Incidence of postdural puncture headache. A prospective study of 101 spinal anaesthetics in orthopaedic patients

L. Chan, MBBS, FFARACS
A. E. Delilkan, MBBS, FFARCS, FFARACS

Department of Anaesthesiology, Faculty of Medicine, University of Malaya, Kuala Lumpur

Summary

Spinal anaesthesia was performed on 101 patients with a 25-Gauge (0.52 mm) needle. We found a 13.9% overall incidence of postdural puncture headache (PDPH) in an orthopaedic population whose mean age was 33.6 years. This incidence is too high and an alternative technique may be needed.

Key words: Spinal anaesthesia, orthopaedic surgery, postdural puncture headache.

Introduction

PDPH is a well-known sequela following procedures where the dura is punctured intentionally (subarachnoid spinal anaesthesia) or accidentally in epidural anaesthesia. Since 1898 when PDPH was brought into limelight by August Bier and Hildebrandt,[1] a large amount of research and projects have been reported. This preliminary report hopes to enlighten anaesthesiologists on the incidence of PDPH in our local population.

Methods

During the months April 1990 to August 1990, at the University Hospital, Kuala Lumpur, we observed 101 orthopaedic in-patients who received spinal anaesthesia for lower limb surgery. The decision to perform surgery under spinal as well as the choice of premedication (if any was given) for the patient, was left to the individual clinician in charge of the case.

Verbal consent was obtained from the patients for the procedure. As suggestion could bias results[2], patients were not told of specific problems but were told of the procedure. The patients were of ASA physical status 1 to 3 and needed lower limb surgery. The spinal anaesthesia was performed by all members of the Anaesthetic Department according to accepted standards of procedure and care. All patients received Bupivacaine 0.5% (Marcain Spinal 0.5% Heavy) except one patient who received Lignocaine 5% (Xylocaine 5% Heavy). The majority of patients received a median puncture sitting up. A 25-Gauge spinal needle was used in the third, fourth or fifth lumbar interspace. Most patients had preload intravenous Compound Sodium Lactate (Hartmann's Solution 500 to 1000 ml).

After surgery, the following instructions were followed:

1. Remain in bed for the first 6 hours (to enable the anaesthetic to wear off and for recovery of strength in the legs).

2. Subsequently, allow ambulation where possible.

3. Fluids encouraged orally.

All of them were seen at least once in the postoperative ward. Thereafter the operator was contacted by the ward staff if any postoperative complication occurred. Whenever a headache was recorded, an interview with the patient was conducted by the same anaesthetist. Should a postdural puncture headache occur, it was treated conservatively with fluids, simple analgesics, bed rest for comfort and reassurance. None needed an epidural blood patch.

Results

Age and sex distribution of patients

Table I shows that the male to female was 3.8:1 with a mean age of 33.6 years (range 13 to 88 years). 84.2% of the patients were below 50 years.

Table I
Age and sex of 101 patients

Age Group	Male	Female	Total
Below 50 years	70 (92.5%)	11 (52.4%)	85 (84.2%)
50 years or older	6 (7.5%)	10 (47.6%)	16 (15.8%)
Total	**80 (100.0%)**	**21 (100.0%)**	**101 (100.0%)**

Distribution of PDPH according to age and sex

The incidence of PDPH in the age groups below 50 years and 50 years or older was 15.0% and 9.5% respectively (Table II). Using Fisher exact test, this was not significant ($p < 0.4$). The overall incidence of PDPH was 13.9% and the mean age of this group of patients with PDPH was 34.6 years. In Table III, although the incidence of PDPH appeared higher in the female group (18.8% compared with 12.9% in male patients), this was not significant.

Table II
Distribution of PDPH according to age

Patients	Below 50 years	50 year or older	Total
No headache	68 (85.0%)	19 (90.5%)	87 (86.1%)
With PDPH	12 (15.0%)	2 (9.5%)	14 (13.9%)
Total	**80 (100.0%)**	**21 (100.0%)**	**101 (100.0%)**

Fisher exact test: $p < 0.4$

Table III
Distribution of PDPH according to sex

Patients	Male	Female	Total
No headache	74 (87.1%)	13 (81.2%)	87 (86.1%)
With PDPH	11 (12.9%)	3 (18.8%)	14 (13.9%)
Total	**85 (100.0%)**	**16 (100.0%)**	**101 (100.0%)**

Fisher exact test: $p < 0.7$

Ethnic distribution and PDPH

Table IV shows that the three ethnic groups were well-distributed. A significant difference among the races with regard to the incidence of headache was unlikely.

Table IV
Distribution of PDPH according to race

Ethnic Group	Patients with no headache	Patients with PDPH	Total
Malay	26 (81.2%)	6 (18.8%)	32 (100.0%)
Chinese	32 (88.9%)	4 (11.1%)	36 (100.0%)
Indian	29 (87.9%)	4 (12.1%)	33 (100.0%)
Total	**87 (86.1%)**	**14 (13.9%)**	**101 (100.0%)**

Distribution of PDPH according to traumatic lumbar puncture

A traumatic lumbar puncture was one that involved at least one of these three types of trauma – multiple skin punctures, a bloody tap, more than one dural puncture.

