MORBIDITY FROM SUBARACHNOID SPINAL ANAESTHESIA – A PROSPECTIVE STUDY ON THE POST – OPERATIVE MORBIDITY FROM SUBARACHNOID SPINAL ANAESTHESIA

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ABSTRACT

A clinical survey was conducted on 274 patients who had surgery under subarachnoid spinal anaesthesia. The anaesthetic was performed with either a 23 gauge or 25 gauge needle. All patients were interviewed on the second and sixth post-operative days. Data on morbidity (especially post-dural puncture headache and backache) was collated and analysed with respect to needle gauge. Backache was the most common complaint (20.5%). Using the finer needle did not reduce this aspect of morbidity. Post-dural puncture headache on the other hand was significantly reduced by the use of the finer 25 gauge needle (from 12.3% to 4.9%).

Key Words: Spinal anaesthesia, morbidity.
23 gauge/25 gauge spinal needles.
Backache, Post-dural puncture headache.

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INTRODUCTION

Regional anaesthesia such as subarachnoid block is currently enjoying a resurgence in popularity and usage. Serious sequelae is rare. Unfortunately backache and post-dural puncture headache are both common and troublesome.(1-16)

Incidence of post-dural puncture headache has been reported from under 1% (8, 17) up to 75% (18). This wide variation in the incidence of post-dural puncture headache has led various authors to arrive at contrasting conclusions. Some have no misgivings about subarachnoid block, which play a significant role in their armamentarium. Others have concluded that the incidence of post-dural puncture headache, in young patients particularly, is prohibitively high. As such, these anaesthetists avoid its use in any young patient (9, 10). Obviously knowledge of the local incidence of post-dural puncture headache will aid clinicians in decision making. It was mainly with this in mind that this study was undertaken.

METHOD

A clinical survey on morbidity following subarachnoid block was conducted over a six month period. The decision to perform surgery under subarachnoid block was left to the individual clinician in charge of the case. All patients who had spinal anaesthesia were included in the survey if they were contactable for at least one week after surgery. Patients were informed of their inclusion in the survey but were not told of the specific problems being studied. Kaplan had already shown that suggestion would significantly bias results (19). Volunteers in his study who received sham spinals (ie. local anaesthetic injections without dural puncture) developed headaches similar to the group which actually had dural punctures. Others who have addressed this aspect of subarachnoid block have frequently arrived at similar conclusions (11) though dissenting views are not without their proponents. (12, 13)

Details of patient characteristics, anaesthetic technique, difficulty of procedure, spread of local anaesthetic and complications were all recorded. Each patient was interviewed twice – on the second and sixth post-operative days. Patients were interviewed by one of two research assistants in the ward or at home (by telephone) if discharged.

Patients were randomized into 2 groups; namely the 23G (23 gauge) and 25G (25 gauge) groups. Randomization was achieved by alternating the gauge of the needles used on each surgical list. Randomization rather than matching was utilized to correct any error introduced by differences in weight, height and type of surgery.

The anaesthetic was performed by all members of the anaesthetic unit representing a wide spectrum of experience in anaesthesia. No attempt was made to adhere to a strict protocol insofar as technique was concerned. However subarachnoid block was usually performed with patients in the lateral position, with maximal flexion of the hips, knees and spine. This was in contrast to the technique advocated by Rosser and Schneider (14). The puncture site was then cleansed with chlorhexidine and iodine solutions. Excess solution was dabbed dry and drapes applied. The midline approach was generally the approach of first choice. Dural puncture was achieved without the use of introducers in all but 9 patients.

Upon conclusion of the survey, the data was analysed identifying and comparing morbidity between the 23G and 25G groups.

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Results were analysed using the appropriate tests of significance. Tests used were Chi-square with Yate's correction for small numbers, unpaired T-test and Fisher's exact test.

RESULTS

Table 1 shows the distribution of patients in the two groups (23G and 25G) by age and sex. In all there were 274 patients included in this study. 130 patients were in the 23G group whilst 144 were in 25G group. Randomization by alternating the needle gauge on each surgical list led to even spread of patients with regard to sex, weight and height. However there was a slight inequality in numbers between the two group as the number of patients on any list was never constant. This difference in numbers was not significant ($p>0.05$). The 23G group consisted of 95 males and 35 females. In the 25G group, there were 112 males and 32 females.

