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A RANDOMIZED DOUBLE BLIND STUDY TO FIND THE INCIDENCE OF POST DURAL PUNCTURE HEADACHE USING QUINCKE AND WHITACRE NEEDLES

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ABSTRACT

The objectives of this study is to find the incidence of post dural puncture headache(PDPH) while using traumatic(Quincke) and atraumatic(Whitacre) needles for spinal anaesthesia . A prospective randomized double blind study in 100 ASA 1 and 2 patients undergoing lumbar subarachnoid block for elective inguinal hernia surgery conducted over 8 months. Lumbar puncture was performed by Anaesthesiologists with more than 5 years clinical experience. The number of attempts at dural puncture and ease of using spinal needle was noted. The incidence of PDPH was assessed upto postoperative day 7. Data could not be analysed using lab tests as the incidence was nil in the Whitacre group. Only 2(4%) incidence of PDPH was reported in the Quincke needle group while there was no incidence in the Whitacre group. 2 spinal anesthesia procedures had to be abandoned in the Whitacre group. It can be concluded that Whitacre needle has less incidence of postdural puncture headache when compared to Quincke needle of comparable bore sizes. Though the Whitacre needle group did not show any incidence of post dural puncture headache, the Quincke group showed only 2 cases out of 50 cases of postdural puncture headache which is not statistically significant.

KEYWORDS: **Post dural puncture headache, traumatic needle, atraumatic needle, Whitacre needle, Quincke needle.**

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INTRODUCTION

Post dural puncture headache (PDPH) is a distressing complication of central neuraxial blockade[1-2] especially in postoperative patients who are burdened with the stress of surgery and the surgical wound. Some of the contributing factors to PDPH are, the type of needle used[3], bore size of needle[3], surgery for which the patient has come(obstetrics shows high incidence[4], needle orientation[5-6] and experience of the Anesthesiologist.[7] Most of these factors are easily modifyable. It has been seen that the rate of CSF loss through a hole made in the duramater by a needle of 25 G or more bore size is 0.084-4.5 ml/sec when compared to the rate of CSF production which is 0.35/min.[1] This wide range of flow between 0.084-4.5ml/sec in the same bore size may be attributed to the above mentioned factors. Alignment of the needle while piercing the duramater was not seen as a factor in PDPH.[8] Studies have shown that PDPH is incident in 0.3-20% of cases where 26 G Quincke needle was used [9-10] , while comparable incidence of 0-14.5% was seen with Whitacre 25 G.[11-12]

MATERIALS AND METHODS

After obtaining Institutional Ethical Committee approval, 100 consenting adults of American Society of Anaesthesiologists(ASA) 1 & 2 status undergoing hernia repair below the umbilicus were enrolled in the study which was undertaken for a period of 10 months. These patients were aged between 20 to 70 years, weighing 45 to 80 kg and a height of 150-180 cm. After applying the exclusion crieteria, 100 patients were allocated into two groups randomly according to lots taken by the Anaesthesiologist performing the lumbar puncture. The patients were blinded as to which group they were assigned to. The observer was also blinded and did not know which group each patient belonged to. The groups were assigned as Group 1(Whitacre group) and Group 2 (Quincke group).All dural taps were performed by Anaesthesiologists with >5 years post PG experience to eliminate any bias due to inexperience on the part of the perfomer. The number of attempts of dural puncture and ease of using the spinal needle were noted down. All Anaesthesiologists were well versed in using the Quincke needle in their day to day clinical practice. After securing a wide bore canula, Lactated Ringers solution infusion was started. All mandatory monitors like ECG, SPO_2, NiBP were attached. Oxygen was supplemented with a face mask. Premedication was given with Inj. Midazolam 1mg intravenously. After positioning the patient and applying strict asepsis, local anaesthetic 2% lignocaine was injected into the L3-L4 or L2-L3 space. By median approach, using either 25G Whitacre or 26 G Quincke needle 3 to 3.5 cc of 0.5% bupivacaine heavy was injected into the subarachnoid space after ensuring free flow of CSF. The patient was laid supine and pulse rate, blood pressure and respiratory rate were monitored every minute for the first 10 minutes and every 5 minutes thereafter. All patients were hydrated intraoperatively to maintain haemodynamic stability. Vasorpessors and anticholinegics were used if necessary, to maintain haemodynamic stability. At the end of surgery 100 mg diclofenac suppository was introduced into the patient per rectally for postoperative analgesia. Amount of intravenous fluid given intraoperatively and duration of surgery was also noted. The patient was monitored postoperatively till motor block started wearing off. Side effects like nausea, vomiting, pruritus, gastritis and head ache were monitored for. The patient was followed up for 7 days postoperatively. In case they were discharged before 7 days, they were asked to inform us in case headache developed and to report to hospital. Headache was noted for time of onset, type, site, factors relieving it and aggravating it. Any headache fronto-occipital in nature aggravated by standing, straining, leaning forward, and relieved on rest was identified as postdural puncture headache.

