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## EVALUATION OF 25-GAUGE QUINCKE AND 24-GAUGE GERTIE MARX NEEDLES FOR SPINAL ANAESTHESIA FOR CAESAREAN SECTION

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### ABSTRACT

**Objective:** To compare the insertion characteristics and rate of complications between 25-gauge Quincke and 24-gauge Gertie Marx needles.

**Design:** Prospective, randomized study.

**Setting:** University of Benin Teaching Hospital; a university-affiliated tertiary centre.

**Subjects:** Parturients (ASA 1 and 2) scheduled for elective caesarean section. They were randomly assigned to receive spinal anaesthesia with either 25-gauge Quincke needle or 24-gauge Gertie Marx needle. The patients with abnormal spaces, coagulopathy, infection, pre-eclampsia/eclampsia or obesity were excluded.

**Main Outcome Measures:** The number of attempts at successful identification of the spinal space, intraoperative complications, incidence of postdural puncture headache (PDPH), non-postdural puncture headache (NPDPH) and backache.

**Results:** Sixty women were studied. The 24-gauge Gertie Marx needle resulted in more successful location of the spinal space on the second attempt ( $P < 0.05$ ). Non-postdural puncture headache was seen in 43% of the study population. PDPH was seen in 10% of the Quincke group and none in the Gertie Marx group. There was no difference in the incidence of backache in both groups.

**Conclusion:** The ease of insertion and low incidence of PDPH with the Gertie Marx needle may encourage trainee anaesthetists to use this needle for caesarean section.

### INTRODUCTION

Subarachnoid anaesthesia provides rapid, safe anaesthesia for caesarean section. A major morbidity following subarachnoid anaesthesia is the high incidence of post-dural puncture headache (PDPH) particularly in the obstetric patient (1,2). The size and configuration of the needle tip have been reported to affect the development of PDPH (3-5).

Although subarachnoid anaesthesia is the favoured technique of anaesthesia for caesarean section in the developed countries, general anaesthesia is commonly used for caesarean delivery in Nigeria (6). There has been concerns over the need of our trainee anaesthetists to acquire proficiency in the conduct of spinal anaesthesia for caesarean section. The 25-gauge Quincke needle has been the only available needle for subarachnoid anaesthesia for caesarean section with its associated problem of high incidence of PDPH. Recently, the 24-gauge Gertie Marx needle was introduced in our hospital. It is a modified Sprotte-Whitacre needle. It has a pencil point tip that is slightly bigger than the 25-gauge Quincke needle (diamond shaped tip).

We were eager to know if the slightly stiffer Gertie Marx needle with conical point will (a) be easier to

insert and thus be preferred for the trainee anaesthetist to acquire the relevant skills in the practical conduct of spinal anaesthesia for caesarean section; (b) reduce the incidence of dural puncture headache. Thus, this prospective, randomized study was designed to compare the insertion characteristics and the rate of complications of 25-gauge Quincke and 24-gauge Gertie Marx needles in obstetric patients presenting for elective caesarean section.

### MATERIALS AND METHODS

The study included ASA 1 and 2 women scheduled for elective caesarean section. The patients with abnormal lumbar spaces, coagulopathy, infection, pre-eclampsia or obesity were excluded. Informed verbal consent was obtained from every patient before recruitment into the study. They were randomized, pulling out of a hat method, into two groups having spinal anaesthesia performed with either a 25-gauge Quincke needle or 24-gauge Gertie Marx needle (IMD, Inc., UT USA, length 127mm).

All patients had intravenous administration of 15-20 mL/kg of 0.9% saline before induction of subarachnoid block. Lumbar puncture was conducted in the sitting position through the L2-3 or L3-4 interspace under aseptic condition. The needle was introduced with the injection

orifice parallel to the dural fibres. Upon entering the subarachnoid space, the needle was rotated to place the injection port cephalad. Bupivacaine 0.5% (Astra) was then injected without barbotage. After the withdrawal of the needle, the patient was returned to the supine position (with a 15 degree left lateral tilt) in which the surgery was performed. Withdrawal of the needle from the skin and reinsertion constitute an attempt. The bupivacaine dose was determined by the attending anaesthetist with the planned anaesthetic level of up to T4.

All patients and the assessor of postoperative complications but not the attending anaesthetists were blinded to the needle used. The patient's age, height, weight and the number of attempts at dural puncture were recorded. Intraoperative events like hypotension, shivering, nausea and vomiting and peritoneal irritation were recorded. Postoperatively, the patients were visited daily for five days by an anaesthetist not involved in the perioperative care and were questioned about headache/backache. A headache that was exacerbated on sitting or standing and relieved in the supine position was considered to be a postdural puncture headache (PDPH).

PDPH was classified as mild if there was no limitation of activity or no treatment. It was moderate if there was limitation of activity and regular analgesics required and severe if the patient was confined to bed or unable to feed the baby.

Continuous variables (age, height, weight) were analyzed using paired t-test. Chi-square test was used for categorical data, where appropriate.

## RESULTS

Sixty women were studied, 30 parturients in each group. There were no differences in the age, height and weight of the patients in each group (Table 1). Table 2 shows the number of attempts at successful dural puncture. There was no difference between both needles on single attempt at location of the subarachnoid space. The Gertie Marx needle resulted in more successful outcome on two attempts ( $p < 0.05$ ). Intraoperative adverse outcomes were similar parturients in both groups (Table 3). Postdural puncture headache was seen in 10% of the Quincke group while none of the women in the Gertie Marx group had PDPH. There was no epidural blood patch as the PDPH were mild to moderate. Non-postdural puncture headache (NPDPH) was seen in about 43% of the parturients. Backache in the immediate postpartum period was similar in both groups (Table 4).

