INCIDENCE OF POST-DURAL PUNCTURE HEADACHE USING DIFFERENT SIZES OF QUINCKE NEEDLES - A CLINICAL STUDY

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ABSTRACT

BACKGROUND

Headache may be a troublesome feature after spinal anaesthesia. After the introduction of spinal anaesthesia, post-dural puncture headache has been an unfavourable complication. August Bier, father of spinal anaesthesia was the first to describe the classical features of dural puncture headache. The post-dural puncture headache has been a serious objection to the use of spinal analgesia especially in obstetric patients.

Objectives- 1. To find out the relationship of age, sex, weight and nature of the surgical procedure with post-dural puncture headache. 2. To find out the relationship between the incidence of post-dural puncture headache and the size of the spinal needle.

MATERIALS AND METHODS

The study population consisted of One thousand patients scheduled to undergo various selective and emergency surgeries under spinal anaesthesia. The study population was randomly allocated to receive spinal anaesthesia using 22, 23, 24, 25 and 26 gauge spinal needles. In the post-operative period, patients were followed up for seven days. Specific enquiry was made regarding the presence of headache, its onset, severity, duration, postural variation and any association with visual, auditory disturbance and neck rigidity. After the study, qualitative analysis was made with respect to incidence of post-dural puncture headache and its affiliation with the needle sizes, nature of the surgery, sex, age and weight.

RESULTS

1. Younger age group are at higher risk of developing post-dural puncture headache. 2. Female patients have high incidence of post-dural puncture headache compared to males. 3. Obstetric and gynaecological cases carry high incidence of post-dural puncture headache. 4. Thicker the size of the needle, more is incidence of post-dural puncture headache.

CONCLUSION

Incidence of post-dural puncture headache is lesser or nil by using finer size needles like 26 gauge and 27 gauge needle.

KEYWORDS

Post-dural puncture Headache, Sizes of Needle, Spinal Anaesthesia, Age, Weight.

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BACKGROUND

Headache following spinal anaesthesia is a perplexing problem to the anaesthesiologists. Post-dural puncture headache has been an unfortunate complication since the inception of spinal anaesthesia. August Bier, father of spinal anaesthesia was the first to describe the classical features of dural puncture headache. Following an attempted subarachnoid anaesthesia on August 24, 1898, he noted "All these symptoms (Pressure in the head and dizziness) disappeared as soon as I lie down horizontally but they return when I arouse". The post-dural puncture headache has been a serious objection to the use of spinal analgesia especially in obstetric patients. Many literatures have showed the theories of its cause as many.

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Such a multiplicity of theories point up the lack of knowledge concerning the true genesis of these headaches. In the present study, an attempt was made to find out the incidence of post-dural puncture headache in patients posted for elective and emergency surgeries.

The Aim of the Study is to find out the incidence of post-dural puncture headache with regards to age, sex, weight and nature of the surgical procedure.

To find out the relationship between the incidence of post-dural puncture headache and the size of the spinal needle.

MATERIALS AND METHODS

A clinical study comparing the incidence of post-dural puncture headache using different size spinal needles was carried out in the Department of Anaesthesiology, in Adichunchanagiri Institute of Medical Sciences, Bellur, Nagamangala Taluk during the period December 2015 to November 2016.

The study population consisted of One thousand patients scheduled to undergo various selective and emergency surgeries under spinal anaesthesia. The study population was randomly allocated to receive spinal anaesthesia using 22,23,24,25 and 26 gauge spinal needles.

A complete pre-anaesthetic checkup was done a day before surgery for the elective cases and for the emergency

cases it was done on the day of the surgery and patients with the history of headache were excluded from the study. All the elective patients were premedicated with Tab. Diazepam 10 mg at night.

On the day of surgery, an intravenous line was established using 18 gauge IV cannula (Vasofix) and Dextrose saline injection was started. Under aseptic precaution with patient in a lateral decubitus position, lumbar puncture was attempted at L2-3/L3-4 space. After obtaining a free flow of cerebrospinal fluid, the local anaesthetic agent was introduced into the spinal space.