RESULTS

100 patients were enrolled in this study. Only 98 patients were included in the analysis as 2 patients from Group 1 had to be excluded due to technical reasons. In Group 1 there were 35 males and 13 females while in Group 2 there were 40 males and 10 females. Both groups were comparable with respect to age, weight, height and sex. 2 patients were excluded from Group 1 as the Anaesthesiologist experienced difficulty in locating the subarachnoid space. 25 G Whitacre needle comes with an introducer needle. So in cases where there is difficulty in locating the subarachnoid space, the maneuverability of the Whitacre needle was limited within the space due to the introducer needle. So in both these cases the Anaesthesiologist had to revert back to a wider gauge Quincke needle which he/she was more familiar with and which afforded more maneuverability within the intervertebral space. In both cases they were able to tap CSF but with difficulty. the incidence of PDPH was assessed upto postoperative day 7. In the Whitacre group no patient developed PDPH as against the Quincke group where 2 patients out of the 50 developed PDPD. This amounts to 0% incidence in Group 1 and 4% incidence in Group 2. Data could not be analysed using lab tests as the incidence was nil in

the Whitacre group. Postdural pucture headache was promptly treated with analgesics and no epidural blood patch was requried in both the cases.

Table 1
Demographic Data

Patient Charecteristics	Group 1 (Whitacre Group) (n=48)	Group 2 (Quincke Group) (n=50)
Age(years)	48.1 ± 11.9	48.9 ± 11.2
Body weight(Kg)	65.2 ± 5.8	64.9 ± 6.2
Height (cm)	163.3 ± 8.6	163.9 ± 8.2

