Research Article

Effect of Hydrocortisone on Reducing severity of Post Dural Puncture Headache after Spinal Anesthesia for Elective Caesarean Section

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Abstract | Spinal anesthesia is frequently used in pregnant female undergoing caesarean section due to its safety than general anaesthesia. Post dural puncture headache (PDPH) is commonly occurring problem associated with spinal anaesthesia and causes a considerable morbidity. PDPH depends on several factor and various methods have been used to reduce and treat the pain of PDPH. We evaluated effects of hydrocortisone on the treatment of PDPH in obstetrical patient. To compare mean decrease in Visual Analogue Scalepain score in patients who developed PDPH after elective caesarean section under spinal anaesthesia who were given conventional treatment versus conventional treatment plus hydrocortisone. Double blind randomized control trial. Study conducted in department of anaesthesia and obstetrics of Allama Iqbal Medical College, Jinnah hospital (tertiary care) conducted from13th June 2014 to 13th December 2014. Sample size was calculated 60 (30 each) cases using 95% confidence interval, 80% power of test. Patients who developed PDPH after spinal anaesthesia for elective caesarean section were divided into 2 group; Group A (Conventional Treatment) and Group B, (Conventional Treatment plus Hydrocortisone 100mg 8 hourly for 48 hours). Details were recorded regarding age; mean pretreatment and post treatment VAS after 6 hours. Mean decrease in pain VAS score was 3.30 ± 1.2 in group A while 7.17± 1.3 in group B. (P value 0.001). Intravenous hydrocortisone is more effective in reducing post dural puncture headache pain severity after spinal anaesthesia for elective caesarean section when given along with conventional treatment as compared to conventional treatment alone.

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Introduction

80-90% caesareans are performed under regional anaesthesia. Spinal Anaesthesia is easier to administer and has quick onset and dense motor blockade. It has proved to be extremely safe if administered with care and preventive measures but along with these measures still there are chances of problems. It allows parturient mother to be awake during procedure and feel the childbirth, provision of early breast feed. It also prevents the incidence of pulmonary aspiration and problems associated with intubation like difficult intubation, stress response and injuries associated with laryngoscopy. Spinal Anaesthesia is associated with reduced chances of deep venous thrombosis and pulmonary embolism, significant less surgical bleed-

ing and number of transfusions required. Other advantages of Spinal Anaesthesia are short nil per oral time postoperatively due to early return of gut motility, early mobilization, significantly less post-operative nausea and vomiting, less or no pain immediately after surgery, no sore throat and cough along with decreased hospital stay.[1]

If after spinal anaesthesia headache occurs with sitting, standing or walking then it is labeled as Post Dural Puncture Headache (PDPH). Its incidence after spinal anaesthesia in obstetrics is 1-6% while it may be 80% after inadvertent dural puncture during epidural anaesthesia. [2]This headache significantly increases morbidity by causing nausea, vomiting, or visual disturbances and prolonging hospital stay for both mother and child. [3], [4]

PDPH is caused because of loss of cerebrospinal fluid from subarachnoid space into the epidural space decreasing the cerebrospinal fluid pressure and downward movement of the brain and traction on the dura and meninges. [5]Bed rest, intravenous fluids, diclofenac sodium, paracetamol, caffeine and epidural blood patch have been used for the management of PDPH. [6]Epidural blood patch is very effective and is used when conservative measures do not work or pain is very severe. Steroids cause their clinical effects by promoting the reabsorption of CSF from the extradural spaces to increase CSF amount in subarachnoid space. [7]Alam et al in non-obstetrical patients found that hydrocortisone plus conventional treatment decreases pain score in patients with PDPH from 9.32 + 0.83 before start of treatment to 2.06±1.98 after 6 h of treatment (mean decrease in pain score 7.26±1.15) as compared to conventional treatment alone from 9.17±1.69 to 6.02±2.46 (mean decrease in pain score 3.15±.77). [8]There are three case reports of hydrocortisone in obstetric patients used to treat post-dural puncture headache who were not responding to conventional medication. [9]In pregnant patients who developed PDPH after spinal anaesthesia, the mean pain VAS score was 6.63 ± 1.35 with conventional treatment while with conventional treatment plus intravenous hydrocortisone the mean VAS score was 2.77 ± 1.07 after 6 hours of treatment ($p < 0.001$) [10]. Rationale of this study was to find the effectiveness of hydrocortisone on PDPH management in obstetrical patient as other drugs like Pregabalin, Gabapentine and Sumatriptan are not safe in lactating mothers so that a safe drug can be used for management of PDPH to reduce patient's morbidity, hospital stay and cost.

