VOLUME-6 | ISSUE-4 | APRIL - 2017 • ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46

Comparison of the incidence of PDPH in two groups of patients, obese and non-obese undergoing caesarean section under spinal anaesthesia

Anaesthesiology

KEYWORDS: Spinal anaesthesia, Postoperative complications, obesity, headache.

Sourabh Roy — Associate Professor, Department of Anesthesiology, KPC Medical College, Kolkata, India.

Krishna Gupta — Professor, Department of Anesthesiology, KPC Medical College, Kolkata, India.

ABSTRACT

BACKGROUND: Anecdotal experience and limited publications suggest that an inverse relationship between body mass index (BMI) and postdural puncture headache (PDPH) may exist. We hypothesized that parturients with increased BMI have a lower incidence of PDPH than those with a lower BMI after dural puncture.

METHODS: We performed a prospective clinical study during spinal anaesthesia between January 1, 2016, and December 31, 2016. The primary outcome was the incidence of PDPH. The association between BMI and PDPH was assessed using chi sure test. Secondary analysis evaluated the highest reported numeric rating of pain scores for headache and the need for an epidural blood patch between BMI groups.

RESULTS: Post dural puncture hedche was significantly higher in the non obese group . The incidence of PDPH in parturients with a BMI ≥30 kg/m (2%) was lower than in parturients with a BMI <30 kg/m (18%). Median (interquartile range) headache severity (0-10 verbal rating scale) was 8 (6-9) and did not differ between parturients in the high versus low BMI groups (P = 0.61).

CONCLUSIONS: The findings are consistent with previous reports of decreased PDPH incidence after unintentional dural puncture in parturients with an increased BMI .

Introduction

Obesity in pregnancy is usually defined as a Body Mass Index (BMI) of 30 kg/m2 or more at the first antenatal consultation. BMI is a simple index of weight-for-height and is calculated by dividing a person's weight in kilograms by the square of their height in metres (kg/m2). There are three different classes of obesity: BMI 30.0–34.9 (Class I); BMI 35.0–39.9 (Class 2); and BMI 40 and over (Class 3 or morbid obesity),[1,2,3] which recognise the continuous relationship between BMI and morbidity and mortality. Obesity in pregnancy is associated with an increased risk of a number of serious adverse outcomes, including miscarriage,[4] fetal congenital anomaly,[5] thromboem bolism,[6,7] gestational diabetes,[8] pre-eclampsia,[9] dysfunctional labour,[10] postpartum haemorrhage,[8] wound infections,[8] stillbirth[11,12] and neonatal death.[12-14] There is a higher caesarean section rate[15] and lower breastfeeding rate[16]in this group of women compared to women with a healthy BMI. A meta-analysis of 33 cohort studies showed that the OR for caesarean section (either elective or emergency) was 1.46 (95% CI 1.34–1.60) and 2.05 (95% CI 1.86– 2.27) respectively among women defined as overweight and obese in individual studies, compared to women with a normal weight.[15] Spinal anesthesia seems to be well-suited for in patients undergoing cesarean section because of the short interval from injection to surgical anesthesia [17]. It has a very rapid onset and provides a dense neural block which can produce highly effective pain relief and may decrease patient morbidity after caesarean sections; moreover, failures are very infrequent [18,19]. Advantages over epidural block include the absence of risk of systemic local anesthetic toxicity, simplicity of technique, and rapid onset of surgical anaesthesia.

Spinal anesthesia also called spinal analgesia or subarachnoid block is a form of regional anesthesia and a kind of neuraxial block involving injection of opiods, local anesthetics or other permissive drug into the subarachnoid space [18,19]. The first spinal anesthetic was delivered by an accident. Its inception can be traced back in the late 19th century by James Leonard Corning. He reported on spinal anesthesia in 1885 for the first time. The first planned spinal anesthesia was administered by August Bier in 1898. He had personal knowledge of the symptoms of post dural puncture headache (PDPH). Bier reported complications including back and leg pain, vomiting and headache. Even at this early stage, he had associated the loss of cerebrospinal fluid with post spinal headache [20,21].

