

POSTDURAL PUNCTURE HEADACHE; COMPARISON BETWEEN LUMBAR PUNCTURE NEEDLE NO 25 G AND 27 G

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ABSTRACT... Objective: To evaluate the role of needle diameter in causing postdural puncture headache (PDPH) in patients undergoing elective caesarian section. **Study Design:** Comparative cross-sectional study. **Place and Duration of Study:** This study was conducted in Department of Anaesthesia and Intensive care PNS Shifa Karachi over duration of six months. **Patients and Methods:** It was a cross sectional study of 100 patients, which were divided into two separate groups. Group I and Group II were given spinal anaesthesia with 25 gauge and 27 gauge Quincke needles respectively. In both the groups the patients were randomly selected and were blind to size of the spinal needle used. **Results:** The data was analyzed using Chi-square test. A P value of <0.05 was considered statistically significant. Two patients in 25-G group and one in 27-G group required additional general anaesthesia because of inadequate spinal anaesthesia. Thus, a total of three patients were excluded from the study. Five out of forty-eight patients in group 1 and one out of forty-nine patients in Group II suffered from post spinal headache. **Conclusions:** The proportion of patients with post spinal headache with 25 G needle is significantly more than those with 27 G.

Key words: Post spinal headache, spinal needle size, lumbar puncture.

INTRODUCTION.

Spinal anesthesia provides several advantages for lower segment caesarian section (LSCS) as compared to general anaesthesia^{1,2}. The increasing popularity in obstetrics is because of its simplicity, ease of performance, requirement of minimum apparatus, has minimal effect on blood biochemistry, ensures optimum level of arterial blood gases, patients remain conscious during surgery and maintains airway, requires minimal post operative care and post operative analgesia. It is a fairly common procedure for providing rapid safe anaesthesia for other surgical procedures as well^{3,4}.

Postdural puncture headache (PDPH) is one of the most frequent complications of lumbar puncture following spinal anaesthesia⁵. It is defined as headache occurring after dural puncture and has significant effects on

patient's postoperative well-being. PDPH is believed to result from decreased intracranial pressure as the cerebrospinal fluid leaks through the dural hole, with the settling of the brain and stretching of the intracranial nerves, dura and blood vessels. The headache may first be experienced several hours to days after the dural puncture. It is usually bifrontal and occipital and is aggravated by the upright posture and by straining. It is relieved by lying down^{6,7}. It needs to be differentiated from aseptic meningitis, infective meningitis, cortical vein thrombosis, cerebral/epidural hematoma and tension/migraine headache⁸.

Few decades ago less refined and thicker spinal needles were being used and the incidence of PDPH was high. The incidence of PDPH can be as high as 80% if puncture occurs with a 16 G needle⁹. But within the last

17 years more refined and thinner needles of 24 G to 28 G have been used more often and the incidence of PDPH is grossly reduced to less than 3 to 5%. Studies reported that the incidence of PDPH can be reduced to almost 0% with the use of specially designed, non-cutting, pencil point and fine gauge needles¹⁰. However, most recent studies reported incidences of 1% - 3% even with these smaller gauge needles^{11,12}.

The incidence of PDPH is highest in obstetric patients¹³. It is affected by factors like size and type of spinal needle, age of the patients and median or para median approach^{14,15,16}. To minimize the problem different sizes and designs of the spinal needle have been recommended¹⁷. Although fine gauge needles i.e. 29 G or smaller, decreases the incidence of PDPH, the slow flow of CSF through these needles leads to repeated dural punctures and contributes to PDPH^{10,15}.

PATIENTS AND METHODS

The study was conducted at Department of Anaesthesia PNS shifa over period of six months. 100 surgical patients undergoing LSCS were divided into two groups of 50 each. Group I: spinal anaesthesia with 25G Quincke needle and Group II: spinal anaesthesia with 27G Quincke needles.

Inclusion Criteria

Patients with age 20 – 35 years, ASA I and Glasgow coma score 15/15.

Exclusion Criteria

Patients with neurological deficits/ psychological ailment, spinal cord deformity/previous spinal surgery, grossly obese, hypertensive/hypovolemic and sustaining more than one prick, where excluded.

PROCEDURE

After obtaining informed written consent, the subjects were divided in two groups by lottery method. Each group consists of 50 patients. Group I: Patients who received spinal anaesthesia with 25G quincke needle. Group II: Patients who received spinal anaesthesia with 27G quincke needle. Thorough pre-anaesthesia assessment of patients was done. Inj. Ranitidine 1 ampoule and Inj.

Metoclopramide 1 ampoule were given IV slowly preoperatively 1 hour before surgery. In the operating room, ECG and heart rate were monitored by a cardioscope. Blood pressure was monitored non-invasively. Pulse oximetry was done using a finger probe. All the patients were preloaded with 500 ml Ringer lactate solution prior to spinal anaesthesia.