To compare mean decrease in VAS pain score in patients who developed PDPH after elective caesarean section under spinal anaesthesia who were given conventional treatment versus conventional treatment plus hydrocortisone.

Study conducted in departments of anesthesia and obstetrics & Gynecology of Allama Iqbal Medical College, Jinnah hospital (tertiary care) conducted from13th June 2014 to 13th December 2014. This study was double blind randomized control trial

Materials and Methods

Institutional ethical review board permission and informed consentfrom patients study was taken. We included pregnant women who developed PDPH after elective caesarean section under spinal anaesthesia, Age group 21-40 years. ASA Status II. Patients with Obesity Body Mass Index >30Kg/m^2, with chronic headache, convulsion, CVA diagnosed on history & examination and hypertensive patients (BP > 140/90mmHg) were excluded.

Sample size was calculated 60 (30 each) cases using 95% confidence interval, 80% power of test with an expected mean decrease in pain score in hydrocortisone group as 7.26 ± 1.15 and in placebo group as 3.15 ± 0.77[8].In all patients, spinal anaesthesia was performed by same anesthesiologists using midline approach while patients were in sitting position using 25-gauge cutting needle and 0.75% hyperbaric Bupivacaine 12 mg to 15 mg depending height of patients. Patients who developed PDPH were randomly assigned by using lottery method into group A and B. In Group A patients were treated with bed rest, hydration, diclofenac sodium 50mg BD, paracetamol-caffeine 500mg 2 tab QID along with 2 ml of 0.9% normal saline IV (placebo) three times a day for 48 h. In Group B patients were treated as in group Aplus100mg hydrocortisone, prepared in 2 ml, IV three times a day for 48 h. The researcher was blinded to this treatment. An observer blinded to the groups assessed the pain score before start of treatment and 6 h after beginning of treatment, by asking patients to explain the severity of PDPH by using a visual analogue scale after keeping patients in sitting position

for 1 min. Difference in pain score before and after treatment was recorded (according to operational definition). No patient was dropped out. All the information was entered in predesigned proforma.

All concerned information wasentered in SPSS version 20. Mean and standard deviation were calculated for quantitative variable like age, mean VAS score. T test was used to analyze the difference of VAS for PDPH betweentwo groups. < 0.05 P value was considered statistically significant. Data was stratified for age. T test was applied post stratification with considering p value < 0.05 as statistically significant.

Results and Discussion

There was no significant difference in mean age and mean pretreatment VAS pain score in both groups. The Mean post treatment VAS pain score in group B was significantly lower as compared to group A (Table 1).

Table 1: *Pain on VAS in both groups.*

Pain on VAS	Group A (Conventional Treatment) (n=30)	Group B (Conventional Treatment plus Hydrocortisone) (n=30)	P Value
	Mean ± SD	Mean ± SD	
Pre Treatment	8.30 ± 0.9	8.10 ± 1.2	0.613
Post Treatment	5.00 ± 0.8	0.93 ± 0.7	0.001
Mean Decrease	3.30 ± 1.2	7.17 ± 1.3	0.001

In this we found that hydrocortisone 100 mg intravenous for 48 hours three times a day decreased mean pain VAS score from 8 to less than 1 when given with conventional treatment where as conventional treatment alone decreased mean VAS score from 8 to 5.

