



Successful epidural anesthesia in a patient with an extremely shallow epidural space: a case report

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ABSTRACT

Although epidural anesthesia is considered relatively safe, unintentional dural puncture or spinal cord injury occurs if the needle is advanced too deep. In this case report, we described a successful epidural anesthesia in an adult patient who has an extremely shallow epidural space (1.5 cm), which is the smallest depth reported in the literature. The distance from the skin to the epidural space should be checked before the procedure to avoid serious complications particularly in small women. The epidural needle should not be advanced beyond a depth of 1.5 cm without loss-of-resistance technique or other methods for identifying the epidural space. The present case report re-emphasizes the importance of basic tips and fundamental techniques used for safe epidural anesthesia. Anesthesiologists should be aware that the epidural space depth could be as small as 1.5 cm even in adult patients.

Key words: Computed tomography; Epidural anesthesia; Spinal cord injuries

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INTRODUCTION

Epidural anesthesia is a frequently performed anesthetic technique that effectively provides pain relief during and after surgery. Although epidural anesthesia is a relatively safe and established technique, it could cause various neurological complications such as unintentional dural puncture, epidural hematoma or abscess, and direct spinal cord injury.¹⁻⁴ Dural puncture or direct spinal cord injury would occur if the needle is advanced too far. It has been reported that the incidence of unintentional dural puncture after epidural anesthesia is 0.16%–1.3% with postdural puncture headache occurring in 16%–86% patients.⁵ On the other hand, previous large prospective and retrospective studies involving 30,000–500,000 patients have not identified any

direct spinal cord injury due to epidural anesthesia, indicating that direct spinal cord injury is extremely rare.^{6,7} However, several case reports exist, and once direct spinal cord injury occurs, the prognosis is devastating.²⁻⁴

Here we present the safe and successful administration of epidural anesthesia in a surgical case involving an 85-year old woman with an extremely shallow epidural space.

CASE REPORT

An 85-year-old woman (height: 148 cm, weight: 49 kg, body mass index: 22.4 kg/m²) with gastric cancer was scheduled to undergo open distal gastrectomy. General anesthesia combined with epidural anesthesia was planned. Prior to the epidural

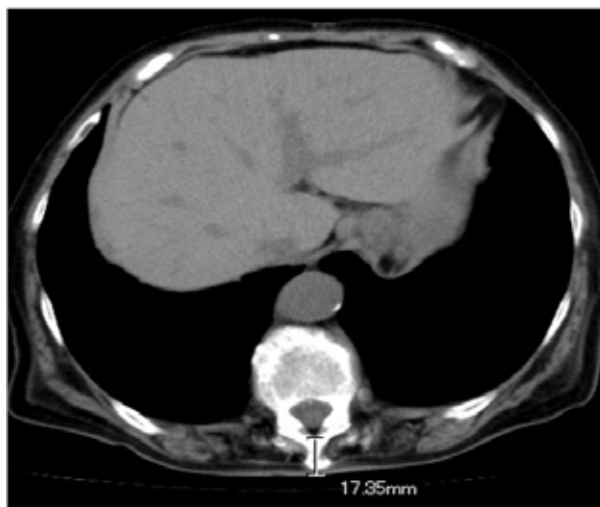


Figure 1: Axial computed tomography scan of the spine at the Thoracic 10/11 level. The distance from the skin to epidural space is 17.35 mm.

anesthesia, the preoperative computed tomography was checked by the anesthesiologists to measure the distance from the skin to the epidural space at lower thoracic intervertebral levels. Surprisingly, the distance was lesser than 2 cm (Figure 1).

In the operating room, after standard monitoring was initiated, the patient was placed in the lateral decubitus position. Following asepsis and skin infiltrated with 1% lidocaine, an 18-gauge Tuohy needle was inserted toward the T10/11 level via the midline approach. The needle was slowly advanced, and the epidural space was identified at a depth of 1.5 cm using the loss-of-resistance technique. An epidural catheter was inserted through the needle and advanced 6 cm into the upper thoracic epidural space. The patient did not present with any neurological symptoms during the procedure. The appropriate placement of the epidural catheter was confirmed by segmental cold sensation loss in the T7–11 dermatomes after administration of a 3 mL test dose of 1% lidocaine.

