



# Combined Spinal Epidural (CSE) as a Sole Anesthetic Technique for 9 Hours of Complex Orthopedic Surgery on a Critically Ill Trauma Patient: A Case Report

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**Keywords:** combined spinal epidural, anesthesia, orthopedic surgery, anesthetist

**Abbreviations:** COPD: chronic obstructive lung disease, CSE: combined spinal epidural, DHS: dynamic hip screw, LCP-DCP: low contact plate-dynamic compression plate, WHO: World Health Organization, DVT: deep vein thrombosis, MI: myocardial infarction

## 1. Introduction

The anesthetic decision of general or regional anesthesia has always been controversial. However, the decision always depends on the patient's clinical condition, the type of surgery, and the clinical experience of the anesthetist in charge of the case [1]. In patients who require extensive major and long surgery while they suffer from multiple comorbidities including diabetes, ischemic heart disease with compromised left ventricular function, and severe chronic obstructive lung disease (COPD), regional anesthesia as a single anesthetic technique +/- sedation proved to be safer than general anesthesia preoperatively, especially when it keeps the patient awake and in full control of his/her breathing [2]. Avoiding general anesthesia and mechanical ventilation was found to be advantageous in such patients because they might not tolerate long hours of surgery under general anesthesia, and could remain ventilator-dependent once they are ventilated mechanically, especially when they have ventilator-acquired pneumonia, which could be fatal [3, 4]. In emergency circumstances, where the anesthetist does not have enough time to optimize the patient's clinical condition, regional anesthesia could be safer than general anesthesia especially in elderly frail critically ill patients [5].

We report a case of a revision femoral prosthetic fracture in a high-risk trauma patient with multiple

comorbidities including obesity, diabetes, and severe cardiopulmonary disease. The major operation was performed effectively using combined spinal epidural (CSE) anesthesia under sedation as a sole anesthetic technique under propofol TCI sedation. This unique anesthetic technique significantly contributed to the complication-free recovery experienced by the patient, which helped him to be discharged home safely and quickly.

## 2. Surgical Background

A 53-year-old gentleman presented with a low-energy injury to his right thigh while walking. The patient felt that his lower limb gave way and then fell; thus, it is fair to consider that the fracture preceded the fall or even caused it. He denied having any pain in his thigh before this.

Upon presentation, he was given adequate analgesia and his right lower limb was put in skin traction for better pain control in the ward, easier transfers, and nursing. He was explained that he has a complex interprosthetic femoral shaft fracture and conservative management would not be suitable due to the fracture pattern and previous operations. He consented to the removal of fixation devices and fixation of the fracture and was booked for the theatre the next morning.

The patient sustained a comminuted spiral fracture of the femoral shaft starting just distal to the lesser

trochanter (subtrochanteric area) between a dynamic hip screw (DHS) plate and a distal low contact plate-dynamic compression plate (LCP-DCP). These two devices were used when the patient sustained a road traffic accident 24 years ago in which he had a fracture of the same femur and a traumatic amputation of the same side upper limb.

The use of these two devices left an area of the femoral shaft unprotected biomechanically. Even though the fracture healed in 1999, this caused an increased risk of a new fracture between the two fixation devices which eventually happened 24 years later.

Following discussion through our local and regional MDT process, the decision was made to remove the DHS device and all the screws (or as many as possible) in order to fit a cephalomedullary nail. During the operation, a universal broken metalwork removal kit was used, which helped significantly in the process of removing so many different types of screws and plates.

The patient was positioned on a traction table with the contralateral leg on a padded gutter support. A lateral incision was utilized under fluoroscopic guidance to remove the DHS device. Then the incision was extended distally to expose the second device (LCP-DCP plate). All the screws were removed, but unfortunately, there were three broken screws in the femoral medulla from the previous operation. The plate itself was left in order to avoid stripping the periosteum and creating a new weak area in the new fixation attempt. The decision was made to use the plate with new screws to give some more rotational stability to the new fixation construct.

The fracture was reduced and held with forceps. A proximal incision was utilized to gain access to the femoral canal and a reconstruction cephalomedullary nail was used under fluoroscopic guidance. The broken screw shafts were pushed aside and the nail managed to bypass the LCP-DCP plate area to allow a distal locking screw.