Table 1
DISTRIBUTION BY AGE AND SEX

AGE	Below 30 years		30 to 49 years		50 yrs or older	
GAUGE	23G	25G	23G	25G	23G	25G
MALES	31	42	33	34	31	36
FEMALES	9	5	8	10	18	17
TOTAL	40	47	41	44	49	53

Table 2
WEIGHT AND HEIGHT

	MEAN WEIGHT (kg)	STANDARD DEVIATION	MEAN HEIGHT (cm)	STANDARD DEVIATION
23G	59.73	10.67	164.15	8.96
25G	58.54	11.27	163.27	8.41

Table 3
SURGICAL PROCEDURE AND GAUGE USED

GAUGE	ORTHOPAEDICS	GENERAL SURGERY	OBSTETRICS AND GYNAECOLOGY
23G	77	47	6
25G	75	58	11

Table 4
POST-OPERATIVE COMPLAINTS

	23G (%)	25G (%)
Backache	20.2	20.8
PDPHA	12.3	4.9
Injection Site Tenderness	11.5	8.3
Myalgia	5.6	12.5
Ordinary Headache	5.6	6.3
Sore throat	3.8	2.1
Others	3.1	2.8

PDPHA – Post Dural Puncture Headache

No significant differences existed between the two gauge groups with regard to weight and height. The mean height in the 23G group was 164.15 cm with a standard deviation of 8.96 cm. The mean height in the 25G group was 163.27 cm with a standard deviation of 8.41 cm. The distribution of the groups by height and weight are shown in Table 2.

Distribution of patients from the two groups by the type of surgery is shown in Table 3. No significant difference was observed in this regard too.

Post-operative complaints were solicited by means of a questionnaire. The results are shown in Table 4.

Complaints not specifically sought for, but volunteered by the patient were recorded and are tabulated in Table 5.

Table 6 shows the distribution of patients who had post-dural puncture headache after stratification by age, sex and the gauge of the needle used.

The duration of the headaches are shown in Table 7.

Table 5
"OTHER COMPLAINTS"

Complaints	No. of Patients
Difficulty in micturition	3
Giddiness	2
Impotence	1
Neckache	1
Occipital numbness	1

Table 8 shows that ordinary headaches are significantly less likely to last for more than a day as compared to post-dural puncture headaches.

Table 6
POST-DURAL PUNCTURE HEADACHES

Age	Sex	23G	25G
15 to 29 yrs	M	5/31 (16.1%)	4/42 (9.5%)
	F	1/9 (11.1%)	0/5 (0%)
	Both (PDPHA)	6/40 (15%)	4/47 (8.5%)
	Both (OHA)	1/40 (2.5%)	4/47 (8.5%)
30 to 49 yrs	M	5/33 (15.2%)	1/34 (2.9%)
	F	2/8 (25%)	0/10 (0%)
	Both (PDPHA)	7/41 (17.1%)	1/44 (2.3%)
	Both (OHA)	4/41 (9.8%)	3/44 (6.8%)
50 yrs or older	M	2/31 (6.1%)	2/36 (5.6%)
	F	1/18 (6.5%)	0/17 (0%)
	Both (PDPHA)	3/49 (6.1%)	2/53 (3.8%)
	Both (OHA)	3/49 (6.1%)	2/53 (3.8%)
All patients	M	12/95 (12.6%)	7/112 (6.3%)
	F	4/35 (11.4%)	0/32 (0.0%)
	Both (PHA)	16/130 (12.3%)	7/144 (4.9%)
	Both (OHA)	8/130 (6.2%)	9/144 (6.3%)

PDPHA = Post-dural puncture headache
OHA = Ordinary headache

Table 7
DURATION OF HEADACHE

TYPE	GAUGE	Less than a day	1-2 days	3-4 days	5-6 days	7 days or more
PDPHA	23	5	5	3	2	1
PDPHA	25	2	2	2	0	1
Ordinary Headache	23	6	1	0	0	0
Ordinary Headache	25	6	1	0	0	1

Table 8

TYPE	LESS THAN A DAY	LONGER THAN A DAY
Postdural Puncture Headache	7	16
Ordinary Headache	12	3

DISCUSSION

Backache

Table 4 summarizes all post-operative complaints from patients. It is clear that backache was the leading complaint regardless of the needle gauge used.

