycopyrrolate with stable haemodynamics and extubation of trachea was performed.

In both the cases, we evaluated all of the neurological functions by clinical examination as well as by brain magnetic resonance imaging (MRI) and found no neurological deficit. Wrongful drug administration occurred because of look-alike ampoules of atracurium besylate and diclofenac sodium. We reported about these drugs ampoule to the concerned pharmaceutical company.

Discussion

Anaesthesia professionals are compared with commercial pilots because both face a high incidence of critical incidents either at take-off (induction of anaesthesia) and landing (emergence from anaesthesia). Both accidents and incidents in the aviation industry are taken as an opportunity to redesign the faulty system. Hence, they have a well-developed feedback and information system. However, accidents during anaesthesia are often not reported due to fear of being blamed for carelessness; forgetfulness and sometimes weakness of a person's character.³ During anaesthesia, most drug errors are totally or partially attributed to human error which is an inherent part of human psychology and activity; hence the occurrence of error can only be reduced and not eliminated.^{4,5}

Reporting incidents is the first step in correction errors as without knowledge of the problem, nothing can be changed. Orser et al suggested various strategies to prevent drug errors by using distinct labels and unique, standardised colour coding system for anaesthetic drugs and also suggested training residents in intravenous drug management.⁶

Jensen et al⁷ and Merali et al⁸ suggested few recommendations for minimising these anaesthetic drug mishaps. Our institute strictly follows the recommendations mentioned below but despite these efforts, errors may occur.

Merali et al⁸ recommendations to reduce medication errors at different stages of the system:

1. Patient information- Consistent documentation and full operative medication history
2. Drugs information- should provide enhanced pharmacist support
3. Communication for drug orders and information-
 - a. Eliminate use of dangerous abbreviations and dose expressions
 - b. Incorporate computerised physician orders entry into strategic planning
4. Nomenclature, packaging and drugs labelling-
 - a. Enhance communication mechanism.
 - b. Standardised anaesthetic cart trays and consider usage pattern.
 - c. Labelling to all products
5. Drug standardisation, storage and distribution-
 - a. Evaluate the need and then clearly identify and segregate hazardous products.
 - b. Increased provision of premixed solutions.
 - c. Segregate and label storage areas for neuromuscular blockers.
 - d. Acquisition of prefilled automated dispensing cabinet.
6. Environment and workflow-
 - a. Minimise advance preparation of drug syringe
 - b. Return or remove unused medication from work cart
7. Paramedical staff competency and education-
 - a. Investigate, evaluate and educate staff about the serious complications associated with workaround practices.
8. Patient education-
 - a. Consider providing enhanced education material for preoperative patients with involvement of pharmacy.
9. Quality processes and risk management-
 - a. Encourage reporting all things (including near misses) by all practitioners
 - b. Consistently employ independent double checks for hospital selected "high alert" drugs.

In 2006, the FDA mandated that manufacturers include a machine-readable barcode, radio-frequency identification (RFID), and computerised ordered entry (CPOE) systems. They have all come on the horizons as the technological solutions, only to create different problems which may be almost as big as those they are intended to solve.⁹

Despite the best of efforts, the increased use of technology and high standards of both direct and indirect monitoring in anaesthesia and critical care, medication errors continue to occur even at the best health centres worldwide.

Conclusion

Simple vigilance, standardised protocol, regular training to health care personnel and 'think before do' are the key factors to avoid the occurrence of medication errors. Contents of ampoules and vials should be readable, optimally labelled according to standard font size and colour. Health personals should label the syringe immediately after a drug is loaded, cross verify the ampoule before and after loading syringe, and before moving on to the next drug. This will help in reducing such errors and preventing such mishaps.

Conflict of interest: There was no conflict of interest for this study to authors and institute.

Acknowledgement The authors express sincere thanks to all who helped in data acquisition and manuscript reporting in such bold topic.

Sources of Funding: None

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