

An analysis of postdural puncture headache in obstetric patients: A study from Kano, Nigeria

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ABSTRACT

Background: One of the complications of spinal anesthesia is postdural puncture headache. Many risk factors have been identified which when addressed could reduce the incidence.

Objectives: This was a prospective study that analyzed the incidence, onset and severity of postdural puncture headache among pregnant women who had cesarean section under a subarachnoid block in Aminu Kano Teaching Hospital, Kano, Nigeria.

Patients and Methods: Spinal anesthesia was performed on 146 patients using size 25- or 26-gauge Quincke, Whitacre, or Sprotte needles. Patients were followed up to determine the incidence, onset, and severity of post spinal headache. The data were analyzed using Statistical Package for Social Sciences (SPSS) version 18.0 (SPSS Inc., SPSS Statistics for Windows, Chicago, IL, USA). Demographic variables were presented using tables while summary was done using means, standard deviation, and percentages. Test of association was done using Fisher's Exact test. A *P* value < 0.05 was considered statistically significant.

Results: The overall incidence of postdural puncture headache was 15.8% with all cases presenting within the first 24 hours. Most patients rated their headache as mild to moderate on a 10-cm visual analogue scale.

Conclusion: Traumatic Quincke spinal needle is associated with high incidence of postdural puncture headache and therefore we recommend the use of atraumatic pencil tip needle especially in obstetric anesthesia.

Key words: Cesarean section; postdural puncture headache; spinal anesthesia.

Introduction

Subarachnoid block (SAB), also called spinal anesthesia, is a well-established regional anesthetic technique in obstetric practice because of its safety, low cost, and reliability.^[1] It is globally advocated in cesarean delivery due to its simplicity, rapid onset, and provision of excellent operating conditions.^[2] In addition to avoiding maternal and fetal risks associated with general anesthesia, other advantages of SAB include early bonding between mother and baby, minimum stay in the recovery room, and provision of adequate postoperative

analgesia.^[3] However, despite all these advantages, the technique is associated with complications like postdural puncture headache (PDPH) which may restrict its acceptance especially by obstetric patients.^[4]


PDPH is an iatrogenic complication of procedures in which the dura is penetrated, such as spinal/epidural anesthesia,

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diagnostic lumbar punctures, myelograms, inadvertent dural punctures during spinal surgery, or epidural injections. The most important factors influencing its frequency and severity are the patient's age and the size of the dural puncture.^[5] A large epidemiological study conducted by Vandam *et al.*^[6] shows that it is more common in young females, and early ambulant patients, with the highest incidence occurring in pregnant women undergoing cesarean section (C/S). The reported incidences of PDPH are about 40%, 25%, 2–12%, and <2% with a 22G, 25G, 26G, and 29G needles respectively.^[7-10]

Classically, PDPH is dull, throbbing, severe, frontal or occipital, worsened in the upright position (sitting or standing) and relieved in the supine position. It may be accompanied by backache, nausea, vomiting, neck stiffness, and audiovisual disturbances. These clinical features result from loss of cerebrospinal fluid, traction on the cranial contents, and reflex cerebral vasodilatation.^[11] Although, it can occur immediately or may take months following a dural puncture, studies have shown that about 90% occur within the first 72 hours and most within 48 hours.^[12,13] It is usually self-limiting and about 72% of cases will resolve spontaneously within 7 days.^[6]

Treatment includes oral analgesics (paracetamol, nonsteroidal anti-inflammatory drugs, and opioids), high fluid intake, intravenous caffeine, and sodium benzoate infusion.^[14,15] Other treatment modalities include use of tight abdominal binders^[16,17] (effective but not popular) and intermittent saline injections^[18,19] for both prevention and treatment of confirmed PDPH. However, the gold standard treatment of PDPH is autologous epidural blood patch, with about 90% of patients relieved by the first injection and 98% by a subsequent injection.^[20]

The aim of this study was to determine the incidence, onset and severity of postdural puncture headache among pregnant women undergoing cesarean section under a SAB in Aminu Kano Teaching Hospital, Kano, Northwestern Nigeria.