Spinal anaesthesia administered with a 25 G or 27 G needle. The back of the patients was cleaned with Povidone Iodine and spirit and draped with sterile towels. Spinal anaesthesia was performed using a midline approach at the L3-4 or L4-5 interspaces using one of the above spinal needles and 0.75 % hyperbaric bupivacaine 1.5 - 2.0 ml was injected. After withdrawal of the needle, the patient was turned to the supine position with left uterine displacement. Level of sensory blockade and changes in parameters like heart rate, BP were recorded. Solution of Ringer lactate, colloid and blood were transfused as maintenance fluid and also according to the blood loss. Hypotension was treated with Inj. ephedrine given intravenously. Complications like nausea, vomiting, bradycardia, respiratory depression, skin reaction were managed symptomatically. After recovering from spinal anaesthesia, patients were shifted to the ward.

Different anesthesiologists not knowing the type of needle used, did postoperative observations. Patients were interviewed on day 1, 2, 3, 4, 5 and were questioned as regard to headache, its severity, location, character, and duration, associated symptoms like nausea, vomiting, auditory and ocular symptoms.

Criteria of post dural puncture headache were:

1. Occurred after mobilization.
2. Aggravated by erect or sitting position and coughing, sneezing or straining.
3. Relieved by lying flat.
4. Mostly localized in occipital, frontal or generalized.

Severity of headache was assessed on 1-4 scale. (Crocker 1976).

1. Mild headache which permitted long periods of sitting/erect position and no other symptoms.

2. Moderate headache, which made it difficult for the patient to stay upright for more than half an hour. Occasionally accompanied by nausea, vomiting, auditory and ocular symptoms.
3. Intense headache immediately upon getting up from bed, alleviated while lying horizontal in bed. Often accompanied by nausea, vomiting, ocular and auditory symptoms.
4. Headache occurred even while lying horizontal in bed and greatly aggravated immediately upon standing up, eating is impossible because of nausea and vomiting.

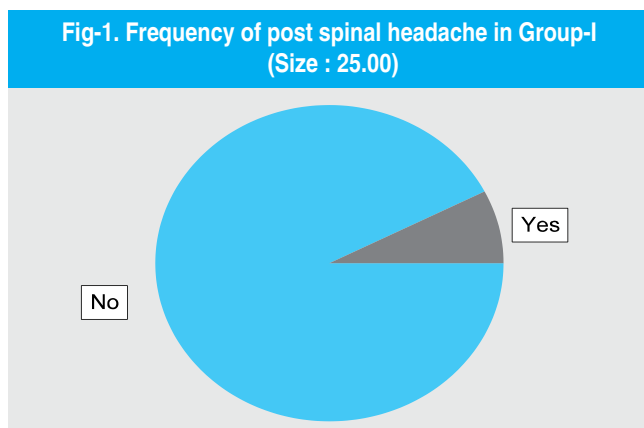
The severity of headache was also graded on a 0 to 10 verbal numerical analogue scale (0=no pain and 10 = the worst pain imaginable).

If headache was reported, patients were managed accordingly and the follow up was continued as long as the headache was resolved. The data was analyzed by using SPSS Version 12. Mean ± SD was calculated for the age and weight of the patients. Frequencies and percentages were calculated for headache. Chi square test was applied to compare headache in two groups. P value of <0.05 was considered statistically significant.

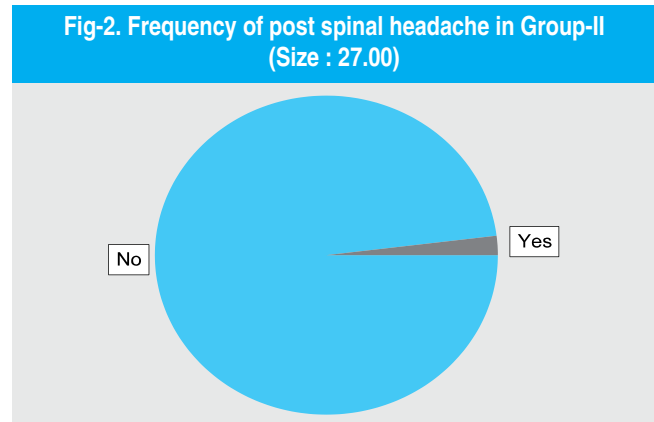
RESULTS

Two patients (4%) in 25-G group and one (2%) in 27-G group required additional general anaesthesia because of inadequate spinal anaesthesia. Thus a total of three patients were excluded from the study. The data from the remaining 97 patients were used for analysis.

In the 25 – G group, 4 out of forty-eight patients developed post spinal headache (8.33%) [Fig no. 1],



while in the 27 – G group, one out of forty- nine patients developed post spinal headache (2.04%) [Fig no. 2].



| Characteristics of post spinal headache | | |
|---|---------|----------|
| Onset | Group-I | Group-II |
| 1 st day | - | - |
| 2 nd day | 11.11% | 1.12% |
| 3 rd day | 22.22% | - |
| 4 th day | - | - |
| Location | | |
| Frontal | 22.22% | 11.11% |
| Generalized | 11.11% | - |
| Occipital | - | - |
| Severity | | |
| Mild | 3 | 1 |
| Moderate | 1 | - |
| Severe | - | - |
| Duration | | |
| <24 hrs | 3 | 1 |
| 25-48hrs | 1 | - |
| >48hrs | - | - |

The difference between two groups was found to be statistically significant (P<0.05). The overall frequency of PDPH in the entire group was 5.15% (5 of 97).