Table V shows that 25 patients had a traumatic lumbar puncture and four of them developed PDPH subsequently. The occurrence of traumatic lumbar puncture did not contribute any significance to the incidence of PDPH.

Table V
Incidence of PDPH and traumatic lumbar puncture

	Patients with no headache	Patients with PDPH	Total
Traumatic lumbar puncture	21 (84.0%)	4 (16.0%)	25 (100.0%)
Non-traumatic lumbar puncture	66 (86.8%)	10 (13.2%)	76 (100.0%)
Total	**87 (86.1%)**	**14 (13.9%)**	**101 (100.0%)**

Distribution of PDPH according to operator experience

TableVI shows the spectrum of experience involved in the regional technique. The incidence of PDPH based on operator experience was not predictable.

Table VI
Distribution of PDPH according to operator experience

Operator	Patients with no headache	Patients with PDPH	Total
Lecturer	13 (100.0%)	0 (0%)	13 (100.0%)
Year 4 Medical Officer	22 (85.0%)	4 (15.0%)	26 (100.0%)
Year 3 Medical Officer	11 (90.9%)	1 (9.1%)	12 (100.0%)
Year 2 Medical Officer	25 (92.6%)	2 (7.4%)	27 (100.0%)
Year 1 Medical Officer	16 (79.0%)	7 (21.0%)	23 (100.0%)
Total	**87 (86.1%)**	**14 (13.9%)**	**101 (100.0%)**

Distribution of PDPH according to urgency of operation

19.8% of the patients were operated on under emergency conditions. The incidence of PDPH was at least four times more common following a spinal anaesthetic for urgent surgery than for elective surgery as shown in Table VII.

Table VII
Distribution of PDPH according to urgency of operation

Urgency of operation	Patients with no headache	Patients with PDPH	Total
Elective operation	74 (91.4%)	7 (8.6%)	81 (100.0%)
Emergency	13 (65.0%)	7 (35.0%)	20 (100.0%)
Total	**87 (86.1%)**	**14 (13.9%)**	**101 (100.0%)**

Fisher exact test: $p < 0.006$

Associated complications of PDPH

Table VIII shows the common associated complications of PDPH. The main problem was nausea and vomiting. This patient (* *) experienced flashes of light whenever he was in an upright position. He had moderate PDPH for two days.

Table VIII
Associated complications in the 14 patients with PDPH

Type of complications	Number of patients
Nausea and vomiting	4
Neck stiffness	2
Backache	2
Ocular	1**

Discussion

There are clinicians who avoid giving a spinal anaesthetic to the young patient, whether hospitalised[3] or a day case.[4] However, others use it routinely[5,6] and regard it as an integral and essential part of standard patient management, giving due attention to needle size, meticulous technique and reliable treatment with an epidural blood patch when conservative measures fail.

The incidence of PDPH has been reported from under 1% [20] to 75%.[21] Many investigators have found that PDPH is more common in the young than in the older generation.[7,8] The incidence of PDPH seems to decrease with age. We observed the same relationship: 15.0% in those less than 50 years and 9.5% in the 50 years or older, although a significant relationship between age and the incidence of headache was not found. Recent studies in young adults, using 25G needle, have shown that the incidence of PDPH is variable – from 8.5% to 37.2%.[8,4] We found an overall incidence of 13.9% in an orthopaedic population with a mean age 33.6 years.

To predict the risk of PDPH, Lybecker[10] worked out mathematical equations illustrating the relationship between the incidence of PDPH and age.

Early studies by Vandam and Dripps[9] had already pointed out the incidence of PDPH decreasing with age.

Whether a much smaller gauge spinal needle would be satisfactory had been studied earlier with different results. In J.W. Geurts[11] study of 80 patients under 40 years, they found a PDPH incidence of 25% with a 25-Gauge spinal needle and 0% with a 29-Gauge spinal needle. Using a 29G needle proved slightly more difficult and time consuming. Hans Lybecker[10] recorded no significant difference between 22 versus 25-Gauge needle with regard to the incidence of spinal headache, suggesting that the use of a 26-Gauge or even smaller gauge may not be relevant with respect to the reduction of PDPH incidence. P. Lesser[12] suggested that the use of a 30-Gauge was not a practical proposition for routine clinical work (overall 25% failure rate).

A proposed associated risk factor for PDPH includes sex[3,9] particularly in the pregnant and postpartum women.[13] However, we could not find a significant relationship between the incidence of PDPH and the gender factor.

Distribution of PDPH in the three ethnic groups appeared fairly similar. There appeared to be no relationship between traumatic lumbar puncture and PDPH. This is in accordance with previous observations.[17, 18] In many series backache was the most common associated problem.[4, 14] Others recorded nuchal stiffness and pain as the chief accompanying symptom.[19] We found that the chief complaint was nausea and vomiting, a complaint not uncommon following any form of anaesthetic technique.[15] Out of the four patients who had nausea and vomiting, three were from the emergency list. The stress factor, among others, could have contributed largely to the problem of nausea and vomiting.