Patients and Methods

Approval from the research ethics committee of Aminu Kano Teaching Hospital, Kano, Nigeria was sought and obtained. Data was prospectively collected from 146 ASA II-III patients who had SAB for cesarean section and consented to participate in the study, between November, 2015 and July, 2016. A preanesthetic evaluation was done for all participants a day before surgery for elective cases and at least an hour before surgery for emergency cases, to assign them to the ASA classification of physical status. All patients with known contraindications to SAB and

history of a preexisting chronic headache were excluded. Explanation about SAB, PDPH and its treatment, the use of the visual analogue scale (VAS)^[21-23] in grading the severity of PDPH during the postoperative period were provided to all the patients in the language they understood. Patients were preloaded with 500–1000 mL of normal saline as appropriate via a size 18G or 16-gauge intravenous cannula over a period of 10–15 minutes. The block was performed by consultants, resident doctors, or nurse anesthetists using size 25- or 26-gauge Quincke, Whitacre, or Sprotte needles in the sitting position. All successful lumbar punctures were followed with administration of 2.0–2.5 mL of 0.5% hyperbaric bupivacaine. All patients were then immediately positioned supine with a left lateral tilt after which the level of loss of skin sensation to pin prick or cold saline was ascertained before skin incision. Monitoring consisted of continuous electrocardiogram, pulse oximetry, and noninvasive blood pressure (NIBP) measurements. The NIBP measurement was done every 2 minutes initially over the first 10–15 minutes and subsequently every 5 minutes till the end of the cesarean section. Preoperative and postoperative information obtained were recorded on a proforma. These included patients' biodata, cadre of the anesthetists, types and sizes of spinal needles used and occurrence of PDPH, and associated complications such as backache, nausea, and vomiting.

Postoperatively, all patients were followed up for 3 days. In this study, PDPH was defined as headache in the frontal or occipital region aggravated by sitting or standing and relieved by lying flat.

Severity of PDPH was graded as mild, moderate, or severe according to the VAS. VAS 0 = no headache, 1–3 cm = mild headache, 4–7 cm = moderate headache, >7 cm = severe headache.^[21-23]

Backache was defined as pain and tenderness over the lumbar area (points of spinal needle insertion).

Patients who developed PDPH were treated with bed rest, enhanced fluid intake, Panadol extra (paracetamol 500 mg + caffeine 65 mg) two tablets per oral, 6 hourly. Epidural blood patch might be considered in refractory cases.^[24]

The data were analyzed using SPSS version 18.0 (SPSS Inc., SPSS Statistics for Windows, Chicago, IL, USA). Demographic variables were presented using tables while summary was done using means, standard deviation, and percentages. Test of association was done using Fishers' exact test. A *P* value ≤ 0.05 was considered statistically significant.

Results

One hundred and forty six patients were recruited for the study which was conducted from 1 November 2015 to 31 July 2016. The mean age \pm SD was 29.44 ± 5.5 years. The modal age was 30.0 years. Forty seven (32.2%) patients were within the age group of 30–34 years while seven (4.8%) patients represented age group of 40–44 years [Table 1].

Sixty six (45.2%) patients were classified with ASA II, followed by ASA IIE 54 (37.0%). ASA IIIE, 6 (4.1%) was the least represented [Table 2].

Quincke spinal needle was the most commonly used spinal needle and it was used for 142 (97.2%) patients. Other needles used were Whitacre in two (1.4%) patients, and Sprotte in two (1.4%) patients respectively.

Table 1: Socio-demographic characteristics of the respondents

Variable	Frequency	Percent
Age group		
16-24	29	19.9
25-29	42	28.8
30-34	47	32.2
35-39	21	14.4
40-44	7	4.8
Total	146	100.0
Tribe		
Hausa	114	78.1
Igbo	11	7.5
Yoruba	6	4.1
Others	15	10.3
Total	146	100.0

Table 2: ASA status, spinal needle type and status of the anaesthetist

Variable	Frequency	Percent
ASA Status		
ASA II	66	45.2
ASA IIE	54	37.0
ASA IIIE	6	4.1
ASA IV	20	13.7
Total	146	100.0
Spinal needle type		
Quincke	142	97.2
Whitacre	2	1.4
Sprotte	2	1.4
Total	146	100.0
Status of anaesthetist		
Consultant	6	4.1
Senior registrar	29	19.9
Registrar	80	54.8
Non physician	31	21.2
Total	146	100.0

Most of the SABs were performed by registrars 80 (54.8%) while consultants performed the blocks in six (4.1%) patients.

