

## Misuse of Ketamine: Report of two Cases

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### ABSTRACT

Two patients were referred to our hospital from different private hospitals, within a period of 2-months, following complications arising from ketamine anaesthesia. Our assessment revealed obvious cases of misuse of ketamine hydrochloride as a sole anaesthetic. The cases are presented to highlight various forms of misuse of ketamine in the hands of non-anaesthetists.

**KEY WORDS:** *Ketamine, Misuse*

### Introduction

Lack of adequate anaesthetic manpower and facilities remain a common problem of health care delivery in developing countries<sup>1,2</sup>. As a result many anaesthetic procedures are carried out by personnels without formal training in the specialty. Ketamine with its ease of administration and documented safety profile in the hands of non-anaesthetists<sup>3-5</sup>, has been found useful in this regard. Unfortunately, not all those who administer ketamine fully appreciate the limitations and dangers of this drug. As a result, the drug is often misused, sometimes with disastrous consequences. These two cases are discussed to further educate the occasional "Anaesthetists" on the limitations of ketamine anaesthesia.

### Case Reports

Case 1: A 45-year old man was referred from a private hospital to the University of Ilorin Teaching Hospital (UIITH) with a history of failure to recover from anaesthesia, with sudden and sustained increase in blood pressure. He had developed apnoea and suffered Cardiac arrest during a surgical procedure for excision of a lipoma on the right scapular being done under Ketamine anaesthesia. He had received a total of 250mg ketamine in two divided intravenous bolus doses of 150mg initially followed by 100mg (interval not stated). Following Cardiopulmonary resuscitation, he regained spontaneous respiration after 1 hour. He, however, remained unconscious and his blood pressure, which had been normal

(Preoperative blood pressure was 120/70-mmHg), persistently fluctuated in the range 240/90-200/90-mmHg. There was no associated seizures. He was initially managed at the private hospital where he received two 10mg-8hrly intravenous bolus doses of hydrallazine without improvement. The past medical, drug and social history obtained from an informant was unremarkable, except for occasional intake of palm wine. Patient had never been diagnosed hypertensive. Preoperative urinalysis result was normal. Physical examination at UITH revealed a moderately Obese middle-aged man in deep coma (GCS 5/15-eye opening 2, best verbal response 1, best motor response 2). He was well hydrated, not pale, anicteric and afebrile. The pupils were slightly dilated (3mm) but reacting to light. There were no lateralising signs. Cardiovascular examination revealed a pulse rate of 106 beats/minute, regular with normal volume. The blood pressure was 210/90mmHg. The jugular venous pressure and the heart sounds were normal. Respiration was regular but grunting respiration. Arterial oxygen saturation (SaO<sub>2</sub>) ranged between 88-90% with the patient breathing atmospheric air. Respiratory rate was 20 breaths/minute. There were few transmitted sounds in both lung fields. The Surgical wound on the right scapular was neatly dressed. There was no active bleeding. A diagnosis of post cardiac arrest encephalopathy was made. Ketamine-induced hypertensive encephalopathy was a differential. The patient was admitted into the intensive Care Unit. Investigations carried out on him include a full haemogram which revealed PCV 49%, WBC 15.8x10<sup>9</sup>/L

(neutrophil 77%, Lymphocyte 23%). His Random Blood Sugar(RBS) was 8.6mmol/L. The serum biochemistry including sodium, potassium and urea was normal. Urinalysis result was also normal. The serum bicarbonate and arterial blood gases could not be done in this center at the time of presentation. Electrocardiogram and chest X-ray could not be done for logistic reasons.

The patient was managed with intravenous infusion of 10% mannitol 500ml to alternate with 5% dextrose water 1 litre 6-hourly. He was also given an initial intravenous bolus dose of 8mg dexamethasone and placed on further doses of 4mg 6 hourly. Intramuscular hydrallazine 20mg 6 hourly P.R.N was prescribed to keep the diastolic blood pressure below 120mmHg. Following preoxygenation, nasotracheal intubation was done preceded by intravenous administration of 150mg thiopentone and 100mg suxamethonium. When the patient regained spontaneous ventilation he was allowed to breath spontaneously with the inspired atmospheric air enriched with oxygen via a catheter which was dropped inside the nasotracheal tube. His respiratory rate ranged from 15-18 breaths/minute and arterial oxygen saturation ranged between 92-94%. Patient did not show any remarkable improvement. His condition continued to deteriorate and he eventually died about 26 hours after admission.

Case 2: An 8-month old baby was referred from a private hospital with two week history of high grade intermittent fever, chills and rigor, and 6-day history of vomiting, abdominal pain and frequent passage of bloody stool. The patient had presented at the private

hospital 5-days earlier following failure of various forms of self-medication instituted at home. Physical examination then had revealed an acutely ill-looking and irritable child who weighed 8.2kg. She was moderately dehydrated, pale and febrile. Her respiratory rate was 44 breaths/minute. The chest was clinically clear on auscultation with good air entry bilaterally. She had normal first and second heart sounds with a heart rate of 160/minute. The abdomen was uniformly distended, firm and tender with a girth of 42cm at the level of the umbilicus. A mobile and firm sausage-shaped mass was felt in the left lower quadrant of the abdomen. Percussion note was tympanitic. Bowel sounds were absent. A provisional diagnosis of acute intestinal obstruction secondary to intussusception was made.

