

## Accidental dural puncture-perioperative management

### INTRODUCTION

The incidence of accidental dural puncture (ADP) varies from 0.19% to 3.6%<sup>[1]</sup> during epidural anaesthesia even in experienced hands and warrants a prompt response. The possible options include conversion to spinal anaesthesia through the same epidural needle (no postoperative analgesia), placement of the epidural catheter in another interspace (motor blockade even with sensory dose due to seepage of the drug through rent in the dura), and intrathecal catheterization, ation through the dural hole, or less commonly abandoning the procedure.<sup>[2,3]</sup>

Among these, intrathecal catheterisation can benefit by the administration of appropriate local anaesthetic for rapid onset of surgical anaesthesia, postoperative pain relief and also to decrease the incidence of post-dural puncture headache (PDPH).

### METHODS

The study includes patients who underwent total knee replacement under combined spinal epidural (CSE) anaesthesia from November 2018 to April 2019 at our institute. After obtaining institutional ethics committee approval, all the patients had thorough preanaesthetic evaluation, informed consent regarding anaesthetic procedure, rare possibility of ADP, and implications of various management options of ADP in case it occurs was taken. Preoperative hydration

was provided to all patients along with routine and other indicated premedication. In all patients, sitting position with a midline approach at L<sub>3-4</sub>/L<sub>4-5</sub> was used. Monitoring includes noninvasive blood pressure, electrocardiogram, oxygen saturation, and pulse rate. We used Portex® 18 G Combined Spinal Epidural kit (18 G Tuohy epidural needle with Whitacre spinal needle 27 G and 18 G Epidural catheter). Seven out of 220 patients who underwent TKR had ADP; the epidural needle was left *in situ* and 18G multi orifice epidural catheter was threaded through the same 18G epidural needle up to a length of 3-4 cm into the subarachnoid space. The catheter with a bacterial filter was taped to the skin. After checking aspiration for clear cerebrospinal fluid (CSF), hyperbaric bupivacaine 0.5% 10 mg was injected through the catheter to achieve the required block level for surgery. The spinal anaesthesia was maintained intraoperatively with intermittent top-ups of 2.5-5 mg of 0.5% hyperbaric bupivacaine, to maintain an appropriate level of block [Table 1].

For all patients, the catheter and filter were sealed aseptically and labeled clearly as “Intrathecal catheter: No drug to be given” and the anaesthetist on duty was duly informed regarding the procedure and postoperative analgesia management. Oral fluids were encouraged after the regression of motor blockade. Intravenous fluids were administered till 9 am on the first postoperative day. Deep vein thrombosis prophylaxis was given according to institution protocol.

Postoperative analgesia was maintained by continuous spinal infusion with 0.125% levobupivacaine along with butorphanol (80 µg per ml) at the rate of 0.8 to 1 ml/h according to analgesic requirement,

**Table 1: Details of patients with ADP and their management**

Case with ADP	1	2	3	4	5	6	7
TKR-Unilateral (U/L) or Bilateral (B/L)	U/L	B/L	U/L	U/L	U/L	B/L	U/L
Initial drug-Hyperbaric bupivacaine (H)	2 ml (H)	2 ml (H)	2 ml (H)	2 ml (H)	2 ml (H)	2 ml (H) PLUS Fentanyl 25 µg	2 ml (H)
Additional dose	2.5 mg	5 mg	2.5 mg	-	2.5 mg	5 mg	5 mg
Postoperative analgesia	0.125%	0.125%	0.125%	0.125%	0.125%	0.125%	0.125% L
Local anaesthetic plus	L	L	L	L	L	L	
Butorphanol 80 microgram/ml							
Rate of infusion ml/hr	1	1	1	0.8, then 0.6	1	1	1
Catheter removed after	72 hrs	96 hrs	72 Hrs	72 Hrs	72 Hrs	96 hrs	72 hrs
Complaints	-	Mild PDPH For one day	-	Motor Weakness	Headache	-	Fever

TKR – Total knee replacement, U/L – Unilateral, B/L – Bilateral, H – Hyperbaric Bupivacaine, L – Levo Bupivacaine, ADP – Accidental Dural Puncture, PDPH – Post-dural puncture headache

which was started at the end of the surgery in the operation theater. Infusion continued for 3 days in five patients (Unilateral TKR) and 4 days in other two patients (Bilateral TKR) and then the catheter was removed.