New cortical screws were inserted into the LCP-DCP plate missing the nail, of course. The wound was thoroughly lavaged and closed in layers. A special negative pressure dressing was applied due to the anticipated oozing. The patient was toe touch weight-bearing with the physios in the ward, but soon after his first line of recovery and due to his difficulty in ambulating with no arm on the same side, the decision was made to proceed to partial weight-bearing which he found easier. He was discharged on day 14 postoperatively.

### **3. Anesthetic Technique**

The patient was assessed before surgery, where he was found to be elderly, frail, and obese with multiple comorbidities including diabetes mellitus II, COPD, and IDD with a long-standing smoking history.

However, he was reasonably controlled and hemodynamically stable on his regular medications.

After discussion, he has accepted having his operation done under CSE + propofol TCI sedation as the sole anesthetic technique under routine and invasive arterial pressure monitoring and HDU observation postoperatively.

Upon admission to the theatre, the patient was checked according to the World Health Organization (WHO) protocol, and all monitors were attached to him. Later, a couple of big peripheral IVs and arterial lines were established.

The patient was put in a lateral position to facilitate the CSE anesthetic two separate needles technique via a midline approach, which was performed smoothly and without complication.

After testing the block and commencing the patient's propofol TCI sedation, the operation was allowed to start.

The surgery was continued for about 9 hours, however, the patient remained hemodynamically and respiratory stable through the operation. All data was recorded manually and in the electronic system of the hospital.

After a short period in the recovery room, the patient was transferred to the HDU for a routine overnight observation. Later, he was moved to his routine ward and discharged home safely after a few weeks.

### **4. Discussion**

Giving general anesthetics to high-risk patients with multiple comorbidities might be risky for this group of patients. Regional anesthesia including spinal, continuous spinal, CSE, or epidural anesthesia with or without sedation remains a safer option than general anesthesia for lower limb trauma patients. Spinal anesthesia is simple, but finite and might not be enough for long operations [6]. Continuous spinal anesthesia is a more invasive procedure with a significant incidence of post-operative headache [7]. Epidural anesthesia can cover a long surgery; however, its slow induction time might be a disadvantage, especially in an emergency [8]. CSE was found to be a more practical, flexible, and safe technique, allowing better hemodynamic stability, quicker surgical start with profound muscle paralysis, and long-term surgery as well as excellent postoperative analgesia and effective physiotherapy [9, 10]. However, special attention should be given avoiding the possible upward migration of the epidural blockade by constant monitoring of the upper level of the block postoperatively [11].

In addition to the above-mentioned advantages, the CSE regional anesthetic technique was found to have more general physiological benefits facilitating better and quicker recovery including A: Blunting the

patient's physiological response to the surgical stress; B: Blocking the upper lumbar splanchnic sympathetic nervous pathway improving the GIT function postoperatively; C: Decreasing the incidence of postoperative complications, e.g., myocardial infarction (MI), pneumonia, and deep vein thrombosis (DVT); D: Controlling the patients' post-operative pain and sickness speeding up the patient's discharge from the hospital safely [12–14].

Needless to mention, these complications will add to the cost of the patient's management which will put more burden on the NHS budget [15].

## 5. Conclusion and Recommendations

We believe that regional anesthetic techniques, especially CSE can provide excellent quality surgery for both patient and surgeon allowing better surgical as well as anesthetic management and enhancing recovery, especially for compromised trauma patients having major long-time lower limbs complex orthopedic surgery.

We believe that the anesthetist's clinical experience is a major factor in providing this elite anesthetic technique.

We also learn from the past COVID-19 pandemic experience that regional anesthesia has been strongly recommended because it could be safer for the anesthetic staff to decrease their contact with the patient's airway. Also, regional anesthesia could decrease the burden on the NHS by speeding up the rate of the patient's discharge from hospitals aiming at decreasing the incidence of nosocomial infection because of long hospitalization, decreasing the cost of treatment, and allowing more beds for other patients shortening their waiting operative lists [15].

Finally, we strongly recommend encouraging the suggested CSE technique for high-risk surgical comorbid orthopedic trauma patients having major long-term lower limb operations.

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