In this study 20.5% of patients complained of post-operative backache. 20.2% from the 23G group had backache whilst 20.8% of patients from the 25G group had backache. This difference was statistically insignificant. This is not unexpected as the mechanism believed to be responsible is not one of trauma. It is believed that relaxation of the muscles removes the protective mechanisms that reduce the strain caused by stretching of the ligaments, joint capsules and paraspinous muscles (15). The lack of benefit from use of small gauge needles lends support to the belief that trauma is not the underlying mechanism that causes backache.

In many series, backache has been found to be the most common post-operative complaint (9, 20, 21). H. Flaatten and J. Raeder found that patients with backache were more likely to refuse a repeat subarachnoid block than patients who had post-dural puncture headache (9). This may seem to indicate that backache was more distressing to the patient than post-dural puncture headache.

It has been shown that backache is no more common after subarachnoid block than after general anaesthesia (15, 16). Backache corresponded better with the period of immobilization and duration of the surgery than with the type of anaesthesia. However it is more likely to be blamed on the anaesthetic if subarachnoid block had been performed.

Post-dural puncture headache

Unlike backache, where anaesthetic technique is generally believed to contribute little to the outcome, post-dural puncture headache is very much influenced by the anaesthetic procedure.

Historical Perspective

J. Leonard Corning has been credited with the first descriptions of spinal anaesthesia. In 1884, the year cocaine was discovered, he treated a patient with seminal incontinence in what appears to be either an epidural block or a subarachnoid block. In 1885, he described what certainly was subarachnoid block, first in a dog and subsequently in a human subject (22, 23). The patient subsequently complained of headache and vertigo.

It was however August Bier who brought spinal anaesthesia into clinical practice (24). In 1898, one of his assistants performed a successful subarachnoid block on him. He unfortunately had the dubious honour of being one of the first patients to develop post-dural puncture headache.

Age and post-dural puncture headache

In this study, post-dural puncture headache was found to be the second most common untoward outcome from subarachnoid block. Table 6 shows the incidence of headache by the various age groups. The figures show that post-dural puncture headache is more likely to occur in the young age group. Flaatten et al concluded after a study of 247 young patients (age less than 55 years) that subarachnoid block was best avoided with patients less than 30 years of age (10). In this age group, they found the incidence of post-dural puncture headache to be 29.0% in males and 57.1% in females. Others have reported fascinatingly low incidences of post-dural puncture headache of less than 1% with the use of the same 25G needles (17).

The effect of age on post-dural puncture headache is well demostrated in Table 6. 11.5% of patients below the age of 30 years developed post-dural puncture headache whilst only 4.9% of patients 50 years and more did so ($p>0.05$). In both the 23G and 25G groups of patients, the effect of age was demonstrable although not attaining statistical significance. An incidence of 15% in 23G patients below the age of 30 years contrasted with 6.1% in those who were 50 years or older. Similarly in the 25G group, the trend was mantained when 8.5% of those below 30 years of age developed spinal headaches as compared to 3.8% of those 50 years and older.

The effect of age on the incidence of post-dural puncture headache is a well established and recognized fact (10, 26). What remains in dispute, is whether the use of small gauge needles can reduce post-dural puncture headache to acceptable levels and severity.

Gauge size and post-dural puncture headache

The incidence of post-dural puncture headache in the 23G and 25G groups after stratification by age and sex is also shown in Table 6. It is immediately apparent that the smaller 25G needles resulted in less post-dural puncture headache with approximately the same incidence of ordinary headaches.

The criteria for differentiating an ordinary headache from post- dural puncture headache were occurrence after mobilization, aggravation by assuming the erect or sitting positions, relief from assuming the supine position or increased abdominal pressure, predominantly occipital or frontal and accompanied by visual disturbances or dizziness in the latter (25).

