

Postdural Puncture Headache Comparative Study between 25 Gauge Pencil Point Needle and 25 gauge Quincke Needle

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ABSTRACT

Objective: To discover if spinal anaesthesia with 25 gauge pencil point needle produces postdural puncture headache in fewer patients than 25 gauge Quincke needle.

Place of study: Department of Anaesthesia, Nawaz Sharif social security hospital, Lahore.

Material & methods: Two hundred patients from different surgical departments of Nawaz Sharif Social Security Hospital Lahore having different surgical procedures on lower abdomen and lower limbs like hernias, amputations, debridements, TURP, vesicolithotomy, DHS, total hip replacements, tibial nailing or plating, external fixators, caesarian sections and hystrectomies were included in this study. The patients of either sex between the age of 18-80 years (ASA-II) were selected after obtaining proper consent and procedure explained to them.

Results: Two groups consisting 100 patients each were randomly chosen. There was no statistically significant difference between these groups with respect to age, height and weight having p value as (P 0.012 and 0.002) respectively. The percentage of patients expressed no pain at all was 96% in group-Q and 98% in group-P. One male patient aged 55 years group-Q suffered moderate postural headache on first day. Postoperatively moderate postural headache required bed rest limiting daily activities and required only analgesic to subside pain.

Conclusion: Spinal anaesthesia is picking up popularity once again in the modern anaesthetic time. Since the introduction of spinal anaesthesia headache had remained a well recognized complication and was considered to be a small price to pay for the excellent anaesthesia produced by the spinal block.

Key words: Postdural puncture headache, quincke needle, pencil point

INTRODUCTION

Postdural puncture headache (PDPH) occurs when transdural leakage of cerebrospinal fluid allow the brain to sag with in the cranium resulting in traction on pain-sensitive intracranial vessels. The traction on the brain and cortical meninges produces the characteristic headache, which is relieved most commonly by lying down.¹

The most important factors influencing the frequency and severity of PDPH are the age of the patient and size of the dural perforation. The size and shape of the hole in the dura is dependent of the diameter of the needle on the thickness of the dura at the puncture site² and on the position of the needle bevel in relation to the long axis of the dural fibres.³

The position of the needle bevel in relation to the longitudinal axis of the dural fibers was examined.⁴ It shows that orienting the bevel of a 25 gauge Quincke needle or 25 gauge pencil point needle parallel to the longitudinal dural fibres significantly diminishes the incidence of headache following subarachnoid anaesthesia.

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Postspinal headache is throbbing in nature of varying severity and presents most commonly within 48 hours of dural puncture if severe may be accompanied by neck stiffness, nausea, vomiting and photophobia. Postspinal headache is an undesirable complication to be avoided if possible. All the patients undergoing spinal anaesthesia must be informed of the risks of PDPH and the safe and effective treatment exists should one develop.

The occurrence of postdural puncture headache limits wide use of this useful method of anaesthesia.⁵ The size and shape of the needle is important in the etiology of PDPH. The configuration of the needle tip has received increasing attention in recent years and has led to revival of interest in the Whitacre needles.⁶ It is thought that a smaller pencil-point needle have the low incidence of PDPH associated with extreme fine gauge choosing small diameter, non cutting spinal needles will reduce the incidence of PDPH.

MATERIALS AND METHODS

Two hundred patients from different surgical departments of Nawaz Sharif Social Security Hospital Lahore having different surgical procedures on lower abdomen and lower limbs like hernias, amputations, debridements, TURP, vesicolithotomy, DHS, total hip

replacements, tibial nailing or plating, external fixators, caesarian sections and hystrectomies were included in this study. The patients of either sex between the age of 18-80 years (ASAI-II) were selected after obtaining proper consent and procedure explained to them. The patients with systemic disease like uncontrolled diabetes mellitus and hypertension, congestive cardiac failure, severe anemia, pulmonary oedema, coagulopathies and vertebral column deformities were excluded from the study.

Group P: One hundred patients had spinal anaesthesia with 25 gauge pencil point needle.

Group Q: One hundred patients had spinal anaesthesia with 25 gauge Quincke needle.

Injection (Midazolam) Dormicum 2mg I/V was given as pre-medication 1 hour before induction. Preloading with crystalloid 500 to 750ml was done. Sterilization done with pyodine. Spinal anaesthesia performed at L2-L3 to L4-L5 interspace in the lateral or sitting position. Subcutaneous infiltration with 2% xylocaine plain 1-3ml performed with 27-G needle to facilitate spinal anaesthesia, hyperbaric 0.5% bupivacaine 2-4ml used, and the direction of needle directed cephalic slightly upwards towards umbilicus. After injection the patient was placed immediately in supine position.

