Headache After Spinal Anesthesia for Cesarean Section: A Comparison of the 27-Gauge Quincke and 24-Gauge Sprotte Needles

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A high incidence of postdural puncture headache (PDPH) occurs after spinal anesthesia for cesarean section. To examine this problem, a study was conducted with the recently developed 24-gauge Sprotte and 27-gauge Quincke needles in patients undergoing elective and emergency cesarean section (n = 298). The needle to be used was assigned in a random manner: group I, 27-gauge Quincke (n = 147); group II, 24-gauge Sprotte (n = 151). During the postoperative period, patients were visited daily and asked specifically about the presence and severity of headache. The overall incidence of PDPH was 2% (n = 6), five in the Quincke group (3.5%) and one in the Sprotte group (0.7%). There was no significant difference in the incidence of PDPH between the two groups. Five headaches were classified as mild, and only one was moderate to severe. All headaches resolved quickly with conservative management and without blood patch. The authors conclude that the choice between a 27-gauge Quincke and a 24-gauge Sprotte needle does not influence the incidence of PDPH after spinal anesthesia for cesarean section.

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Spinal anesthesia for cesarean section is a popular and effective technique. Advantages over epidural block include the absence of risk of systemic local anesthetic toxicity, simplicity of technique, and rapid onset of surgical anesthesia; however, there is an inevitable risk of postdural puncture headache (PDPH) after spinal anesthesia, and until recently, the incidence of this complication was high enough to limit its use for cesarean section. The introduction of smaller gauge needles and of different needle-tip designs has created renewed enthusiasm for this technique. The 24-gauge Sprotte needle is associated with a very low incidence of spinal headache (1), and the widely used Quincke needle is now available in 26-, 27-, 29-, and 30-gauge sizes. The goal of this study was to compare, in a randomized clinical trial, the incidence of PDPH in patients undergoing cesarean section who received spinal anesthesia with either a 24-gauge Sprotte or 27-gauge Quincke needle.

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Methods

The study was approved by the Institutional Ethics Committees of both participating hospitals (Royal Victoria Hospital and Jewish General Hospital). Two hundred ninety-eight patients consenting to spinal anesthesia for elective and emergency cesarean section were studied and were warned about the possible development of PDPH. Age, height, weight, gravidity, and parity were recorded for each patient. Group I (n = 147) had spinal anesthesia administered with a 27-gauge Quincke needle (Becton-Dickinson, Rutherford, N.J.); in group II (n = 151), the 24-gauge Sprotte needle was used (Pajunk, Geisingen, Germany). Patients received 1–1.5 L of intravenous normal saline solution at room temperature before block unless surgery was extremely urgent. The spinal needle was inserted at the L2-3 or L3-4 interspace in the sitting or lateral decubitus position, depending on the anesthetist's preference. Blocks were performed by staff, fellows, and residents under supervision. The bevel of the Quincke needle was kept parallel to the long axis of the dural fibers. An introducer was used in all patients. Hyperbaric 0.75% bupivacaine with 8.25% dextrose was the sole local anesthetic agent in the first 100 patients and the anesthetist chose a dose with the aim of obtaining a T-4 sensory

block (dose range 10.5–15 mg). Preservative-free morphine (0.2 mg) was added to the syringe containing bupivacaine in all subsequent patients. At the Royal Victoria Hospital only, a transdermal scopolamine patch (1.5 mg) was placed at the time of surgery for emesis prophylaxis. The following information was recorded for each patient: number of attempts at puncture, position during block, bupivacaine dose, cephalad level of anesthesia obtained, occurrence of paresthesias, total amount of intravenous fluid administered, intraoperative analgesic supplement requirement, and the amount of ephedrine administered. Patients were seen daily by an anesthetist at the Royal Victoria Hospital and by a trained nurse at the Jewish General Hospital 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 II, moderate to severe headache when sitting or ambulating; class III, 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, oral analgesics, and oral caffeine. Blood patch therapy was explained at this time. Comparison of the following variables between the two groups was made with χ^2 analysis with Yates' correction factor when appropriate: incidence of elective and emergency surgery, PDPH, failure to obtain surgical anesthesia, need for intravenous analgesic supplement, paresthesias, shivering, back pain, and use of neuraxial morphine and transdermal scopolamine. A P value <0.05 was considered significant. A two-tailed t-test was used to compare age, height, weight, gravidity, parity, bupivacaine dose, number of days of follow-up, number of attempts to puncture the dura, ephedrine dose, and total volume of intravenous fluid administered. A P value <0.05 was considered significant.