It proved unpredictable to equate years of experience with the incidence of PDPH. However, Renkl[16] reported that lumbar punctures performed by experienced anaesthesiologists resulted in a lowered incidence of PDPH.

Interestingly, there was a significant relationship between incidence of PDPH and whether operation was done on an emergency or elective basis. At least four times as many patients developed PDPH following an emergency operation when compared to planned operations. One explanation could be that the listed cases were well prepared, premedicated and more stress free. In this study, the most commonly served premedication was Diazepam (Valium) 10 mgm. given orally one to two hours before the scheduled operation. Patients in the emergency list did not receive premedication.

There were no previous reports where emergency cases were involved in the study of PDPH.

Conclusion

A 13.9% overall incidence of PDPH is probably underquoted for this limited study as there would be patients who, after discharge following an uneventful spinal and surgery, later suffered a PDPH at home.

Spinal anaesthesia appears to be unsuitable as an anaesthetic technique for the young adult. Should the 25-Gauge needle be limited to the 50 years or older patients?

A prospective study over three years is being undertaken at the moment before more definitive conclusions can be drawn.

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References

1. Bonica J.J. Principles and Practice of Obstetrics. Analgesia and Anaesthesia, Philadelphia, PA, Davis, 1969: 72–3.

2. Kaplan g. The psychogenic etiology of headache post lumbar puncture. Psychosom Med 1967, 29 : 376–9.

3. Flaatten H, Rodt S, Rosland J, Vamnes J. Post-operative headache in young patients after spinal anaesthesia. Anaesthesia 1987; 42 : 202–5.

4. Flaatten H, Raeder J. Spinal anaesthesia for out-patient Surgery. Anaesthesia 1985; 40 : 1108–11.

5. Bridenbaugh LD. Regional anaesthesia for out-patient surgery – a summary of 12 years' experience. Canadian Anaesthetists' Society Journal 1983; 30 : 548–52.

6. Gibb WRG, Wen P. Current practice of diagnostic lumbar puncture. British Medical Journal 1984; 289 : 530.

7. V. J. Sarma. Intrathecal anaesthesia for day-care surgery. Anaesthesia 1990; Volume 45 : 769–71.

8. H. B. Tay, T. C. Low, Y. H. Loke. Morbidity from subarachnoid spinal anaesthesia. Singapore Medical Journal 1989; No. 30 : 350–5.

9. Leroy D. Vandam, Robert D. Dripps. Long-term follow-up of patients who received 10,098 spinal anaesthetics. JAMA. June 16, 1956 : 586–91.

10. Hans Lybecker, Jakob T. Molkler, Ole may, Hans K. Nielsen. Incidence and Prediction of Postdural Puncture Headache. Anaesthesia Analgesia 1990; 70 : 389–94.

11. J.W. Geurts, M.C. Haanschoten, R.M. Van Nijk, H. Kraak and T.c. Besse. Postdural puncture headache in young patients. Acta Anaesthesia Scand 1990; 34 : 350–3.

12. P. Lesser. An evaluation of a 30-gauge needle for spinal anaesthesia for caesarean section. Anaesthesia 1990; Volume 45 : 767–8.

13. Winkler W.P., Serk W.M., Hale R. Postpartum Spinal Headache. Am Obstet Gynaecol. 1963; 85 : 500–6.

14. Middleton M.J., Bell C.R. Postoperative headache: attempts to reduce the incidence. Anaesthesia Analgesia 1965; 44 : 446–8.

15. Dent, S.J., Ramachandra, V. and Stephen, C.R. Postoperative vomiting: incidence, analgesics and therapeutic measures in 3,000 patients. Anaesthesiology 1955; 15 : 564.

16. Renkl F, Schafer H.G., Dittman M. Spinal anaesthesia with extreme fine cannulas. In: Rosberg B. ed. Abstract of the 5th Congress of the ESRA. Lund: Wahlin and Dahlholm, 1986.

17. James B. Gormley. Treatment of postspinal headache. Anaesthesiology 1960; 21 : 565–6.

18. Emory M.L. Certain reactions following spinal puncture: a comparison of technics. Am Practitioner 1948; 2 : 451–6.

19. E. Aboulegish. Long term follow-up of Epidural Blood Patch. Anaesthesia Analgesia. Current Researches. 1975; Vol. 54, No. 4: 459–63.

20. Wetchler B.V., Brace D.E. Technique to minimize the occurrence of headache after lumbar puncture by use of small bore spinal needle. Anaesthesiology 1955; 16 : 270.

21. Croff J.B., Epslein B.S., Coaklet C.S. Prophylaxis of dural puncture headache with epidural saline. Anaesthesia and Analgesia 1973; 52 : 228–31.