



## INCIDENCE OF POST DURAL PUNCTURE HEADACHE IN SPINAL ANAESTHESIA FOR CHOLECYSTECTOMY

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### ABSTRACT

Post dural puncture headache is a significant and well known complication of puncture of the duramater. Historical reference to Post dural puncture headache was recorded by August Bier in 1899. There is a direct correlation between needle size and risk of Post dural puncture headache. This study comprised of 200 ASA grade I and II patients between 15 to 74 years of age of both sexes who underwent elective cholecystectomy. After undergoing a thorough pre-anaesthetic check up each patient received pre-medication one night before surgery and skin sensitivity test was done. Patient was kept nil orally, a baseline pulse rate, blood pressure and oxygen saturation were recorded. Lumbar puncture was done in sitting position at L<sub>2</sub>-L<sub>3</sub> inter vertebral space with Quincke needle (23, 25, 26 G). After assuring a free flow of clear cerebrospinal fluid 4 ml of 0.5 % bupivacaine heavy was injected. After achieving satisfactory block patients were oxygenated by face mask and regular monitoring of pulse rate, blood pressure and oxygen saturation was done and recorded. Statistical analyses was done by applying students 't' test. The mean age of the patient was 41.2 ± 12.2 years and female patients outnumbered their male counterparts (87.5 %). 25G needle was used in maximum number of patients. The incidence of Post dural puncture headache with 23, 25, 26 G was 24.3 %, 9.2 %, 4.1 % respectively. On statistical analysis the Post dural puncture headache was significantly higher with 23G needle as compared to 25 or 26G (p < 0.05). However there is no statistical significance between 25 and 26G needles. The study concluded that the incidence of post dural puncture headache can be reduced to minimum with the use of small sized needles and proper technique of spinal anaesthesia by an experienced anaesthesiologist.

**Keywords:** Post dural puncture headache, duramater, bupivacaine, cholecystectomy, quincke needle.

### INTRODUCTION

Post dural puncture headache (PDPH) is a significant and well known complication of puncture of the duramater. This occurs in spinal anaesthesia and lumbar puncture and may accidentally, occur in epidural anaesthesia. Leakage of cerebro-spinal fluid (CSF) through dural puncture appears to be the main cause of PDPH and was first proposed in 1902.<sup>1,2</sup> Historical reference to PDPH was recorded by August Bier in 1899 and he described the headache as a feeling of very high pressure in the head, accompanied by light dizziness when raising quickly from the chair.<sup>3</sup> There is a direct correlation between needle size and risk of PDPH. Small gauge needles are reported to have low incidence of complications.<sup>4</sup> Meta analysis of 450 articles showed reduction of PDPH when small gauge non cutting spinal needles (pencil point) are used. With quincke needle the incidence of PDPH is directly related to the size of the needle used.<sup>5</sup> Although pencil point needles are clearly associated with less PDPH compared to cutting needles of the same size yet cutting needles are widely used due to economic reasons and better ease of use.<sup>6-12</sup>

### MATERIAL AND METHODS

This feasibility study comprised of 200 ASA grade I or II patients of both sexes, between 15 to 74 years of age, who underwent elective cholecystectomy. All the patients were screened by the surgical team and a thorough pre-anaesthetic check-up with relevant investigations was done. After undergoing a thorough pre-anaesthetic check-up each patient received Diazepam 5 mg orally, night before surgery and skin test was done with 0.1 ml of bupivacaine. The patient was kept nil orally. A baseline pulse rate, blood pressure and oxygen saturation were recorded. An 18 gauge intravenous cannula was inserted and intravenous fluid was started before

spinal anaesthesia. Lumbar puncture was done in sitting position at L<sub>2</sub>-L<sub>3</sub> inter vertebral space. A quincke 23, 25 or 26 gauge spinal needle was used. After assuring a free flow of clear CSF, 4 ml of 0.5 % bupivacaine heavy was injected. When a satisfactory block was achieved, assessed by gently pinching the skin of the area desired, injection ondansetron was given intravenously followed by injection midazolam in titrated dose intravenously according to the patient's need. All the patients were oxygenated with 4 litres/min by face mask. Regular monitoring of pulse, blood pressure and oxygen saturation was done. Any fall in pulse or blood pressure was managed by injection atropine and injection mephentermine respectively in titrated doses. Pain was treated with injection ketamine 0.5 mg/kg intravenously if needed. All the observations were recorded on an approved Proforma. All the observations, so obtained were subjected to statistical analysis to find percentage and 't' values by paired and unpaired 't' tests, as the case may be.

