

Incidence and management of post-dural puncture headache following spinal anaesthesia and accidental dural puncture from a non-obstetric hospital: A retrospective analysis

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ABSTRACT

Background and Aims: Post-dural puncture headache (PDPH) is one of the complications following spinal anaesthesia (SA) and accidental dural puncture (ADP). In our institute, we routinely practice epidural analgesia (EA) for supra-major surgeries. Our previous audit on EA revealed 4% incidence of ADP. This led us to a clinical initiative to follow-up patients with dural puncture (DP) to note the incidence, presentation, associated symptoms and treatment of PDPH. Herewith, we present the retrospective analysis over a 2-year period. **Methods:** Following institutional review board approval, the follow-up notes of patients who had DP from May 2011 to April 2013 were analysed retrospectively (using SPSS 20 version) with respect to the needle size, level of DP, reinsertion of epidural catheter, details of ongoing analgesics, incidence and severity of PDPH and treatment received. **Results:** In 2 years, we found that the incidence of PDPH in the patients who received SA was 3.9% and 25% in the ADP group. There was a positive association between needle size, type and PDPH, and it was seen more in the 20–40 age group. The commonest presentation of PDPH was occipital/frontal headache within 96 h and lasted for a mean of 3 days. All patients received pharmacological treatment. Seventy-one per cent of patients (25) were either on coffee or caffeine tablets. One case of intractable PDPH responded well to oral pregabalin 75 mg. **Conclusion:** PDPH severity and incidence following ADP in our centre is lower than the reported incidence from obstetric centres and can be effectively controlled with drug treatment only.

Key words: Accidental dural puncture, non-obstetric population, post-dural puncture headache, post-spinal headache

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INTRODUCTION

Post-dural puncture headache (PDPH) is a common complication after lumbar puncture.^[1] PDPH typically presents with headache in frontal/occipital region which is postural in nature, that is worse on standing and better when lying down.^[1] Associated symptoms include stiff neck, hearing loss, tinnitus, photophobia and nausea.^[1] The prevalence of PDPH is higher in pregnant women,^[1] and extensive data are available on incidence, management and prevention of PDPH in obstetric patient both following spinal anaesthesia (SA) and accidental dural puncture (ADP) during epidural analgesia (EA).^[2-6] The incidence of PDPH following ADP varies and can be 80–86% in the obstetric population.^[2]

There exist limited data with respect to DP in non-obstetric patients.^[7] Our cancer institute practices EA for supra-major surgeries. Our previous audit on EA revealed a rate of ADP of around 4%, which was higher than the reported incidence of 2.6% in

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literature.^[8] Following the audit, as a service initiative, all patients who received SA or had an ADP were actively followed up for PDPH symptoms. This retrospective analysis of the clinical records is aimed to look at the incidence and severity of PDPH in this group of patients. The secondary objectives include understanding the causative factors, the associated symptoms and treatment offered for the same at our centre.

METHODS

After permission from the Institutional Review board, the clinical records of patients who had dural puncture between May 2011 and April 2013 were retrospectively analysed. During this 2-year period, all patients with DP – either ADP or following SA – were visited by a group of nurses who enquired about symptoms of PDPH. Other relevant details of the DP including the needle size, level of dural puncture, reinsertion of epidural catheter were captured by the team as per a predrafted case record form. The nurse team in liaison with the acute pain service (APS) recorded any symptoms of PDPH till 5 days after DP or at hospital discharge, whichever was later. In case the patient was discharged earlier than 5 days, an attempt was made to call the patient 5–7 days after surgery, to enquire about symptoms of PDPH. All symptomatic patients were followed up by the nurse team till resolution of symptoms. In case, if any patient was discharged with mild symptoms of PDPH, the team would telephonically call the patients to note the further course of PDPH symptoms. In case, if the patient did have any new or worsening of previous symptoms, they were asked to visit the pain clinic. The last contact with a patient was recorded as the ‘last follow-up post-surgery’.

For convenience, patients who had dural puncture (DP) during SA and combined spinal epidural anaesthesia (CSE) were clubbed as the intentional dural puncture group (IDP). The data were analysed in two groups – the IDP group and ADP group. One patient had DP during CSE, as the implication of dural rent is more with the larger Tuohy needle, the details of the patient were analysed with the ADP group and not with IDP group.

PDPH was defined as headache which was aggravated by sitting or standing and was reduced on lying down. Presence of a postural component was essential to label the headache as PDPH.^[9] The

severity was recorded on 5-point scale (0 = no headache, 1 = mild, 2 = moderate, 3 = severe, 4 = unbearable).^[10,11] In paediatric patients, severity was recorded in accordance to parents’ perception. Presence of postural headache was taken as an event and severity expressed as percentage. For analysis, the worst headache recorded for a symptomatic patient during his entire symptom period was the ‘worst scores’ and the arithmetic average of all severity scores was recorded as ‘average score’ for the severity of PDPH. The percentage distribution of patients with respect to severity of symptoms both worst and average was reported. The presence of associated symptoms with PDPH like nausea, vomiting, vertigo and tinnitus were noted as events.

