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CASE REPORT

# Remifentanil and Midazolam for Procedure Sedation and Analgesia in a Patient with Spinal Cord Injury Undergoing Debridement

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Patients with spinal cord injuries (SCIs) often develop pressure sores owing to prolonged immobility, necessitating multiple debridement surgeries. General and regional anesthesia are commonly used during surgical or examination procedures; however, autonomic dysreflexia frequently occurs. There is no consensus on the ideal technique for the perioperative anaesthesia management in this population. Here, we present the case of a 74-year-old female with a SCI who successfully received procedural sedation and analgesia with intravenous midazolam and remifentanil.

Key words: Spinal cord injury, autonomic dysreflexia, remifentanil, midazolam

## INTRODUCTION

Despite significant progress in contemporary medicine, the burden of spinal cord injury (SCI) has increased over the last few decades. Consequently, patients with paraplegia more frequently require emergency or elective surgery below the level of their injury. These patients, particularly when undergoing procedures that involve afferent noxious stimulation of the hollow viscera of the pelvis, lower extremities, and skin, pose unique anesthetic challenges.[1]

Anesthetic management of these patients can be a challenge. The most feared complication during the perioperative management of these patients is autonomic hyperreflexia or dysreflexia (AD). This condition occurs in approximately 85% of cases with an injury above T6-T7.[2] AD occurs owing to the stimulation below the level of the lesion that leads to sympathetic nervous system activation, resulting in vasoconstriction and increased blood pressure. The brain initiates compensatory mechanisms by enhancing the parasympathetic activity to suppress sympathetic responses. However, the parasympathetic impulses cannot transmit below the lesion, resulting in persistent hypertension with bradycardia.[3] Other important clinical manifestations are headache, flushing, sweating, and piloerection. If AD occurs perioperatively, it is managing successfully with good recovery.[1]

In this article, we present the case of procedural sedation and analgesia (PSA) using midazolam and remifentanil in a paraplegic patient undergoing a debridement procedure.

## CASE REPORT

A 74-year-old female (height 158 cm and weight 57 kg) patient had a history of SCI below T8 for 33 years and was regularly medicated for hypertension. She had previously experienced dizziness, postoperative nausea, and vomiting after general anesthesia (GA). For her current debridement surgery, we opted for PSA. Intraoperatively, we monitored vital signs using electroencephalography, noninvasive blood pressure (BP), and pulse oximeter monitors.

Preoperative BP – 141/71 mmHg, heart rate (HR) – 76 beats/min (bpm), room air blood oxygen – 94%. We administered 2.5 mg of intravenous midazolam to reduce anxiety and used remifentanil with a target-controlled infusion (Minto model) at an effective site concentration (Ce) of 1.0 ng/mL

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for analgesia to avoid spinal reflexes. Approximately 30 min after the skin incision, the BP elevated to 147/90 mmHg, HR – 67 bpm and oozing over the surgical site was noted. The remifentanil was therefore increased to 1.5 ng/mL; the BP reduced to 130/80 mmHg and the bleeding decreased.

During the procedure, the patient was able to converse normally, hemodynamics and respiration remained stable, reporting no discomfort, and the patient maintained an Observer Assessment of Alertness/Sedation Scale score of 5. The procedure lasted 135 min and proceeded smoothly, and both the patient and the surgeon were very satisfied with this anesthetic technique. Postoperative BP – 136/72 mmHg, HR – 72 bpm, room air blood oxygen – 96%. Total remifentanil dosage used during surgery 420 μg. The patient did not suffer from postoperative nausea, vomiting, or dizziness.

## DISCUSSION

Complications during the perioperative period are not uncommon in patients with SCI owing to their abnormal responses to surgical stressors. AD can lead to sympathetic nervous system activation, resulting in anxiety, agitation, sweating, headache, and hypertensive crisis. Compensatory parasympathetic activity is ineffective below the lesion, causing persistent hypertension and bradycardia.[4]

In a review article, Rizk *et al*.[1] examined 82 patients who underwent 89 procedures. GA was the most commonly used technique (68.5%), followed by spinal anesthesia (13.5%). Only three procedures were performed under conscious sedation, none of which used remifentanil. One procedure was conducted under local anesthesia alone, whereas nine procedures did not require GA. The review highlighted that perioperative complications, particularly AD, could involve pulmonary, cerebral, and, most commonly, cardiac issues. PSA also led to the complications such as hypertension, bradycardia, tachycardia, sweating, apnea, headaches, blurred vision, convulsions, and bladder spasms. The authors concluded that GA and regional anesthesia are equally utilized, as well as local techniques and PSA, for these patients. However, they pointed out the difficulty in assessing the level of the block in regional anesthesia.[1] The use of muscle relaxants and opioids in these patients is controversial, and the high rate of respiratory complications makes GA particularly challenging.[5,6]

PSA with or without sedation may be a safe and suitable alternative for surgery below the level of injury in patients with paraplegia.[7,8] Studies have shown promising results in this regard. For instance, Wadhwa *et al*.[9] reported two patients with paraplegia undergoing lower limb surgery with PSA using intravenous midazolam or fentanyl, respectively, without any episodes of AD. In addition, Aslanidis *et al*.[10] presented a case of PSA using 1.5 mg of intravenous midazolam initially and a dexmedetomidine infusion in a patient with paraplegia undergoing an orthopedic procedure without complications. These cases suggest that PSA might be an effective alternative approach for patients with SCI undergoing procedures below the injury level.

Remifentanil, a fast-acting, short-duration selective μ-opioid agonist, allows for precise dosage adjustment and stable hemodynamics. It provides effective pain relief without causing prolonged respiratory depression or sedation. When combined with propofol or benzodiazepines, remifentanil is particularly suitable for PSA.[11-14] This combination offers the benefits of effective analgesia and sedation while maintaining patient safety and comfort.

## CONCLUSION

This case first demonstrates that PSA with midazolam and remifentanil is a viable alternative modality for patients with SCI, offering effective anxiety and pain management while preventing AD and minimizing postoperative discomfort. This approach should be considered for patients with similar conditions.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

### Data availability statement

The data that support the findings of this study are available from the corresponding author, ZF Wu, upon reasonable request.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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