12.3% of patients in the 23G group developed post-dural puncture headache whilst only 4.9% in the 25G group did so ($p<0.05$). In all age groups for both sexes, the incidence of post-dural puncture headache was lower in the 25G group. When stratified into the various age sub-groups, the number of females was too small to justify comment. The authors feel that although the percentages are shown with regard to female patients, caution should be exercised during interpretation. The data would be better considered as a whole i.e. considering both the males and females as a single group.

The effect of needle gauge on post-dural puncture headache was seen at each age group although this did not attain statistical significance. In this study, the incidence of post-dural puncture headache was an intermediate figure of 11.5% for patients below the age of 30 years. When only 25G needles was considered the incidence of post-dural puncture headache was 8.5%. In the same age group, 15% of 23G patients had post-dural puncture headache. In contrast only 4.9% of patients above the age of 50 years developed post-dural puncture headache; 6.1% and 3.8% in the 23G and 25G groups respectively. The numbers in each age group were not adequate to establish statistical significance but when all age groups were considered as a whole the effect of gauge size on post-dural puncture headache was siginificant ($p<0.05$).

Thus this study provides additional evidence for the already well established fact that needle gauge plays a

dominant role in the development of post-dural puncture headache (8, 17, 26, 27).

Duration and severity

Patient acceptance of subarachnoid spinal anaesthesia is more likely to be influenced by the severity and the duration of post-lumbar puncture headache. Table 7 shows that post-lumbar puncture headache, tended to last longer compared to ordinary headache (10) which rarely lasted for a day or more ($p<0.05$). See Table 8. There was only one patient with an ordinary headache who complained that he had a headache that recurred everyday for more than seven days. This patient had frequent headaches prior to surgery and was actually having one when he went for surgery. His headaches continued without any change in character after the procedure.

Post-dural puncture headache not uncommonly lasted for more than a day. 60.2% of post-lumbar puncture headache lasted up to 2 days, and a furthur 26.8% continued up to 4 days. In other words, 87% of post-lumbar puncture headaches were over by 4 days. Only 2 patients complained that their headaches lasted 7 days or longer. There was no statistical difference between the 23G and 25G groups with regard to the duration of the post-dural puncture headache.

Other authors have however found that the use of small gauge needles led to a significant reduction in the duration of post-lumbar puncture headache (26),

Graph 1 shows how the patients with headache graded the severity of their headaches. Patients were divided into 3 groups – those with ordinary headaches, 23G patients who developed post-dural puncture headache and 25G patients who developed post-dural puncture headache. Severity scores were obtained by allowing patients to subjectively score the intensity of the pain on a scale of 1 to 10. A score of 1 being minimal and that of 10 being the most intense pain the patient could imagine encountering. A score of 1 to 4 was arbitrarily assigned as mild whilst a score of 5 to 8 was moderately severe. A score of 9 and 10 was considered to be severe.

The only patients who complained of severe headache were those who developed post-dural puncture headache after a 23G needle was used. 13.3% of post-dural puncture headache from the 23G group rated their severity as severe, 33.3% as moderate and 53.3% as mild.

