INCIDENCE OF POST DURAL PUNCTURE HEADACHE AND EASE OF NEEDLE INSERTION: A COMPARISON OF 25 GAUGE QUINCKE AND 25 GAUGE WHITACRE SPINAL NEEDLES IN NIGERIAN OBSTETRIC PATIENTS

“A DISSERTATION SUBMITTED TO THE NATIONAL POSTGRADUATE MEDICAL COLLEGE OF NIGERIA IN PART FULFILLMENT OF THE REQUIREMENTS FOR THE FELLOWSHIP OF THE COLLEGE IN ANAESTHESIA.”

BY

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DECLARATION

“It is hereby declared that this work is original. The work has not been presented to any other College for a fellowship nor has it been submitted elsewhere for publication”

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DR M.P. UFOEGBUNAM
CERTIFICATION

“The study reported in this dissertation was done by the candidate under our supervision. We have supervised the writing of the dissertation”.

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DEDICATION

This work is dedicated to:

All victims of severe PDPH, especially my wife who had severe post dural puncture headache after the birth of our daughter. She described it thus: “my head felt heavier than my body and was throbbing, when I stood up it felt as if my head would fall off”.

ACKNOWLEDGEMENT

My sincere gratitude goes to God who directed me to this unique specialty of Anaesthesia and to my teachers in the Department of Anaesthesia, University of Nigeria Teaching Hospital, Enugu, namely Dr. H.A Ezike, Dr. P.U.N Nze, Dr. Okafor U.V.

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I express my gratitude to the consultants and residents of obstetrics and gynaecology department, all resident doctors of the department of anaesthesia, all staff of post natal and antenatal wards and especially to the students who assisted in data collection.

I thank Prime Technology Medical Ventures, Surulere, Lagos who assisted in procuring the pencil point needles used in this study.

Finally, I thank my wife and children for their prayers, love and encouragement.
LIST OF ABBREVIATIONS

1. ASA - American Society of Anesthesiologists
2. BMI - Body Mass Index
3. CSF - Cerebrospinal Fluid
4. CS - Caesarean section
5. df - Degree of freedom
6. e.g. - example
7. EBP - Epidural blood Patch
8. Fig - Figure
9. G - Gauge
10. g - Gram
11. hr - Hour
12. I.V - Intravenous
13. Kg.m$^2$ - Kilogram per meter square
14. L - Litre
15. L3-L4 - Third and Fourth lumbar vertebrae
16. L4-L5 - Fourth and Fifth lumbar vertebrae
17. m - Meter
18. min - Minute
19. ml - Millilitre
20. mg - Milligram
21. ml.min$^{-1}$ - Millilitre per minute
22. MRI - Magnetic Resonance Imaging
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<td>N</td>
<td>Sample size</td>
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<td>24.</td>
<td>P-Value</td>
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<td>25.</td>
<td>PDPH</td>
<td>Post Dural Puncture Headache</td>
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<td>PEPI</td>
<td>Programme for Epidemiologists</td>
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<td>27.</td>
<td>Post op.</td>
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<td>28.</td>
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<td>29.</td>
<td>SaO₂</td>
<td>Arterial Oxygen Saturation</td>
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<td>30.</td>
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<td>31.</td>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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SUMMARY

Sixty seven parturients, ASA 1 and 11, undergoing non-emergent Caesarean section were studied in a prospective manner. Spinal anaesthesia was successful in all the patients. They were grouped into two appropriately matched groups namely 25 gauge Quincke group and 25 gauge Whitacre group. The insertion characteristics, prevalence of PDPH, response to treatment, maternal satisfaction and future acceptance of spinal anaesthesia were determined.

There were no differences in the demographic features between the two groups. Post dural puncture headache occurred in 9.1% (N=33) of the Quincke group and none in the Whitacre group. The PDPH was moderately severe in 66.7% of the patients with a mean duration of less than 2.5 days, it was mainly generalized in 66.7% (N = 33), starting on first post operative day in 66.7% of patients and 7 hours post op in 1 patient (33.3%). Positive correlation was established between PDPH prevalence rate and number of attempts at lumbar puncture (P-value < 0.05). Number of drops of CSF lost during lumbar puncture did not affect the incidence of PDPH. Patient’s rating of the technique of spinal anaesthesia was satisfactory in 97.0% (N =33) and 100% (N =34) respectively. On future acceptance of the spinal anaesthesia, 93.9% (N =33) and 100% (N =34) respectively will accept spinal anaesthesia in the future.

The use of 25 G Whitacre pencil point spinal needle at not more than two attempts may eliminate PDPH in the obstetric patients.
CHAPTER ONE
INTRODUCTION

Karl August Bier published six cases of spinal anaesthesia in 1899, having performed the first recorded spinal anaesthesia the year before. “On August 16, 1898, at 8.35 Am., “I injected 3 cc of 0.5% solution of cocaine (0.015 g) in the manner I have described [lateral position, Quincke’s technique, and fine hollow needle] and waited 20 minutes. Sensation was lost in the lower half of the body.” Complications from the use of spinal anaesthesia have been described over this same period of time. Bier was the first to describe a ‘spinal’ or ‘post dural puncture headache’\textsuperscript{1}. In Great Britain a number of high profile legal cases in the 1950s concerning major complications of neuraxial techniques led to its decline for more than two decades.\textsuperscript{3}

Caesarean section is one of the most important obstetric procedures performed with very high success rates in the developing countries.\textsuperscript{4,5} It can be life saving for both the mother and the fetus considering its various indications.\textsuperscript{5} However, over the last thirty years the Confidential Enquiry into Maternal Deaths has been responsible for the increased use of regional anaesthesia for caesarean section due to its increased safety.\textsuperscript{6} Spinal anesthesia has been accompanied by a very significant decrease in the death rate attributable to anaesthesia in the United Kingdom.\textsuperscript{6} General anaesthesia is now used in less than 5% of caesarean sections.\textsuperscript{6} However, there are still a number of important complications that are associated with regional anaesthesia and analgesia.

The incidence of post–dural puncture headache was 66% in 1898 during researches on cocainization of spinal cord by August Bier in which 5 out of 8 patients had headache.\textsuperscript{1} This alarmingly high incidence of post–spinal headache was likely attributable to the use of large gauge, medium bevel,
cutting spinal needles. In 1956, with the introduction of 22 gauge and 24 gauge needles, the incidence was estimated to be 11%.7

Today the use of fine gauge pencil–point needles, such as the Whitacre and Sprotte® has produced a greater reduction in the incidence of post–dural puncture headache, which varies with the type of procedure and patients involved. It is related to the size and design of the spinal needle used, 8 the experience of the personnel performing the lumbar puncture, 9 and the age10 and sex11 of the patient.

Anaesthetists have been active in attempting to reduce the incidence of post dural puncture headache. The use of smaller sizes has led to reduction in the incidence of post–spinal headache. The incidence is 40% with a 22 gauge needle; 25% with a 25 gauge needle;12,13 2%–12% with a 26 gauge Quincke needle;12,14 and <2% with a 29 gauge needle.15 However, technical difficulties leading to failure of the spinal anaesthesia are common with needles of 29 gauge or smaller.15 Large diameter spinal needles will clearly produce large dural perforations making the likelihood of a dural puncture headache high. Conversely, the smaller diameter needles produce small dural perforations with a lower incidence of headache and a high failure rate.14 A balance has to be struck between the risks of dural puncture headache and technical failure. Gauges 25, 26 and 27 needles probably represent the optimum needle size for lumbar puncture.16

Available evidence indicates that there are no universally agreed definitions for PDPH.17 Wiesel et al defined PDPH as a headache affecting the frontal or occipital areas whose symptoms were aggravated by assuming the sitting position and alleviated by recumbency.18 Carrie and Collins, however, defined significant PDPH as any headache occurring after dural puncture which is not only postural but also continuous for more than 24hrs at any level of
intensity or so severe at any time that the patient is unable to maintain an upright posture, in other words, an headache which has any significant effect on the patient post operative well being. \textsuperscript{19} Reid & Thornbum typically described PDPH as dull or throbbing, frontal or occipital in origin and radiating to other areas of the head. Its unique diagnostic feature is its postural nature. While an upright posture exacerbates the headache, lying down partly or totally alleviates it. Head shaking, coughing and jugular compression worsen the symptoms. \textsuperscript{17,20-22} Kunckle et al reported that the mechanism of post dural puncture headache is thought to be due to a decrease in cerebrospinal fluid (CSF) pressure produced by leakage through the dural membrane at the needle puncture site. This lowered pressure produces traction on intra-cerebral supporting structures and blood vessels and leads to the sensation of a headache.\textsuperscript{23} Post-dural puncture headache is a complication that should not be treated lightly. There is the potential for considerable morbidity,\textsuperscript{24} even death.\textsuperscript{25,26}

When PDPH develops in the obstetric patient, the morbidity is considerable. The new mother is incapacitated. She may be unable to get out of bed to care for her baby or herself. The cost of health care increases because she may need to stay in the hospital longer than planned.

