

# Prophylactic Role of Epidural Saline Injection for Post Dural Puncture Headache: A Pilot Study

L AZIZ K BASHIR A SHAHBAZ A AHMED T MAJEED T U I GILLANI

Department of Anaesthesiology, Services Institute of Medical Sciences Lahore

Dr Leena Aziz, Assistant Professor

**Aims and objectives:** This pilot study was designed to judge the prophylactic role of epidural saline injection for prevention of post dural puncture headache (PDPH) in patients with accidental dural puncture during the setting up of epidural anaesthesia. **Patients and methods:** Ten patients who sustained accidental dural puncture during routine epidural anaesthesia for various gynaecological and obstetrical surgical procedures carried out in Gynae Block of Services Hospital Lahore between 16-03-05 to 15-04-06 were included in the study. All patients had ASA I to ASA III status. The age range was 25 to 50 years and weight range was 45 to 70. Kg. A 16 gauge Touhy needle was used for epidural anaesthesia. In case of dural puncture, epidural anaesthesia was given one space above or below the site of puncture. The study was approved by hospital ethical committee. After completion of surgery, 30 ml of normal saline (0.9%) was injected in the epidural space. All patients were observed for three days for occurrence of post dural puncture headache. **Results:** Two out of ten patients (20%) complained of post dural puncture headache. One patient had to undergo repeat surgery under general anaesthesia for a surgical complication but did not complain of post dural puncture headache. **Conclusion:** Prophylactic epidural saline injection is associated with low frequency of post dural puncture headache in patients with accidental dural puncture during setting up of epidural anaesthesia.

**Key words:** epidural anaesthesia, post dural puncture headache (PDPH)

Accidental dural puncture is an unfortunate complication of neuraxial anaesthesia and has significant impact on the healthcare cost, as it prolongs hospitalization<sup>1,2</sup>. It is the most distressing complication of regional block. It often lasts for several days and may be associated with auditory and visual disturbances, nausea, vomiting and cranial nerve palsy. Post dural puncture headache (PDPH) is defined as headache aggravated in upright position and relieved or reduced by lying flat<sup>3,4</sup>. The symptoms of PDPH result from loss of cerebrospinal fluid, traction on the cranial contents and reflex vasodilatation. It is related to needle size, needle type<sup>5,6,7</sup> female sex and young age. PDPH is more prevalent in obstetric patients<sup>8,9</sup>. Onset of headache is usually 12-72 hours following procedure or sooner. Untreated, it may last for weeks<sup>10</sup>.

Overall incidence of PDPH after intentional dural puncture varies from 0.1 -36 %. The highest incidence of 36% is seen after ambulatory diagnostic lumbar puncture using a 20 or 22 gauge standard Quincke spinal needles. Unintentional dural puncture with large Touhy needle (16-18 gauge) is associated with a very high incidence (70-80%) of PDPH (Table 1).

However, early treatment is indicated if symptoms persist<sup>11</sup>. A number of treatment options are available ranging from non-invasive pharmacological approach to invasive approach<sup>12</sup>. As the natural history is one of the spontaneous resolution, many recommend approximately 24 hour of conservative therapy. This ranges from bed rest, hydration, analgesic, steroids and ergotamine. Caffeine has been used in the past and is used even today<sup>13</sup>.

Table 1: Relationship between needle size and incidence of post-dural puncture headache

Needle tip design	Needle gauge	Incidence of PDPH (%)
Quincke	22	36
Quincke	25	3-25
Quincke	26	0.3-20
Quincke	27	1.5-5.6
Quincke	29	0-2
Quincke	32	0.4
Sprotte	24	0-9.6
Whitacre	20	2-5
Whitacre	22	0.63-4
Whitacre	25	0-14.5
Whitacre	27	0
Whitacre	26	2.5-4
Tuohy	16	70

Epidural blood patch is very effective treatment for PDPH<sup>5,6</sup>. About 96% success rate can be expected from a properly executed blood patch<sup>5</sup>. It should ideally be performed 24 hours after the puncture. Autologous blood (15-20 ml) is injected aseptically through epidural canula. The patient may complain of increasing pressure and discomfort in the back and legs. The patient should remain supine and immobile for 30 minutes to one hour to allow the blood to form a clot<sup>7</sup>. Extra skill and personal care is involved. The patient might be apprehensive to undergo the procedure again.

In the past, epidural saline has been used to relieve headaches as it causes a mass effect in epidural space compressing the dural sac and displacing the conus medularis, cauda equina and sometimes also the nearby nerve roots<sup>14</sup>. The thecal compression raises the CSF pressure.

