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Case Report

An Unexpected Cause of Respiratory Insufficiency in a Child with Tracheomalacia

Lauretta Oseni*, **Mody Kalgi**

Department of Pediatrics, Bristol Myers Squibb Children's Hospital at Robert Wood Johnson University Hospital, 200 Somerset Street, New Brunswick, NJ 08901, United States

ABSTRACT

Background: The purpose of this study is to express the importance of accurate history taking and broadening the differential diagnosis. This report discusses a patient who presented with respiratory symptoms that was initially misdiagnosed.

Case: A 14 months old girl with a history of tracheomalacia presents as a transfer from an outside medical center for increased work of breathing after being treated for croup with no improvement. After further history taking it was revealed that half a tablet of 8 mg suboxone was found in the patients mouth about 16 hours prior to presenting. The patient required multiple doses of naloxone before returning to baseline and was discharged after 48 hours of monitoring.

Keywords: Tracheomalacia; Suboxone; Buprenorphine; Mu-opioid receptor; Drug

INTRODUCTION

Why should a physician be aware of this? Toxic ingestions is very common in this patient population and obtaining a comprehensive history is crucial in such cases. It is important to keep the differential diagnosis broad so children with such toxicities can be identified and treated in a timely manner.

CASE STUDY

A 14 months old Female with a history of tracheomalacia presented to our Emergency Department as a transfer from another medical center due to respiratory insufficiency. One day prior to presentation she was noted to have increased work of breathing, her mother called` Emergency Medical Services (EMS) and the patient was taken to the Emergency Department (ED) at the outside hospital where she received three doses of racemic epinephrine and one dose of IV dexamethasone 0.6 mg/kg (7 mg) before being transferred to Robert Wood Johnson University Hospital. At the outside hospital Complete Blood Count (CBC) and Comprehensive Metabolic Panel (CMP) performed were unremarkable. In our Emergency Department (ED), the triage vitals were temputure (T) 36.7^{0}C (98.1F); Heart Rate (HR) 163; Respiratory Rate (RR) 32 BP 103/53 O2 sat 96% on blow by oxygen which she was transferred on. The patient was noted to be sleepy but arousable with increased work of breathing, retractions, audible stridor, and saturations dipping to mid-80s on room air so she was placed on High Flow Nasal Cannula (HFNC) 10L 50%. The patient was administered one dose of IV dexamethasone 0.5 mg/kg (6 mg) and one dose of 0.5 ml inhaled racemic epinephrine. Her respiratory status was observed to moderately improve after receiving treatments. Respiratory Viral Panel obtained reported negative. Diagnosis in the emergency room was moderate respiratory distress secondary to croup. On arrival to the Pediatric Intensive Care Unit (PICU) floor, vitals were Temperature (T) 37.1^{0}C (98.8F); Heart Rate (HR) 127; Respiratory Rate (RR) 27; Blood Pressure (BP) 117/58 O_2 sat 97% on High Flow Nasal Cannula (HFNC) 10L 50%. The patient was noted to be very sleepy, arousable only to painful stimuli with pin point sized pupils, intermittent bradypnea with good recovery, and audible stridor which improved upon awakening. The patient had a Glasgow Coma Scale (GCS) score of 11. At this point, the story didn't seem to add up. It was very unusual to see a patient with croup presenting with such decreased mental status. Other differentials that were thought about at this time included head injury, toxic ingestions, and electrolyte abnormalities. Upon further questioning of the mother about the patients decreased mental status, she revealed that the patient ingested "half a tablet" of 8 mg Suboxone about 16 hours prior to presentation which is prescribed to the patients grandmothers' boyfriend. The mother reported that she found the tablet in the patients mouth and was able to take it out but the patient had been very sleepy since the incident. The patient's mother denied any other medications in the house or the possibility of other ingestions. Due to clinical symptoms

Correspondence to: Oseni L, Pediatric Resident, Department of Pediatrics, Bristol Myers Squibb Children's Hospital at Robert Wood Johnson University Hospital, 200 Somerset Street, New Brunswick, United States, Email: lauretta.oseni@gmail.com

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and newly revealed history, the patient was administered three back to back doses of 0.1 mg/kg (1 mg) IV Naloxone as adequate response was not appreciated on the initial dose. Our patient had partial response overall to the naloxone. Initial Arterial Blood Gas (ABG) was pH 7.31 PvCO2 55, 4 hours later pH 7.33 PvCO2 48, urine and serum drug screen was negative for any substances. Electrocardiography (ECG) in Figure 1 and Chest X-rays (CXR) obtained was unremarkable. The patient clinically improved on HDO (Hospital day one), was able to be weaned off oxygen with improving alertness and respiratory effort. Her Glasgow Coma Scale (GCS) score 24 hours after presentation was 15. Department of Child Protection and Permanency (DCPP), social work, and toxicology were consulted and the patient was cleared for discharge to home by all services on HDT (Hospital day two).