Twenty three (15.8%) patients presented with headache which was dull (16, 72.7%) and throbbing (6, 27.3%). The headache occurred within the first 24 hours after the procedure and was aggravated by sitting and standing in 7 (36.8%) and 12 (63.2%) patients respectively. It was relieved by supine position in most of the patients 18 (94.7%) [Table 3].

The headache was mild and moderate in 13 (61.9%) and 8 (38.1%) patients respectively. None of the patients complained of severe PDPH. All the patients who experienced PDPH were successfully treated using oral fluids and analgesics; hence none of the patients required epidural blood patch.

Only three (2.1%) presented with complaints of backache while 13 (8.9%) presented with either nausea or vomiting. There was no complaint of visual or auditory disturbances.

There was no statistically significant difference on the occurrence of headache between different needle types [p (Fischers') = 0.538], status of the anaesthetist [p (Fischers') = 1.00], and age group of the patients [p (Fischers') = 1.00].

Similarly, headache severity was not associated with the tribe of the patients [p (Fischers') = 1.000].

Discussion

PDPH is the most common complication of procedures in which the dura is penetrated, such as diagnostic lumbar punctures, SAB, myelograms, and inadvertent dural punctures during epidural injections.^[25] It occurs with a wide range of reported frequencies from as low as <1% to as high as 70%.^[26] The use of smaller gauge (24–30G), non-cutting (atraumatic) needles, the risk drastically reduced to as low as 2% or less.^[27] The headache that ensues after dural puncture is postulated to be primarily due to loss of CSF from a defect made in the dura with resultant intracranial hypotension.^[27] A large defect allows for greater loss of CSF which potentially increases the chance of intracranial hypotension and PDPH. When the patient assumes an upright position (sitting or standing), there is a downward traction on pain-sensitive intracranial veins, meninges, and cranial nerves caused by gravity and loss of buoyancy from the reduced CSF pressure.

The incidence of PDPH in this study was found to be 15.8% which is higher than those reported from previous

Table 3: Incidence, characteristics and associated symptoms of PDPH

Variable	Frequency	Percent
Headache		
Yes	23	15.8
No	123	84.2
Total	146	100.0
Nature of Headache		
Dull	16	72.7
Throbbing	6	27.3
Total	22	100.0
Onset of the headache		
1 st Postoperative Day	146	100
2 nd Postoperative Day	0	0
3 rd Postoperative Day	0	0
Severity of Headache		
Mild	13	61.9
Moderate	8	38.1
Total	21	100.0
Site of Headache		
Fronto-occipital	19	95.0
Parietal	1	5.0
Total	20	100.0
Aggravating factor		
Sitting	7	36.8
Standing	12	63.2
Total	19	100.0
Relieving factor		
Supine	18	94.7
Prone	1	5.3
Total	19	100.0

studies.^[28-30] This might be attributed to multiple risk factors which include the needle design, experience of the anesthetists, age and sex of the study patients.

Ahsan *et al.*^[28] found a zero incidence of PDPH among 125 patients who had spinal anesthesia. This could be attributed to the atraumatic needles (polymedic, 25G) used in all their patients compared to the Quincke (traumatic) needles used in 97.2% of our patients.

Nafiu and his colleagues^[29] found an incidence of PDPH among 96 parturient who had SAB to be 8.3%. However, this finding is still lower than that of our study despite the fact that Quincke needles were used in all their patients. This could be explained by the fact that in their study, all the spinal blocks were performed by a consultant anesthetist compared to only 4.1% blocks performed by consultants in this study.