The patient was offered surgery but the parents declined. She was then managed conservatively with nil per oral, continuous nasogastric (N/G) tube drainage, intravenous antibiotics and fluid therapy. However, by the 5<sup>th</sup> day of admission the child's condition deteriorated. There was a gross distension of the abdomen (abdominal girth was 49.3cm at the level of the umbilicus). An erect plain abdominal x-ray showed multiple air/fluid levels with uniform lower quadrant opacity consistent with intestinal obstruction. A second offer of surgery was made, to which the parents consented. The child was then prepared for surgery under ketamine anaesthesia since the private hospital lacked anaesthetic personnel and equipment. Following intravenous administration of the first one-third of a mixture of 50mg ketamine and 10mg diazepam, the child developed prolonged

and life-threatening apnoea. The child was quickly resuscitated, further ketamine administration discontinued and the surgery abandoned. There was no associated cardiac arrest. Following full recovery from anaesthesia, the child was referred to University of Ilorin Teaching Hospital (UITH) for further management.

History, physical findings and laboratory investigations at the paediatrics emergency unit of UITH were also consistent with the diagnosis of intestinal obstruction secondary to intussusception. An emergency laparotomy was done under endotracheal anaesthesia with relaxant technique. Intraoperative course was uneventful. The child had a smooth postoperative course and was discharged home on the 12<sup>th</sup> postoperative day.

## Discussion

Shortage of anaesthetic manpower and facilities remain a persistent problem of health care delivery in developing countries.<sup>1,2</sup> Recent survey in Nigeria confirmed a profound shortage of physician anaesthetists resulting in substandard level of anaesthetic care.<sup>2</sup> In most clinics and some general hospitals surgical procedures are done under ketamine anaesthesia administered by non-anaesthetists.<sup>3,4</sup> Although ketamine has a reputation for easy administration and documented safety profile in the hands of non-anaesthetists,<sup>4,5</sup> the drug is frequently misused, sometimes with disastrous consequences.

One problem that was common to the two patients is the development of

apnoea during anaesthesia. This highlights an important but often unappreciated feature of ketamine hydrochloride. Although the drug has been shown to have minimal effect on the central respiratory drive,<sup>6</sup> it may like other intravenous general anaesthetic agents cause respiratory depression or even apnoea.<sup>7</sup> The apnoea may last long enough to require active resuscitative intervention as it occurred in these patients. The onset of apnoea was quickly recognised and promptly treated in the second patient. This, however, was not the case with the first patient; hence, the progression to cardiac arrest obviously preceded by severe hypoxia. Unrecognised or badly managed hypoxia is a common cause of cardiac arrest in the perioperative period.<sup>8</sup> Since the cardiac arrest may not have been recognised early by the surgeon whose mind was completely focused on his surgery, the patient could have developed cardiac arrest long before it was noticed. A situation where the surgeon plays the dual role of operating and inducing anaesthesia, especially the practice in the private hospitals, has been rightly recognised as a potential cause of morbidity and mortality.<sup>9</sup> Cardiac arrest lasting more than 3 - 4 minutes results in permanent brain damage.<sup>8</sup> Irreversible brain damage had remained in the first patient even though the patient regained spontaneous cardiac and respiratory activities following cardiopulmonary resuscitation (CPR). He therefore remained a human vegetable till death. Intraoperative cardiac arrest is a common cause of failure to awaken from anaesthesia.<sup>19</sup> Although there were no gross clinical evidence of stroke on examination, it is not impossible that

the patient may have had a stroke following the sudden and sustained increase in blood pressure. It is difficult to establish to what extent the use of 5% dextrose for fluid therapy in the intensive care unit may have influenced the outcome in this patient. Infusion of large quantities of dextrose in the neurological patients has been shown to significantly elevate intracranial pressure (ICP).<sup>11</sup> Also there is substantial evidence that hyperglycaemia exacerbates ischaemic neurological damage.<sup>12</sup>

Misapplication of ketamine anaesthesia was another problem common to the two cases. It is due to lack of an in-depth knowledge of the limitations of ketamine as a sole anaesthetic. The posture of patients during surgery is an important factor to consider in the choice of anaesthetic technique. For an operation on the scapular region, the patient would either lie completely prone or semi-prone to allow for easy surgical access. Ketamine anaesthesia is not suitable for operation in any of these two positions. Apart from the fact that prone position may cause abdominal compression with resultant respiratory embarrassment, maintenance of a patent airway cannot be guaranteed without tracheal intubation. Maintenance of an unobstructed airway in semi-prone or lateral position also requires some experience. Although the referral letter did not indicate the posture of the first patient during the procedure, the patient might have been badly positioned.

Ketamine as a sole anaesthetic is also unsuitable for the patient in the second case report for two reasons. First is the emergent nature of the case with full stomach and grossly distended

abdomen. Any form of anaesthesia that does not completely isolate the airway from soilage by way of tracheal intubation and proper packing of the hypopharnx with gauze in the paediatric age group is unsuitable. Secondly, ketamine increases skeletal muscle tone.<sup>13</sup> For this reason it has been shown to be unsuitable as a sole anaesthetic for intraabdominal surgery due to inadequate muscle relaxation<sup>1</sup>.

Ketamine has an important and seemingly unrivaled place in developing countries. However, there is need for the general practitioners, and other non-anaesthetists, who may be involved in ketamine administration to fully, understand the correct uses, limitations and dangers of ketamine anaesthesia to enhance patients' safety.

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