After epidural catheter placement, general anesthesia was induced and the planned surgery was uneventfully conducted. The postoperative course was uneventful and no neurological symptoms were observed.

DISCUSSION

Several studies have investigated the epidural depth in surgical patients. Hirabayashi et al. investigated the epidural space depth in 1007 patients who underwent epidural anesthesia. In their study, the

shallowest space was found at the thoracolumbar level (mean values: 4.1 ± 0.6 cm for men, 3.6 ± 0.5 cm for women).⁸ Ravi et al. investigated 120 patients and revealed an epidural space depth of 38.77 ± 5.48 mm in non-obese female patients. Another study involving 168 patients who underwent thoracic epidural anesthesia revealed that the epidural space depth was 6.1 ± 1.1 cm, with the shallowest depth being 3.5 cm,⁹ indicating that the epidural space in our patient (1.5 cm) was extremely shallow.

These studies have demonstrated significant individual differences, which potentially increase the risk for dural puncture and other neurological complications. Factors that correlate with the depth of the epidural space have also been investigated. The body weight and body mass index (BMI) are reported to exhibit a strong correlation with the depth of the epidural space.^{8,10} Other factors that are reported to show a correlation to the epidural space depth include sex, height, body surface area.^{8,11}

Prediction of the epidural depth before epidural anesthesia is expected to be clinically useful. Using linear regression analysis for 120 patients, Ravi et al. formulated the predictive equation for the epidural space depth in relation to BMI as follows: Depth (mm) = $a + b$ (BMI), where $a = 17.7966$ and $b = 0.9777$.¹⁰ Although this formula may be useful for most patients, the estimated depth for our patient according to this equation was 39.7 mm, which is far from the actual depth. The measured value on computed tomography has been shown to closely correlate with the actual epidural space depth during the procedure.⁹ By checking the preoperative computed tomography, epidural anesthesia was safely performed in the present case. If we had not referred to the computed tomography findings before the procedure, dural puncture or spinal cord injury could have occurred.

Direct spinal cord injury could even occur during skin infiltration before epidural anesthesia. Absalom et al. reported a case of direct spinal cord injury during skin infiltration by a 4-cm needle, and they recommended the use of a shorter needle.¹² However, the present case report emphasizes that even a shorter needle could reach the spinal cord and cause direct spinal cord injury. Not all patients undergo computed tomography prior to epidural anesthesia or surgery. The needle should not be introduced deeper than 1.5 cm during skin infiltration particularly in small women. The loss-of-resistance technique or other methods for identifying the epidural space must

extremely shallow epidural space

be applied beyond the depth of 1.5 cm. If available, ultrasound can also be used to identify the epidural space before and during the procedure.¹³

CONCLUSION

Serious neurological complications related to epidural anesthesia are rare but catastrophic. If preoperative computed tomography is available, the distance from the skin to the epidural space should be checked before epidural anesthesia procedure to avoid serious complications. The present case report re-emphasizes the importance of basic tips and fundamental techniques used for safe epidural

anesthesia. Anesthesiologists should be aware that the epidural space depth could be as small as 1.5 cm even in adult patients.

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Authors' Contributions:

MK: Anesthetic management and drafting the paper

NM & TM: Revision of the manuscript and collection of the data

DK & TM: Revision of the manuscript

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PATIENT PSYCHE

Patients in western countries are very intolerant to their diseases, they convey everything at the earliest... But once they reach their doctors they become tolerant; they wait for hours outside, can wait for weeks for an investigation and even wait for months to get an appointment by a consultant.

In our third world countries, its absolutely reversed...patients are very tolerant to their illnesses and will not visit their doctor till the end. But once they reach, they become totally intolerant... Want consultation in minutes, diagnosis in seconds and to get cured with the cheapest treatment in milliseconds.

By: Prof. Masood Haq

Shared by: Professor Haqdad Durrani