Values expressed as mean ± SD; n-number of patients; SD-standard deviation

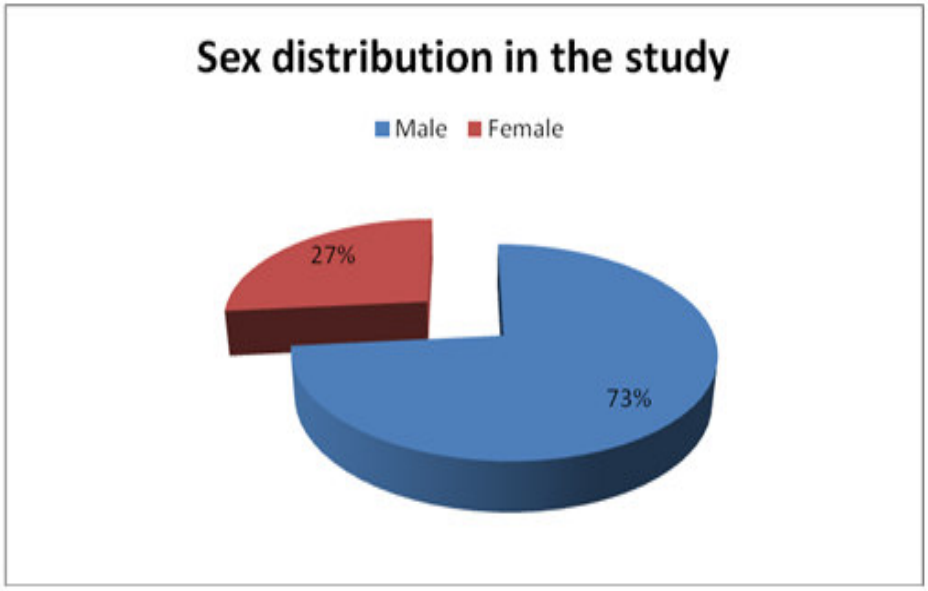

Figure 1

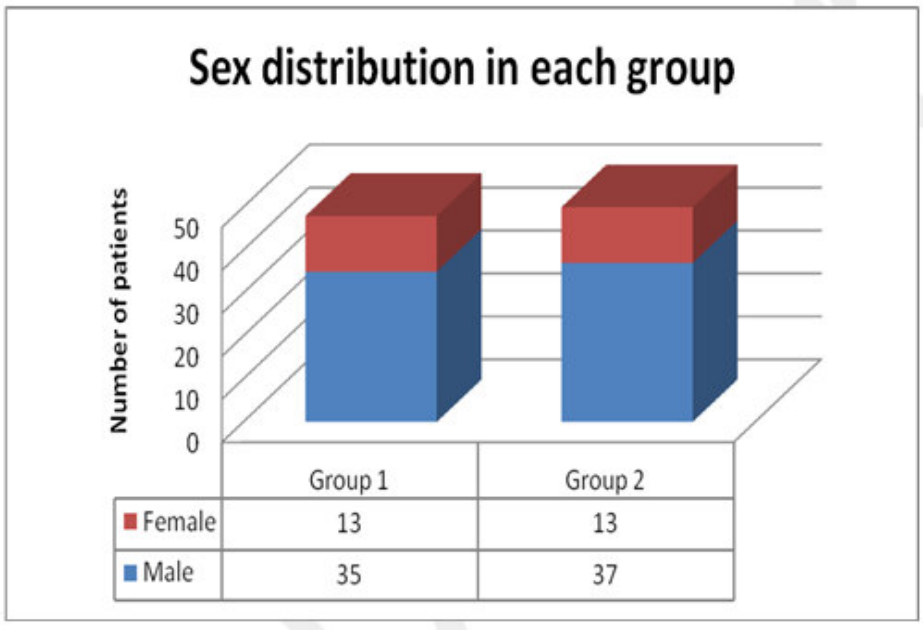

Figure 2

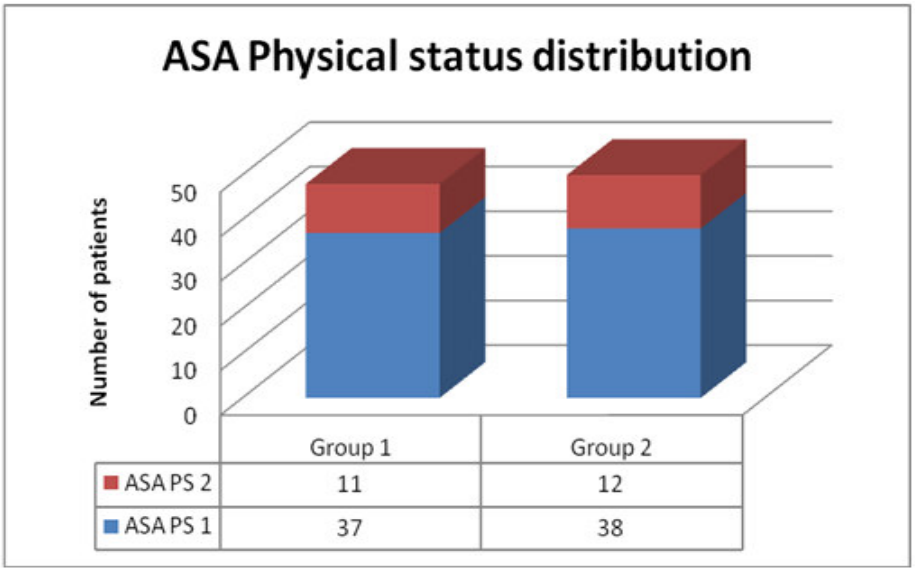

Figure 3
ASA PS-American Society of Anaesthesiologists physical status

DISCUSSION

Central neuraxial blockade is an integral part of modern anaesthesia having a vast number of advantages in comparison to General anaesthesia especially in providing postoperative analgesia and decreased blood loss during surgery[13]. One of the most distressing complications of central neuraxial blockade is postdural puncture headache. All the advantages attributed to spinal anaesthesia get obliterated once post dural puncture headache sets in. Most of the factors contributing to PDPH are easily modifyable. Use of atraumatic needle to tap CSF is seen to decrease the incidence of PDPH. Both traumatic & atraumatic needles are readily available in the market today. Still it is seen that Quincke needle(traumatic needle) is being used for spinal anaesthesia in most institutions and hospitals. The results of this study are very encouraging with respect to the Whitacre needle. Factors known to cause postdural puncture headache like surgery for which the patient has come, needle orientation, sex of patient and experience of the Anesthesiologist have been comparable in both the groups. The type of needle used definitely showed an increase in the incidence of postdural puncture headache in this study. These results are comparable to studies by Eriksson AL et al[14] and Santanen U et al.[15] Needle deformation once it has contacted bone during its advance into the subarchnoid space is seen to be one of the causes of PDPH ,especially when traumatic needles are used as they were more likely to be deformed.[16] Needle deformation ,it was seen, led to a bigger hole in the duramater irrespective of the gauge of needle used.Operator inexperience is a factor leading to inadvertent dural puncture following epidural anaesthesia leading to PDPH[17] as the needle used for epidural anaesthesia is a wide bore needle. Earlier it was thought that the hole made in the dura by a needle whose bevel was directed parallel to the longitudinal axis of the spinal column,split the dural fibers rather than cut it. This was thought so as it