

# Epidural Blood Patch For Postdural Puncture Headache - A Prospective Study of 60 Patients

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## ABSTRACT

**Introduction:** Spinal anaesthesia is used widely now a days. This dural puncture is associated with CSF leak which decreases the intracranial pressure and causes headache. The incidence of postdural puncture headache was around 66% in 1898. With the advent of 22G to 29G spinal needles, the incidence decreased to 11%. The aim of present study was to assess the effectiveness of epidural blood patch in treating postdural puncture headache.

**Material and methods:** A total of 60 patients were involved in this prospective study. All the patients received epidural blood patch for postdural puncture headache. Lumbar epidural puncture was performed at the site of previous puncture or as chosen by the operator. 22 ± 5 ml of blood from antecubital vein was injected in the absence of any pain. Age, height and gender of the patients were noted. The size of the needle used, difficulties encountered during puncture were also noted. Presence of clinical symptoms, delay between dural puncture and EBP and level of EBP were also noted. NCSS software was used for analysis. Fisher test or unpaired t test was used for analysis.

**Result:** Majority of the patients presented with neck pain (87.5%) and headache (96%). Vestibular signs like nausea and vomiting were present in 69.6% of patients. Cochlear signs were present in 35.7% cases and ocular signs were present in 35.7% cases. The volume of injected blood was 22 +/- 5 ml. Complete relief of symptoms occurred in 75% cases and 25% patients had incomplete relief. The failure rate was only 6%.

**Conclusion:** Epidural blood patch is an effective treatment option for postdural puncture headache. According to our study it offered a success rate of 93.3%.

**Keywords:** Anticubital, Epidural, Postdural, Spinal Anaesthesia

## INTRODUCTION

The introduction of spinal anaesthesia was in the year 1891, when Wynter and Quincke used aspiration of CSF as a mode of treatment of raised intracranial pressure.<sup>1</sup> With the advent of spinal anaesthesia, the use of general anaesthesia has taken a side and it is now widely used in obstetrics and lower limb surgeries. Association of headache with CSF leakage has been in knowledge since 1898 when Karl Bier demonstrated his experience. Headache and backache are the most common symptoms associated with dural puncture.<sup>2</sup> 90% headaches begin within 3 days of procedure. Headache is described as severe, searing and spreading like hot metal.<sup>3</sup> The post dural puncture headache causes significant morbidity amongst patients. Various neck, vestibular and ocular symptoms are associated with postdural puncture headache and these clinical signs act as a diagnostic criteria for detecting accidental puncture.<sup>4</sup> The mechanism by which CSF loss causes headache is not clear. There are two schools of thoughts. The first states that decrease in intracranial pressure causes traction on the intracranial structures especially when the patient is in erect

position. According to the second theory, decrease in CSF volume lead to compensatory increase in intracranial blood volume by venodilation causing headache. The incidence of postdural puncture headache was around 66% in 1898.<sup>5</sup> With the advent of 22 G and 24 G needles, the incidence decreased to 11%.<sup>6</sup> Many treatment modalities have been used like intrathecal catheter, intravenous gabapentin, epidural morphine and ACTH. Various studies have been done on epidural blood patch to evaluate its effectiveness.<sup>7-9</sup> In 1960, Gormley proposed injection of autologous blood in lumbar epidural space.<sup>10</sup> There are also two schools of thoughts regarding its mechanism of action. According to one, a clot is formed of the injected blood which adheres to the hole in duramater<sup>11,12</sup> and according to second the blood injected increases the CSF pressure, thus reducing the traction on the brain and meningeal structures.<sup>13,14</sup> The volume of blood to be injected to obtain sure shot results is still controversial.<sup>10,15</sup> The aim of present study was to assess the effectiveness of epidural patch in treating postdural puncture headache.