Results

Demographic data are shown in Table 1 and do not differ significantly between the two groups. 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 neuroaxial morphine and transdermal scopolamine. Table 3 compares bupivacaine dose, number of days of follow-up, number of attempts to puncture the dura, ephedrine dose, and total volume of intravenous fluid administered. The incidence of shivering at elective surgery was 20%. The overall incidence of PDPH was 2% ($n = 6$), one PDPH occurring in the Sprotte group (0.7%) and five in the Quincke group (3.4%). This difference was not statistically significant.

Five of these headaches were classified as mild, and only one was moderate to severe. All recovered quickly with conservative management and without blood patch. Thirty episodes of headache that occurred in the postpartum period did not have the

Table 1. Patient Characteristics in the Two Study Groups

	27-Gauge Quincke needle ($n = 147$)	24-Gauge Sprotte needle ($n = 151$)
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 ± SD.

Table 2. Nonparametric Clinical Variables in the Two Study Groups

	27-Gauge Quincke needle ($n = 147$)	24-Gauge Sprotte needle ($n = 151$)
Elective cases	93 (63)	96 (64)
Emergencies	54 (37)	55 (36)
PDPHs	5 (3.5)	1 (<1)
Failures	1 (<1)	0 (0)
Received IV analgesia	23 (16)	19 (13)
Paresthesia at spinal needle insertion	9 (6)	9 (6)
Intraoperative shivering	35 (24)	42 (28)
Postoperative back pain	67 (46)	57 (38)
Intrathecal morphine administered	94 (64)	95 (63)
Transdermal scopolamine patch placed	43 (29)	47 (31)

PDPH, postdural puncture headache; IV, intravenous.
Number of patients (percent).

Table 3. Parametric Clinical Variables in the Two Study Groups

	27-Gauge Quincke needle ($n = 147$)	24-Gauge Sprotte needle ($n = 151$)
Bupivacaine dose (mg)	13.6 (1.3)	13.8 (1.2)
Days follow-up	4.6 (0.8)	4.5 (0.8)
Number of attempts at LP	1.7 (1.1)	1.6 (1.0)
Ephedrine administered (mg)	10.6 (10.6)	12.4 (9.5)
Intraoperative IV fluids (mL)	2860 (539)	2889 (552)

LP, lumbar puncture; IV, intravenous.
Mean (± SD).

features of PDPH (10% incidence). Thirteen were in the Sprotte group and 17 in the Quincke group. This difference was not significant.

Discussion

Postdural puncture headache after cesarean section remains an important cause of postoperative morbidity. Of note, Chadwick et al. (2), in a review of closed claims in the ASA database, revealed that headaches are the third most frequent reason for claims against anesthesiologists in obstetrics (2). Median payment = $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 (e.g., 14.5% in a study by Cesarini et al. [1]). This has deterred many from freely adopting spinal anesthesia in obstetrics. The introduction of finer gauge Quincke needles (26-, 27-, 29-, and 30-gauge) has encouraged their evaluation for cesarean section. Puncture with both 29- and 30-gauge Quincke needles is usually performed through another needle placed in the epidural space, and this introduces the possibility of a dural puncture with a larger gauge epidural needle. Although the incidence of associated PDPH is very low, technical difficulties with these very small needles are frequently reported (4). Further experience would no doubt improve results.

The 26-gauge Quincke needle has not been widely studied in obstetrics, but reported PDPH rates have varied considerably (e.g., Barker [5] 2%; Snyder et al. [6] 25%). The 27-gauge Quincke needle is easy to use through an introducer, and spinal fluid returns adequately. Little information is available on the use of this needle in obstetrics.