As PDPH is known to be more common in 20–40 years and with least incidence in more than 60 years of age, age was divided into four groups <20, 20–40, 41–60 and >60 for further analysis.^[12] Association between age, gender, needle size, type, number of attempts and level of DP was compared using Chi-square test. The level of insertion was clubbed into three groups for comparison: Lumbar (L1-L5), Low thoracic (T7-8 interspace and lower), High thoracic (T6-7 interspace and higher). For convenience, start of oral feeds and ambulation was clubbed into categories such as within 6 h, 6–12 h, 12–24 h, 24–48 h, beyond 48 h and then compared with the presence of PDPH.

The treatment offered to the patient by the APS team and details of ongoing analgesics were recorded. All data were analysed using SPSS 20 version. *P* value <0.05 was considered significant.

RESULTS

In 2 years, 320 patients received SA and 87 cases were done under CSE, to make a total of 407 patients in the IDP group. EA was attempted in 3449 patients. In 80 patients, dura was accidentally breached during epidural placement (ADP). The average last follow-up time post-surgery in ADP group was 5.9 days and IDP group was 3.7 days. The team could establish telephonic communication with 17 patients who had received SA and were discharged early. No new symptoms of PDPH were noted in this group. Six patients who were discharged with mild symptoms of PDPH had no worsening of symptoms on telephonic follow-up. Other patient details including age, gender and primary surgical unit are enumerated in Table 1.

In the IDP group, PDPH was seen in 16 patients (incidence of 3.9%), while we had a 25% incidence of PDPH in ADP group, with 8 out of the 20 patients presenting with postural headache. Duration of headache lasted for a mean of 3 days (± 2) with onset within 96 h for all patients [refer Figure 1]. The earliest presentation was seen within 24 h in three patients from the IDP group. The presentation was mainly occipital/frontal headache with 86% of patients reporting average severity scores as mild/moderate [refer Figure 2]. Associated symptom with PDPH was mainly vomiting in 33% of patients. Two patients had vertigo and giddiness and two patients had associated neck stiffness, with equal distribution from IDP and ADP groups. None of the patients had tinnitus, photophobia, hearing loss, paraesthesia of scalp, upper or lower limb pain.

We looked into the factors influencing incidence of PDPH. A direct association was seen between needle size

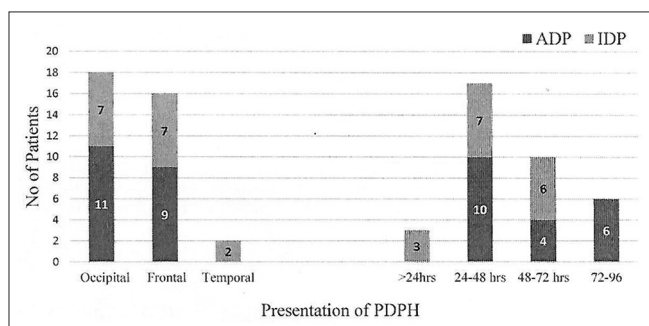


Figure 1: Bar graph showing onset and presentation of postdural puncture headache (PDPH), $n = 36$. ADP – Accidental dural puncture group, $n = 20$; IDP – intentional dural puncture group, $n = 16$

and type, and number of attempts and PDPH [Table 2]. The incidence was highest in patients with ADP (with Tuohy needle). We analysed this group further with respect to use of EA. In 67 patients, epidural catheter was successfully placed; the procedure was abandoned in 13 patients. Five patients (38%) developed PDPH out of 13 patients in whom the epidural placement was abandoned, while 14 (21%) out of 67 patients developed PDPH in whom epidural was reinserted were symptomatic. This difference was not statistically significant ($P = 0.283$). There was an increased incidence of PDPH in age group of 20–40 years. Gender, approach to epidural space (midline or para median), presence of traumatic attempt at epidural insertion, start of oral feeds and ambulation did not influence onset of symptoms of PDPH.