As we know that VAS score 1 is considered as minimum pain and no medication is required for this level of pain. On the other hand mean VAS score 5 is moderate pain and further pain medication is recommended for the patients with this severity of pain. Hydrocortisone is safe to be taken i.v. at home so hospital admission is not required for the treatment of PDPH. Whenever patient complaints of PDPH, should be taken seriously because of its debilitating effects and important differential diagnosis. ASA's closed claims analysis project showed that PDPH is the third most common issue for which obstetric anaesthetists had to face litigation.[10]

PDPH is considered to be caused by dural leakage of CSF from the subarachnoid space into epidural space by dural puncture with spinal needle. Potential factors contributing to affect the incidence of PDPH are pregnancy, young patients, females, needle tip shape (cutting versus non cutting), needle gauge size, bevel orientation, number of lumbar puncture (LP) attempts, previous history of PDPH approach (medianversusparamedian), clinical experience of the anaesthetist performing the procedure.[11],[12]

PDPH treatment aims at reducing leakage while increase formation of CSF, sealing the hole in dura and decreasing the vasodilation in brain tissue. When conservative treat is not effective and headache is severe and refractory with prolonged hospital stay only then Epidural blood patch (EBP) which is significantly invasive treatment should be considered. After epidural blood patch headache improvement is due to a formation of patch of clotted blood sealing the hole in dura, interrupting the leakage of CSF and simultaneously causing decrease in subarachnoid space due to expansion of epidural space. Adrenocorticotropic hormone (ACTH) has been considered as alternative therapy to EBP when PDPH isrefractory to conservative treatment strategy or when there is EBP failure or not suitable.[13],[14]

Alam et al in non-obstetrical patients has shown that hydrocortisone plus conventional treatment decreases pain VAS score in patients with PDPH from 9.32 ± 0.83 before start of treatment to 2.06 ± 1.98 after 6 h of treatment (mean decrease in pain score 7.26 ± 1.15) as compared to conventional treatment alone from 9.17 ± 1.69 to 6.02 ± 2.46 (mean decrease in pain score 3.15 ± 0.77).[8]

Similar results were shown by another study in which the mean PDPH pain VAS score in patients treated with conventional treatment was 6.63 ± 1.35 while in patients who received intravenous hydrocortisone along with conventional treatment was 2.77 ± 1.07 after 6 hours of treatment (p <0.001)[10].

Turiel et al reported three obstetric patients of PDPH whichwas refractory to treatment with analgesics, bed

rest, hydration and caffeine. The first case was with spinal anaesthesia by 22G needle and the other two cases were accidental dural perforation during attempted epidural block with 18G needles. All three patients developed refractory PDPH. Intravenous hydrocortisone (100 mg) every 8 hours was given and there was complete relief of PDPH in all three patients.[16]

On the basis of efficacy of ACTH regarding the treatment of PDPH it is considered that it must be causing release of steroid hormones. So Hydrocortisone considered being useful in patients, who present with PDPH after spinal anaesthesia, provided it is not given to those patients who have signs of active infection, history of diabetes mellitus, hypertension or gastro-intestinal ulcer.[17]

Other drugs which are being used for the treatment of PDPH are Pregabalin, Gabapentine and Sumatriptan but these drugs are not safe in lactating mothers[11]. Exact mechanism of hydrocortisone in reducing PDPH is unknown. Dexamethasone was also used as prophylaxis for the prevention of PDPH after spinal anaesthesia in double blind randomized control trail and it was associated with increased frequency of PDPH.[19]

Limitations and Suggestions

Hydrocortisone has to be given i.v. It can increase patient hospital stay as drug has to be given for 48 hours or trained person is required for home injections. We assessed decrease in PDPH after 6 hours but drug was given for 48 hours that means single dose is considered to be effective.

Further research at larger scale is recommended to have the significant data regarding dose, route, safety in lactating mothers and duration of treatment of hydrocortisone for the management of PDPH.

Conclusions

Intravenous hydrocortisone is more effective in reducing post dural puncture headache pain severity after spinal anaesthesia for elective caesarean section when given along with conventional treatment as compared to conventional treatment alone.