A standard questionnaire regarding headache to patient

1. On the day of surgery.
2. Three to five days after surgery.

HEADACHE

- . Severity
- . Localization
- . Character
- . Duration
- . Presence or absence of associated symptoms.
- . Aggravation by erect, sitting position.
- . Relief on lying flat

Either localized to occipital or frontal region with aggravation on coughing and sneezing or straining.

Monitoring

- ECG.
- Pulse oximetry.
- Temperature.
- NIBP for every 5 minute.
- Heart rate for every 5 minute.

The following factors recorded as to grade the dural click as distinct or indistinct, speed of CSF back flow was immediate, delayed or slow, aspiration of CSF as easy, slow or impossible, ease of injection as acceptable or unacceptable.

The patient was allowed to ambulate 6-12 hours after operation depending upon type of surgery performed. The patients were seen on the day of surgery and 3-5 days after operation where they were

questioned using a standard questionnaire. The patient questioned like headache, its severity, localization, character (e.g. posture dependant) duration, presence or absence of associated symptoms like backache, or any neurological sequelae.

Headache was considered to be a classical postdural puncture if fulfilled the following conditions, aggravated by the erect or sitting position, relieved on lying flat, mainly occipital or frontal region aggravated on coughing, sneezing or straining. Headache further classified as mild, moderate or severe. Mild did not interfere with daily routine was less than 24 hours duration and was treated conservatively.

RESULTS

Two groups consisting 100 patients each were randomly chosen. There was no statistically significant difference between these groups with respect to age, height and weight having p value as (P 0.012 and 0.002) respectively (Table 1 & 2). The percentage of patients expressed no pain at all was 96% in group-Q and 98% in group-P (Table 3).

One male patient aged 55 years group-Q suffered moderate postural headache on first day. Postoperatively moderate postural headache required bed rest limiting daily activities and required only analgesic to subside pain.

Table 1: Demographic Profile

	Group-Q (Mean±SEM)	Group-P (Mean±SEM)	P Value
Age	40.9583±2.0523	45.9032±2.8100	0.012
Weight	61.76 ± 2.1394	63.92 ± 3.0001	0.002

Group-Q 25-G Quincke needle
Group-P 25-G Pencil point needle

Table 2: Sex Distribution of patients

Sex	Group-Q	Group-P
Male	70	65
Female	30	35

Table 3: Patients Having Post-Dural Puncture Headache (Postoperative day)

Group	Age/ Sex	App. Of symptoms	Severity	Duration
Q	55/M	1	Moderate	72 hrs
Q	24/F	1	Slight	64 hrs
Q	26/M	2	Slight	10 hrs
Q	20/F	2	Severe	120 hrs
P	48/F	1	Slight	20 hrs
P	54/F	1	Slight	60 hrs

One female patient aged 20 years suffered severe headache throbbing in character localized to occipital region, aggravated by straining associated with neckache and backache appeared in second

day postoperatively of 120 hours duration, relieved by complete bed rest, intravenous fluids and analgesic. There was no need for extradural blood patch and the patient was over from the symptoms completely on the 7th day postoperatively and there was no need for re-hospitalization later on. Two patients in group-P both females aged 48 and 54 years suffered slight postural headache on the first postoperative day. The duration of pain in group-P was 20-60 hours as compared to duration of pain in group-Q which was 10-120 hours. So the duration of pain was less in group-P (Table 3).

Table 4 shows distribution of patients with rank pain score in Group-Q no pain was experienced in 96% cases. Two patients had mild, one had moderate and one had experienced severe headache. In Group-P no pain was recorded in 98% cases. Only two patients had mild pain. The slight large value of chi-square (P 0.5672) indicates that the rank pain scores and needle type used are independent of each other regarding severity of headache.

Table 4: Distribution of patients with Rank Pain Score

Group	=n	Mild pain	Moderate pain	Severe pain	Total
Q	96%	2	1	1	100
P	98%	2	Nil	Nil	100

$\chi^2 = 1.5164$, DF= 3, P value =0.5672

Table (5) shows the duration of headache in hours. In Group-Q two patient experienced slight headache on second post-operative day which remained for 10 and 64 hours respectively. One patient experienced moderate headache of 72 hours duration and one patient experienced severe headache of 120 hours duration respectively. Whereas in Group-P two female patients experienced slight headache of 20 and 60 hours respectively on first day post-operatively. It concludes that the duration of headache is less in patients in Group-P as compared to Group-Q.

