

Catalepsy with Ketamine; A Rare Complication

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Abstract:

Background: Ketamine is a widely used anesthetic both in adult and pediatric patients. Ketamine may be used either alone or with other anesthetic agents like Midazolam or Propofol. Due to its good safety profile, Ketamine is being used even in primary care settings and emergency departments without anesthetist cover for daycare procedures. **Case Report:** We are reporting a case of an elderly gentleman who underwent Endoscopic Retrograde Cholangiography under Ketamine. The patient developed severe muscular hypertonia of all extremities after the completion of the procedure while recovering from anesthesia. During this phase, our patient maintained his vitals on room air without any need of intervention. This Ketamine induced catalepsy resolved completely within one hour. **Conclusion:** Catalepsy is a rare complication of ketamine and care providers must be aware of this complication otherwise it can lead to serious consequences.

Key Words: Catalepsy, Ketamine, Anesthesia

Introduction:

Ketamine was synthesized in 1962 by Parke Davis and first used in humans in 1965 [1]. Ketamine is one of the most commonly used anesthetic agents due to its safety profile. For decades it has been used for anesthesia in main operation theaters and emergency departments for daycare procedures. It is used alone or in combination with other anesthetic agents like propofol and midazolam [2,3]. Ketamine has also gained popularity as a single induction agent in hypotensive patients requiring intubation [4,5].

Ketamine is a dissociative anesthetic and hallucinogen acting as an antagonist on N-methyl-D-aspartate receptor (NMDA) receptors in CNS, primarily acting on the thalamocortical projection system. Two phases of ketamine distribution can be distinguished following intravenous administration. The first phase corresponds to the anesthetic effect of the drug and is characterized by rapid distribution (half-life of 10 to 16 minutes), and a large volume of distribution, due to the drug's high lipid solubility. The second phase represents redistribution from the central nervous system (CNS) to peripheral tissues, with an elimination half-life of two to three hours. Ketamine can cause side effects like tonic colonic movements, visual hallucinations, vivid dreams, bradycardia, and hypotension but catalepsy is a rarely reported complication [6].

Catalepsy is defined as muscular hypertonia and fixed posture without response to external stimuli. It is a symptom complex including rigid body, rigid limbs, unresponsiveness, loss of muscle control and slowing of bodily functions [7]. It is associated with Parkinsonism and epilepsy. Catalepsy may be caused by antipsychotics like haloperidol and it may be a withdrawal symptom of cocaine [8]. Ketamine has been associated with muscular hypertonicity and catalepsy. Typically it resolves without consequences, but descriptions of this process are uncommon in the published medical literature [9]. We report a case of a patient who underwent Endoscopic Retrograde Cholangio-Pancreatography (ERCP) plus CBD stenting for gallbladder mass under monitored anesthesia. After the procedure patient developed catalepsy associated with intravenous ketamine administration.

Case:



A 60yr old gentleman presented with a history of fever and abdominal pain. Fever was associated with shivering, nausea and right hypochondrial pain. He developed yellow discoloration of skin and sclera for 2 months. It was associated with generalized body itching, dark yellow color urine and clay-colored stools. He lost about 10 Kg of weight over the past 2 months. There was no history of any other comorbid diseases in the past.

On examination, he was emaciated with normal vital signs. He was jaundiced with no peripheral stigmata of chronic liver disease. There was tenderness in the right hypochondrium. Other systemic examination was unremarkable. Investigations showed hemoglobin 11.1g/dl, white cell count 14000/cu.mm, platelet $704 \times 10^9 /l$, serum sodium 136mmol/l, serum potassium 3.6mmol/l, serum chloride 100mmol/l, serum bicarbonate 23mmol/l and serum creatinine 0.7mg/dl. His total bilirubin was 21.8mg/dl, conjugated bilirubin 16.7mg/dl, unconjugated 5.1mg/dl, alkaline phosphatase 546 u/l, SGPT 45 u/l, SGOT 102u/l, Total protein 6.4g/dl and serum albumin 2.7g/dl. His prothrombin time was 14.6 with an INR was 1.2. On CT scan of the abdomen, he was diagnosed to have an infiltrative mass of the gall bladder causing obstructive jaundice. So, he was planned for ERCP and CBD stenting in general anesthesia to relieve the obstruction.

This procedure is usually done in propofol alone or in combination with Ketamine in our center. Due to the physical condition and hemodynamic status of the patient, anesthetist decided to perform his procedure with only Ketamine. During the procedure, the patient developed bradycardia and hypotension. Bradycardia was managed by giving Inj. Atropine 1mg and hypotension with intravenous fluids. The patient received a dose of Ketamine up to 2mg/kg body weight. After the completion of the procedure, while recovering from anesthesia, he developed generalized severe hypertonia and was not responsive to any external stimuli. First upper limbs developed muscular rigidity leading to hyperextension and this progressed to lower limbs over a short period of time. There was also the involvement of facial muscles giving it a typical grimacing appearance. Patient was hemodynamically stable and maintaining o_2 saturation on room air. He was kept in the recovery room under observation for any complication or signs of respiratory distress. Hypertonia resolved gradually without requiring any further treatment. Improvement started from hands then arms and neck gradually. In one hour, he was fully conscious and oriented. Patient was shifted to the ward and was monitored for the next 24 hours for any procedure and anesthesia-related side effects.

Discussion:

Ketamine is a commonly used anesthetic agent in adults and pediatric patients to achieve adequate analgesia and anesthesia. It is not only used by medical professionals but also by non-medical persons outside control environment.

Ketamine has a good safety profile at therapeutic doses. It does not cause respiratory depression at therapeutic dose but produces a mild sympathomimetic effect on cardiovascular system leading to hypertension and tachycardia [10]. At therapeutic doses, it is rarely associated with serious side effects needing intervention. A study done in our department showed that Ketamine in

combination with propofol offers stable hemodynamics, adequate sedation, and analgesia for patients undergoing ERCP. It also offers quick onset and offset of sedation [11].

Catalepsy is occasionally seen in some of the patients suffering from neurological disorders or as a side effect of some drugs. It is rarely reported with Ketamine, but the mechanism is not clear. A couple of animal studies showed that there is an association between Ketamine and catalepsy which was dose-dependent and electroencephalograms during this catatonic state reveals both central nervous system excitation and depression [12]. Medical literature review revealed some case reports of patients who underwent procedural anesthesia with Ketamine and developed muscular hypertonia. Heitz CR and his colleague used Ketamine with Midazolam for anxiolysis and bronchodilation following awake nasotracheal intubation in a patient with chronic obstructive airway disease [13]. Another case reported by them involved the use of procedural sedation with ketamine and propofol for shoulder dislocation reduction. These cases involved rigidity to the face and upper extremities. Both patients had uneventful recoveries without further pharmacologic intervention [13]. Vien A and Chhabra N reported a case of an elderly lady with chronic renal failure who underwent procedural sedation for reduction of a dislocated ankle fracture. Bilateral lower extremity muscle rigidity occurred following administration of ketamine, which was mitigated by intravenous midazolam [14].

Our patient developed generalized muscular hypertonicity and hyperextension. Patient was unresponsive for one hour but maintaining his vital signs without any support. He was monitored in recovery until complete mitigation of symptoms and gained complete consciousness spontaneously. Catalepsy resolved without any active intervention in our case but in some cases may require ventilatory support to maintain saturation.

Catalepsy is a potentially serious side effect of Ketamine that can lead to mishap if not handled properly. As the use of Ketamine is increasing in adults and pediatric patients' doctors should know the full spectrum of side effects associated with it and their management.

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