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Post-Dural Puncture Headache Following Spinal Anaesthesia: Comparison of 25g Vs 29g Spinal Needles

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Objectives: To compare the incidence of post-dural puncture headache (PDPH) following spinal anaesthesia with a 25G and a 29G needle.

Methods: One hundred ASA I or II patients aged 25 to 45 years who were to receive spinal anaesthesia to undergo subumblical surgery were included in the study. Patients were randomly divided into two groups, group I received spinal anaesthesia with 25G Quincke point needle and group II received spinal anaesthesia with 29G Quincke point needle. Difficulty in localising the space and time taken to administer spinal anaesthesia were noted. Post-operatively incidence and severity of headache, backache and any auditory symptoms were recorded.

Results: PDPH occurred in 12 (24%) patients in the 25G group and two (4%) patients in the 29G group. Incidence of backache was also significantly higher in the 25G group. Two patients in the 25G group complained of impaired hearing. However, the total time taken to administer spinal anaesthesia and number of redirections of the needle to locate sub-arachnoid space were significantly more in the 29G group.

Conclusion: Spinal anaesthesia with a 29G needle reduces the incidence of PDPH in young adults. However, it is technically more difficult and time consuming to give spinal anaesthesia with a 29G needle than with a 25G needle.

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Post dural puncture headache (PDPH) is a well known complication of spinal anaesthesia especially in younger patients[1-3]. Although it may be transient, mild PDPH may persist for hours or many weeks and can be severely incapacitating.

Previous studies have reported a reduced incidence of headache in young patients with the use of a 29G needle, with the incidence varying between 0-1.2%[4-5]. However, grading of headache has not been done in many studies. The present study was

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undertaken to compare the use of 25G and 29G Quincke point needles in two groups of young patients with regard to the incidence and severity of PDPH, backache and ease of performing spinal anaesthesia.

METHODS

The study was approved by the hospital ethics committee and informed consent was obtained from 100 patients of ASA Grade I and II of either sex in the age group between 25 to 45 years, who were to receive spinal anaesthesia to undergo subumblical surgery. Obstetric patients, patients with abnormalities of spine, soft tissue infection at the site of needle insertion, acute ear infection and respiratory tract infection, coagulation disorders and neurological symptoms were excluded.

All the patients were visited a day before surgery and were informed of the procedure. Detailed history of the patient was taken and their educational status was recorded. Patients were premedicated with tab. diazepam 5 mg a night before and 5 mg on the morning of surgery. Morphine sulphate 0.15 mg/kg and promethazine 0.5 mg/kg was also administered intramuscularly to all the patients 45 min. before anaesthesia.

After preloading the patients with 20 ml/kg of normal saline over a period of 20 minutes, spinal anaesthesia was administered in L3-4 interspace with 2.5-3.5 ml of 0.5% bupivacaine in 8% dextrose with either a 25G or 29G needle using midline approach. The number of times the needle was redirected to locate the space and the total time taken to give spinal block was recorded. The level of block was tested with the help of a spirit swab and the level of the block recorded 20 min after the injection of the drug. All patients were administered 35% O_2 intraoperatively using a ventimask.

Heart rate, systolic and diastolic blood pressures were observed before spinal anaesthesia, every one minute after spinal anaesthesia for the first ten minutes and then every five minutes thereafter till the end of surgery using a Horizon 2000 monitor (Mennon Medical Inc). ECG and oxygen saturation were monitored throughout the surgery.

Maintenance fluid at the rate of 10 ml/kg/hour was administered intraoperatively. Fall in systolic blood pressure below 100mmHg or 20% of the baseline value was treated with rapid administration of iv. fluids and 5 mg of mephentermine given intravenously.

Postoperatively, all the patients were mobilized after haemodynamic stability and return of sensation and motor power were confirmed. All the patients were visited at the end of 24 hours and then on the third and fourth post-operative day by an anaesthetist who was not present during the performance of spinal anaesthesia. PDPH was graded as follows[5]:

Grade I – Headache not interfering with normal daily activity.
Grade II – Periodic bed rest needed to relieve the headache.
Group III – Mild analgesics and bed rest required for <eight days.
Grade IV – Bed rest for >eight days and epidural blood patch required.

Bed rest, abundant hydration and oral paracetamol 500 mg thrice a day were prescribed for relief of PDPH. Headache which was not postural and due to some other reason was also noted. All averages were reported as the arithmetic mean±SD. Statistical analysis between the groups was performed using Student's t-test and Chi square test. $p<0.05$ was considered as statistically significant.

RESULTS

There were fifty patients in each group and both the groups were comparable with regard to age, sex, educational status and level of block (Table 1).

Table 1. **Age, sex, educational status and level of block**

Age (yrs)	*Group I (n=50)*	*Group II (n=50)*
Mean (SD)	33.96 (7.25)	33.04 (7.35)
Male:Female	27:23	31:19
Educational Status		
Illiterate (n)	20	19
Up to 10th standard (n)	8	3
Above 10th standard (n)	22	28
Level of block (thoracic dermatome) mean (SD)	8.44 (1.72)	8 (1.80)

*p>0.05

Number of redirections of the needle required to locate the sub-arachnoid space were significantly more in the 29G group as compared to the 25G group ($p<0.05$) (Table 2). Time taken to administer spinal anaesthesia was also significantly longer with the 29G needle as compared to the 25G needle [7.20 (3.48) minutes versus 4.04 (2.37) min. $p<0.05$]. Two patients in Group II had failed block as compared to none in Group I.