Table 5: Distribution of Headache in Hours

Group	Headache		
	Mild	Moderate	Severe
Q	10-64	72	120
P	20-60	-	-

Successful dural puncture was achieved in all patients in both groups. All patients received 0.5% hyperbaric bupivacaine intrathecally and none of the patient more than two attempts were made. Table 6 showing block site and time taken from completion of skin preparation to successful injection. The mean time taken to complete intrathecal injection in group-

Q at L3-L4 level was 3 minutes and 50 seconds whereas in group-P L4-L5 level was 4 minutes and 30 seconds. Despite the flexibility of the needle especially in 25-G needle there was no significant difference in the time taken to complete intrathecal injection.

Table 6: Block site and time taken

Group	25G	25 G
L3-L4	45 Seconds	48 Seconds
L4-L5	52 second	58 seconds

One female patient aged 24 years who experienced severe pain having duration of 120 hours had episodes of vomiting three times. None of the patient who experienced mild or moderate pain had any complaint of vomiting in either group-Q and group-P.

There were no postoperative neurological sequelae detected in either group. Table 7 showing complications of spinal anaesthesia not fulfilling the criteria for post dural puncture headache.

Same percentage as (3%) of patients were observed who experienced atypical headache in both the groups. Patients who suffered backache were also the same in 6% in each group indicating no significant difference between the groups.

Table 7: Complications of Spinal Anaesthesia not relating to criteria of postdural puncture Headache

	Group Q	Group P
A typical headache	3%	3%
Backache	6%	6%

DISCUSSION

Spinal anaesthesia is picking up popularity once again in the modern anaesthetic time. Though this technique has a low complication rate, but it carries the special risk of postdural puncture headache.⁵ This complication occurs in procedures in which dura is perforated, including spinal anaesthesia and epidural anaesthesia with accidental dural puncture.

The following factors are thought to influence the incidence of PDPH.

- Age: Higher incidence in younger patients.
- Gender: Higher incidence in females.
- Needle size: The larger the diameter of the needles, the higher the incidence and the more prolonged and severe the PDPH.
- Multiple attempts: Higher incidence associated with increased number of perforations of dura mater.
- The needle bevel direction and relationship to dural fibres: Higher incidence if the needle is inserted perpendicular to the longitudinal dural fibres, thus cutting them instead of separating them.

f. Duration of recumbency conflicting results indicate questionable relevance of this factor on the incidence of PDPH.

g. Higher incidence with previous history of PDPH⁷.

Though the above mentioned factors have influence on the incidence of PDPH but the most important is the needle size.⁸ The idea that a conical or pencil point needle might prove less traumatic to the dura and produce less cerebrospinal fluid leakage and therefore, a low PDPH was first reported by Greene⁹.

The influence of the configuration of the needle tip on the incidence of PDPH has recently been the subject of renewed interest¹⁰. The most widely accepted theory concerning the cause of PDPH is based on the concept of loss of CSF through a dural tear. When the patient assumes the upright position the brain is thus deprived of its cushion with increasing tension being exerted on anchoring structures innervated with stretch sensitive fibres. The lumbar CSF fluid pressure normally increases from 5 to 15cm H₂O in the horizontal position.¹¹ Owing to the pressure gradient between the intradural and extradural space, spinal fluid is lost into the epidural space as long as the hole in the duramater exists. The amount of fluid lost is dependent on the size of the hole and the rate of the CSF production. Withdrawal of CSF in the sitting position and onset of headache has been demonstrated in volunteers. Replacement of the withdrawn with saline, using a volume of saline equal to the volume of CSF withdrawn, relieves the headache.

A study reported by Ronald¹² a preliminary headache caused by leakage of spinal fluid may be minimized by using a smaller cutting spinal needle or by using a needle without a cutting bevel. The results of above mentioned study is close to results of present study on 200 patients.