In my center only Quincke type spinal needles have been available for many years probably because of the cost of pencil point needles. It is three times the cost of the Quincke needle.\textsuperscript{27}

Riggs, 1961, working in Nigeria found that spinal anaesthesia was the most common anaesthetic technique used in rural areas of Nigeria with relatively low incidence of complications.\textsuperscript{28} Adesunkanmi reported a PDPH incidence of 12.5% in a sample of 32 obstetric and non obstetric patients using a 22 gauge spinal needle and 2mls of 5% hyperbaric lignocaine.\textsuperscript{29} In 1996
Amata obtained a prevalence rate of 7% amongst 100 caesarean section cases performed under spinal anaesthesia with a 22 gauge bevelled spinal needle and 2.5mls of 0.5% hyperbaric bupivacaine. In 2002 Olukoju in Lagos obtained a prevalence of 12% and 8% respectively with 22 gauge and 26 gauge Quincke needles amongst 100 non-obstetric patients and also established positive correlations between PDPH prevalence rate and spinal needle size and number of attempts at lumbar puncture. Imarengiaye & Edomwonyi in Benin City evaluated 25- gauge Quincke and 24- gauge Gertie Marx needles in sixty Obstetric patients and obtained a PDPH prevalence rate of 10% among Quincke group and none in the Gertie Marx group. Imarengiaye & Ekwere also in Benin City in a cross-sectional study of incidence and severity of PDPH in 119 Obstetric patients in whom 25- gauge Quincke needles were employed for lumbar puncture obtained a PDPH incidence of 22.7%. Fyneface-Ogan et al in Port Harcourt evaluated the incidence of PDPH among one hundred Obstetric patients using sizes 25- gauge and 26- gauge Becton Dickinson Whitacre needles and observed that PDPH occurred in 6.0% of 25 gauge needle group but no difference was noted in the insertion characteristics between the two needles.

No study in Nigeria has compared the 25 gauge Quincke and Whitacre spinal needles in the obstetric population.

**AIM AND OBJECTIVES**

**GENERAL OBJECTIVE**
To compare the incidence of PDPH and ease of needle insertion using 25-gauge Quincke and 25-gauge Whitacre needles in Nigerian obstetric patients.

SPECIFIC OBJECTIVES

1. To determine the incidence of PDPH in parturient after caesarean section using 25-gauge Quincke needle

2. To determine the incidence of PDPH in parturient after caesarean section using 25-gauge Whitacre needle.

3. To document the ease of needle insertion in the two groups.

4. To document the response to treatment of post dural puncture headache in the two groups.

5. To determine the influence of PDPH on the acceptance of the anaesthetic technique in the future.

CHAPTER TWO
LITERATURE REVIEW
HISTORY
Spinal anaesthesia developed in the late 1800s. In 1891, Wynter and Quincke aspirated cerebrospinal fluid (CSF) from the subarachnoid space for the treatment of raised intracranial pressure associated with tuberculous meningitis. The catheters and trochars used were probably about 1 mm in diameter and would certainly have led to a post dural puncture headache. However, all Quincke and Wynters’ patients died soon after.

In August 1898, Karl August Bier, a German surgeon, injected cocaine 10–15 mg into the subarachnoid space of seven patients, himself and his assistant, Hildebrandt. Bier, Hildebrandt and four of the patients all described the symptoms associated with post–dural puncture headache. Bier concluded that the headache was attributable to loss of CSF. By the early 1900s, there were numerous reports in the medical literature of the institution of spinal anaesthesia using large spinal needles. Headache was reported to be a complication in 50% of patients. At that time, the headache was said to resolve within 24 hours.

It was not until a Swiss obstetrician in 1901 used intrathecal cocaine for the relief of pain in the second stage of labour that regional anaesthesia for obstetrics was popularized. Vomiting and a high incidence of post–dural puncture headache were noted, but the high mortality rate in Caesarean deliveries performed under spinal anaesthesia (1 in 139) led to the abandonment of this technique in the 1930s. The period from 1930 to 1950 has often been referred to as the ‘dark ages of obstetric anaesthesia’.

In 1951, Whitacre and Hart developed the pencil–point needle, based on the observations of Greene in 1926. He demonstrated in his experiments that a greater trauma was produced by the use of a needle with a blunt cutting
point than by a needle of the same caliber with a point rounded, tapering and sharp. Developments in needle design since that time have led to a significant reduction in the incidence of post–dural puncture headache.

**Anatomy of the spinal dura mater**

The spinal dura mater is a tube extending from the foramen magnum to the second segment of the sacrum. It contains the spinal cord and nerve roots that pierce it. The dura mater is a dense, connective tissue layer made up of collagen and elastic fibres. The classical description of the spinal dura mater is of collagen fibres running in a longitudinal direction. This had been supported by histological studies of the dura mater. Clinical teaching based upon this view of the dura recommends that the bevel of a cutting spinal needle be orientated parallel rather than at right angle to these longitudinal dural fibres. Orientating the needle bevel at right angle to the longitudinal fibres, would cut more fibres. The cut dural fibres, previously under tension, would then tend to retract and increase the dimensions of the dural perforation, thereby increasing the likelihood of a post–spinal headache. Clinical studies had confirmed that post–dural puncture headache was more likely when the cutting spinal needle was orientated perpendicular to the direction of the dural fibres. However, recent light and electron microscopic studies of human dura mater have contested this classical description of the anatomy of the dura mater. These studies describe the dura mater as consisting of collagen fibres arranged in several layers parallel to the surface. Each layer or lamellae consists of both collagen and elastic fibres that do not demonstrate specific orientation. The outer or epidural surface may indeed have dural fibres arranged in a longitudinal direction, but this pattern is not repeated through successive dural layers. Recent measurements of dural thickness have also
demonstrated that the posterior dura varies in thickness, and that the thickness of the dura at a particular spinal level is not predictable within an individual or between individuals. Dural perforation in a thick area of dura may be less likely to lead to a CSF leakage than a perforation in a thin area, which may explain the unpredictable consequences of a dural perforation.

Cerebrospinal fluid

Cerebrospinal fluid production occurs mainly in the choroid plexus. About 500 ml of CSF is produced daily (0.35 ml min⁻¹). The CSF volume in the adult is approximately 150 ml, of which half is within the cranial cavity. The CSF pressure in the lumbar region in the horizontal position is between 5 and 15 cm H₂O. On assuming the erect posture, this increases to over 40 cm H₂O.

PATHOPHYSIOLOGY OF DURAL PUNCTURE

Dura mater and response to trauma

There are few experimental studies of the response of the dura to perforation. In 1923, it was noted that deliberate dural defects in the cranial dura of dogs took approximately one week to close. The closure was facilitated through fibroblastic proliferation from the cut edge of the dura. Keener, in 1959 dismissed the notion that the fibroblastic proliferation arose from the cut edge of the dura. This study maintained that the dural repair was facilitated by fibroblastic proliferation from surrounding tissue and blood clot. The study also noted that dural repair was promoted by damage to the pia arachnoid, the underlying brain and the presence of blood clot. It is therefore possible that a spinal needle carefully placed in the subarachnoid space does not promote dural healing, as trauma to adjacent tissue is minimal. The observation that
blood promotes dural healing agrees with Gormley’s original observation that bloody taps were less likely to lead to a post–dural puncture headache as a consequence of persistent CSF leak.47

**Needle tip deformation and dural perforation**

An in vivo study by Fink et al in 1989 demonstrated that the cutting tip spinal needle is more likely to be deformed after bony contact than comparable sized pencil–point needles.48 However, no in vivo49 or in vitro work has yet demonstrated an increase in the size of dural perforation where damaged needles are used.

**Consequences of dural puncture**

Puncture of the dura has the potential to allow excessive leakage of CSF. Excess loss of CSF leads to intracranial hypotension and a demonstrable reduction in CSF volume.50 After the development of post–dural puncture headache, the presence of a CSF leak has been confirmed with radionuclide cisternography, radionuclide myelography, manometric studies, epiduroscopy and direct visualization at laminectomy. The adult subarachnoid pressure of 5–15 cm H2O is reduced to 4.0 cm H2O or less.51 The rate of CSF loss through the dural perforation50 (0.084–4.5 ml. s⁻¹) is generally greater than the rate of CSF production (0.35 ml min⁻¹), particularly with needle sizes larger than 25Gauge.52,53

Although the loss of CSF and lowering of CSF pressure is not disputed, the actual mechanism producing the headache is unclear. There are two possible explanations. First, the lowering of CSF pressure causes traction on the intracranial structures in the upright position. These structures are pain
sensitive, leading to the characteristic headache. Secondly, the loss of CSF produces a compensatory venodilatation vis-à-vis the Monro Kellie doctrine.\textsuperscript{54,55} The Monro Kellie doctrine, or hypothesis, states that the sum of volumes of the brain, CSF, and intracranial blood is constant. The consequence of a decrease in CSF volume is a compensatory increase in blood volume. The venodilatation is then responsible for the headache.

**Incidence**

The incidence of post–dural puncture headache was 66% in 1898,\textsuperscript{1} this alarmingly high incidence was likely attributable to the use of large gauge, medium bevel, cutting spinal needles. In 1956, with the introduction of 22 gauge and 24 gauge needles, the incidence was estimated to be 11%.\textsuperscript{7} Post dural puncture headache is related to the size and design of the spinal needle used\textsuperscript{8} the experience of the personnel performing the dural puncture,\textsuperscript{9} the age\textsuperscript{10} and sex\textsuperscript{11} of the patient.