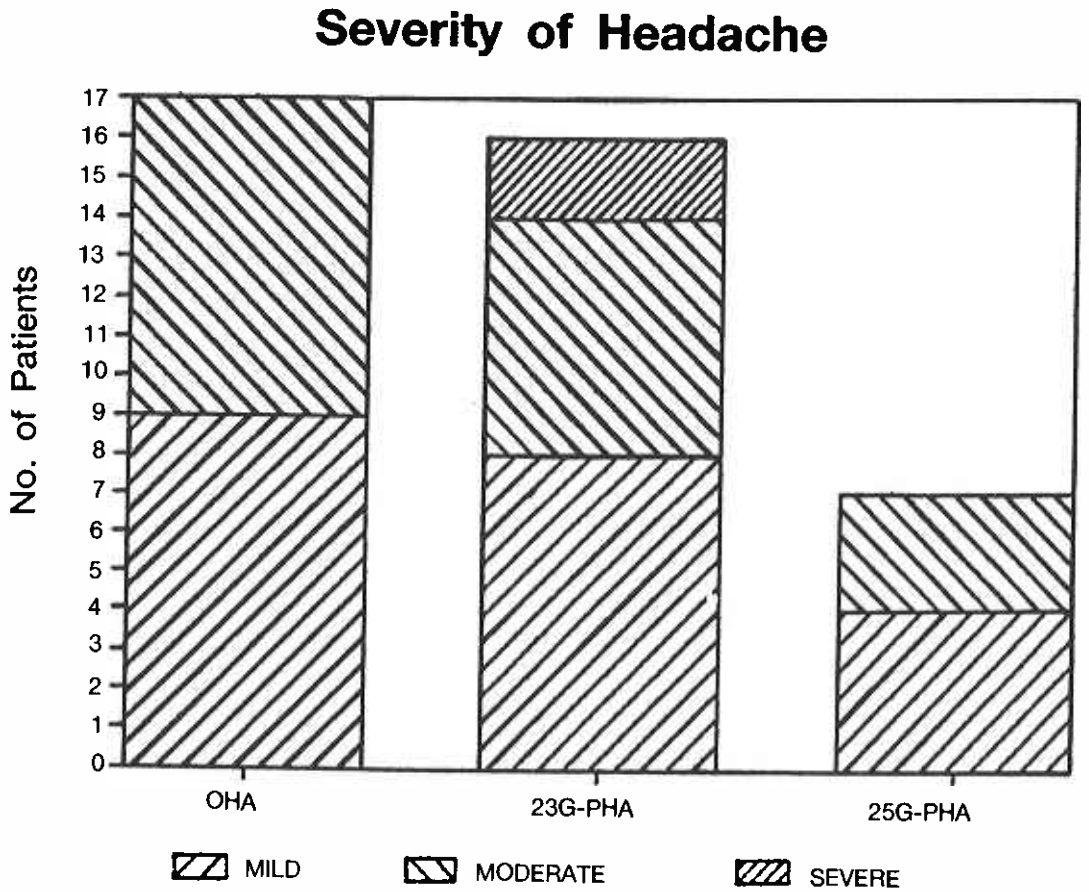
No patient in the 25G group or in the ordinary headache group had a severe post-lumbar puncture headache. Smaller needles are therefore likely to protect against both the development of post-dural puncture headache as well as the development of severe post-dural puncture headache.

Other complaints

Table 5 enumerates all complaints from patients that were made by patients that were not directly asked for. Retention of urine occurred in three patients. The incidence of urinary retention is not more than that following general anaesthesia. Two patients had giddiness on the second day. Unfortunately it was not possible to ascertain if these patients had postural hypotension as they had recovered by the time this was noted. One patient complained of impotence but details with regard to this problem was not available as this patient was understandably antagonistic towards the interviewers. It is most certainly possible that his problem was unrelated to the subarachnoid spinal anaesthesia. complained of impotence but details with regard to this problem was not available as this patient was understandably antagonistic towards the interviewers. It is most certainly possible that his problem was unrelated to the subarachnoid spinal anaesthesia.

One patient had muscular neckache without any associated headache or symptoms suggestive of post-lumbar puncture headache. Another patient interestingly

Graph 1



enough presented with occipital numbness. She did not have any headache whatsoever, and for this reason was not considered to have post-lumbar puncture headache. It is certainly possible that this represented one end of a spectrum of what we know to be post-lumbar puncture headache as this numbness was posture dependent.

In this paper, only the common complaints of spinal anaesthesia were encountered. Many other complications are known to occur but are not likely to be encountered in a study of this size (20).

CONCLUSION

274 patients who received subarachnoid block were followed up for seven days. 20.4% of all patients had backache. 12.3% of 23G group patients has post-dural puncture headaches. Usage of the smaller 25G needle resulted in a lower incidence of post-dural puncture headache of 4.9% ($p<0.05$). Young patients had a higher incidence of headache. When the 25G needle was used 8.5% of patients below the age of 30 years developed post-dural puncture headache, of which none were severe. The authors feel that an incidence of 8.5%, whilst not high enough to preclude its routine use in clinical anaesthesia for the young, should cause the anaesthetist to re-evaluate it's role.

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