Focus on the design of the needle tip is not new. In 1923, Greene (7) modified a beveled needle by rounding the tip and further beveling the edge in an effort to reduce dural trauma and PDPH. Hart and Whitacre (8) in 1951 introduced a solid-tip pencil-point needle with a lateral eye, believing that this would spread rather than cut dural fibers, and reported a low incidence of associated PDPH. Now known as the Whitacre needle, it has been available in a 22-gauge size for many years and has its loyal advocates; however, randomized trials comparing it with the Quincke needle were not attempted until recently. Snyder et al. (6) reported a 4% incidence of PDPH after 22-gauge Whitacre needle use, compared with 25% after 26-gauge Quincke needle use. A 25-gauge Whitacre needle is newly available, but its ability to reduce the incidence of PDPH has yet to be fully evaluated. In Sweden, Haraldson (9) in 1951 independently reported on the use of a pencil-point needle designed by Sjövall of very similar appearance to the Whitacre needle.

Sprotte et al. (10) reported in 1987 on a 6-yr experience with 22- and 24-gauge needles of his own design. The tip is solid, ogival in shape, with a lateral eye that is longer than the Whitacre needle eye. The incidence of PDPH was very low (0.02%), but obstetric patients were not included. Cesarini et al. (1) studied the 25-gauge Quincke and 24-gauge Sprotte needles in a randomized trial for cesarean section. No headaches were reported in the Sprotte group, but 14.5% were reported in the Quincke group.

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. Direct questioning revealed a very low and acceptable incidence of PDPH. There was no significant difference in the incidence of PDPH between the two needle groups with this sample size, although a definite trend was observed in favor of the Sprotte needle. It is possible that a study with a much larger sample size (800–1000 subjects per group) would reveal a significant advantage for the Sprotte needle. It was hoped that an observer questioning the patients would be unaware of which needle had been used. Unfortunately, manpower logistics rendered this impossible, but because objective criteria were used to determine the presence and classification of PDPH, the results should not be biased. It is possible that some patients developed a headache after discharge from the hospital, because no telephone follow-up was done. From a practical standpoint, however, no patient required prolonged hospitalization because of PDPH. A subgroup of patients received transdermal scopolamine (n = 97), and this drug could possibly influence the incidence of headache, although there was no evidence of this. Johnson et al. (11) have suggested that intrathecal fentanyl might lower the incidence of PDPH if added to the local anesthetic at cesarean section. Carney et al. (12) were not able to show that intrathecal morphine diminished the incidence of PDPH after cesarean section. In the present study, headaches only occurred in those who received intrathecal morphine. Although a clear trend was noted, statistical significance was lacking.

The comparative cost of Sprotte and Quincke needles is an important consideration. When purchased in bulk, the cost to the Royal Victoria Hospital in May 1991 was $2.44 CAN for the 27-gauge Quincke needle and $10.00 CAN for the 24-gauge Sprotte needle. There is obviously a considerable cost benefit in using

the 27-gauge Quincke needle for routine cases, possibly reserving the Sprotte needle for an anticipated difficult block. The 27-gauge Quincke needle is more flexible, and the backflow of spinal fluid is slower than with the 24-gauge Sprotte needle. Those taking part in the study became adept and comfortable with both needles, but if asked for a subjective judgment, most would prefer the Sprotte. Anesthetic failures have been reported by Crone and Vogel (13) with the Sprotte needle and are thought to be related to the long lateral eye, with injection of some of the local anesthetic into the epidural space. No failures were seen with the Sprotte needle in this series.

The incidence of shivering at elective cesarean section (20%) was much lower in this study than that reported by Workhoeven (14) under epidural anesthesia (64%) with intravenous fluid at room temperature. The impression that less shivering occurs under spinal than under epidural anesthesia deserves further investigation.

Postoperative back pain was present in a surprisingly high number of patients, although the majority of these appeared totally undisturbed by this complaint. Evaluation of the severity and duration of back pain after spinal anesthesia for cesarean section is warranted. Back pain is a common complaint after spinal anesthesia for other types of surgery and may deter a patient from accepting the same anesthetic in the future (15).

In conclusion, spinal anesthesia with either the 24-gauge Sprotte or the 27-gauge Quincke needle was associated with a high degree of satisfaction from patients, anesthetists, and obstetricians and a low (2%) incidence of PDPH.

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