In a prospective study conducted over 2 years by Lubusky *et al.*^[30] revealed in 2003 an incidence slightly similar to that of our study (16.3%). However, in 2004 an incidence of only 3% was reported. The former high incidence was obtained when

85.2% of the blocks were performed using Quincke needles. Whereas the latter incidence was found when 77.8% of the blocks were performed using atraumatic needles (Whitacre and Atraucan). This has further confirmed reports from previous studies about the lower incidences of PDPH with atraumatic needles.^[30-32]

Demographic factors that are known to be associated with risk of PDPH might have played a role in the high incidence observed in this study. Age is a recognized risk factor with age range of 18–40 years carrying the highest risk.^[8,33] Our patients' age range fits fairly well into this age bracket. Superimposed on the age factor is the female sex regardless of age. The risk of PDPH in women approximately doubles that of men.^[6,34]

Studies have shown that lateral needle bevel orientation could reduce the incidence of PDPH.^[35,36] Most of the blocks were performed by the trainee doctors with more than half by those in the junior cadre. There is a possibility that this technique was not observed by the trainees and the nurses; hence contributing to the high incidence.

All the 23 patients developed the headache within the first 24 hours and was described as dull (72.7%) or throbbing (27.3%) and was mild to moderate, relieved mostly in the supine position. Nineteen (95.0%) of the patients who developed the PDPH experienced it in the fronto-occipital area. These findings are consistent with those reported from previous studies.^[6,12,13]

Conclusion

Our study has clearly demonstrated a high incidence of PDPH due to the use of traumatic Quincke needle irrespective of its caliber.

Limitations

In this study, the duration of PDPH was not followed up.

Recommendation

Blunt tipped spinal needles such as Sprotte and Whitacre with small calibre should be used routinely when performing SAB during cesarean section.

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Conflicts of interest

There are no conflicts of interest.

References

- Gogarten W, Van Aken H. A century of regional analgesia in obstetrics. *Anesth Analg* 2000;91:773-5.