## MATERIAL AND METHODS

Patients reporting to the institute, state during the period of March, 2013- December, 2016 were enrolled in the study. Diagnosis was made on the basis of history of dural puncture with associated postural symptoms. Patients were forced to stay in bed due to their headache. All the patients were treated by epidural blood patch. Patients with suspected infection, hemolysis was not included in the study. Severely immunocompromised patients were also excluded.

### Technique

It was performed while maintaining strict aseptic conditions and the patient in sitting position. 18 G needle was used to locate the lumbar epidural space by loss of resistance technique. The level of puncture for EBP was close to the underlying site of dural puncture. If not known, the site was chosen by the operator. After locating the epidural space, venous sample drawn from antecubital vein was slowly injected into the space under aseptic conditions. The speed of approximately 0.3 ml/sec was used. The injection was stopped after the appearance of pain in legs, back or buttocks. The operator injected at least 20 ml of blood in the absence of any pain.<sup>16</sup> The cannula was removed and the patient was asked to stay in dorsal decubitus position for one hour.<sup>17</sup> Patient was evaluated one hour after the injection

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for its effectiveness and then on 1<sup>st</sup> and 15<sup>th</sup> postoperative day. The result was classified into complete relief, incomplete relief or failure. Complete disappearance of all the symptoms was regarded as complete relief. Patients who resumed their daily activity and showed improvement were taken as incomplete relief. Patients who showed no relief and had to stay on bed for a part of the day were regarded as failure cases.

Age, height and gender of the patients were noted. The size of the needle used, difficulties encountered during puncture were also noted. Presence of clinical symptoms, delay between dural puncture and EBP and level of EBP were also noted.

## STATISTICAL ANALYSIS

Data was expressed as mean +/- Standard deviation. Comparison of patients with incomplete and complete relief of symptoms was performed by unpaired t test or Fischer test when required. P <0.05 was considered significant. NCSS software was used for analysis.

## RESULT

Total of 60 patients were included in this study during a period of three years. Out of these 45 patients were females and rest 15 patients were males. In around 18% of cases dural puncture lead to PDPH, out of which 4 patients were of spinal anaesthesia and 7 patients were of epidural anaesthesia. Among these regional anaesthesia was provided to all for surgery. 9 patients (15%) of PDPH reported after use of Touhy needle (17-18 G). Figure 1 shows the vertebral space where dural puncture was performed and where epidural patch was given. Symptoms of CSF leak were noted after a delay of 1-10 days after dural puncture. Majority of the patients presented with neck pain (87.5%) and headache (96%). Vestibular signs like nausea and vomiting were present in 69.6% of patients. Cochlear signs were present in 35.7% cases and ocular signs were present in 35.7% cases. Epidural blood patch was given after a delay of 1-53 days,

median of 4 days. The volume of injected blood was 22 +/- 5 ml. In 47 patients discomfort occurred by injection of 19 +/- 5 ml of blood. Pain occurred in 32 patients (53.3%) which were mostly preceded by discomfort. Patients with pain and discomfort were given lower volume of blood. Complete relief of symptoms occurred in 75% cases and 25% patients had incomplete relief. The failure rate was only 6%. Table 1 depicts the factors responsible for failure and incomplete relief. Failure rate and patients with incomplete relief were higher in patients receiving dural puncture with needle less than 20 G. Only 11.6% of patients presented with difficulties during epidural patch (Figure-1). Fever was the only complication encountered during this study which also resolved spontaneously.

## DISCUSSION

According to our study on PDPH, epidural blood patch is an effective and safe treatment, around 75% of the patients had complete relief from symptoms. The failure rate was only 7%. There exists a dilemma amongst the anaesthesiologists regarding the treatment of postdural puncture headache. According to a study by Baysinger et al<sup>18</sup> in 2011, many anaesthetics in North America still resort to older treatment of oral caffeine, NSAIDS and bed rest as a treatment for postdural puncture headache. Anaesthesiologists are still avoiding newer techniques like epidural blood patch, intravenous cosyntropin and neuraxial morphine. According to findings of Vercauteren et al<sup>9</sup>, the effectiveness of EBP is highly variable as the criteria of success are different amongst different studies. In our study the symptom of CSF leak appear after a delay of approximately 1 day. Headache and neck symptoms are the most frequently reported symptoms. According to our study, the incidence of dural puncture was greater with larger gauge needle which was similar to a study conducted by Stride and Croper.<sup>19</sup> Larger the puncture, more difficult it is to seal with epidural blood patch. According to studies, dural puncture with 22G or 24G needles,