**Table 1**

### *Demographic characteristics*

Characteristic	Gertie Marx Needle (%)	Quincke Needle (%)
Age ( Yrs)	31.6 (3.9)	32.5 (3.4)
Weight (kg)	77.7 (9.2)	77.0 (10.6)
Height (cm)	162.8 (3.5)	161.1(4.6)

**Table 2**

### *Successful dural puncture and number of attempts*

Number of attempts	Gertie Marx Needle	Quincke Needle
1	18	19
2	10	2
>2	2	9

**Table 3**

### *Perioperative clinical variables*

Feature	Gertie Marx Needle	Quincke Needle
Parasthesiae	2	3
Peritoneal discomfort	3	2
Shivering	2	2
Nausea/vomiting	1	1
Hypotension	2	3

**Table 4**

### *Postoperative problems*

Problem	Gertie Marx Needle (%)	Quincke Needle (%)
PDPH	0	3 (10.0)
NPDPH	7 (23.3)	6 (20.0)
Backache	5 (16.6)	4 (13.3)

## DISCUSSION

There was no incidence of postdural puncture headache in the Gertie Marx needle group. Similar results have been reported with the use of the 24 gauge Sprotte needle(5). The absence of PDPH in the Gertie Marx needle group may be due to the conical configuration of the needle tip. The pencil point needles separates rather than tear the dural fibers thus limiting cerebrospinal fluid loss. This concept which was first mooted by Hart and Whitacre(7) has been modified in the design of the Gertie Marx needle. The features of the Gertie Marx needle include the advantages of the Whitacre and Sprotte needles.

The 10% incidence of PDPH in the Quincke group is similar to other studies in the obstetric population(5,8). Some authors did not find any significant difference between the incidence of PDPH when comparing the Sprotte needle(9) or the Whitacre needle(10,11) with 25-27 gauges of the Quincke needle. Buetner *et al* (12) comparing the same sizes of Whitacre and Quincke needle found a significant difference in the incidence of PDPH in both groups. The conical needle design was given as reason for their observation. However, the consensus opinion favours the use of pencil point needles for caesarean section. The size of the spinal needle is also important in evaluating the incidence of PDPH. The smaller the needle, the lower the incidence of PDPH(3,13,14). It is difficult to comment on the effect

of the size of the needle on the occurrence of PDPH in our study. Ordinarily, it would have been expected that the smaller Quincke needle should result in lower incidence of PDPH. This was not the case in this study. The design of the tip of the needle may be a more important determining factor on the incidence of PDPH when comparing needles of different tip configuration.

Our patients were evaluated daily for five days to enhance the detection of all cases of PDPH. This also coincides with the duration of hospitalisation post caesarean section in our hospital. The definition of PDPH was based on the major determining factor, its postural nature(15). All the cases of PDPH were mild to moderate and no blood patch was performed. There is a possibility that a larger sample size could have led to the detection of PDPH in the Gertie Marx needle group. A power analysis at the design of the study, using a predicted incidence of PDPH with 24 gauge Sprotte needle of 4.2% by (Devicic *et al*(9), indicated the recruitment of over 1085 patients in each group to detect an incidence of 2.1%. This was not possible in a centre with an approximate 300 caesarean sections (elective and emergency) annually(6). We therefore chose to study 60 patients to allow for the completion of the study within a reasonable time.

A total of 13 (21.7%) patients developed headache post caesarean section that did not meet the criteria for PDPH. Several studies have shown non-postdural puncture headache (NPDPH) to be unrelated to the regional technique(16,17). A careful evaluation of headache post caesarean section under spinal anaesthesia is important. Other factors may be at play particularly malaria which is endemic in this environment. Headache that is not posture related may be the initial symptom of malaria in the postpartum period.

Postoperative backache was seen in 30% of our patients. Most of the patients did not complain of backache on routine clinical evaluation. This lack of self-reporting of this problem may indicate its mildness or the willingness of the patients to cope. Backache after regional technique has been shown to be unrelated to the technique. Trauma due to repeated attempt at dural puncture has also been implicated in the onset of backache after caesarean section under spinal anaesthesia(10) It is not unlikely that existing backache from lumbar lordosis of pregnancy, and labour prior to the spinal anaesthesia may be blamed on the technique. It is helpful therefore to identify patients with backache before induction of spinal anaesthesia and exclude the technique as a causal factor in the development of backache postpartum.

We could not demonstrate any advantage of one needle over the other in the successful location of the subarachnoid space on the first attempt. However, the Gertie Marx needle resulted to higher success rate on the first two attempts. The Gertie Marx needle is new in our hospital unlike the Quincke needle. Further usage of the needle may improve success rate. Flanagan

*et al*(18) had speculated that the conical, pencil point needle may improve the aspects of technical handling.

Our results shows that, like other pencil point needles, the Gertie Marx needle has a low incidence of PDPH. As previously speculated with conical point needles, it may enhance the ease of insertion but this remains to be proven. These features may encourage increased use of spinal anaesthesia for caesarean section especially in units where general anaesthesia for this surgery is high.

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