Pencil point needles separate dural fibres instead of cutting them and have an advantage in reducing trauma to the dural fibres. The dural defect produced by a Whitacre needle is smaller and leads to a smaller loss of CSF than with comparable Quincke needles. Leakage of CSF through human dura measured in vitro after puncture by spinal needles fluid loss tailed off in all cases and ceased within 5 minutes in 10% punctures made with G-25 needle. Whitacre pencil point needle produced less fluid loss than a 25-G Quincke point inserted across the fibres ($p < 0.05$)¹³.

In this present study one group of 100 patients received spinal anaesthesia with 25-G Quincke needle. The percentage of patients experienced no pain at all was 96%. The overall incidence of classical features of PDPH was 4% in group-Q. Two

patients one male of 26 years and one female of 24 years had mild headache of 10 and 64 hours duration on first and second post operative day. One male patient had moderate headache of 72 hours duration on first post operative day. One female patient of 20 years had symptoms of severe headache on second day of 12 hours duration acceptance was high as 98% with no complaint of incomplete block in group-Q results. The average duration of PDPH was less than four days. The headache responded to bed rest, intravenous fluid, analgesics and in no case did the severity of the duration of headache warrant epidural blood patch.

A clinical survey was conducted on 274 patients under subarachnoid spinal anaesthesia. The anaesthesia was performed either with 24-G and 25-G Quincke needles. Patients were interviewed on 2nd and 6th day post-operatively. Data on morbidity especially for post dural headache and backache was collected and analyzed with respect to needle gauge. With 25-G needle backache was the most common complaint (20.5%). The present study having subarachnoid block did not require a blood patch for post dural puncture headache. However other recent studies^{6,16,17} reports and Incidence of (PSH) post spinal headache of some 4% in younger patients using a Whitacre 22-G pencil point needle which is in keeping close with the result of the present study.

So far as subjective assessment of the block concerns, there were few painful episodes in both the groups about ten out of 100 patients in group-Q had painful episodes and eight patients in group-P. These episodes of pain were transient in nature and usually associated with exteriorisation on closure of the peritoneum. They were all relieved by intravenous opioids. There was no sensation at all in 50 and 60 patients out of 100 group-Q and group-P respectively there was awareness of pulling in 35 and 30 patients in group-Q and group-P respectively.

The result showing complication of spinal anaesthesia not relating to criteria of post dural puncture headache. In group-Q 3 patients out of 100 had complaint of atypical headache and the same number was in group-P. Six patients out of 100 each in both the groups had complaint of backache. Whatever the cause of the pain, the cure is to seal the hole in the dura. This always occurs naturally, usually within one week, but it may occasionally take much longer. A remarkable and unwelcome feature of the post dural puncture headache syndrome is that such a trivial injury may cause such an incapacitating condition.

The first report of the use of autologous blood injected into the extradural space to "patch" the hole in the dura was made by Gormley in 1960 inspired by his impression that dural puncture accompanied by a

"blood tap" was less likely to result in PDPH. Using only 2-3ml of blood, he claimed 100% cure in his series of eight subjects (one of whom was himself when suffering from PDPH after myelography).

Regarding blood patching the blood acted as a plug and exerted a mass of time during which the body reparative mechanisms sealed the hole permanently.

CONCLUSION

Spinal anaesthesia is picking up popularity once again in the modern anaesthetic time. Since the introduction of spinal anaesthesia headache had remained a well recognized complication and was considered to be a small price to pay for the excellent anaesthesia produced by the spinal block.

Post dural puncture headache occurs when leakage of CSF through a dural hole lessens the cushioning effect of the brain, allow it to sag with in the cranial vault. This situation leads to reflex vasodilation and traction on pain - sensitive cerebral vascular structures. The result and postural headache occurs 24-72 hours after initial dural puncture and persists for five to seven days with out treatment and if severe enough it may persists for a year. The use of smaller spinal needles with tip design to spread dural fibers will dramatically decrease the incidence of PDPH. The reported incidence of PDPH varies from 1% to 30%.

Headache caused by leakage of spinal fluid may be minimized by using a smaller-gauge spinal needle, or by using a needle with out a cutting bevel.

Two patients who had spinal anaesthesia with 25-G Whitacre pencil point non cutting needle had complaint of postural headache of slight severity of 20 and 60 hours duration respectively on first post-operative day. Non of them required blood patch. Headache get relieved by rest, mild analgesics and IV fluids. The patients discharged from hospital on third day and were not re-hospitalized for this complaint. It is concluded that with the use of 25-G

Whitacre non cutting pencil point needle, there is reduction in the incidence of post dural puncture headache.

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