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Original Article

Postoperative Delirium after General Anesthesia in Patient with a Single Kidney. A Case Report

Zijian Guan, BS[1], Yinshi Xu, MD[2], Yingshi Quan, MD[2,*]

[1] Department of Anesthesiology, Yanbian University, Yanbian University Hospital, Yanji, Jilin, P.R. China

[2]Department of Anesthesiology, Yanbian University Hospital, Yanji, Jilin, P.R. China

[*]Corresponding Author: Yingshi Quan

Abstract:
Introduction: We present a case involving a 50-year-old woman with postoperative delirium (POD) is a condition that causes sudden cognitive issues after surgery, leading to longer hospital stays and higher risk of complications. It's more common in patients with liver and kidney problems.
Patient Concerns: This article presents a retrospective analysis of a case in which a patient with a single kidney developed prolonged postoperative delirium after receiving general anesthesia in the operating room.
Diagnosis: Postoperative delirium.
Interventions: Sedatives and anti-hypertensive medications, such as midazolam and urapidil, were administered for maintenance treatment.
Outcomes: The patients gradually restored consciousness.
Clinical Significance: Clinicians should pay special attention to patients with liver and kidney dysfunction to prevent postoperative delirium, and develop effective clinical management strategies based on the patient's clinical characteristics and relevant guidelines.
Abbreviations: POD = Postoperative delirium
Keywords: kidney dysfunction, postoperative delirium, young woman

1. Introduction

Postoperative delirium (POD) is characterized by acute cognitive disturbances such as confusion, disorientation, and fluctuating levels of consciousness, can have significant impacts on recovery, often leading to extended hospital stays and increased morbidity. Disfunction in liver and kidney significantly increases the incidence of postoperative delirium events. One case of postoperative delirium in a patient with a single kidney, who underwent general anesthesia at Yanbian University Hospital(Yanbian Hospital), is retrospectively analyzed according to related literature.

2. Case report

We report a case of a female patient who postoperative delirium after operative room anesthesia.

A 50-year-old female patient was admitted on November 4, 2022, for colostomy closure, more than two months after initial surgery. She had previously suffered abdominal trauma resulting in splenic and colon rupture and kidney injury. At our hospital, she underwent colon repair, colostomy creation, and left nephrectomy. Postoperative recovery was good, with normal colostomy function, flatus, and defecation at discharge. Her mental state, sleep, and appetite were normal, and there were no significant changes in weight. The patient has no history of psychiatric illness or family history of hereditary

diseases. For this admission, blood tests showed a glomerular filtration rate (GFR) of 85.94 ml/min, with no other significant abnormalities.

The patient, meeting surgical criteria with no contraindications, underwent a laparoscopic partial colectomy. An enema was performed the night before surgery. On November 7, 2024, the patient entered the operating room with preoperative vitals as follows: oxygen saturation 99%, heart rate 95 bpm, and blood pressure 170/107 mmHg. No intravenous fluids were administered prior to surgery.For anesthesia induction, the following drugs were used: midazolam 2 mg, sufentanil 20 μg, etomidate 18 mg, rocuronium 35 mg, scopolamine butylbromide 0.3 mg, and methylprednisolone sodium succinate 40 mg. For anesthesia maintenance, propofol was administered at 200 mg/h, remifentanil at 400 μg/h, and rocuronium at 10 mg/h. During the three-hour surgery, sufentanil was administered multiple times for pain management, totaling 45 μg. The procedure successfully completed the sigmoid colectomy and anastomosis. Intraoperative fluids were 900 mL of sodium lactate Ringer's solution and 200 mL of hydroxyethyl starch. Urine output was 200 mL, and blood loss was 100 mL.Postoperatively, neostigmine and atropine were given to reverse the neuromuscular blockade. However, the patient experienced delayed awakening, with drowsiness and difficulty communicating, small tidal volumes, and an increased respiratory rate. The patient's vital signs were: blood pressure 180/100 mmHg, heart rate 100 bpm, and oxygen saturation 100%. Magnetic Resonance Imaging, cerebral CT perfusion imaging and blood routine examination were performed immediately after surgery. The cerebral CT perfusion imaging showed prolonged TTP in the right hemisphere (Figure 1), other Neurological examination and electrolyte levels were normal. To improve the patient's condition, suctioning and oxygen therapy at 3 L/min were performed. The patient was also given 200 mg of sugammadex, 40 mg of methylprednisolone sodium succinate, and 0.2 mg of nicardipine. Organic neurological diseases like intracranial hemorrhage and cerebral infarction were ruled out.Six hours postoperatively, the patient became gradually agitated with persistent hypertension. Treatment included sedatives (midazolam 50 mg/50 mL at 2 mL/h) and antihypertensives (urapidil 25 mg/50 mL at 4 mL/h). Twenty-four hours postoperatively, the patient's mental status improved, becoming more lucid and regaining consciousness, though with mild cognitive impairment. Sedatives and antihypertensive medications were gradually reduced. A multidisciplinary consultation concluded that the patient likely experienced severe postoperative delirium. With symptomatic and supportive treatment, the patient's mental clarity improved, and they could answer questions accurately. The patient was discharged on postoperative day 7 without significant discomfort.