DISCUSSION

There is considerable evidence that the PDPH is due to a low CSF pressure consequent upon seepage of CSF

through the dural puncture hole and choroid plexus is unable to secrete sufficient fluid to maintain the CSF pressure^{16,18,19}. Size and number of holes in the dura makes a difference in the loss of CSF. It takes about two weeks or more for the holes to seal²⁰.

The most important factor contributing to the higher incidence of PDPH was the gauge, type of needles used and entrance angle of the needle bevel to the longitudinal axis of the spinal cord^{15,16}. Thicker the needle and more traumatic the type of needle (cutting type), more the incidence of PDPH¹⁷. The observed incidence of PDPH in this study was in accordance with the above finding. The incidence of PDPH was 5.15 % in group I and 1.03 % in group II. In a study by Lambert DH the incidence of headache was 1.06 %, 3.65 % and 2.08 % with 25 G Whitacre, 25 G Quincke and 26 G Quincke needles respectively²⁰.

The 27-G needles, when used for spinal anaesthesia among in hospital patients, resulted in a 0-4% incidence of PDPH. However, when dural punctures were performed with 27-G needles on healthy ambulating volunteers, post spinal headache developed in 12% of the subjects²¹. In the present study all the patients were instructed to remain in supine position for 24 hrs in the post operative period.

A cutting type of needle inserted through the dural wall tears off a number of fibers in the wall and a permanent opening in it is ensured. Pan PH et al suggested the use of a pencil point lumbar puncture needle and the tip of the pencil point needle separates the longitudinal dural fibers without producing serious injury. When the needle is withdrawn the fibers return to a state of close approximation²². In the present study, bevel of the needle was inserted parallel to the longitudinal dural fibers, so that these fibers are separated and are not damaged and a narrow slit like opening is obtained, with a greater tendency to contraction and plugging of the hole, decreasing the leakage of CSF. In a study by Tabedar et al the incidence of PDPH among patients in whom the bevel was inserted parallel to the longitudinal dural fibers was 0.56 times the incidence among patients in whom the bevel was inserted perpendicular to the longitudinal

dural fibers²³.

The thin needles, such as a 29 or 32 G, result in a lower incidence of post spinal headache, but these are technically difficult to use, and also increase the chance of a dural puncture with the introducer needle. Muzcuri S reported that the use of smaller gauge needles resulted in less post spinal headache ie 6% with 25 G and 2% with 27 G but noted that spinal anaesthesia was difficult to perform in their cases²⁴. Santanen et al found minimum instance of post spinal headache among patients when using 29-G needles but encountered difficulty in performing dural punctures²⁵. Hwang et al in their study compared the incidence of PDPH using 25 G and 26 G Quincke needles and found no significant difference i-e 3.65% with 25 G and 2.06% with 26G²⁶. In another study by Reina MA et al the failure rate was 2 % and 6 % with 22 G and 25 G Whitacre needle²⁷. In the present study 25 G Quincke needle was associated with the greatest incidence of successful dural puncture following a single needle insertion (100 %). The 27 G Quincke needle was associated with 4 % failure rate.

Age of the patient did not play any significant role in my study since all the patients in varying groups were of the similar age groups. However the incidence is found to be lower in older patients. In older patient an altered pain sensitivity of vascular pain receptors and narrowed route of escape of CSF from the epidural space are assumed to be the explanation for lower incidence.

Wadud R et al found the incidence of PDPH in young patient 27.6 % (with 20 G) and 12.6 % (with 25 G). In the elderly patients incidence of headache with 20 G and 25G needles was 10.8 % and 7.8 % respectively²⁸. The incidence of PDPH is more common among women than men; particularly prone are the parturients because of the reduction of both the intra abdominal and epidural pressure after delivery, thereby promoting extra leakage of CSF than usual²⁹. Sex bound difference is caused by emotional and hormonal factors. Kuczkowski KM mentioned the factors responsible for an increased incidence of PDPH in obstetric patient include stress of labour, changing hormonal level and dehydration³⁰.

The local anaesthetic drugs used to produce spinal anaesthesia have been reported to influence the incidence of post spinal headache. Bernat Garcia J et al conducted a study of patients undergoing spinal anaesthesia for caesarian delivery and concluded a significantly lower incidence of PDPH among patients who received tetracaine-procaine compared with patients who received lidocaine-glucose or bupivacaine-glucose; however they found no difference between the lidocaine and bupivacaine groups. They also reported that there was no statistical difference in the length of time spent in the recovery room or the time required for the first ambulation among patients who received tetracaine-procaine, lidocaine or bupivacaine³¹.

CONCLUSION

The frequency of post spinal headache is significantly reduced by using a smaller gauge Quincke needle i.e. 27 G as compared to a larger sized needle i.e. 25 G.

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