Reducing the size of the spinal needle has made a significant impact on the incidence of PDPH. The incidence is ~40% with a 22 gauge needle; 25% with a 25 gauge needle;\textsuperscript{5,13} 2%–12% with a 26 gauge Quincke needle,\textsuperscript{5,14} and <2% with a 29 gauge needle.\textsuperscript{15} However, technical difficulties leading to failure of the spinal anaesthesia are common with needles of 29 gauge or smaller.\textsuperscript{15}

An editorial written by Reid et al in 1997 reviewing available evidence shows that the highest incidence of PDPH occurs in obstetric patients\textsuperscript{17}. The reported incidence of PDPH in this group of patients varies from 0.4%–28%.\textsuperscript{56,57} Crawford noted that the reason for the particularly high risk of PDPH amongst obstetric patients remains unclear.\textsuperscript{58} Cesarini et al attributed this phenomenon to the fact that patients are often under forty years of age and
are females. Halfalvi attributed the high incidence of PDPH in obstetric patients to the softness of tissues occurring during pregnancy. Dakin & Carli indicated that a reduced incidence of PDPH is associated with the pencil point needles compared with similar sized bevelled needles amongst obstetric patients.

PREVENTION OF POST DURAL PUNCTURE HEADACHE

Needle size

Large diameter spinal needles will clearly produce large dural perforations, making a high incidence of dural puncture headache possible. Conversely, the smaller diameter needles produce small dural perforations with a lower incidence of headache. Twenty nine gauge spinal needles, are technically more difficult to use, and for spinal anaesthesia, are associated with a high failure rates. A balance has to be struck between the risks of dural puncture headache and technical failure. Gauges 25, 26 and 27 Quincke type needles probably represent the optimum needle size for spinal anaesthesia.

Needle design

The Quincke type is the standard needle with a medium cutting bevel and the orifice at the needle tip. In 1926, Greene proposed a needle tip design with a non–cutting edge that would separate the dural fibres to avoid post–dural puncture headache. In 1951, the Whitacre needle was introduced and, in 1987, the Sprotte needle. The generic term for these needles is pencil–
point or atraumatic. The Whitacre needle has a diamond shaped tip, and the Sprotte needle tip is conical. The orifice is up to 0.5 mm from the needle tip. Clinical and laboratory studies have confirmed that pencil–point needles produce fewer post–dural puncture headaches than medium bevel cutting needles. However, there are disadvantages. Paraesthesia has been observed with the pencil–point needles. The reason may lie in the distance from the tip of the needle to the orifice. The tip has to be passed at least 0.5 mm into the subarachnoid space before the orifice enters the subarachnoid space. The tip then can impinge upon the stretched cauda equina. Giving credence to this hypothesis, paraesthesia is uncommon with the short bevelled needles. The problem of low CSF flow and paraesthesia seen with the pencil–point needles has promoted the search for novel needle designs.

Duration of post operative recumbency

Conflicting studies exist in literature on the questionable relevance of this factor on PDPH. It has been assumed in the past that prolonged post operative recumbency prevents or reduces the incidence of PDPH. Several controlled trials have, however, showed that the duration of recumbency after lumbar puncture has no effect on the incidence of PDPH rather it may only delay symptoms or decrease the severity of PDPH.

PRESENTATION OF DURAL PUNCTURE HEADACHE

Onset of Symptoms

Ninety per cent of headaches usually occur within 3 days of the procedure, and 66% start within the first 48 h. Rarely, the headache develops between 5 and 14 days after the procedure. The headache may
present immediately after dural puncture. However, this is rare, and its occurrence should alert the physician to alternative causes.

Headache is the predominant, but not ubiquitous presenting complaint. The headache is described as severe, ‘searing and spreading like hot metal’. The common distribution is over the frontal and occipital areas radiating to the neck and shoulders. The temporal, vertex and nuchal areas are reported less commonly as the site of discomfort, although neck stiffness may be present. The pain is exacerbated by head movement, and adoption of the upright posture, and relieved by lying down.

Other symptoms associated with dural puncture headache include nausea, vomiting, hearing loss, tinnitus, vertigo, dizziness and paraesthesia of the scalp, and upper and lower limb pain. Visual disturbances such as diplopia or cortical blindness have been reported. Cranial nerve palsies are not uncommon. Neurological symptoms may precede the onset of grand mal seizures. Intracranial subdural haematomas, cerebral herniation and death, have been described as a consequence of dural puncture. Unless a headache with postural features is present, the diagnosis of post–dural puncture headache should be questioned, as other serious intracranial causes for headache must be excluded.

Diagnosis

The history of accidental or deliberate dural puncture and symptoms of a postural headache, neck ache and the presence of neurological signs, usually guide the diagnosis.

Differential diagnosis
The diagnosis of post–dural puncture headache is frequently clear from the history of dural puncture and the presence of a severe postural headache. However, it is important to consider alternative diagnoses as serious intracranial pathology may masquerade as a post–dural puncture headache. Clinicians should remember that intracranial hypotension can lead to intracranial haemorrhage through tearing of bridging dural veins, and a delay in diagnosis and treatment may lead to serious consequences. Pathologies that may masquerade as post–dural puncture headache include intracranial tumours, intracranial haematoma, pituitary apoplexy, cerebral venous thrombosis, migraine, chemical or infective meningitis. It has been estimated that 39% of parturients report symptoms of a headache unrelated to dural puncture following delivery.

**Duration**

The largest follow up of post dural puncture headache is still that of Vandam and Dripps in 1956. They reported that 72% of headaches resolved within 7 days, and 87% had resolved in 6 months. The duration of the headache has remained unchanged since that reported in 1956. In a minority of patients the headache can persist. Indeed, case reports have described the persistence of headache for as long as 1–8 yr after dural puncture. It is interesting to note that even post dural puncture headache of this duration has been successfully treated with an epidural blood patch.

**TREATMENT**

**Overview**

Studies observing the effects of treatments in post-dural puncture headache
often fail to recognize that, with no treatment, over 85% of post-dural puncture headaches will resolve within 6 weeks.\textsuperscript{82}

**Psychological**
Patients who develop post-dural puncture headache may reveal a wide range of emotional responses from misery and tears to anger and panic. It is important both from a clinical and medico-legal point of view, to discuss the possibility of headache before a procedure is undertaken that has a risk of this complication. Even so, this discussion will not prepare the patient for the sensations he or she feels should the headache develop. Obstetric patients are particularly at risk, as they are not able to look after their new baby. It is important to give the mother a thorough explanation of the reason for the headache, the expected time course, and the therapeutic options available. Regular review is essential to monitor the course and therapeutic maneuvers undertaken.

**Conservative and non pharmacological treatment**

Bed rest has been shown to be of no benefit.\textsuperscript{84} No clinical evidence exists to support the maintenance of the supine position before or after the onset of the headache as a means of treatment.\textsuperscript{64} The prone position has been advocated, but it is not a comfortable position for the post-partum patient. A clinical trial of the prone position after dural puncture failed to demonstrate a reduction in post-dural puncture headache.\textsuperscript{86}

A tight abdominal binder raises the intra-abdominal pressure. The elevated intra-abdominal pressure is transmitted to the epidural space and may relieve the headache. Unfortunately, tight binders are uncomfortable and
are seldom used in current practice. There are few units that would recommend this approach.\textsuperscript{87}

\textbf{Epidural blood patch}

\textbf{History}

After the observation that 'bloody taps' were associated with a reduced headache rate,\textsuperscript{47} the concept of the epidural blood patch was developed. The principle is that the blood, once introduced into the epidural space, will clot and occlude the perforation, preventing further CSF leak. The high success rate and the low incidence of complications have established the epidural blood patch as the standard against which alternative methods are evaluated.

\textbf{Technique}

The presence of fever, infection on the back, coagulopathy, or patient refusal are contraindications to the performance of an epidural blood patch.\textsuperscript{88} As a precautionary measure, a sample of the subject's blood should be sent to microbiology laboratory for culture.\textsuperscript{89} With the patient in the lateral position, the epidural space is located with a Tuohy needle at the level of the supposed dural puncture or an intervertebral space below. The operators (two clinicians) should be prepared for the presence of CSF within the epidural space. Up to 30 ml of blood is then taken from the patient's arm and injected slowly through the Tuohy needle. Should the patient describe lancinating pain of dermatomal distribution, the procedure must be stopped.\textsuperscript{89} There is no consensus as to the precise volume of blood required. Practitioners now recognize that the 2–3 ml of blood originally described by Gormley is inadequate, and that 20–30 ml of blood is more likely to guarantee success.\textsuperscript{89} At the conclusion of the procedure, the patient is asked to lie still for one\textsuperscript{88,90} or, preferably, 2 hours, before being allowed to walk around.\textsuperscript{91}

\textbf{Contraindications}
Contraindications are those apply to epidural and spinal anaesthesia, and include a raised white cell count, pyrexia and technical difficulties, others include coagulopathy, hypovolaemia, local sepsis at the site of lumber puncture etc. Limited experience with HIV-positive patients suggest that it is acceptable providing no other bacterial or viral illnesses are active.\textsuperscript{92}

**The blood patch**

Using either radiolabelled red cells\textsuperscript{93} or an MRI scan,\textsuperscript{94} several studies have reported the degree of spread of the epidural blood patch. After injection, blood is distributed caudally and cephalad regardless of the direction of the bevel of the Tuohy needle. The blood also passes circumferentially around to the anterior epidural space. The thecal space is compressed and displaced by the blood. In addition, the blood passes out of the intervertebral foramina and into the paravertebral space. The mean spread of 14 ml of blood is six spinal segments cephalad and three segments caudal. Compression of the thecal space for the first 3 hours, and a presumed elevation of subarachnoid pressure, may explain the rapid resolution of the headache. Compression of the thecal sac is not, however, sustained and maintenance of the therapeutic effect is likely to be attributable to the presence of the clot eliminating the CSF leak. It has been observed that CSF acts as a procoagulant, accelerating the clotting process.\textsuperscript{95} At 7–13 hours, there is clot resolution leaving a thick layer of mature clot over the dorsal part of the thecal sac.