**Patients and methods**

With above background knowledge, we conducted a pilot study in the Anesthesia department of Services Hospital/ Services Institute of Medical Sciences Lahore in Gynae operation theatre between 16-03-05 to 15-04-06. Epidural Anesthesia with 16 gauge Tuohy needle was already being conducted for various gynecological and obstetrical patients of ASA I to III status. Their ages were between 25 to 50 years. The weight ranged from 45 to 70 Kg. No patient above 70 Kg was subjected to an epidural block. Being a teaching hospital both trained staff and trainees under supervision were working.

A total of 624 patients received epidural anaesthesia for various procedures. Out of these, 10 patients had accidental dural punctures during the setting up of block. One patient received dural puncture twice. Another site preferably above the failed site was located and epidural catheter passed. Block was established in the usual routine method. After giving test dose of 3ml 2% lignocaine with 1:100000 adrenaline, 10 ml of 2% lignocaine with 1:100000 adrenaline and 15-20ml of 0.5% bupivacaine were injected in the epidural space at L2-3 or L4-5 interspace. Injection butorphanol 0.5 -1mg was also added to deepen and prolong the block.

Surgery was commenced after the level of block was confirmed. Full patient monitoring protocol was observed. Towards the end of surgery or before shifting the patient out of the operation theatre, 30ml of 0.9% normal saline per epidural catheter was injected in all ten patients. The patients were followed up for three consecutive post operative days by a junior resident unaware of the puncture for PDPH.

**Results**

Two patients complained of headaches (PDPH) for 3 days but resolved by conservative treatment by 5<sup>th</sup> day (Fig 1). One patient, who was treated with epidural saline injection, had to receive general anesthesia in the evening for a surgical complication. She too was followed up for 3 days with no PDPH.

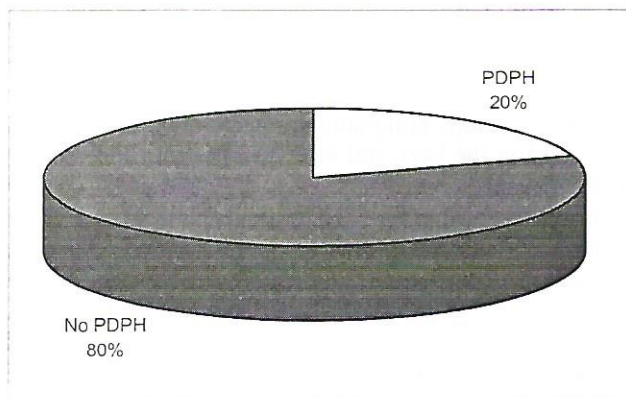


Fig 1. Frequency of PDPH among patients treated with epidural normal saline injection

**Discussion**

This study was conducted keeping the available data by Turnbull and Shepherd<sup>5</sup> that incidence of post dural puncture headache is 70-80% with 16 G Touhy needle. Chohan and Hamdani<sup>7</sup> cited this high number as well, and so did a survey of cases over a period of ten years by Costigan and Sprigge<sup>11</sup>.

The efficiency of blood patch is definitely proven but it needs a special expertise. A definite psychologically distressing effect on the patient is expected to undergo the same procedure again. Chohan and Hamdani<sup>7</sup> state that due to high incidence of PDPH after epidural needles, some anaesthesiologists believe in prophylactic blood patch. Others argue that unnecessary treatment is given with known complications associated with it. We thought of going for prophylactic trial to our accidental puncture patients with normal saline right in the theatre before patient was subjected to the symptoms. Advocates of an epidural saline bolus or infusion maintain that lumbar injection of saline raises epidural and intra-thecal pressure. Reduction in leak would allow the dura to repair. Theoretically, normal saline would also produce mass effect similar to blood patch. Saline is relatively inert and sterile solution hence bolus or infusion seemed attractive alternatives to regimens by Crawford, Stevens and Jorgensen<sup>12,15</sup>.

It was believed that epidural saline might induce an inflammatory reaction within the epidural space, promoting closure of the dural perforation. Histological studies however, do not support this in contrast to autologous blood patch, as observed by Lauder and Korbon<sup>16</sup>.

Usubiaga et al. noted that the pressure rise is also not sustained and is dissipated within 10 min<sup>17</sup>. Thus there are no studies that are able to demonstrate either a sustained rise in CSF pressure or accelerated closure of the dural perforation after the administration of epidural saline. There are some case reports describing the success of epidural saline. Rice and Dabbs observed in 1950 that use of epidural saline to relieve headaches after dural puncture<sup>18</sup>. Lumbar injection of 20ml of saline may temporarily relieve the pain due to increased lumbar CSF pressure and therefore decrease in intracranial traction.