was believed that the collagen fibers constituting the duramater ran longitudinally[18]. Later it was seen that there was no specific orientation for the collagen and elastic fibers making up this layer[19]. Also ,it was seen that the thickness of the dura posteriorly, varied in diffentent places ,showing individual variations[19].The thicker the dura,the lesser the chance of CSF leak and PDPH.But more recent studies still attribute needle orientation as a cause of PDPH [5-6] . Studies showed that using 26 G Quincke needle showed an incidence of PDPH of 0.3%-20%[9-10],while 25 G Whitacre showed an incidence of 0%-14.5% [20,21] which was comparable as against the incidence of 3%-25% PDPH with 25 G Quincke needle[22]. Rate of failure with the Whitacre needle was 4% when compared to the Quincke needle in this study. The 2 cases where the Whitacre needle could not get a positive lumbar tap, a wide bore Quincke needle was used with success. But the patients' anatomical variances, and compliance were not taken into consideration and therefore significance may not be attributed to this. Whitacre needle being a pencil point needle requires a introducer needle to negotiate the tough superficial layers of the subarachnoid space, thus a needle through needle is used to attain a lumbar puncture with a Whitacre needle. In case of difficult lumbar puncture situations where negotiation of the needle through the space poses a challenge for the Anaesthesiologist, obtaining a successful puncture using the needle through needle may be difficult. This was the reason why in 2 cases Whitacre

needle had to be abandoned and Quincke needle was used with success.

CONCLUSION

From the results of this study, we conclude that the Whitacre needle is much superior to a comparable bore Quincke needle with respect to the incidence of postdural puncture headache as the incidence of postdural pucture headache was nil with the Whitacre group as against the 4% incidence in the Quincke group. But as a failsafe, it is always advisable to keep a wide bore Quincke spinal needle in hand in cases where unexpected difficulty in tapping cerebrospinal fluid arises as a result of anatomical variances and patient cooperation to the procedure.

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CONFLICT OF INTEREST

Conflict of interest declared none.