All patients were followed up daily for 7 days and evaluated for common symptoms of motor weakness, paraesthesia, PDPH, fever, and any signs of infection. One patient had mild PDPH for one day which subsided with fluid management. One patient had a mild headache not related to postural changes that subsided with symptomatic treatment. One patient had high-grade fever associated with chills and rigors along with burning micturition and on evaluation found to have urinary tract infection, which subsided on treatment.

One patient complained of transient unilateral motor weakness in operated limb (no movements at ankle joint). So the infusion rate was reduced to 0.6 ml/h. Later the patient was able to move his ankle joint after reducing the infusion rate.

**DISCUSSION**

ADP during epidural anaesthesia is not uncommon. Immediate placement of an intrathecal catheter has been suggested to be useful among the different alternatives for managing the ADP on the table and perioperatively.<sup>[1]</sup> In recent years, insertion of intrathecal catheter following ADP has gained popularity. The advantages of this maneuver are avoidance of second dural puncture, immediate provision of anaesthesia, postoperative analgesia and to decrease the incidence of PDPH. PDPH is observed in >50% of patients following an ADP.<sup>[4]</sup> It may hinder ambulation and increase hospital stay.<sup>[5]</sup>

**Table 2: Possible causes for accidental dural puncture in this study**

Possible cause of ADP	Number of Patients
Difficult Anatomy-Obese patients (BMI 36-40 kg/m <sup>2</sup> )	Two
Unable to identify loss of resistance (post laminectomy patients)	Two
Sudden movement of the patient	One
Procedure by junior residents	Two

ADP – Accidental Dural Puncture, BMI – Body mass index

In our study, we encountered seven patients who had ADP and were managed successfully with intrathecal catheterisation. The possible reasons for the ADP in our study are mentioned in Table 2.

The intrathecal placement of the epidural catheter was postulated to initially “plug” the dural tear and cease the efflux of CSF from the subarachnoid space.<sup>[5]</sup> When removed after being *in situ* for long term, the edema and fibrinous exudates resulting from an inflammatory reaction were thought to seal the dural hole and prevent further CSF leakage.<sup>[6]</sup> The most plausible hypothesis seems that the catheter plugs the dural hole and thereby reduces or stops fluid loss.<sup>[7]</sup>

The continuous spinal anaesthesia is standard anaesthesia technique, although the use of epidural catheter as spinal catheter was debatable.<sup>[8]</sup> The use of epidural catheter as intrathecal catheter got acceptance slowly as it was noted that thin catheters, which were meant for continuous spinal anaesthesia were actually responsible for neural complications and their insertion is also difficult.<sup>[9,10]</sup> More and more data are now becoming supportive of intrathecal catheterization.

However, there are rare possible complications associated with intrathecal catheterisation

including meningitis, epidural or spinal abscess, hematoma, arachnoiditis, or cauda equina syndrome.<sup>[11]</sup>

## CONCLUSION

During epidural anaesthesia, in the event of accidental dural puncture, intrathecal catheterisation through the same needle can be considered as relatively safe and useful method for perioperative management without any serious complications. Further, large multicentric studies are required before its validation for use in ADP.

## Declaration of patient consent

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

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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**Submitted:** 09-Jul-2019

**Revised:** 13-Jun-2019

**Accepted:** 02-Mar-2020

**Published:** 01-May-2020

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Access this article online	
Quick response code	Website: www.ijaweb.org
	DOI: 10.4103/ija.IJA_328_19

**How to cite this article:** Thummala V, Nageswararao L, Swetha D, Sriharitha S, Mounica U. Accidental dural puncture-perioperative management. *Indian J Anaesth* 2020;64:425-7.

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