In the postoperative period, patients were followed up for seven days. Specific enquiry was made regarding the presence of headache, its onset, severity, duration, postural variation and any association with visual, auditory disturbance and neck rigidity. The headache was considered to be post-dural puncture headache, if it met the following characteristics.

1. Postural - relieved by lying supine and exacerbated by sitting or standing.
2. Severe or dull aching or throbbing in nature.
3. May be accompanied by nausea, vomiting, visual disturbance, tinnitus or deafness.
4. Whether the headache is occipital or frontal.
5. Neck stiffness and pain at the site of puncture.

Patients with headache after spinal anaesthesia were treated with analgesics, intravenous fluid and absolute bed rest until symptoms subsided. After the study, qualitative analyses were made with respect to incidence of post-dural puncture headache and its affiliation with the needle sizes, nature of the surgery, sex, age and weight.

RESULTS

Sl. No	Age in Years	Male	Female	Total
1.	17-25	114	144	258
2.	26-35	143	174	317
3.	36-45	135	112	247
4.	46-55	49	46	95
5.	56-65	40	15	55
6.	>65	24	4	28
	Total	**505**	**495**	**1000**

Table I. Age Distribution of Cases

	M	F
Maximum Age	84	85
Minimum Age	17	17
Mean Age	41.31	33.64

Mean age for 1000 cases 37.51.

Table 1 shows the age distribution observed in the present study. The maximum age observed in the present study is 85 years (Case No. 477) and the minimum age is 17 years (Case no. 84). The mean age is 37.51 years.

Sl. No.	Weight in Kg.	Male	Female	Total
1.	40-50	20	87	107
2.	51-60	332	372	704
3.	61-70	149	34	183
4.	>70	4	2	6
	Total	**505**	**495**	**1000**

Table II. Weight Distribution of Cases

Maximum Weight	90 kg	70 kg
Minimum Weight	40 kg	40 kg
Average weight	64.3 kg	54.5 kg

Total mean weight for 1000 cases = 59.47 kg.

Table II shows the weight distribution observed in the present study. The maximum weight observed in the present study is 90 kg (Case No. 265) and the minimum weight is 40 kg (Case No. 70). The mean weight is 59.47 kg.

Sl. No.	Nature of Surgical Procedures	
1.	General Surgeries	526
2.	Orthopaedic	149
3.	Obstetrics (LSCS)	99
4.	Gynaec	204
5.	Urology	22
	Total	**1000**

Table III. Nature of Surgical Procedures

Table III shows the various surgical procedures carried out in the present study.

Total No. of Patients	No. of Patients who Developed PDPH	Incidence
1000	28	2.8%

Table IV. Showing the Incidence of Post-dural Puncture Headache

Table IV shows the incidence of post-dural puncture headache observed in the present study. Out of 1000 patients, 28 patients developed post-dural puncture headache giving an incidence of 2.8%.

Sl. No.	Age in Years	Male	Female	Total	%
1.	17-25	2	4	6	0.6
2.	26-35	1	11	12	1.2
3.	36-45	3	4	7	0.7
4.	46-55	-	4	2	0.2
5.	56-65	1	-	1	0.1
6.	> 65	-	-	-	-
	Total	**7**	**21**	**28**	**-**

Table V. Relationship between Age, Sex and Weight of Patients out of 1000 Cases

Table V shows the relationship between age, sex and weight of patients who developed post-dural puncture headache. 25 patients (89%) who developed post-dural puncture headache were between the ages of 17-45 years and 15 of them were females posted mainly for lower segment Caesarean section (60%).

2 patients aged between 46-55 years and 1 patient 56-65 years developed post-dural puncture headache.

The incidence of post-dural puncture headache in females was more compared to males.

Out of 28 patients who developed post-dural puncture headache, females accounted for 21 cases and the remaining 7 patients were male.

Sl. No.	Size of The Needle	Total Number of Patients	No. of Patients who Developed Headache	%
1.	22 G	354	21	5.9%
2.	23 G	380	7	1.8%
3.	24 G	190	-	-
4.	25 G	67	-	-
5.	26 G	9	-	-
	Total	**1000**	**28**	**2.8%**

Table VI. Relationship between Size of the Needle and Occurrence of PDPH

Table VI The table shows the relationship between size of the needle and occurrence of post-dural puncture headache.