**Outcome**

The technique has a success rate of 70–98% if carried out more than 24 h after the dural puncture.\textsuperscript{88} If an epidural blood patch fails to resolve the headache, a repeat blood patch has a similar success rate. Failure of the second patch and repeating the patch for a third or fourth time has been reported. However, in the presence of persistent severe headache, an alternative cause and
treatment should be considered.

**Complications**

Immediate exacerbations of symptoms and radicular pain have been described,⁹⁶ these symptoms do not persist and resolve with the administration of simple analgesics. Long-term complications of epidural blood patch are rare. A single case report of an inadvertent subdural blood patch described non-postural, persistent headache and lower extremity discomfort.⁹⁷

The effect of the blood patch on the success of subsequent epidurals has been addressed.⁹⁸ Though case reports describe limited spread of epidural analgesia⁹⁹ after previous epidural blood patch, a large retrospective study over a 12-yr period⁹⁸ found that subsequent epidural analgesia was successful in > 96% of patients.

**Pharmacological treatment**

The aim of management of post-dural puncture headache is to: (i) replace the lost CSF; (ii) seal the puncture site; and (iii) control the cerebral vasodilatation. Supportive therapy such as rehydration, acetaminophen, non-steroidal anti-inflammatory drugs, opioids, and antiemetics may control the symptoms and so reduce the need for more aggressive therapy,⁸⁵ but do not provide complete relief.¹³

**Caffeine**

Caffeine is a central nervous system stimulant that amongst other properties produces cerebral vasoconstriction. The most frequently quoted work on the treatment of post-dural puncture headache with caffeine is that of Sechzer.¹⁰⁰,¹⁰¹ He evaluated the effects of one or two 0.5 g doses of I.V. caffeine on subjects with established post-dural puncture headache and
concluded that I.V. caffeine is an effective therapy for post-dural puncture headache.

It is assumed that caffeine acts through vasoconstriction of dilated cerebral vessels.\textsuperscript{102} If cerebral vasodilatation were the source of the pain, cerebral vasoconstriction might limit the pain experienced. Indeed, it has been demonstrated that caffeine causes a reduction in cerebral blood flow,\textsuperscript{103} but this effect is not sustained. Caffeine therapy is simple to administer compared with the technical skills required to perform an epidural blood patch. Were caffeine as successful as suggested by previous reports, it would no doubt be widely advocated. However, a North American hospital survey of the treatment of post-dural puncture headache identified that most hospital practitioners had abandoned the use of caffeine as they had found it ineffective.\textsuperscript{104} The effects of caffeine on post-dural puncture headache seem, at best, temporary.\textsuperscript{102} In addition, caffeine is not a therapy without complications,\textsuperscript{105} and does not restore normal CSF dynamics, thus leaving the patient at risk from the serious complications associated with low CSF pressure.

The dose now recommended for the treatment of post-dural puncture headache is 300–500 mg of oral or I.V. caffeine once or twice daily.\textsuperscript{102, 106} One cup of coffee contains about 50–100 mg of caffeine and cola drinks contain 35–50 mg. The LD50 for caffeine is of the order of 150 mg kg\textsuperscript{-1}. However, therapeutic doses have been associated with central nervous system toxicity,\textsuperscript{105} and atrial fibrillation.

**Sumatriptan**

Sumatriptan is a 5-HT\textsubscript{1D} receptor agonist that promotes cerebral vasoconstriction, in a similar way to caffeine.\textsuperscript{107} Sumatriptan is advocated for the management of migraine and recently, for post-dural puncture headache.
There have been only a few case reports where sumatriptan was used successfully to manage post-dural puncture headache.\textsuperscript{108} However, a recent controlled trial found no evidence of benefit from Sumatriptan for the conservative management of post-dural puncture headache.\textsuperscript{109}

**Epidural, intrathecal and parenteral opioids**

A number of authors have advocated the use of epidural,\textsuperscript{110} intrathecal\textsuperscript{111} or parenteral morphine\textsuperscript{112} to treat PDPH. A controlled trial of intrathecal fentanyl as prophylaxis found no evidence of a reduction in the incidence of post-spinal headache after dural puncture with a 25-gauge spinal needle.\textsuperscript{113}

**Surgical Treatment**

There are case reports of persistent CSF leaks, that are unresponsive to other therapies, being treated successfully by surgical closure of the dural perforation,\textsuperscript{114} this is clearly a last resort treatment.

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**CHAPTER THREE**

**PATIENTS AND METHODS**

**Study Location:**

This study was carried out on parturients undergoing caesarean section in the labour ward theatre of the University of Nigeria Teaching Hospital (UNTH), Enugu, and a tertiary health institution with about 700-bed capacity. This study was carried out between May 2007 and March 2008.

**Ethical Clearance:**
Approval for the study was obtained from the Hospital Ethics committee of UNTH, Enugu. Written, informed consent (see appendix) was obtained from each parturient before being recruited.

**Sample Size:**

A review of the obstetric theatre register at UNTH Enugu for three years (January 2003 to December 2005) showed that an average of 175 caesarean sections were done yearly, out of that number, 75 patients, 77 patients, and 78 patients had elective caesarean delivery in 2003, 2004, and 2005 respectively. Statistical analysis gave a yearly average of 76.6 elective caesarean sections and a monthly average of 6.4 cases. It was hoped that at least 30 ASA (American Society of Anesthesiologist) 1 and 2 parturients per group will be studied over a period of ten months. This sample size based on a pilot study at the hospital and analyzed in conjunction with a statistician was deemed to be adequate.

**Patients Selection:**

Inclusion criteria included parturients for elective caesarean section that are ASA 1 and 11 and who did not have any contraindication to spinal anaesthesia.

Exclusion criteria included those parturients with contraindications to regional anaesthesia, namely hypovolaemia, coagulopathy, severe pre-eclampsia, local sepsis at the site of lumbar puncture, patient’s refusal, history of pre-existing non-post dural puncture headache and allergy to amide local anesthetics.

**Study Design:**
This was a prospective, randomized, single blind, comparative study. As part of obtaining consent for the procedure, the patients were informed about the possibility of a headache after the anaesthetic but details concerning its character were not given.

Parturients were allocated to two groups: size 25-gauge Quincke spinal needle group (Group 1) and size 25-gauge Whitacre spinal needle group (Group 2). This was done by the drawing of sixty eight (68) sequentially numbered, opaque, sealed envelopes containing instructions for the needle type. For each consecutive parturient admitted into the antenatal ward that satisfies inclusion criteria, the envelopes were shuffled before the drawing (and selection) was made.

Parturients, for caesarean sections, were fasted overnight, and premedicated with oral ranitidine 150mg at night. Their weight (kg) and height (meters) were recorded by ward nurses. Patients were transported to the operating room lying on their left sides. Drugs and equipment for resuscitation were assembled before the initiation of the procedure.

On arrival in the operating room, baseline vital signs (maternal pulse rate, blood pressure, respiratory rate, oxygen saturation) and foetal heart rate were recorded.

A size 16 gauge Intravenous cannula was inserted into a forearm vein and Intravenous ranitidine 50mg, metoclopramide 10mg were given. Preloading of the circulation was achieved with 10ml. kg\(^{-1}\) of 0.9% Normal saline for about 20 to 30 minutes. Intravenous infusion was then slowed to administer about 10ml.kg\(^{-1}\).hr\(^{-1}\) to all patients to serve as maintenance fluid. Under aseptic condition, spinal anaesthesia was induced by the author with the parturient in the sitting position, using a
midline approach. Identification of L₃-L₄ or L₄-L₅ interspace was done thus: a line drawn between both iliac crests usually crosses either the body of L₄ or the L₄-L₅ interspace. Counting spinous processes up or down from these reference points identifies other spinal levels. The skin, subcutaneous tissues and the interspinous ligament were infiltrated with 3-4mls of 1% plain lidocaine. Subarachnoid space was entered with either a 25-gauge Whitacre spinal needle (Becton Dickinson and company Franklin Lakes U.S.A) or a 25-gauge Quincke spinal needle (Tae-Chang Industrial South Korea). The needles were passed through a 21-gauge introducer (Becton Dickinson and Company, Franklin Lakes, U.S.A). The Quincke needles were introduced with their bevel facing sideways. The stillette was removed, and free flow of cerebrospinal fluid was observed, before performing subarachnoid injection. The spinal needle was removed and the puncture site dressed. All parturients received a standard dose of 2.5mls of 0.5% hyperbaric bupivacaine (12.5mg). After the spinal injection, the parturient was placed in the supine position with a 15° left lateral tilt on an adjustable operating table. Parturients received oxygen at 4l.min⁻¹ via a facemask/intranasal catheter. Pulse oximetry, non-invasive blood pressure and electrocardiography were monitored for all patients using RGB Omicron FT Monitor Model A50r.