We undertook this decades old treatment with this view that prevention is better than cure. No extra logistics were required for injecting 30ml saline on the table and no obvious side effects were known. We were quite pleased over the result as it added to our confidence and that of surgical team. And last but not the least patient was spared from the pain. It seemed a very good treatment choice especially for the underdeveloped countries. We need to work on this aspect in more detail with the current trend of shorter hospital stays. However, PDPH may not occur until the patient has been discharged from the hospital (and no longer followed by the anesthesiologist). There seemed to be a need to educate the care givers like family physician,

obstetrician or even midwife on symptoms of PDPH so that timely intervention is done.

PDPH is complication that should not be treated lightly. In majority of cases problem will resolve spontaneously. In some cases headaches may last for months or even years. Prophylaxis seems promising. Epidural saline does not involve any special equipment. It is an experience worth probing in depth with modern amenities of diagnostics.

### Conclusion

Prophylactic epidural saline injection is associated with low frequency of occurrence of post dural puncture headache in cases with accidental dural puncture during setting up of epidural anaesthesia.

### References

1. Morewood GH. A rational approach to the cause, prevention and treatment of postdural puncture headache. *Can Med Assoc J* 1993; 149: 1087-93.
2. Halpern S, Preston R. Postdural puncture headache and spiral needle design. Metaanalyses. *Anesthesiology* 1994; 81: 1376-83
3. Choi PT, Galuski SE, Lucas S, Takenchil, Jadad AR. Examining the evidence in anesthesia literature.: a survey and evaluation of obstetrical postdural puncture headache reports. *Can J Anaesth* 2002; 49: 49-56
4. Bano F, Haider S, Aftab S, Sultan T. Comparison of 25 gauge Quincke and Whitacre needles for postdural puncture headache in obstetric patients. *JCPSP* 2004; 14 (11): 647-650.
5. Turnbull DK, Shepherd DB. Postdural puncture headache: pathogenesis, prevention and treatment. *Br J Anaesth* 2003; 91: 718-29.
6. Dunjguor KR, Demeby KC. Update on postdural puncture headache. *Int Anesthesiol Clin.* 2002;40 (2): 89-102
7. Chohan U, Hamdani GA. Postdural Puncture headache, *J Pak Med Assoc* 2003; 53: 359-67.
8. Greene HM. Lumber puncture and prevention of postdural puncture headache *JAMA* 1926; 86: 391-92.
9. Peach M, Bauks S, Gurricul, An audit of accidental dural puncture during epidural insertion of a Tuohy needle in obstetric patients. *Int J Obstet Anaesth* 2001; 10: 162-7
10. Choi PT, Galuski SE, Takenchli etal PDPH is a common complication of neuraxial blockade in parturients, a meta analysis of obstetrical studies. *Can J Anaesth* 2003; 50: 460-469
11. Costigan SN, Sprigg JS. Dural puncture: the patient's perspective. A patient survey of cases at DGH maternity unit 1983-1993. *Acta Anaesthesiol Scand* 1996; 40: 710-14.
12. Crawford US. The prevention of headaches consequent upon dual puncture. *Br J Anaesth* 1972; 44: 598-600.
13. Bolten VE, Leicht CH, Scanlou TS. Postpartum seizure after epidural blood patch and intravenous caffeine sodium benzoate. *Anesthesiology* 1989; 70: 146-9.
14. Craft JB, Epstein BS, Coakley CS. Prophylaxis of dural puncture headache with epidural saline. *Anesth Analg* 1973; 52: 228-31.
15. Stevens RA, Jorgensen N. Successful treatment of dual puncture headache with epidural saline injection after failure of epidural blood patch. *Acta Anesthesiol Scand* 1988;32:429-31
16. Lauder CJ, Korbon GA. Histopathologic consequences of epidural blood patch and epidurally administered Dextran 40. *Anesthesiology* 1983; 69:410.
17. Usubiage JE, Usulagia LE, Brea LM Goyena R, Effect of Saline injections on epidural and subarachnoid space pressure and relation to post spinal anesthesia headache. *Anesth Analg* 1967; 46: 293-6.
18. Rice GG, Dabbs CH The use of epidural and subarachnoid injection of saline solution in the treatment of severe post dural puncture headaches. *Anesthesiology* 1950;11:7:23.

Note: This article has been reproduced because there were some computer errors in the last issue.