The incidence of post-dural puncture headache after 22 gauge needle was 5.9%.

380 patients were given spinal anaesthesia with 23 gauge needle, out of this 7 patients developed post-dural puncture headache giving an incidence of 1.8% with 23 gauge needle.

None of the patients who were given spinal anaesthesia with 24, 25 and 26 gauge spinal needles developed any post-dural puncture headache.

General Surgical and Orthopaedic Procedures	11
LSCS	7
Gynaec Cases	9
Bilateral Abd, Tubectomy	1
Total	**28**

Table VII. Relationship between Nature of Surgical Procedure and Occurrence PDPH

Table VII shows the relationship between the nature of surgical procedures and post-dural puncture headache.

Out of the 28 patients who developed post-spinal headache, 11 patients underwent general, surgical and orthopaedic procedures. If caesarean section is alone taken, out of 99 patients who underwent lower segment caesarean section, 7 patients developed post-dural puncture headache giving an incidence of nearly 7%.

DISCUSSION

In spite of the progress made in the field of intravenous anaesthesia, even today spinal anaesthesia enjoys a wide popularity in the developing nations. The reasons for it are spinal anaesthesia produces adequate anaesthesia with good muscle relaxation and the entire anaesthetic procedure may be attended to before the operation is begun (Sixten Haraldson). Spinal anaesthesia disturbs the physiological milieu into a minimum and the patient's consciousness and cooperativeness during the surgery.

Relationship of Age to the Incidence of Post-dural puncture Headache.

Sushan Brother et al (1996) noted that patients in the age group of 20-40 years are more likely to develop post-dural puncture headache. Incidence of post-spinal headache is significantly lower in older patients than in younger patients. The reasons offered for this is older people have an altered pain sensitivity of vascular pain receptors and the narrowed route of escape of CSF (Spielman 1982. Kankun 1981). Vandom et al noted that there is high incidence of Post-dural puncture headache in the age group 20-39 years (30%).

Relationship with Sex

Sushan Brothers et al noted that women are more likely to be affected with post-dural puncture headache than men when the risk is adjusted to age. According to Schofield (1957), the sex bound difference in the incidence of post-dural puncture headache is due to emotional, hormonal factors. Vandom et al also noted that there is a higher incidence of post-dural puncture headache in female patients.

In the present study too, out of 28 patients who developed post-dural puncture headache, 21 patients were female and only seven patients were male. The higher incidence of post-dural puncture headache in females observed in the present study concurs with the studies of Sushan Brothers, Vandom et al, and Bonica et al.

Name of the Author	Surgical Procedure
Rasmussen (1989)	Hip replacement
Campbell (1993)[1]	Caesarean section
Mayer et al (1992)	Caesarean section
Ross et al (1993)[2]	Caesarean section
Toffoletto F. et al (1993)	Knee Joint Arthroscopy
Buettner J. et al (1993)[9]	Surgeries on lower extremities
Devcic A et al[3]	Emergency/elective
(1993)	Caesarean sections
Present Study	General and orthopaedic surgeries Obstetric and Gynec Procedures Only caesarean section

Relationship with Nature of Surgical Procedures

Relationship between Weight and Incidence of Post-dural puncture Headache

Sushan Brothers et al noted that a lower body mass index is related to a greater risk of post-dural puncture headache. In morbidly obese obstetric patient, the post-dural puncture headache rate is significantly lower than in non-morbidly obese patients. In the present study, all the patients who developed post-dural puncture headache had their weight in the range of 51-70 kg. None of the patients who were weighing more than 70 kg developed post-dural puncture headache, this concurs with findings of Sushan Brothers.

Relationship of the Size of the Spinal Needle

The following table shows the incidence of post-dural puncture headache by various authors, different size spinal needles ranging from 22 gauge to 26 gauge.