However,there is an inevitable risk of postdural puncture headache (PDPH) after spinal anesthesia. Post spinal puncture headache is a well known complication of spinal anesthesia. There is considerabl e vari abil ity in the incidence of PDPH, which is affected by many factors such as age, gender and needl e type and si ze. [22] In 1989 the incidence of PDPH was nearly 70%. This alarm ingly high in cidence of PDPH was attributable to the use of larg e gauge, cutting edge spin al needles. Over time the use of fine gauge and fibre splitting pencil point spinal (Pencan, Sprotte) has produced a great reduction in the incidence of PDPH. [22] TheAnecdotal experience and limited publications suggest that an inverse relationship between body mass index (BMI) and postdural puncture headache (PDPH) may exist. [23] The goal of this study was to compare, in a randomized clinical trial, the incidence of PDPH in 2 groups of patients , with BMI either above or below 30 kg/m2, undergoing cesarean section who received spinal anesthesia with 27-gauge Quincke needle.

Methods

The study was carried out in private hospitals and nursing homes of Kolkata with licence for delivery and caesarean section from the Govt. 100 patients consenting to spinal anesthesia for elective and emergency cesarean sectionwere studied and were warned about the possible development of PDPH. Age, height, weight, gravidity, and parity were recorded for each patient. Both the Group O *(n* = 50) and Group N *(n* = 50) had spinal anesthesia administered with a 27-gauge Quincke needle (Spinocan , B Braun). While mothers in Group O had a BMI of more than 30kg/m2 those in Group N had a BMI of less than 30 kg/m2. The BMI were calculated in all thr pregnant mothers during their very first antenatal visit.The spinal needle was inserted at the L2-3 or L3-4 interspace in the sitting position. Blocks were performed by the anaesthesiologists or by the residents under supervision. The bevel of the Quincke needle was kept parallel to the long axis of the dural fibers. Hyperbaric 0.5% bupivacaine with 8.1% dextrose was the sole local anesthetic agent in the patients and the anesthetist chose a dose with the aim of obtaining a T-4 sensory block (dose range 10.5-15 mg). The following information was recorded for each patient: number of attempts at puncture, bupivacaine dose, cephalad level of anesthesia obtained, occurrence of paresthesias, total amount of intravenous fluid administered, intraoperative analgesic supplement requirement, and the amount of mephentermine administered. Patients were seen daily by the anaesthesiologist by trained nurses until discharge and were directly questioned at each visit about the presence of back pain and headache. A headache that was worse when sitting and relieved in the supine position was considered to be a PDPH and was classified according to severity:

class I, mild headache when sitting or ambulating;
class **11,** moderate to severe headache when sitting or ambulating;
class **111,** moderate to severe headache when supine.

On each day that a PDPH was reported, patients were asked to score

it on a standard 100-mm visual analogue scale. They were initially offered conservative management consisting of horizontal bed rest, plenty of oral fluids, oral paracetamol, and oral caffeine.

Statistical analysis

Comparison of the following variables between the two groups was made with chisquare analysis x^2 with Yates' correction factor when appropriate: incidence of elective and emergency surgery, PDPH, failure to obtain surgical anesthesia, need for intravenous analgesic supplement, paresthesias and shivering. A *P* value <0.05 was considered significant. A two-tailed t-test was used to compare age, height, weight, BMI, gravidity, parity, bupivacaine dose, number of days of followup, number of attempts to puncture the dura, mephentermine dose, and total volume of intravenous fluid administered. A *P* value of 0.05 was considered significant.

Results

Demographic data are shown in Table **1** and do not differ significantly between the two groups.

Table 1. Patient Characteristics in the Two Study Groups

	Group O(n = 50)	Group N(n = 50)
Age (yr)	30.3 +5.0	30.5+4.5
Height (cm)	160.8 +6.1	161.9+6.5
Weight (kg)	73.7 +10.7	75.1+12.9
Gravidity	2.3 +1.3	2.4+1.5
Parity	1.0 +1.1	1.0+0.9

Mean 2 SD

Table 2 shows the incidence of elective and emergency surgery,

PDPH, failure to obtain surgical anesthesia, need for intravenous analgesic supplement, paresthesias, shivering, back pain, and the use of oral caffeine.