Data collection form was used to document information on the demographic characteristics of the patients (age, height, weight) as well as the number of attempts at lumbar puncture and type of spinal needle used. Information on the patient’s pulse rate, blood pressure, and level of sensory block, duration of surgery as well as other intra and post operative sequelae were monitored and recorded every five minutes.
After surgery, the patients were instructed to remain in bed in a supine or recumbent position until somatic motor paralysis had completely regressed. They were to ambulate thereafter. Systemic analgesic(s) were administered for post operative pain.

With the assistance of interviewers (final year medical students and nurse anaesthetists in training) who were unaware of the objective of the study and the type of spinal needle used, the patients were further evaluated using a data collection form from the 1st post operative day and daily thereafter until discharge from the ward (see appendix). Specific enquires from patients who developed PDPH included its onset, severity, localization, character (for posture dependency), the duration and presence of associated symptoms, their assessment of the procedure and their willingness to accept the same technique if they were to have another caesarean section. The duration of post-operative recumbency in bed was also recorded. The headache will be adjudged to be PDPH if it fulfils the following criteria of Driessen et al.¹¹⁵

- Aggravation by the erect or sitting position
- Relief on lying flat
- Mainly occipital and/or frontal in nature.
- Aggravation by coughing, sneezing or straining.

The severity of the PDPH will be rated using a standardized headache severity scale.¹⁸,⁵⁹

- Mild headache - no interference with daily activities.
- Moderate headache - ambulatory but some interference with daily activities.
- Severe headache - bed ridden

All patients who developed PDPH were managed with a conservative treatment regimen consisting of bed rest for 48 hours, systemic analgesics (Intramuscular Pethidine 50-100mg four hourly or Pentazocine 30-60mg six hourly all for 48 hours) and fluid hydration of 4 litres per day for 2 days. The patients that failed to respond to the treatment received an epidural patch. All patients were followed up to the time of discharge from hospital.

STATISTICAL ANALYSIS

Data obtained were entered into, and analyzed using, a computer. The SPSS® 11.0 computer based statistical software was used to calculate the frequencies, percentages, mean and standard deviations. Statistical associations were determined using the chi-square($x^2$) for categorical variables and student t-test for numerical variables. A P-value of less than 0.05 was considered significant. Statistical associations were performed using PEPI software for windows. Yates’s correction was used in the calculation of chi-square for any value less than five.
RESULTS

PATIENTS CHARACTERISTICS

A total of 67 parturients (33 in Group 1 and 34 in Group 2) were studied. Full data collection was achieved for all participants. Body mass index (BMI) was calculated for all parturients based on their weight and height.

Demographic characteristics

The age distribution of participants is presented in (table 1). There were no statistically significant differences in the ages in the two groups. The means, ranges and standard deviations of the other demographic characteristics are presented in (table 2). There were no statistically significant differences in the ages, weight, height, BMI, gravidity and parity in the two groups.

Age: The patients were aged between 22 and 43 years. Mean age in Group 1 was 31.91 years (SD±4.92 years), while in Group 2, it was 31.71 years (SD±5.17 years). P-value = 0.872.
Weight: Mean weight in Group 1 was 85.05 kg (SD±17.21 kg), and in Group 2, it was 82.38 kg (SD±17.14 kg). P-value = 0.527.

Height: Mean height in Group 1 was 1.64 m (SD±0.08), and in Group 2, it was 1.64 m (SD±0.08). P-value = 1.000

Body Mass index: Mean BMI in Group 1 was 31.08 kg/m² (SD±4.75), and in Group 2, it was 29.94 kg/m² (SD±5.30). P-value = 0.385

Gravidity: Mean Gravidity in Group 1 was 3.18 (SD±1.59), and in Group 2 was 2.85 (SD±1.58). P-value = 0.397

Parity: Mean Parity in Group 1 was 1.94 (SD±1.58), and in Group 2 was 1.44 (SD±1.35). P-value = 0.168.

Comparison of clinical indices (Table 3) showed that 5 (15.2%) of patients in Group 1 and 6 (17.6%) in Group 2 respectively had previous history of spinal anaesthesia. One patient (3.0%) in Group 1 and 3 (8.8%) patients in Group 2 had previous history of PDPH. Twenty four patients in both Groups 1 and 2 were classified ASA physical status 1. Analysis of intraoperative variables (Table 3) showed no statistical differences in the volume of CSF loss (in drops before intrathecal injection) in both groups, the same also applies to the vertebral interspace used for lumbar puncture in both Groups. Pentazocine and Pethidine were the preferred analgesics used for post operative pain control in the two Groups. The time of first analgesic requirement from end of surgery in both groups ranged between 1 - 9 hrs (mean 3.20± 2.03 hrs) and 1 - 8 hrs (3.21± 1.87 hrs) respectively. The duration of post operative recumbency ranged between 7 - 27 hours (mean 15.97±4.15) and 3 - 48 hours (mean 16.65±8.60) respectively.

Ease of insertion of needle assessed by number of attempts at lumbar puncture (Table 4) showed that 22 (66.7%) and 23 (67.6%) respectively in
Groups 1 and 2 had successful lumbar puncture at one attempt. There was no significant difference in the ease of needle insertion in the two groups.

Post dural puncture headache occurred in 3 parturients in Group 1 and none in Group 2 (Table 5, Fig 1). This gives a PDPH prevalence rate of 9.1%, however it was not statistically significant.

The location of PDPH was frontal in 1 patient (33.3%) and both occipital and frontal in 2 patents (66.7%), aggravated by sitting and standing in 2 patients (66.7%) each and relieved by recumbency in all 3 patients (100.0%) (Table 6). Associated symptoms were recorded in 66.6% of spinal anaesthetics complicated by PDPH with nausea occurring once, dizziness once; one patient had no associated symptom (Table 6).

The pattern of PDPH presentation (Table 7) revealed that PDPH was of moderate severity in 2 patients (66.7%). Onset time of PDPH was on the first post operative day in all 3 patients (100%), 7, 19 and 21 hours from end of surgery. The duration of headache ranged from 48 -52 hours (mean 49.67±2.08)

Comparison of demographic, clinical and intra operative variables of patients with and without PDPH in Group 1 (Table 8) showed no statistically significant difference except in the number of attempts at lumbar puncture (Figure 2). All 3 patients (100.0%) in group 1, who developed PDPH had 2 attempts at lumbar puncture whereas 22 patients (73.3%), and 6 patients (20.0%) among the subset of group 1 without headache were punctured once and twice respectively.

Treatment received for PDPH (Table 9) showed that all who had PDPH received conservative treatment such as bed rest for 24 hours, additional fluid intake and systemic analgesics and the response to treatment was rated good
by all three patients. Duration of post operative recumbency in hours ranged from 17 -27 hours (mean 20.33±5.77).

Patients’ satisfaction with the anaesthetic technique and future acceptance of spinal anaesthesia are presented in (Tables 10). In Group (1), 32 patients (97%) and in Group 2, all 34 patients (100%) were satisfied with the anaesthetic technique. On future acceptance of spinal anaesthesia, 31 patients (93.9%) in Group 1 and 100.0% in Group 2 would accept spinal anaesthesia in future. Two patients (6.15%) in Group 1 would rather not have spinal anaesthesia in the future because they felt pain during surgery.

All the 3 patients (100.0%) in group 1 who had PDPH were satisfied with their anaesthetic, and the remaining 29 patients (96.7%) who did not have PDPH were also satisfied with their anaesthetic.
Table 1: Age distribution of patients

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>Group 1 (N = 33)</th>
<th>Group 2 (N = 34)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent (%)</td>
</tr>
<tr>
<td>&lt; 30</td>
<td>9</td>
<td>27.3</td>
</tr>
<tr>
<td>30 – 34</td>
<td>12</td>
<td>36.4</td>
</tr>
<tr>
<td>35 – 39</td>
<td>10</td>
<td>30.3</td>
</tr>
<tr>
<td>≥ 40</td>
<td>2</td>
<td>6.0</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>100</td>
</tr>
</tbody>
</table>