Sl. No.	Gauge	Dripps (1924)	Greene (1926)	Phillips
1.	16	26%	30%	-
2.	19	10%	18%	-
3.	20	14%	14%	14%
4.	22	9%	8%	-
5.	24	6%	2%	3%
6.	26	-	< 1%	-

Dittmen et al in 1988 noted that there is universal consensus about the fact that the thicker the lumbar puncture needle higher could be the Incidence of post-dural puncture headache.[4]

Vandam et al (1956) noted that the incidence of post-dural puncture headache with 16 gauge needle to be 18%, with 19 gauge needle to be 10% and with 20 gauge needle to be 14%. He also noted that when the spinal needle size is reduced to 22 gauge the incidence was lowered to 9% and with 24 gauge it was 6%.

Table Showing the Relationship of the Size of the Spinal needle Table A.

Authors	Sample	Size	% of Headache
1. Sunderg (1992)	22 Q	25	-
2. Lynch (1992)[5]	22 W	100	5%
3. G.Pittoni (1995)	22 S	117	0.8%
4. Jones et al[6] (Myelogram)	22 Q	107	58.2%
5. Peterman et al (Myelogram)	22 Q	340	15.6%
6. Tourtellotte[7] (Bevel tip)	22 Q	100	36%
7. Jones et al[6] (Bevel tip)	22 Q	-	37.5
8. S.B. Peterson (1996)	22 W	340	16%
9. Dripps et al[8]	22 W	-	27%
10. Present study	22 Q	4952	9%
	22 Q	**354**	**5.9%**
Table A			
Present Study	23 G	380	1.8%
Table B			

1.	Trakkila (1992)[9]	24 G	83	2.4%	1.1%	
2.	Cessonini (1990)	24 G	55	-	-	
3.	Mayer (l992)	24 G	151	0.7%	-	
4.	Lim (1992)	24 G	28	10.7%		3.5%
5.	Wiesel (J993)	24 G	47	13.0%		6.3%
6.	Barnet A Green et al (1949)	24 G		2.5%		
7.	Present Study	24 G	190	0.0%		
Table C						

1.	Buettner (1993)[10]	25 G	200	3%	0%
2.	Lynch (1991)[5]	25 W	100	2%	0%
3.	Campbell (1993)[1]	25 W	150	0.7%	0.7%
4.	Ramssen (1989)	25 Q	95	12.6%	NA
5.	G.Pittoni (1995)	25 S	234	0%	0%
6.	Wechler et al	25 G		0.6%	
7.	Ashwh et al (1995)	25 G		0.0%	
8.	Present Study	25 G	67	0.0%	
Table D					

1.	Backer (1990)[11]	26 Q		2%	0%
2.	Tourtellotte et al (1972)[7]	26 Q		12%	
3.	Flatten et al (1989)[12]	26 Q		10.1%	
4.	Ross et al (1993)[2]	26 Q		20%	
5.	Ross et al (1992)[2]	26 Q		8%	
6.	Greene[13]	26		0.4%	
7.	Present study	26 G	9	0.0%	
Table E					

Needle Gauge	No. of Spinal Anaesthetics	No. of PDPH	(%)
16	839	151	18
19	154	16	10
20	2698	377	14
22	4952	430	9
24	634	37	6

Because of the fact that smaller sized spinal needles have a lower incidence of post-dural puncture headache, the use of smaller size needles like 22, 23, 24, 25, 26 gauge, for spinal anaesthesia purposes has become a routine procedure and because of this, the incidence of post-spinal headache is also reduced very significantly.

CONCLUSION

1. Incidence of post-dural puncture headache is around 2.8% in patients undergoing various elective surgical procedures.
2. Patients aged between 20-40 years are at higher risk of developing post-spinal headache.
3. Female patients have a high incidence of post-dural puncture headache compared to males.
4. Obstetric and gynaecological cases carry high incidence of post-dural puncture headache.
5. Thicker the size of the needle, more is incidence of post-dural puncture headache.
6. By using finer size needles like 26 gauge and 27 gauge needle, the incidence of post-dural puncture headache can be reduced to nil.

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