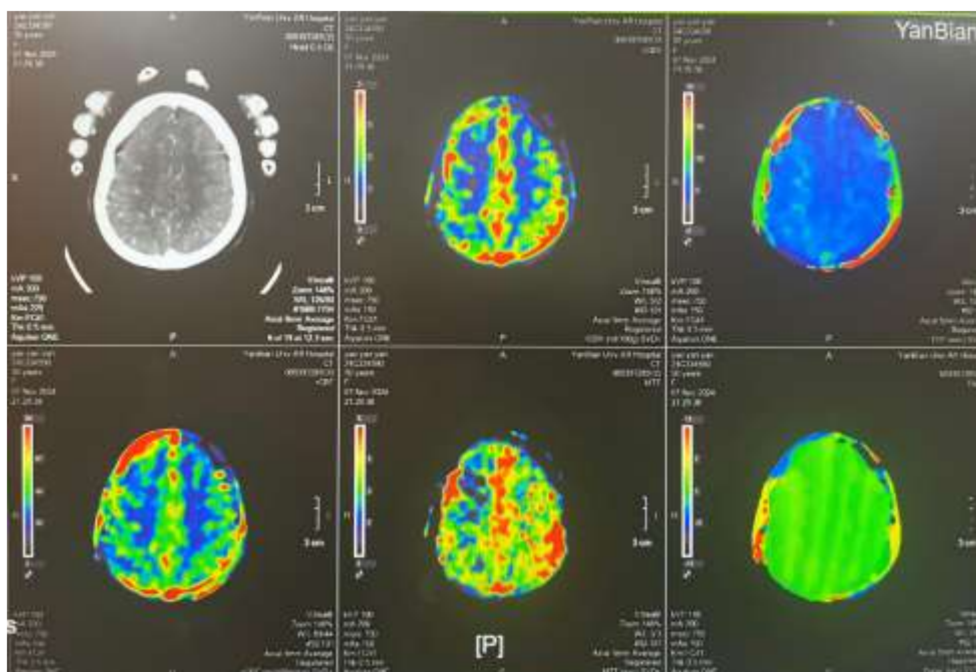

Figure 1. prolonged TTP in the right hemisphere

3. Discussion

The occurrence of POD is caused by many factors. One of the key factors influencing the POD is the pharmacokinetics and pharmacodynamics of anesthetic drugs[(1)], as their metabolism and clearance can vary widely among patients. Age-related physiological changes, comorbidities, and genetic variability can affect the metabolism of anesthetic agents, leading to prolonged drug effects or interactions that may increase the risk of delirium[(2)]. For instance, those with impaired liver or kidney function may metabolize drugs more slowly, resulting in higher plasma levels and prolonged sedation, which are associated with an increased incidence of POD[(3)]. Furthermore, the use of adjunct medications such as opioids and benzodiazepines can further complicate postoperative outcomes by altering neurotransmitter balance and affecting central nervous system function. This case indicates that in patients with liver and kidney dysfunction, such as those with a single kidney, the probability of POD is , lasts longer, and is difficult to correct.

The key point of this case is how to prevent postoperative delirium in patients with hepatic and renal dysfunction. For patients with renal dysfunction, it is critical to adjust drug dosing and avoid medications that heavily rely on renal clearance. Anesthesia plans should consider using agents with minimal renal metabolism, such as dexmedetomidine, or opt for alternative pain management strategies, including regional anesthesia techniques where appropriate[(4)]. In addition, intraoperative management should focus on maintaining optimal fluid balance and ensuring adequate renal perfusion to reduce the likelihood of further renal compromise. Furthermore, postoperative management plays a critical role in preventing POD[(5)]. Early mobilization, proper hydration, and careful monitoring of electrolyte levels can mitigate some of the risk factors for delirium. Sedation levels should be minimized to avoid over-sedation, and narcotics should be used sparingly, especially in the presence of renal impairment. Regular cognitive assessments during the postoperative period can help identify early signs of delirium, allowing for prompt intervention.

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4. Conclusion

Using multimodel analgesia can reduce the incidence of postoperative delirium and improve prognosis after operation in patients with hepatic and renal insufficiency. Through careful management of anesthesia and postoperative period, the risks can be minimized, leading to better recovery and a lower incidence of postoperative complications such as delirium.

Author contributions

Analysis and interpretation of data, drafting the article for important intellectual content, and final approval: Yingshi Quan, Yinshi Xu.

Conception, design, and acquisition of data: Zijian Guan.

Conceptualization: Zijian Guan.

Data Curation: Zijian Guan.

Funding Acquisition: Yingshi Quan, Yinshi Xu.

Investigation: Zijian Guan.

Methodology: Zijian Guan.

Writing – original draft: Zijian Guan.

Writing – review and editing: Yingshi Quan, Yinshi Xu.

Conflicts of Interest: The authors declare no conflicts of interest.

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