$\chi^2 = 2.140$, df = 3, $p = 0.544$ (Not statistically significant)
Table 2: Demographic characteristics of patients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 (N = 33) Mean ± SD (Range)</th>
<th>Group 2 (N = 34) Mean ± SD (Range)</th>
<th>t-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>31.91±4.92 (22-43)</td>
<td>31.71±5.17 (22-40)</td>
<td>0.16</td>
<td>0.872</td>
</tr>
<tr>
<td>Height (M)</td>
<td>1.64±0.08 (1.5-1.8)</td>
<td>1.64±0.08 (1.5-1.8)</td>
<td>0.00</td>
<td>1.000</td>
</tr>
<tr>
<td>Weight (Kg)</td>
<td>85.05±17.21 (53-121)</td>
<td>82.38±17.14 (51-120)</td>
<td>0.64</td>
<td>0.527</td>
</tr>
<tr>
<td>BMI(Kg.M^2)</td>
<td>31.08±4.75 (23.6-41.9)</td>
<td>29.94±5.30 (21.5-42.2)</td>
<td>0.93</td>
<td>0.358</td>
</tr>
<tr>
<td>Gravidity</td>
<td>3.18±1.59 (1-7)</td>
<td>2.85±1.58 (1-8)</td>
<td>0.85</td>
<td>0.397</td>
</tr>
<tr>
<td>Parity</td>
<td>1.94±1.58</td>
<td>1.44±1.35</td>
<td>0.39</td>
<td>0.168</td>
</tr>
</tbody>
</table>
Table 3: Comparison of patients’ clinical variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 (N = 33) Frequency (%)</th>
<th>Group 2 (N = 34) Frequency (%)</th>
<th>Statistics</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous history of spinal anaesthesia</td>
<td>5 (15.2)</td>
<td>6 (17.6)</td>
<td>χ² = 0.076</td>
<td>0.783</td>
</tr>
<tr>
<td>Previous history of PDPH</td>
<td>1 (3.0)</td>
<td>3 (8.8)</td>
<td>χ² = 0.238</td>
<td>0.628</td>
</tr>
<tr>
<td>ASA physical status:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASA I</td>
<td>24 (72.7)</td>
<td>24 (70.6)</td>
<td>χ² = 0.038</td>
<td>0.846</td>
</tr>
<tr>
<td>ASA II</td>
<td>9 (27.3)</td>
<td>10 (29.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intra-operative Variables:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume of CSF loss (drops):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nil</td>
<td>3 (9.1)</td>
<td>2 (5.9)</td>
<td>χ² = 0.679</td>
<td>0.878</td>
</tr>
<tr>
<td>One</td>
<td>18 (54.5)</td>
<td>20 (58.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>10 (30.3)</td>
<td>11 (32.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three</td>
<td>2 (6.1)</td>
<td>1 (2.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean volume of CSF loss ± SD</td>
<td>1.33±0.74</td>
<td>1.32±0.64</td>
<td>t = 0.06</td>
<td>0.953</td>
</tr>
<tr>
<td>Vertebral interspace used:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L₃-L₄</td>
<td>17 (51.5)</td>
<td>13 (38.2)</td>
<td>χ² = 1.194</td>
<td>0.274</td>
</tr>
<tr>
<td>L₄-L₅</td>
<td>16 (48.5)</td>
<td>21 (61.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of post-op recumbency (hours)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>7-27</td>
<td>3-48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean duration of post-op recumbency±SD</td>
<td>15.97±4.15</td>
<td>16.65±8.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>t = 0.41</td>
<td>0.683</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Ease of needle insertion assessed by number of attempts at lumbar puncture in the two groups

<table>
<thead>
<tr>
<th>Number of Attempts</th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>1</td>
<td>22</td>
<td>66.7</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>27.3</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>6.1</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mean number of attempts for Group 1 = 1.39, standard deviation = 0.61
Mean number of attempts for Group 2 = 1.32, standard deviation = 0.48
t = 0.52, p = 0.603
Table 5: Prevalence of post dural puncture headache.

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th></th>
<th>Group 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Present</td>
<td>3</td>
<td>9.1</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Absent</td>
<td>29</td>
<td>90.9</td>
<td>34</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>100.0</td>
<td>34</td>
<td>100.0</td>
</tr>
</tbody>
</table>

$\chi^2$ (Yates’s correction) = 1.459, df = 1, p = 0.227

Table 6: Clinical manifestations of PDPH

<table>
<thead>
<tr>
<th>Clinical Manifestation</th>
<th>Frequency (N=3)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Localization of headache:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frontal</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Generalized</td>
<td>2</td>
<td>66.7</td>
</tr>
<tr>
<td></td>
<td>Frequency (N=3)</td>
<td>Percent (%)</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>Aggravated by:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting</td>
<td>2</td>
<td>66.7</td>
</tr>
<tr>
<td>Standing</td>
<td>2</td>
<td>66.7</td>
</tr>
<tr>
<td>Relieved by recumbency</td>
<td>3</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Associated symptoms:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nausea</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Dizziness</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
<td>33.3</td>
</tr>
</tbody>
</table>

Table 7: Pattern of presentation of PDPH

<table>
<thead>
<tr>
<th>Pattern of Presentation</th>
<th>Frequency (N=3)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Moderate</td>
<td>2</td>
<td>66.7</td>
</tr>
<tr>
<td>Onset time of PDPH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First post-operative day (7,19 and 21 hours post op)</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>15.67±6.18</td>
<td></td>
</tr>
<tr>
<td>Duration of headache:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range (Hours)</td>
<td>48 – 52</td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>49.67±2.08</td>
<td></td>
</tr>
</tbody>
</table>
Table 8: Comparison of patients with and without PDPH in Group 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Headache (N = 3)</th>
<th>No Headache (N = 30)</th>
<th>Statistics</th>
<th>p-value</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age ± SD</td>
<td>31.0±4.00</td>
<td>32.0±5.05</td>
<td>t = 0.33</td>
<td>0.743</td>
<td>NS</td>
</tr>
<tr>
<td>Mean parity ± SD</td>
<td>1.33±1.16</td>
<td>2.00±1.52</td>
<td>t = 0.74</td>
<td>0.466</td>
<td>NS</td>
</tr>
<tr>
<td>Previous history of spinal anaesthesia</td>
<td>1 (33.3%)</td>
<td>4 (13.3%)</td>
<td>$\chi^2$ = 0.006</td>
<td>0.939</td>
<td>NS</td>
</tr>
<tr>
<td>Previous history of PDPH</td>
<td>0 (0.0%)</td>
<td>1 (3.3%)</td>
<td>$\chi^2$ = 0.001</td>
<td>0.999</td>
<td>NS</td>
</tr>
<tr>
<td>ASA physical status:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASA I</td>
<td>3 (100.0%)</td>
<td>21 (70.0%)</td>
<td>$\chi^2$ = 0.187</td>
<td>0.665</td>
<td>NS</td>
</tr>
<tr>
<td>ASA II</td>
<td>0 (0.0%)</td>
<td>9 (30.0%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intra-operative Variables:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of attempts at Lumbar Puncture:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0 (0.0%)</td>
<td>22 (73.3%)</td>
<td>$\chi^2$ = 8.649</td>
<td>0.013</td>
<td>S</td>
</tr>
<tr>
<td>2</td>
<td>3 (100.0%)</td>
<td>6 (20.0%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0 (0.0%)</td>
<td>2 (6.7%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean number of attempts at</td>
<td>2.00±0.00</td>
<td>1.33±0.61</td>
<td>t = 1.88</td>
<td>0.070</td>
<td>NS</td>
</tr>
<tr>
<td>lumbar puncture ± SD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume of CSF loss (drops):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nil</td>
<td>1 (33.3%)</td>
<td>2 (6.7%)</td>
<td>$\chi^2 = 2.061$ 0.560 NS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>1 (33.3%)</td>
<td>17 (56.7%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>1 (33.3%)</td>
<td>9 (3.0%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three</td>
<td>0 (0.0%)</td>
<td>2 (6.7%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean volume of CSF loss ± SD</td>
<td>1.0±1.0</td>
<td>1.37±0.72</td>
<td>$t = 0.82$ 0.416 NS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertebral interspace used:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L3-L4</td>
<td>3 (100.0%)</td>
<td>14 (46.7%)</td>
<td>$\chi^2 = 1.338$ 0.247</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L4-L5</td>
<td>0 (0.0%)</td>
<td>16 (53.3%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

S- Significant  
NS- Not significant
Table 9: Treatment received for PDPH

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Frequency (N = 3)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservative</td>
<td>3</td>
<td>100.0</td>
</tr>
<tr>
<td>Good response to treatment</td>
<td>3</td>
<td>100.0</td>
</tr>
<tr>
<td>Duration of post-operative recumbency (Hours):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range: 17 – 27</td>
<td>3</td>
<td>100.0</td>
</tr>
<tr>
<td>17</td>
<td>2</td>
<td>66.7</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Mean duration of post-operative recumbency (Hours)</td>
<td></td>
<td>20.33±5.77</td>
</tr>
</tbody>
</table>
Table 10: Patients’ satisfaction and future acceptance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 (N = 33) Frequency (%)</th>
<th>Group 2 (N = 34) Frequency (%)</th>
<th>$\chi^2$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfied</td>
<td>32 (97.0)</td>
<td>34 (100.0)</td>
<td>0.001</td>
<td>0.988</td>
</tr>
<tr>
<td>Future acceptance of spinal anaesthesia:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>31 (93.9)</td>
<td>34 (100.0)</td>
<td>0.547</td>
<td>0.460</td>
</tr>
<tr>
<td>No</td>
<td>2 (6.1)</td>
<td>0 (0.0)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 11: Patients’ satisfaction and future acceptance in Group 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Headache (N = 3) Frequency (%)</th>
<th>No Headache (N = 30) Frequency (%)</th>
<th>$\chi^2$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfied</td>
<td>3 (100.0)</td>
<td>29 (96.7)</td>
<td>0.001</td>
<td>0.999</td>
</tr>
<tr>
<td>Future acceptance of spinal anaesthesia:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2 (66.7)</td>
<td>29 (96.7)</td>
<td>0.652</td>
<td>0.419</td>
</tr>
<tr>
<td>No</td>
<td>1 (33.3)</td>
<td>1 (3.3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The two patients who declined future acceptance of the anaesthetic technique gave pain as their reason.
Table 12: Type of Needle, Demographic data, Cost of needle, History of Post dural puncture headache.