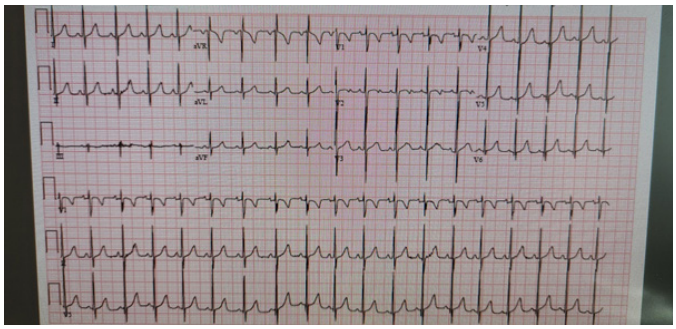

Figure 1: Electrocardiography was unremarkable.

RESULTS AND DISCUSSION

Suboxone is a combination of buprenorphine and naloxone used for the treatment of opioid use disorder. Buprenorphine is a partial receptor agonist at the mu opioid receptor while naloxone is an opioid receptor antagonist. It is intended for sublingual administration as buprenorphine is effective orally while naloxone has no effects in oral formation. However if given in other forms such as intravenously or intranasally, naloxone reverses the effect of buprenorphine. It has been shown in studies that buprenorphine produces similar effects in children as other opioids, including CNS and respiratory depression, miosis, and vomiting owing to its partial μ-receptor agonist activity [1]. Although buprenorphine is a partial agonist at the mu-opioid receptor, in a group of opioid-naive children the effects were similar to those of a pure agonist, and included central nervous system depression, respiratory depression, and death [2].

Although the elimination half-life of oral buprenorphine is 37 hours, the duration of effect from a single acute ingestion may vary, more than half of the patients had clinical effects lasting between 2 and 8 hours, and about a quarter had effects from 8 to 24 hours [1]. This is consistent with the pharmacology of the drug in that it has a high affinity for the μ-receptor and slow dissociation, any child ingesting >2 mg and children <2 years of age ingesting more than a lick or taste should be referred to the emergency department. Children in whom the dose cannot be determined with certainty should also be referred to an emergency department [1]. Our patient began having symptoms a few hours after ingestion and still in respiratory distress on presentation to our Pediatric Intensive Care Unit (PICU) which was about 16 hours after ingestion.

A point to note is that the history of suboxone ingestion was not identified until the patient was admitted to the Pediatric Intensive Care Unit (PICU). This is vital information that is paramount to the management of this patient. It is very important to broaden the differential diagnosis so a comprehensive medical history can be obtained. The formulation of a differential diagnosis is one of the most important and intellectually challenging aspects of medical reasoning [3]. It can be sometimes challenging to obtain a detailed history in different scenarios such as when the patient is critically ill and care givers may be distraught and as a result unable to provide comprehensive or accurate medical history. It is however the duty of the medical team to obtain a complete history, teases out the important details, and put the puzzle together. Occasionally the final diagnosis cannot comfortably explain all the important findings; the discussant may then repeat the entire process, using one of the unexplained findings as a new pivot to identify a second or third diagnosis [3]. In the case of this patient, her mental status continued to deteriorate even after receiving adequate treatment for croup, thus further investigation was warranted. Clinicians should not assume that because suboxone is a combination of a mixed agonist-antagonist and a pure antagonist that pediatric patients are not at risk for opioid toxicity from this medication [4]. Lastly, "diagnosis remains fundamentally dependent on a personal interaction of a clinician with a patient, the sufficiency of communication between them, the accuracy of the patient's history and physical examination, and the cognitive energy necessary to synthesize a vast array of information"[5].

CONCLUSION

This case is one with an underlying message that takes us to the basics of medicine; obtaining a comprehensive medical history and creating a broad differential diagnosis. A critical part of our patient's history was not obtained until she was admitted to the pediatric intensive care unit which precipitated a change in management that was overall beneficial to the care of the patient. Toxic ingestions can cause significant adverse clinical outcomes so it is important to include it in one's differential diagnosis.

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