Ethical clearance number is 403/OJ dated 18/1/2011.

### OBSERVATIONS AND RESULT

The age of patients ranged from 15 to 74 years. The mean age was 41.2 ± 12.2 years. Female patients outnumbered their male counterparts being 87.5 % of the total number of patients. 25 gauge Quincke spinal needle was used in maximum number of patients (70.5 %). Spinal needles used in the remaining 29.5 % of cases was either 26 gauge (11 %) or 23 gauge (18.5 %) (Table 1). 11.5 % of all the patients developed post dural puncture headache. 23 gauge spinal needle was used in 37 patients, out of which 9 patients (24.3 %) complained of headache during post operative period, this number being 4.5 % of the overall incidence of headache. 25 gauge and 26 gauge spinal needles were used in 141 and 22 patients respectively, the incidence of headache pertaining to

these needles being 13 and 1 patient respectively (9.2 % and 4.5 %) (Table 2). On statistical analysis of the above data of incidence of headache related to size of needles, it was observed that the number of patients having post dural puncture headache with 23 gauge needles was significantly higher than those with 25 gauge needle ( $p < 0.05$ ). The comparison of 23 gauge and 26 gauge needles too revealed a statistically significant higher incidence of headache with 23 gauge needles ( $p < 0.05$ ). However, the statistical analysis of post dural puncture headache caused by 25 gauge and 26

gauge needles did not reveal any significant difference. 82.6 % of patients were relieved of headache by taking enough oral fluids and 17.4 % of patients responded by intravenous fluids (500-1000 ml) in 12 hours. No specific oral/ parenteral analgesic was given to any of our patients for headache. However, analgesic injections were being used by the surgical team to relieve surgical pain postoperatively and oral NSAIDS were given for almost one week. None of our patients required aggressive management like blood patching (Table 3).

Table 1: Size of Spinal Needle used

Size of needle (gauge)	Number of patients	Percentage
23	37	18.5
25	141	70.5
26	22	11.0
Total	200	100.0

Table 2: Incidence of Post Dural Puncture Headache

Size of spinal needle (gauge)	No. of Patients	No. of patients developing post dural puncture headache	Percentage
23	37	9	24.3
25	141	13	9.2
26	22	01	4.5
TOTAL	200	23	11.5

Table 3: Relief Measures for Post Dural Puncture Headache

Treatment	No. of patients	Percentage
Oral fluids	19	82.6
IV fluids	4	17.4
Blood patching	0	0.0
Total	23	100.0

## DISCUSSION

Carrie and Collins define post dural puncture headache (PDPH) as “a headache occurring after dural puncture and has a significant effect on the patients post operative well being i.e. headache which is not only postural but also continues for more than 24 hours at any level of intensity or so severe at any time that the patient is unable to maintain upright position.<sup>13,14</sup> The most discussed issue surrounding spinal anaesthesia is PDPH, the incidence reported is between 0 % and 37 %, attributed mainly to patient selection and needle size.<sup>15-19</sup> In our study, in a series of 200 patients, 23 (11.5 %) patients developed PDPH. The incidence of headache was almost similar with that of Vandam and Dripps. In their study the overall risk of PDPH was 11 % in 11000 cases of spinal anaesthesia.<sup>20</sup> Higher incidence of PDPH was reported by various authors which are discordant with our study. Flaaten and Raeder reported an incidence of 37.2 % of PDPH and Cesarini *et al* reported 14.5 % incidence of PDPH.<sup>15,21</sup> A study done by Dagmar Oberhofer *et al* showed frequency of PDPH with 26 and 27G Quincke needles. It was 14.3 % in orthopaedic patients and 13.6 % in parturients.<sup>22</sup> Lower incidence of PDPH were reported by Lybecker *et al*, Agarwal *et al*, Almeida *et al* and Myers *et al*. The incidence of PDPH in their studies were 7.35 %, 5.9 %, 5.6 % and 0.3 % respectively.<sup>23-26</sup> In our study 23, 25 and 26 gauge spinal needles were used in 37, 141 and 22 patients respectively. 9 patients (24.3 %) complained of headache with 23 gauge needle, 13 patients (9.2 %) with 25 gauge needle and 1 patient (4.5 %) with 26 gauge needle during post operative period. On statistical analysis of the incidence of headache related to size of needles, it was observed that the number of patients having post dural puncture headache