	Group O(n = 50)	Group N(n = 50)
Elective cases	32(64)	33(66)
Emergency cases	18(36)	17(34)
Failures	0	0
PDPH	1(2)	9(18)
Intraoperative shivering	12(24)	15(30)
Oral caffeine	0	6(12)

Number of patients (percent).

Table 3 compares bupivacaine dose, number of days of follow-up, number of attempts to puncture the dura, mephentermine dose, and total volume of intravenous fluids given.

	Group O(n = 50)	Group N(n = 50)
Bupivacaine dose (mg)	13.9 (1.3)	13.8 (1.2)
Days follow up	4.1 (0.8)	4.6 (0.8)
Number of attempts at LP	1.7 (1.1)	1.6 (1.0)
mephentermine administered (mg)	9.6 (10.6)	12.8 (9.5)
lntraoperative IV fluids (mL)	2250 (539)	3008(887)

Mean (2 SD).

The overall incidence of PDPH was 2% in group O , but 9 incidences of PDPH occurred in the nonobese group (18%). This difference was statistically significant (p<0.05). out of nine, five of these headaches were classified as mild,

and three were moderate , one being severe. All recovered quickly with conservative management with oral caffeine and without blood patch. The odds ratio for a PDPH in the high BMI compared with the low BMI group was 0.62(95% CI, 0.41-0.97, P = 0. 04) in the parturients. Median (interquartile range) headache severity (0-10 verbal rating scale) was 8 (6-9) and did not differ between parturients in the high versus low BMI groups (P = 0.61). There was no need for epidural blood patch administration for PDPH treatment in either BMI groups.

Discussion

Postdural puncture headache after caesarean section remains an important cause of postoperative morbidity. Of note, Chadwick et al. 24, in a review of closed claims in the ASA database, revealed that headaches are the third most frequent reason for claims against anaesthesiologists in obstetrics 24. Median payment was $5000 (range $1000-$20,000). It is accepted that the incidence of PDPH is directly related to needle size (3), but until recently the smallest size of Quincke needle available was 25 gauge. When used for cesarean section, the 25-gauge Quincke needle is associated with a high incidence of PDPH. This has deterred many from freely adopting spinal anesthesia in obstetrics. The introduction of finer gauge Quincke needles (27-, 29-gauge) has encouraged their evaluation for caesarean section. The present study aimed to reduce the number of variables that might affect the incidence of PDPH. The population was entirely obstetric, and the surgery and local anesthetic agent used were standardized. The only significant variable was obesity. In this study, Lower Body mass index (BMI) has been shown to be conclusively associated with higher risk of PDPH. This may be because of the large abdominal panniculus acting like an abdominal binder and raising the intra-abdominal pressure, thus, reducing the rate of leak of CSF through the dural defect.

Conclusion

Post‑dural puncture headache is a complication that should not to be treated lightly. There is the potential for considerable morbidity, lthough In the majority of cases, the problem will resolve spontaneously. In some patients, the headache lasts for months or even years. In conclusion, spinal anesthesia with 27-gauge Quincke needle was associated with a higher degree of satisfaction in obese patients, with a significantly lower incidence of PDPH.