REFERENCES

1. Lee JA. Arthur Edward James Barker 1850–1916. British pioneer of regional analgesia. Anaesthesia 1979; 34: 885–91
2. Nagaraj Bhalki , Balaraju T C , Vinayak N T , Rajkumar P N , Sreekantha , Sudhakar G K AND Yogesh B. To compare the outcome of minor anorectal surgeries under local anaesthesia versus spinal anaesthesia. Int J Pharm Bio Sci 2012 July; 3(3): B 187 – 201
3. Dittmann M, SCHÄFER HG, Ulrich J, Bond-Taylor W. Anatomical re-evaluation of lumbar dura mater with regard to postspinal headache. Anaesthesia. 1988 Aug 1;43(8):635-7.
4. Flaatten H, Rodt S, Rosland J, Vamnes J. Postoperative headache in young patients after spinal anaesthesia. Anaesthesia. 1987 Feb 1;42(2):202-5.
5. Lybecker H, Møller JT, May O, Nielsen HK. Incidence and Prediction of Postdural Puncture Headache A Prospective Study of 1021 Spinal Anesthesias. Anesthesia & Analgesia. 1990 Apr 1;70(4):389-94.
6. Norris MC, Leighton BL, DeSimone CA. Needle bevel direction and headache after inadvertent dural puncture. Anesthesiology. 1989 May;70(5):729-31.
7. MacArthur C, Lewis M, Knox EG. Accidental dural puncture in obstetric patients and long term symptoms. BMJ. 1993 Apr 3;306(6882):883-5
8. Cruickshank RH, Hopkinson JM. Fluid flow through dural puncture sites. Anaesthesia. 1989 May 1;44(5):415-8
9. Flaatten H, Rodt SÅ, Vamnes J, Rosland J, Wisborg T, Koller ME. Postdural puncture headache A comparison between 26-and 29-gauge needles in young patients. Anaesthesia. 1989 Feb 1;44(2):147-9.
10. Ross AW, Greenhalgh C, McGlade DP, Balson IG, Chester SC, Hutchinson RC, Ashley JE. The Sprotte needle and post dural puncture headache following caesarean section. Anaesthesia and intensive care. 1993 Jun;21(3):280-3.
11. Bucklin BA, Tinker JH, Smith CV. Clinical dilemma: a patient with postdural puncture headache and acute leukemia. Anesthesia & Analgesia. 1999 Jan 1;88(1):166-7.
12. Quaynor H, Tronstad A, Heldaas O. Frequency and severity of headache after lumbar myelography using a 25-gauge pencil-point (Whitacre) spinal needle. Neuroradiology. 1995 Oct 1;37(7):553-6.
13. Attari MA, Mirhosseini SA, Honarmand A, Safavi MR. Spinal anesthesia versus general anesthesia for elective lumbar spine surgery: A randomized clinical trial. Journal of Research in Medical Sciences. 2011 Apr 15;16(4).
14. Eriksson AL, Hallen B, Lagerkranser M, Persson E, Sköldefors E. Whitacre or Quincke needles-does it really matter. Acta Anaesthesiologica Scandinavica. 1998 Dec 1;42(s113):17-20.
15. Santanen U, Rautoma P, Luurila H, Erkola O, Pere P. Comparison of 27-gauge (0.41-mm) Whitacre and Quincke spinal needles with respect to post-dural puncture headache and non-dural puncture headache. Acta anaesthesiologica scandinavica. 2004 Apr 1;48(4):474-9.
16. Parker RK, White PF. A microscopic analysis of cut-bevel versus pencil-point spinal needles. Anesthesia & Analgesia. 1997 Nov 1;85(5):1101-4.
17. Reynolds F. Dural puncture and headache. BMJ: British Medical Journal. 1993 Apr 3;306(6882):874.
18. Greene HM. Lumbar puncture and the prevention of post puncture headache.JAMA 1926; 86: 391–2
19. 18. Reina MA, de Leon-Casasola OA, Lopez A, De Andres J, Martin S, Mora M. An in vitro study of dural lesions produced by 25-gauge Quincke and Whitacre needles evaluated by

scanning electron microscopy. Regional anesthesia and pain medicine. 2000 Jul 1;25(4):393-402.

20. 19. Campbell DC, Douglas MJ, Pavy TJ, Merrick P, Flanagan ML, McMorland GH. Comparison of the 25-gauge Whitacre with the 24-gauge Sprotte spinal needle for elective caesarean section: cost implications. Canadian journal of anaesthesia. 1993 Dec 1;40(12):1131-5
21. Quaynor H, Tronstad A, Heldaas O. Frequency and severity of headache after lumbar myelography using a 25-gauge pencil-point (Whitacre) spinal needle. Neuroradiology. 1995 Oct 1;37(7):553-6.
22. Geurts JW, Haanschoten MC, van Wijk RM, Kraak H, Besse TC. Post-dural puncture headache in young patients. A comparative study between the use of 0.52 mm (25-gauge) and 0.33 mm (29-gauge) spinal needles. Acta Anaesthesiol Scand 1990; 34: 350–3.