<table>
<thead>
<tr>
<th>Needle</th>
<th>Age(yrs)</th>
<th>Height(m)</th>
<th>Weight(kg)</th>
<th>Cost(Naira)</th>
<th>PDPH History (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-gauge Quincke(N=33)</td>
<td>31.91±4.92</td>
<td>1.64±0.08</td>
<td>85.05±17.21</td>
<td>250.00</td>
<td>3.0</td>
</tr>
<tr>
<td>25 –gauge Whitacre(N=34)</td>
<td>31.71±5.17</td>
<td>1.64±0.08</td>
<td>82.38±17.14</td>
<td>750.00</td>
<td>8.8</td>
</tr>
</tbody>
</table>

Values are mean± standard deviation
Fig 1: Relationship of number of attempts and occurrence of PDPH in Group 1
Fig 2: Prevalence of PDPH in the two groups
CHAPTER FOUR

DISCUSSION

Over the last thirty years the Confidential Enquiry into Maternal Deaths has been responsible for the increased use of regional anaesthesia for caesarean section in the United Kingdom due to its proven safety\(^6\). In Nigeria, Edomwonyi et al., in their study titled “Anaesthesia related complications in Obstetric patients” carried out between 2004 and 2005 concluded that the reason for a considerable reduction in anaesthesia related morbidity and mortality in their centre was due to adoption of regional anaesthesia as the preferred method for Caesarean section.\(^{116}\) Spinal anaesthesia though has a low complication rate, but it carries the special risk of PDPH.\(^{117}\) A great deal of attention has been focused on PDPH in obstetrics anaesthetic practice\(^7,20,28\).

In Nigeria, there are studies on the prevalence of PDPH in obstetric patients.\(^{32,33,34}\) Amata’s\(^30\) study was on obstetric patients while Adesunkanmi\(^29\) studied a mixed Nigerian population of non-obstetrics and obstetric patients. Olukoju\(^31\) studied non-obstetric patients. Else where, several studies have addressed the issue of PDPH with cutting and non-cutting needles. Devcic et al., found no significant difference in PDPH between the pencil-point Sprotte and Quincke needle inserted parallel to the dural fibers in obstetric patients.\(^{113}\) Their sample size was roughly three times that of this study for each needle type. Mayer et al., could not find a difference between
the Quincke and Sprotte needles, however, they used a 27-gauge Quincke in their study.\textsuperscript{118}

The observed PDPH prevalence rate in this report using 25 gauge Quincke and Whitacre needles was 9.1\% and 0.0\% respectively. Though no case of PDPH was observed among the Whitacre needle group, the difference in the prevalence rate was not statistically significant. The prevalence rate observed in this study with regards to 25 gauge Quincke needle is similar to the PDPH prevalence rate reported by Vallejo et al (8.7\%) in a randomized double blind study involving healthy, young, obstetric patients.\textsuperscript{27} Imarengiaye and Edomwonyi in Benin reported (10.0\%) prevalence rate.\textsuperscript{32} while Buettner et al., prevalence rate of (8.5\%).\textsuperscript{119} Both Vallejo et al and Buettner et al. observed PDPH prevalence rates of (3.1\% and 3.0\% respectively) with 25 gauge Whitacre needle in obstetrics and non-obstetric patients. The absence of PDPH following the use of 25-gauge Whitacre needle in this study, was found also for the 25 gauge Whitacre, 24 gauge Sprotte, 24 gauge Gertie Marx needles in similar controlled studies in obstetric patients.\textsuperscript{120,59,32} The absence of PDPH seen in this study with size 25 gauge Whitacre needle could be explained by the small sample size used compared to the large sample size used by Vallejo and Buettner. Takkila et al., compared size 25 gauge Quincke needle (inserted parallel and perpendicular) found a significant difference between the two needles, PDPH prevalence rates in the study were (4.5\% and 17.9\% respectively), however, patients of both sexes were used, and some patients had orthopedic and urologic procedures.\textsuperscript{43} Olukoju using 26 gauge Quincke needle passed horizontal to the direction of dural fibers in non-obstetric patients observed a PDPH prevalence rate of (16.7\%).\textsuperscript{31} The PDPH observed in this study supports Flaatten’s assertion that obstetrics patients do not seem to
have a greater incidence of PDPH than non-obstetric patients of the same age group.\textsuperscript{14}

The pattern of presentation and clinical manifestation of PDPH in this study agrees with other findings in the literature. For example, the PDPH onset time, which occurred earlier than 24 hours post operatively in 100% of the patients with a mean value of (15.67hrs ±6.18). In one patient, PDPH occurred seven hours after surgery, a fact which has been observed by other workers.\textsuperscript{31,121} Post dural puncture headache was mild in 33.3% and moderate in 66.7% of the patients. Shut et al., also obtained a similar figure in obstetric patients using size 26- gauge Quincke needle.\textsuperscript{120} Lynch et al., obtained mild PDPH prevalence rate of 66.7% in a population of orthopaedic patients.\textsuperscript{121} The associated symptoms like nausea and dizziness noted in this study may also reflect the severity of PDPH due to a lowering of labyrinthine pressure since communication exists between intracochlea fluid and cerebrospinal fluid.\textsuperscript{122,123} The observation in this study that the duration of PDPH was 48 -52 hours in the patients agrees with other workers.\textsuperscript{17,124,125}

Some workers reported a higher prevalence rate of PDPH in patients with previous history of PDPH.\textsuperscript{66,126} This could not be verified in the present study as all the patients with PDPH had no previous history of PDPH rather PDPH occurred more often (66.7%) in patients with no previous history of spinal anaesthesia. A previous history of PDPH was found by Lybecker et al to be a significant predictor of PDPH.\textsuperscript{127} The possible contribution of psychological factor on the PDPH prevalence rate of this study, in spite of the absence of a previous history of PDPH or insignificant history of previous spinal anaesthesia, can be ignored since patients in both study groups were informed about the possibility of a headache after the spinal anaesthesia.
Post operative recumbency and PDPH prevalence was observed to have an insignificant correlation (P > 0.05), that PDPH occurred more often when the duration of post operative recumbency was less than 48 hours have been expressed in the past by other workers on the assumption that the rate of CSF leakage is also increased.\textsuperscript{7,128} More recent evidence from controlled trials disagree with the above claim, they postulate that the duration of post operative recumbency after lumbar puncture has no effect on the incidence of PDPH and that it may only delay the onset time of PDPH symptoms.\textsuperscript{57,129,130} The development of PDPH may be more dependent upon the creation of an intra and extra-luminal pressure differential in intracranial vessels via other mechanisms and not as a result of CSF leakage.\textsuperscript{23,131}

Ease of needle insertion assessed by number of attempts at identification of subarachnoid space was evaluated in a study by Imarengiaye and Edomwonyi in comparing 25 gauge Quincke and 24 gauge Gertie Marx needles in Obstetric patients, they found the later a more successful locator of the subarachnoid space on the second attempt.\textsuperscript{32} There are few studies which examined the technical difficulties involved in the use of different spinal needles. West brook et al., comparing the force required for dural puncture with different spinal needles and subsequent leakage of cerebrospinal fluid in an in- vitro model discovered that less force was required with Quincke needles than a similar size Whitacre needle but cerebrospinal fluid leak is more with Quincke needles.\textsuperscript{132} The spinal needles used were all inserted by the author through a size 21 gauge introducer. However, the 25-gauge Whitacre needle was marginally the most successful locator of the subarachnoid space after two attempts. Similar results were obtained by Poukkula.\textsuperscript{66} The 3 patients in the Quincke with PDPH were punctured twice through the same interspace
as against their counterparts who had single attempt and the observed difference was statistically significant (P < 0.05). Harrison and Laughan obtained similar result.\textsuperscript{133} The observed association may be attributed to disruption in the dura that were unrecognized possibly because of inadequate penetration of the subarachnoid space or the fine gauge of the needle which allows only a slow flow of cerebrospinal fluid back through the needle.\textsuperscript{133}

Other variables (ASA physical status, choice of vertebral inter-space, volume of CSF lost, post operative analgesia start time) examined in this study though showed insignificant correlation, require more elaborate studies to justify their importance and predictive value as independent risk factors of PDPH.