References

1. CMACE/RCOG Joint Guideline Management of Women with Obesity in Pregnancy March 2010 Jointly published by J Modder MRCOG, CMACE and KJ Fitzsimons Ph.D, CMACE on behalf of the Centre for Maternal and Child Enquiries and the Royal College of Obstetricians and Gynaecologists.
2. National Institute for Health and Clinical Excellence. Obesity. Guidance on the prevention, identification, assessment and management of overweight and obesity in adults and children. London: National Institute for Health and Clinical Excellence (NICE), 2006.
3. World Health Organization. Obesity: Preventing and managing the global epidemic. Geneva: World Health Organization, 2000.
4. 4.. Lashen H, Fear K, Sturdee DW. Obesity is associated with increased risk of first trimester and recurrent miscarriage: matched case-control study. Human Reproduction 2004;19(7):1644-6.
5. Rasmussen SA, Chu SY, Kim SY, Schmid CH, Lau J. Maternal obesity and risk of neural tube defects: a metaanalysis. American Journal of Obstetrics and Gynecology 2008;198(6):611-619.
6. Jacobsen AF, Skjeldestad FE, Sandset PM. Ante- and postnatal risk factors of venous thrombosis: a hospitalbased case control study. Journal of Thrombosis and Haemostasis 2008;6(6):905-912.
7. Larsen TB, Sorensen HT, Gislum M, Johnsen SP. Maternal smoking, obesity, and risk of venous thromboembolism during pregnancy and the puerperium: a population-based nested case-control study. Thrombosis Research 2007;120(4):505-9.
8. Sebire NJ, Jolly M, Harris JP, Wadsworth J, Joffe M, Beard RW, et al. Maternal obesity and pregnancy outcome: a study of 287,213 pregnancies in London. International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity 2001;25(8):1175-82.
9. O'Brien TE, Ray JG, Chan W-S. Maternal body mass index and the risk of preeclampsia: a systematic overview. Epidemiology 2003;14(3):368-74.
10. Nuthalapaty FS, Rouse DJ, Owen J. The association of maternal weight with cesarean risk, labor duration, and cervical dilation rate during labor induction.[erratum appears in Obstet Gynecol. 2004 May;103(5 Pt 1):1019]. Obstetrics and Gynecology 2004;103(3):452-6.
11. Chu SY, Kim SY, Lau J, Schmid CH, Dietz PM, Callaghan WM, et al. Maternal obesity and risk of stillbirth: a metaanalysis. American Journal of Obstetrics & Gynecology 2007;197(3):223-8.
12. Kristensen J, Vestergaard M, Wisborg K, Kesmodel U, Secher NJ. Pre-pregnancy weight and the risk of stillbirth and neonatal death. BJOG: An International Journal of Obstetrics and Gynaecology 2005;112(4):403-408.
13. Cedergren MI. Maternal morbid obesity and the risk of adverse pregnancy outcome. Obstetrics and Gynecology 2004;103(2):219-24.
14. Shah A, Sands J, Kenny L. Maternal obesity and the risk of still birth and neonatal death. Journal of Obstetrics and Gynaecology 2006;26(Supplement 1):S19.
15. Chu SY, Kim SY, Schmid CH, Dietz PM, Callaghan WM, Lau J, et al. Maternal obesity and risk of cesarean delivery: a meta-analysis. Obesity Reviews 2007;8(5):385-94.
16. Amir LH, Donath S. A systematic review of maternal obesity and breastfeeding intention, initiation and duration. MC Pregnancy and Childbirth 2007;7:9.
17. Hurley RJ, Lambert DH. Continuous spinal anesthesia with a microcatheter technique: preliminary experience. Anesth Analg. 1990;70:97.
18. Cook TM, Counsell D, Wildsmith JA, Royal College of Anaesthetists Third National Audit Project. Major complications of central neuraxial block: report on the Third National Audit Project of the Royal College of Anaesthetists. Br J Anaesth.

VOLUME-6 | ISSUE-4 | APRIL - 2017 • ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46

2009;102:179–90.
19. Rodgers A, Walker N, Schug S, et al. Reduction of postoperative mortality and morbidity with epidural or spinal anaesthesia: results of overview of randomised trials. BMJ. 2000;321:1493–20.
20. Corning JL. A further contribution on local medication of the spinal cord, with cases. Med Rec.1888;33:291–3.
21. Looseley A. Corning and cocaine: the advent of spinal anaesthesia. Grand Rounds. 2009;9
22. Kuczkowski K M. Po s t - d u ral puncture headache in the obstetric pat ient:an old problem. New solutions. Minerva anestesiologica. 2004;70:823-30
23. Peralta F1, Higgins N, Lange E, et al.The Relationship of Body Mass Index with the Incidence of Postdural Puncture Headache in Parturients.
24. Chadwick H, Posner K, Caplan R, Ward RJ, Cheney FW. A comparison of obstetric and nonobstetric anesthesia malpractice claims. Anesthesiology 1991;74:242-9.