2. Ranasinghe JS, Steadmann J, Toyama T, Lai M. Combined spinal epidural anaesthesia is better than spinal or epidural alone for caesarean delivery. *Br J Anaesth* 2003;91:299-300.
3. Bano F, Sabbar S, Zafar S, Rafeeq N, Iqbal MN, Haider S, *et al.* Intrathecal fentanyl as adjunct to hyperbaric bupivacaine in spinal anaesthesia for caesarean section. *J Coll Physicians Surg Pak* 2006;16:87-90.
4. Turnbull DK, Shepherd DB. Post dural puncture headache: Pathogenesis, prevention, and treatment. *Br J Anaesth* 2003;91:718-29.
5. Reid JA, Thorburn J. Editorial II. Headache after spinal anaesthesia. *Br J Anaesth* 1991;67:674-7.
6. Vandam LD, Dripps RD. Long term follow up of patients who received 10,098 spinal anaesthetics. Syndrome of decreased intracranial pressure. *J Am Med Ass* 1956;161:586-91.
7. Barker P. Headache after dural puncture. *Anaesthesia* 1989;44:696-7.
8. Flaatten H, Rodt S, Rosland J, Vamnes J. Postoperative headache in young patients after spinal anaesthesia. *Anaesthesia* 1987;42:202-5.
9. Flaatten H, Rodt S, Vamnes J, Rosland J, Wisborg T, Koller ME. Postdural puncture headache. A comparison between 26 and 29 gauges needle in young patients. *Anaesthesia* 1989;44:147-9.
10. Geurts JW, Haanschoten MC, van Wijk RM, Kraak H, Besse TC. Post-dural puncture headache in young patients. A comparative study between the use 0.52mm (25-gauge) and 0.33 mm (29-gauge) spinal needles. *Acta Anaesthesiol Scand* 1990;34:350-3.
11. Hawkins JL, Koonin LM, Palmer SK, Gibbs CP. Anaesthesiology-related death during obstetric delivery in the United States. *Anesthesiology* 1997;86:277-84.
12. Weir EC. The sharp end of the dural puncture. *BMJ* 2000;320:127.
13. Leibold RA, Yealy DM, Coppola M, Cantis KK. Postdural puncture headache: Characteristics, management and prevention. *Ann Emerg Med* 1993;22:1863-70.
14. Sechzer PH. Post-spinal anesthesia headache treated with caffeine. Part II: Intracranial vascular distention, a key factor. *Curr Ther Res Clin Exp* 1979;26:440-8.
15. Jarvis AP, Greenawalt JW, Fagraeus L. Intravenous caffeine for postdural puncture headache. *Anaesth Analg* 1986;65:316-7.
16. Beck WW Jr. Prevention of postpartum spinal headache. *Am J Obstet Gynecol* 1973;115:354-62.
17. Mosavy SH, Shafei M. Prevention of headache consequent on dural puncture in obstetric patients. *Anaesthesia* 1975;30:807-9.
18. Rice GG, Dabbs CH. The use of peridural and subarachnoid injections of saline solutions in the treatment of severe postspinal headache. *Anesthesiology* 1950;11:17-23.
19. Craft JB, Epstein BS and Coakley CS. Prophylaxis of dural puncture headache with epidural saline. *Anesth Analg* 1973;52:228-31.
20. Abouleish E, Vega S, Blendinger I, Tio TO. Long-term follow-up of epidural blood patch. *Anesth Analg* 1975;54: 459-63.
21. Carlsson AM. Assessment of chronic pain. Aspects of the reliability and validity of the visual analogue scale. *Pain* 1983;16:87-101.
22. Price DD, McGrath PA, Rafii A, Buckingham B. The validation of visual analogue scales as ratio scale measures for chronic and experimental pain. *Pain* 1983;17:45-56.
23. Price DD, Patel R, Robinson ME, Staud R. Characteristics of electronic visual analogue and numerical scales for ratings of experimental pain in healthy subjects and fibromyalgia patients. *Pain* 2008;140:158-66.
24. Bendel MA, Moeschler SM, Qu W, Hanley E, Neuman SA, Eldrige JS, *et al.* Treatment of refractory postdural puncture headache after intrathecal drug delivery system implantation with epidural blood patch procedures: A 20-year experience. *Pain Res Treat* 2016; 2016: 2134959. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4997020/>. [Last accessed on 17 Apr 14].
25. Vercauteren MP, Hoffman VH, Mertens E, Sermeus L, Adriaensen HA. Seven-year review of requests for epidural blood patches for headache after dural puncture: Referral patterns and the effectiveness of blood patches. *Eur J Anaesthesiol* 1999;16:298-303.
26. Crawford J. Experiences with epidural blood-patch. *Anaesthesia* 1980;35:513-5.
27. Carson D, Serpell M. Choosing the best needle for diagnostic lumbar puncture. *Neurology* 1996;47:33-7.
28. Ahsan S, Kitchen N, Jenkins C, Margary J. Incidence of Postdural Puncture Headache following Spinal Anaesthesia for Lower Segment Caesarean Section with the 25 Gauge Polymedic Spinal Needle. *J Pak Med Assoc* 1996;46:278-81.
29. Nafiu OO, Salam RA, Elegbe EO. Postdural puncture headache in obstetric patients: Experience from a West African teaching hospital. *Int J Obstet Anaesth* 2007;16:4-7.
30. L'ubuský M, Berta E, Procházká M, Marek O, Kudela M. Development of incidence of post-dural puncture headache in patients undergoing caesarean section in spinal anaesthesia at the Department of Obstetrics and Gynecology in Olomouc during 2003-2004. *Cas Lek Cesk* 2006;145:204-8.
31. Sami HM, Skaredoff MN. In-hospital incidence of postlumbar puncture headaches (PLPH) in Ccsarean section patients associated with the 22-gauge Whitacre needle. *Anesthesiology* 1989;71:A86.
32. Snyder GE, Person DL, Flor CE, Wilden RT. Headache in obstetrical patients; comparison of Whitacre needle versus Quincke needle. *Anesthesiology* 1989;71:A860.
33. Vilming ST, Schrader H, Monstad I. The significance of age, sex and cerebrospinal fluid pressure in post-lumbar puncture headache. *Cephalalgia* 1989;9:99-106.
34. Kuntz KM, Kokmen E, Stevens JC, Miller P, Offord KP, Ho MM. Post-lumbar puncture headaches: Experience in 501 consecutive procedures. *Neurology* 1992;42:1884-7.
35. Mihic DN. Postspinal headache and relationship of needle bevel to longitudinal dural fibers. *Reg Anesth* 1985;10:76-81.
36. Norris MC, Leighton BL, DeSimone CA. Needle bevel direction and headache after inadvertent dural puncture. *Anesthesiology* 1989;70:729-31.