The patients with PDPH received conservative treatment alone and all had good response. There was no case of severe PDPH in this study. Conservative therapeutic measures have been shown by other workers to be efficacious for mild PDPH.\textsuperscript{7, 29, 121} Bed rest for 17 – 27 hours and fluid hydration was the main therapeutic measures. Systemic analgesics were prescribed for post operative pain. Authors who do not accept the benefits of fluid hydration and bed rest for PDPH have recommended the use of epidural blood patch for moderate – severe PDPH.\textsuperscript{122, 134, 135} The response of both mild and moderate PDPH to bed rest and fluid hydration in this study agrees with the observations made by Fearon who attributed the therapeutic efficacy to a decrease in cerebrospinal fluid leakage due to the elimination of the effects of gravity.\textsuperscript{131}

Majority of the patients in this study were satisfied with the anaesthetic technique, 97% in Group 1 and 100% in Group 2. On future acceptance of similar anaesthetic technique, 93.9% in Group 1 and 100% in Group 2 would
accept it. Two patients in group 1 declined future acceptance of the anaesthetic technique because they felt pain during the procedure. The above finding was supported by other workers.\textsuperscript{121,133}

The pencil-point needle used in this study was more expensive than the Quincke needle as also reported by Vallejo et al.\textsuperscript{32} However, the choice of a spinal needle must include other cost considerations, such as the cost and side effects of medications used to treat PDPH, the total cost of an EBP, a possible extended hospital stay,\textsuperscript{136} a visit to the emergency room by the patient, added patient discomfort, and increased staffing requirements. All patients who had PDPH in this study were discharged on the seventh post operative day.
CONCLUSIONS

This study shows that the 9.1% prevalence rate and the morbidity pattern of PDPH observed in a sample of obstetric population using size 25 gauge Quincke needle is comparable to the pattern elsewhere. It was moderate in 66.7% of the patients while the onset time is within 24 hours. The duration was less than 3 days in all the patients. The zero prevalence recorded with the Whitacre needle is also consistent with existing report in the literature. This result confirms the superiority of same size Whitacre pencil point needles over Quincke point needles in reducing PDPH.

The risk factors considered in this study were not statistically significant except the number of attempts at lumbar puncture where we found that all patients who had PDPH in 25 gauge Quincke needle group had more than one attempt at lumbar puncture. Multiple attempts at lumbar puncture were therefore identified as high risk factor consistent with existing report in the literature.

To prevent PDPH, the use of size 25 gauge Whitacre needles may be encouraged as this study has shown but cost consideration especially in the developing countries setting is always a limiting factor.

Conservative measures as treatment for PDPH, should be tried first in view of the good response obtained for all the cases of PDPH in this study. Bed rest as a conservative measure should be extended to at least forty eight hours.

The presence of PDPH did affect patient’s satisfaction and future acceptance of spinal anaesthesia in this study. Patients who declined acceptance of spinal anaesthesia in the future made that decision on account
of inadequate analgesia, so effort should be made to commence adequate post operative analgesia early.
1. To prevent PDPH, pencil-point spinal needles (25- gauge or less) should be used for subarachnoid anaesthesia in obstetrics patients.

2. The insertion of smaller gauge (less than 25- gauge) cutting spinal needles when it is the only one available should be parallel to the dural fibers and effort made to restrict it to one attempt.

3. Post anaesthesia visit of obstetric patients who had subarachnoid anesthesia should be encouraged to facilitate early diagnosis and treatment of PDPH.

4. Conservative treatment measures like bed rest, fluid hydration and adequate doses of opioid analgesic are effective for mild to moderate PDPH.

5. More elaborate controlled studies will be required to evaluate the predictive value of factors like ASA physical status score, volume of CSF lost, choice of vertebral inter-space as well as time of first analgesic requirement in the post operative period.

LIMITATIONS OF THE STUDY
The sample size was limited by time constraints and reduced patient load to the hospital on account of movement to the permanent site.

Number of attempts at lumbar puncture was used as a determinant of ease of insertion.

Post operative follow up of patients was not easy because some of the students who were trained to assist in data collection graduated before the conclusion of the study and fresh recruitment and training had to be done.

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APPENDIX

PATIENT INFORMED CONSENT

Dear patient,

You are being asked to participate in a research study. In order to decide whether or not you should agree to be part of this research study, you should understand enough about the research to make an informed judgment.

This consent form gives detailed information about the study which the investigator will discuss with you. Once you understand the study, you will be asked to sign this form if you wish to participate. The research study being proposed to you is; Incidence of post dural puncture headache and ease

PURPOSE OF THE STUDY:

The purpose of this study is to see if there are significant differences in the benefits and complications derivable from two different types of needles used for spinal anaesthesia amongst Nigerian parturient women and to apply the research findings in reducing the morbidity associated with post dural puncture headache.

DESCRIPTION OF THE STUDY PROCEDURES:

The surgery you are about to undergo will be facilitated by provision of spinal anaesthesia. This involves injecting a drug into the cerebrospinal fluid. The injection is at the lower back, in the midline away from the spinal cord with the patient sitting. Few minutes after injection is given, there is an experience of numbness in both lower limbs. This signifies the onset of anaesthesia in the limbs. Only patients coming for elective caesarean section will take part in this study. During surgery, spinal needle used, number of attempts at lumber puncture and the number of drops of cerebrospinal fluid will be recorded for the two groups and compared. After surgery, interviewers
(final year medical students and nurse anaesthetists in training) who were trained for the study will continue to see you daily asking if you have headache and its characteristics until you are discharged from the hospital. If you develop the characteristic headache, effective treatment will be made available to you at no extra cost.

**STATEMENT OF CONFIDENTIALITY:**

Your participation in this research is confidential. Only the investigator and the interviewer will have access to your identity and to information that can be associated with your identity. In the event of publication of this research, no personally identifying information will be disclosed.

**BENEFITS:**

1. You will not be required to pay for the pencil point needle; this will be provided by the investigator.
2. The result of this study will help in providing better care for patients like you in future.

**RISKS:**

You will not be exposed to any treatment that is not usually indicated for your surgery. Taking part in this study will not expose you to any added risk.

**FINANCIAL COST:**

There will be no additional charges to you for taking part in this study.
VOLUNTARY PARTICIPATION:

The choice to enter or not to enter this study is yours. You are in a position to make a decision if you understand what the doctor has explained and what you have read about the research study. If you decide not to participate, all usual and customary treatment will be made available without prejudice. You have the right to withdraw at any time. The UNTH ethical review committee, which is responsible for making sure that research with patients is appropriate, has reviewed this study.

FEEDBACKS:

If you have any questions or need more information about the conduct of this study, contact Dr. M. P. Ufoegbunam, Dept. of Anaesthesia, UNTH, 08037870550.

RESPONSE:

I have read the above statement and have been able to ask question and express concerns, which have been satisfactorily responded to by the investigator. The purpose of the study as well as the benefits and potential risk
have been explained to me. I hereby give my informed free consent to be a participant in the study.

________________________________________
Name and Signature/Thumb print of Subject
Date ___________________

________________________________________
Name and Signature of Researcher
Date_____________________

________________________________________
Name and Signature of Witness
Date_____________________

**Data Collection Form**

**Study Title**: Incidence of post dural puncture headache and ease of needle insertion: a comparison of 25 gauge Quincke and 25 gauge Whitacre spinal needles Nigerian obstetric patients.

Date ----------------------- Instructions: Write in the spaces provided and circle the most appropriate option(s)

A. Maternal Demographics and physical data
   i. Hospital number________________________
   ii. Age (yrs)_______
iii. Height (meters) _______
iv. Weight (kg) ___________
v. Gravidity/ Parity _______
vi. Indication(s) for caesarean section_____________
vii. Telephone number_____________

B. Pre-Anaesthetic

i. Previous history of spinal anesthesia  Yes or No

ii. Previous history of post dural puncture headache  Yes or No

iii. Type and indication for surgery.________________________________________

iv. American society of Anesthesiology (ASA) Physical status I or II.

C. Intra-operative variables.

i. Number of attempts at lumber puncture. 1, 2, 3, >3

ii. Volume of CSF (Cerebrospinal fluid) loss (drops): nil, 1, 2, 3, >3

iii. Type of spinal needle used: Group 1 or Group 2.

iv. Vertebral inter space used: L3-L4, L4-L5.

v. Time surgery ended ___________

D. Post Anaesthetic evaluation and follow up

I. Headache

i. Absent
ii. If present

Severity scale

i. Mild headache, no interference with daily activities

ii. Moderate headache, ambulatory but some interference with daily activities.

iii. Severe headache, bedridden.

Onset time

i. Immediate

ii. 1st post operative day.

iii. 2nd post operative day

iv. 3rd post operative day

Duration of headache (hrs)


Aggravated by: Sitting / Standing / Sneezing / Coughing / Straining / None.

Relieved by: Sitting / Standing / Recumbency / None.

Associated symptom(s):

<table>
<thead>
<tr>
<th>Nausea</th>
<th>Vomiting</th>
<th>None</th>
</tr>
</thead>
</table>
| Tinnitus | Dizziness | others specify._____

Treatment received for post dural puncture headache:
Conservative ____________________________

Epidural Blood patch _____________________________

Response to treatment:

Good______ Poor _______ No Response______

E. Duration of post operative recumbency (hrs)._______

F. Systemic analgesic for post operative pain.
   i  Start time (hrs) after surgery ____________
   ii Type: Pentazocine / Pethidine

G. Duration of post operative follow up (days)_______

H. Subjects satisfaction or acceptance of the anaesthetic.
   1. Satisfied with present anaesthetic    Yes or No.
      i. If No Why?
         1. PDPH  2. Others specify__________
   2. Would accept similar anaesthetic again    Yes or No
      i. If No Why?
         1. PDPH  2. Others specify__________

I. Other comments ________________________________