with 23 gauge needle was significantly higher than those with 25 gauge needle ( $p < 0.05$ ) and the difference was also significant between 23 and 26 gauge needle ( $p < 0.05$ ) but the study does not reveal any significant difference between 25 and 26 gauge needle. Cesarini *et al* performed a randomized trial of 24 gauge sprotte and 25 gauge quincke needles in patients receiving spinal anaesthesia. There was 14.5 % incidence of PDPH in the quincke group while there was no incidence in sprotte group.<sup>21</sup> Lambert *et al* reported the rate of PDPH with 25 gauge whitacre needle as 1.2 % in comparison to 27 gauge quincke needle as 2.7 %.<sup>10</sup> A randomized comparison done by Buettner *et al* with 25 gauge whitacre and quincke needle revealed a significantly lower incidence of PDPH in the whitacre group (3 % versus 8.5 %).<sup>27</sup> Vandam and Dripps noted that the incidence of PDPH ranged from 18 % with a 16 gauge needle to 5 % with 26 gauge needle.<sup>20</sup> Gary and Kenneth quoted 8 % incidence of spinal headache but Myers *et al* reported only 0.3 % incidence of spinal headache with 26 gauge needle.<sup>26,28</sup> Eckstein *et al* demonstrated a reduction in the incidence of headache from 12 % to 6 % when 25 gauge needle is substituted for a 22 gauge needle.<sup>29</sup> Flaaten and Raeder observed an incidence of PDPH of 37.2 % in 51 young male patients with a 25 gauge quincke needle.<sup>15</sup> Corbey and Bach *et al* conducted a study for the incidence of PDPH in 200 patients under the age of 45 years with 27 gauge quincke or whitacre needles. Incidence of PDPH with quincke needle is 5.6 % and with whitacre is 0 %.<sup>7</sup> A study was done by Corbey and Berg *et al* to compare the incidence of post dural puncture headache with 26 and 27 gauge quincke needles in 205 patients aged 16-45 years. They reported that PDPH was 4.5 % following the use of a 26 gauge needle and 8 % with a

27 gauge needle.<sup>30</sup> Choi *et al* found 6.3 %, 5.6 % and 2.9 % rate of PDPH with 25G, 26G and 27G quincke needles respectively.<sup>6</sup> PDPH is usually self limiting and lasts only a few days. However early treatment is indicated if symptoms persist. Once PDPH is suspected a number of treatment options are available, ranging from non-invasive pharmacological approaches (Methylxanthines, ACTH, Caffeine) to invasive approaches (Epidural saline/ Dextran and Epidural blood patch). Epidural blood patch has a success rate of 96-98 % and has been recognized as the definitive treatment for PDPH.<sup>17,31-34</sup> In a review article 70 % success rate was quoted after blood patching.<sup>35,36</sup> Conservative measures start with bed rest, along with enhanced oral hydration which remains a popular therapy for PDPH. Simple analgesics such as acetaminophen and NSAIDs may provide some benefit.<sup>37-39</sup> In our study 82.6 % (19) patients responded well to bed rest and increased oral fluid intake, no specific oral/ parenteral analgesics were given to our patients and none of them required aggressive management like blood patching which is similar to the study done by Agarwal *et al* and Dagmar Oberhofer *et al*.<sup>22,23</sup> A Norwegian study done in 1985, by Flaaten and Raeder, their 2 patients required treatment of PDPH by blood patch.<sup>15</sup> Another study done by Almeida *et al*, their 3 patients out of 38 required epidural blood patch.<sup>24</sup> A study done by Lybecker H *et al*, 75 patients complained of PDPH out of which 45 patients (60 %) recovered spontaneously and 30 patients (40 %) were treated with an autologous blood patch.<sup>25</sup>

## CONCLUSION

Post dural puncture headache is directly related to the size and type of the spinal needle used. The study concluded that the incidence of post dural puncture headache can be reduced to minimum with the use of small sized needles and proper technique of spinal anaesthesia by an experienced anesthesiologist.

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