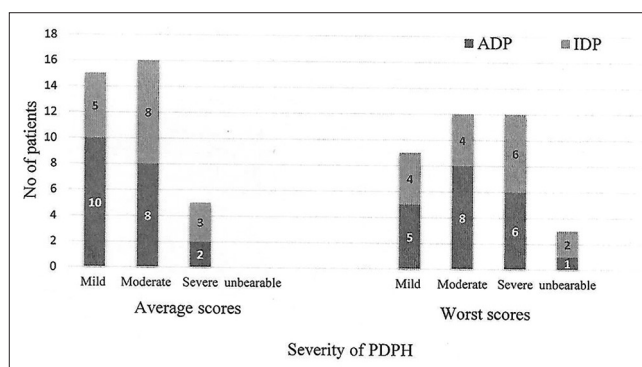


Figure 2: Severity of symptoms in patients presenting with PDPH ($n = 36$). The worst headache recorded for a symptomatic patient during his entire symptom period was recorded as the ‘worst scores’. The arithmetic average of all severity scores was recorded as ‘average score’. ADP – Accidental dural puncture group, $n = 20$; IDP – intentional dural puncture group, $n = 16$

Table 1: Essential patient details (with dural puncture) from May 2011 to April 2013 ($n=487$)

Sr. no.	Variable	Total number of patients (%)	Number of Patients with IDP (PDPH+)	Number of Patients with ADP (PDPH+)	P	
1	Age in years	<20 (less than 12)	55 (11%)	46 (2)	9 (2)	$P=0.012$
		20-40	142 (29%)	122 (10)	20 (9)	
		40-60	176 (37%)	141 (3)	35 (9)	
		>60	114 (23%)	98 (1)	16 (0)	
		Total	487	407 (16)	80 (20)	
2	Gender (M/F)	Male	278 (57%)	240 (7)	38 (8)	$P=0.074$
		Female	209 (43%)	167 (9)	42 (12)	
3	Unit	Bone and soft tissue	216 (44.5%)	198 (12)	18 (7)	$P=0.018$
		Urology	122 (25%)	111 (4)	11 (3)	
		Gynaecology	105 (21.5%)	96 (0)	9 (5)	
		Surgical GI	27 (5.5%)	1 (0)	26 (4)	
		Thoracic	15 (3%)	1 (0)	14 (1)	
		Paediatrics	2 (0.5%)	-	2 (0)	
		Total	487	407 (16)	80 (20)	
4	‘Last follow-up post-surgery’ expressed as mean+SD (minimum-maximum) days		3.7+2.1 (1-12)	5.9+2.3 (2-13)		

ADP – Accidental dural puncture; IDP – Intentional dural puncture; (PDPH+)- number of patients with post dural puncture headache

Table 2: Correlation between dural puncture details and PDPH symptoms (n=487)

Variable		PDPH (no. of patients)		P	
		Yes	No		
Needle size (G)	ADP group	16	19	P<0.001	
		18	1		
		19	0		
	IDP group	22	0		
		23	4		
		25	11		
		26	0		
Total		27	1		
Total		36	451		
Needle type	ADP group	Tuohy	20	P<0.001	
		Quincke	15		
	IDP group	Whitacre	1		
		Total	36		451
Level of dural puncture*	ADP group	Lumbar	9	P=0.007	
		Low thoracic	11		
		High thoracic	0		
	IDP group	Lumbar	16		
		Total	36		451
		Total			36
No. of attempts (missing data=10)	ADP group	Single	2	P=0.048	
		2-3 times	15		
		More than 3 times	2		
	IDP group	Single	10		
		2-3 times	4		
		More than 3 times	2		
		Total			35

ADP – Accidental dural puncture; IDP – Intentional dural puncture group; PDPH – Post dural puncture headache. *Level of insertion - Lumbar (L1-L5), Low thoracic (T7-8 interspace and lower), High thoracic (T6-7 interspace and higher)

Most of the patients (97%) with DP were on analgesics for post-operative pain which included non-opioid analgesic mainly paracetamol (500 mg–1 g TDS). About 48% of patients were on two analgesics round the clock, which was a combination of non-steroidal anti-inflammatory drug (NSAID) and paracetamol in 182 patients and with opioid (tramadol) in 51 patients. For patients who were symptomatic for PDPH (36 patients), hydration oral/intravenous was started. All 36 patients were given round the clock analgesics, with 52% patients receiving more than two analgesics. Seventy-one per cent of patients (25) were either on coffee or caffeine tablets – with coffee being advised in 11 patient and caffeine tablets were started in 14 patients in addition to routine analgesics. Two patients had to be started on tramadol after the onset of PDPH. In one patient with severe persistent headache, blood patch was advised but deferred due to fever; the headache subsequently settled in the next 48 h. Another patient refused blood patch for severe PDPH following SA, this patient was kept in the hospital for 6 days instead of discharge on the third day. He responded to oral medications. In another case, the discharge had to be deferred due to severe PDPH and

this patient responded well to oral pregabalin 75 mg.^[13] No invasive procedures had been tried at our centre for the treatment of PDPH.