Author's Contribution

Shumaila Ashfaq: Data collection

Liaqat Ali: Selection of the study and wrote the manuscript

Muhammad Ashraf Zia: Reviewed the manuscript

Rizwan Ahmad Khan: Edited the data

Mehtash Butt: Data entry

References

1. Braveman FR, Scavone BM, Wong C, Santos AC. Obstetrical anesthesia. In: Brash PG, Cullen BF, Stoelting RK, Cahalan MK, Stock MC eds. Clinical anesthesia. 6th ed. Philadelphia: Wolters Kluver Lippincott Williams & Wilkins; 2009.p.1145-6.
2. Wrobel M, Thomas Volk T. Post-Dural Puncture Headache. Anesth Pain. 2012; 1:273-74. https://doi.org/10.5812/aapm.3610
3. Rabiul MA, Raheen MR, Iqbal KM, Chowdhury RA. Headache following Spinal Anaesthesia: A Review on Recent Update. J Bangladesh Coll Phys Surg. 2011; 29:32-40.
4. Apfel CC, Saxena A, Cakmakkaya OS, Gaiser R, George E, Radke O. Prevention of postdural puncture headache after accidental dural puncture: a quantitative systematic review. Br J Anaesth. 2010; 105:255-63. https://doi.org/10.1093/bja/aeq191
5. Basurto Ona X, Martinez Garcia L, Sola I, Bonfill Cosp X. Drug therapy for treating post-dural puncture headache. Cochrane Database Syst Rev. 2011; (8):CD007887. https://doi.org/10.1002/14651858.CD007887.pub2
6. Zencirci B. Postdural puncture headache and pregabalin. J Pain Res. 2010; 3: 11–14. https://doi.org/10.2147/JPR.S9445
7. David B, Richard B, Lipton, Sait A. Post-Dural Puncture Headache: Diagnosis, Epidemiology, Etiology, and Pathophysiology. Headache 2010; 50: 1144-52. https://doi.org/10.1111/j.1526-4610.2010.01699.x
8. Alam MR, Rahman MA, Ershad R. Role of very short-term intravenous hydrocortisone in reducing postdural puncture headache. J Anaesthesiol Clin Pharmacol. 2012; 28:190-3. https://doi.org/10.4103/0970-9185.94840
9. Neves JF, Vieira VL, Saldanha RM, Vieira Fde A, CoutinhoNeto M, Magalhães MG et al. Hydrocortisone treatment and prevent post-dural puncture headache: case reports. Rev Bras Anestesiol. 2005 Jun; 55(3):343-9. https://doi.org/10.1590/S0034-70942005000300011

10. Noyanashraf MA, Sadeghi A, Azarbakht Z, Salehi S, Hamediseresht E. M.E.J. ANESTH, 2007; 19:415-22.
11. Kwak KH. Postdural puncture headache. Korean J Anesthesiol. 2017; 70: 136-143. https://doi.org/10.4097/kjae.2017.70.2.136
12. Chadwick HS. An analysis of obstetric anesthesia cases from the American Society of Anesthesiologists' closed claims project database. Int J Obstet Anesth. 1996; 5:258-63. https://doi.org/10.1016/S0959-289X(96)80047-1
13. Dittmann M, Schaefer HG and Renkl F, Greve I. Spinal anaesthesia with 29 gauge Quincke point needles and post dural puncture headache in 2,378 patients. Acta Anaesthesiol Scand. 1994; 38:691-3. https://doi.org/10.1111/j.1399-6576.1994.tb03978.x
14. Turnbull DK, Shepherd DB. Post-dural puncture headache: pathogenesis, prevention and treatment. Br J Anaesth. 2003; 91:718-729. https://doi.org/10.1093/bja/aeg231
15. Cousins MJ, Brazier D, Cook R. Intracranial hypotension caused by cervical cerebrospinal fluid leak: treatment with epidural blood patch. Anesth Analg. 2004; 98:1794-1797. https://doi.org/10.1213/01.ANE.0000117225.31416.36
16. Longo S - Postdural puncture: implications and complications. Curr Opin Anaesthesiol. 1999; 12:271-275. https://doi.org/10.1097/00001503-199906000-00002
17. Turiel MM, Simón MOR, La Lastra JS et al - Tratamiento de la cefaleapostpuncióndural con hidrocortisonaintravenosa. Rev Esp Anestesiol Reanim. 2002; 49:101-104.
18. Carter BL, Pasupuleti R - Use of intravenous cosyntropin in the treatment of postdural puncture headache. Anesthesiology. 1999; 91:576-577.
19. Yang B, Li DL, Dong P et al. Effect of dexamethasone on the incidence of post-dural puncture headache after spinal anesthesia: a randomized, double-blind, placebo-controlled trial and a meta-analysis. Acta Neurol Belg. 2015; 115:59-67. https://doi.org/10.1007/s13760-014-0307-x