Table 2. **Redirection of needle in both the groups**

No. of times needle Redirected	*Group I (n=50)*	*Group II (n=50)*
0	20	12
1	9	7
2	12	8
3	6	11
4 or more	3	12

$X^2 = 9.9206$, df = 4 ($p<0.05$)

PDPH occurred in 12 (24%) patients in 25G group and two (4%) patients in the 29G group ($p<0.05$). Of the 12 patients who had PDPH in the 25G needle group, ten of them had grade II PDPH (PDPH relieved by bed rest). Two patients needed bed rest and

analgesics both (Grade III). None of the patients had grade IV PDPH. Atypical headache was reported by four patients, two in each group.

While correlating headache with sex of the patients, needle size and educational status, only the needle size correlated with the development of PDPH (25G vs. 29G $p<0.01$) (Table 3).

Table 3. **Correlation of incidence of headache with sex, needle size and educational status**

	PDPH	Value of x^2
Needle size		
25G	12*	6.7276
29G	2	
Sex distribution		
Male	6	
Female	8	0.0042
Educational status		
Illiterate	6	
$<10^{th}$ standard	0	4.17
$>10^{th}$ standard	8	

*$p<0.01$

Five patients in each group complained of nausea, 18 (36%) patients in Group I and nine (18%) patients in Group II complained of backache ($p<0.05$). Five patients in group I and two in group II complained of neck stiffness. Impaired hearing was reported by two patients in group I only. None of the patients showed evidence of cranial nerve palsy in either of the groups (Table 4).

Table 4. **Incidence of complications in both groups**

	Group I (n=50)	*Group II (n=50)*
PDPH	12*	2
Atypical headache	2	2
Backache	18*	9
Nausea	5	5
Neck stiffness	5	2
Impaired hearing	2	0
Cranial nerve palsy	0	0

*$p<0.05$

DISCUSSION

In the present study PDPH occurred in 12 (24%) patients with a 25G needle compared to two (4%) patients when 29G needle was used. However, the number of redirections of the needle required to obtain CSF were more with the 29G needle and there were two failures also.

PDPH is the most common complication of spinal anaesthesia. It is generally agreed that leakage of CSF from the puncture site in dura results in dilatation and traction on pain sensitive intracranial structures when the patient assumes the sitting posture[6]. A high incidence of PDPH has been reported in young patients following dural puncture and because of this many anaesthetists avoid sub-arachanoid block in these patients. Among the prophylactic measures tried to reduce the incidence of PDPH, use of bed rest[6,7], the prone versus supine position[8], extra hydration and prophylactic blood patch have failed to reduce the incidence of PDPH[9]. The most effective way to reduce the incidence of PDPH is the use of small bore needles for administering spinal anaesthesia.

Past studies have mainly concentrated on the needle size and there are few controlled studies that compare two different sizes of spinal needles in young patients. In a double blind study in young volunteers, Tourtelotte et al[10] found a reduction of headache from 36% to 12% when a 26G instead of a 22G needle was used. In a controlled study Flatten et al[4] reported a reduction in incidence of headache from 10% to 0% when a 29G instead of a 26G needle was used for spinal anaesthesia in patients less than 30 years of age. In a prospective study of 80 patients under 40 years of age, the incidence of PDPH was 25% with a 25G needle with no headache in the 29G group[11].

In our study out of 12 patients (n=50) who suffered headache in the 25G needle group, ten patients had Grade II headache, which was relieved by bed rest alone and two patients required mild analgesic along with bed rest (Grade III). In the 29G group only two patients (n=50) had headache which was relieved by bed rest alone.

Postoperative backache was present in 36% of patients in the 25G group and 18% of patients in the 29G group ($p<0.01$). Our findings differ from those of Geurts et al[11] who did not find any difference in the incidence of backache with 25G and 29G needles. Though the incidence of backache was low in the 29G group in our study, the number of redirection of needle was significantly more in the 29G group (Table 2). It has been hypothesized that backache is caused by position of the patient on the operating table and the duration of surgery rather than by trauma and or local irritation caused by a spinal needle[12,13].

It is generally believed that gender plays a role in the occurrence of PDPH[14-19]. We could not find a significant correlation between the sex of the patient and the incidence of PDPH. The incidence of headache in males and females was nearly identical (six males Vs eight females). Similar findings have been observed by other authors also using a 25G needle[4,5]. However, Flaatten et a[3] reported an incidence of 61.5% in women less than 30 years when given spinal anaesthesia with a 25G needle compared to 23.4% in men of the

same age.

In our study induction time was significantly longer in the 29G group (7.20±3.48 min) as compared to the 25G group (4.04±2.37 min) ($p<0.05$). The number of redirections that were necessary to reach sub-arachnoid space were significantly more in the 29G group as compared to the 25G group and there were two failures in the 29G group. This supports the suggestion that spinal anaesthesia is more difficult with a thinner needle[4,11]. However, the incidence of headache was lower in this group. This is in accordance with previous studies[11,20]. Probably the very thin needle deviates from a direct route to the dura and hits bone[11].

Incidence of non-specific headache was comparable in both the groups in our study. Five patients in each group had a history of nausea intraoperatively. Two patients in the 25G group complained of impaired hearing as compared to none in the 29G group, but a larger sample size and better method of evaluation of auditory functions would be necessary to correlate loss of hearing to the needle size. No patient in either of the group had cranial nerve palsy.

CONCLUSION

Use of a 29G needle significantly reduces the incidence of PDPH after spinal anaesthesia in young adults. Although the use of a 29G needle proves technically more difficult and time consuming, the extent and adequacy of anaesthesia is unaffected.

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