DISCUSSION

Being a cancer hospital, most of the cases are done under general anaesthesia with EA; fewer patients are offered SA or CSE. Incidence of spinal headache in literature is related to needle size and varies from 0.1% to 36%.^[14,15] Our incidence of PDPH following SA was 16/407 patients in the IDP group (3.9%). Incidence of headache is lesser with dural fibre splitting needle such as Whitacre needle rather than dura cutting needles such as Quincke needle.^[14,15] It is essential to have regular audits to improvise on ongoing practise and techniques, and we have discontinued using bigger needles (22 G, 23 G), and Quincke 25 G needle is currently being used at our centre for SA.

The incidence of PDPH after ADP in parturients is around 50–86%.^[2,16,17] Though the incidence of headache after spinal anaesthesia is similar in obstetric and non-obstetric patients,^[18] pregnancy has always been implicated as a risk factor for PDPH.^[14,19]

A number of factors, including dehydration, hormonal imbalance, and high serum oestrogen influencing the tone of the cerebral vessels, have been implicated for high incidence of PDPH in obstetric population.^[14] We encountered a relatively low incidence of 25% (20 out of 80) patients in the ADP group presenting with PDPH.

In the ADP group, the epidural catheter was reinserted in most patients. Injection of epidural saline or hydroxyethyl starch has been reported in a few studies as a treatment of PDPH.^[17,20-22] Continuation of EA post-ADP might have a protective role in preventing leak from the dural rent. Though the incidence of headache was higher in the group in whom epidural was abandoned (38% vs. 21%), this difference was not statistically significant. However, its beneficial role in our patients cannot be completely ruled out. In our institution, all our patients post-laparotomy are advised to use binders by our surgical colleagues. Abdominal binder raises intra-abdominal pressure which is transmitted to the epidural space and may relieve headache.^[21] Lastly, since most of the patients had undergone supra-major surgeries, they were already receiving analgesic medications including some combination of NSAIDs, paracetamol and opioids for postoperative pain relief; this would not be always true in obstetric patients following an uncomplicated delivery. The low incidence of PDPH in our group compared to that reported in literature could be the result of ongoing analgesics, continuation of EA, and use of abdominal binders.

In vitro study, using a model of human dura mater, has demonstrated a smaller loss of CSF when the needle was inserted using the para-median approach when compared to midline approach.^[23] We did not find any difference in incidence of headache with respect to approach to epidural space (midline or para median) and also with respect to gender, start of oral feeds, and the time to ambulate. Similar to available literature, we found an increase incidence of PDPH in 20–40 age group.^[12]

Till date, there are no strong clinical recommendations on how to avoid PDPH after ADP.^[24,25] PDPH has in principle a self-limiting course.^[12] Given a conservative approach in the form of rest, good hydration and treatment of symptoms, over 50% of patients recover within 4 days.^[12] If conservative measures fail to resolve headaches after lumbar puncture, then specific treatment is indicated 72 h after the onset of pain.^[26]

It is essential to be aggressive in treatment in these cases so as to avoid the catastrophic complications like subdural hematoma and seizures.^[27] Though early blood patch is advocated in obstetric patients, the same recommendation cannot be extended in our patients, especially in cancer patients where there remains a chance of cancer seeding.^[27,28]

In our institute, only 3% of all patients reported their average headache scores as 'severe', though 33% of patients had 'severe-unbearable' headache at some point of time. This suggests that patients did benefit with pharmacological treatment. One patient was counselled for blood patch, when severe PDPH symptoms persisted for 72 h. The intervention was later deferred in view of fever,^[25] which is a contraindication for the intervention. The headache subsided within the next 24 h negating the need for a blood patch. We did have another patient who refused blood patch to treat severe symptoms of PDPH following SA. In this case, the patient was discharged after 6 days, 3 days more than the usual course. Social reasons and absence of financial implications could explain why patients with limited financial resources are happy to extend their hospital stay and not keen for an early discharge. This clinical exercise did benefit us in a number of ways. We have a written protocol for management of PDPH and we have now introduced a multilanguage information card, to be given to all patients following SA or ADP, informing them about signs and symptoms of PDPH.

The strength of retrospective analysis is that it is a robust data on PDPH from a non-obstetric hospital; however, it has its own limitations. The patients under PDPH surveillance were restricted to the post-surgical patients. We did not include patients from the ICU services and medical oncology, who had a DP for diagnosis, chemotherapy instillation, or lumbar drain placement. In addition, since this analysis was from data collected from patients with DP, we cannot comment into causes of ADP like anaesthesiologist's expertise or patient factors (e.g., spine deformities) which can influence the incidence of ADP.

CONCLUSION

The incidence of PDPH following ADP is 25% in our hospital which constitutes a non-obstetric general population. This is much lower than that reported from obstetric centres. PDPH in this group can be effectively controlled with drug-based treatment.

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Conflicts of interest

There are no conflicts of interest.

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