	Relief of symptoms		Global results	
	Complete (n=45)	Incomplete (n=15)	Success (n=56)	Failure (n=4)
Age (yrs)	36 +/- 10	35 +/-10	36 +/-10	35 +/- 11
Sex (females)	34	11	38	2
Height (cm)	165 +/- 6	167 +/- 8	166 +/- 7	165 +/- 6
Symptoms				
Delay	1 (1-8)	1 (1-10)	1 (1-8)	1 (1-2)
Neck Pain	37 (82%)	14 (93.3%)	49(87.5%)	3(75%)
Headache	44 (98%)	14 (93.3%)	54(96.4%)	3(75%)
Vestibular sign	32 (71%)	10 (66.6%)	39(69.6%)	2(50%)
Cochlear sign	17 (37.7%)	5 (33.3%)	20(35.7%)	1(25%)
Ocular sign	16 (35.5%)	5 (33.3%)	20 (35.7%)	0
Dural puncture				
Surgery	8	3	9	1
Tuohy needle	6	3	6	1
Needle diameter < 20 G	7	4	8	2
Epidural blood patch				
Discomfort	35 (77%)	12 (80%)	44 (78.5%)	4 (100%)
Pain	23 (51%)	9 (60%)	30 (53.5%)	0
Delay	5 (1-30)	4 (1-53)	4 (1-53)	2 (1-8)
Delay < 4 days	21	7	26 (46.4%)	3 (75%)
Difficulties	5 (11.11%)	2 (13.3%)	5 (8.9%)	1(25%)
Volume (ml)	22 +/- 5	22 +/- 5	22 +/- 5	22 +/- 5

**Table-1:** Shows the demographic data, delay, most common presenting symptoms and difficulties of epidural patch

resolved on its own in about 85% of cases.<sup>20</sup> According to a study by Bradbury et al and Norris et al<sup>21,22</sup>, lateral orientation of the needle decreased the incidence of postdural puncture from 2.4% - 1.4%.

In our study a median delay of 4 days in performing EBP was there after dural puncture. Retrospective study by Loeser et al<sup>23</sup> states that there is a benefit in delaying epidural blood patch but in their study the reason of performing early and late EBP was not known. According to our study, increased severity of CSF leakage could be the possible cause of diminished effectiveness in the early EBP. There have been reports that early EBP was more effective.<sup>24,25</sup> According to our study the volume of blood injected had no influence on success of epidural blood patch. This was in accordance with the study by Taivainen et al.<sup>26</sup>

Various conservative treatments have come up which aim at preventing and decreasing the incidence of PDPH, but their effectiveness is till controversial. Some suggest bed rest decreases the incidence of PDPH but according a study by Carbaat et al<sup>27</sup>, there was no significant difference in the rate of PDPH amongst patients who were immobilised versus 24 hours of bed rest. Amongst never treatment modalities include the use of gabapentin and pregabalin. Both are effective in decreasing the pain of PDPH.<sup>28,29</sup> But since long epidural blood patch is regarded as a treatment of choice for PDPH. A study by Banks et al<sup>30</sup> complete relief was seen in 50% patients, 38% patients got partial relief and 12% had no relief in symptoms on receiving epidural blood patch.

## CONCLUSION

Epidural blood patch is an effective treatment option for treatment of postdural puncture headache. It has a success rate of 93.3% according to our study. The risk of dural leak is lesser if a needle of lesser gauge is used.

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