

Survey of Turkish practice evaluating the management of postdural puncture headache in the obstetric population (1)

B. GUNAYDIN, N. CAMGOZ, G. KARACA, I. GUNGOR and H. CELEBI

Abstract : Many surveys and meta-analysis concerning the management of postdural puncture headache (PDPH) in the obstetric population were published in the literature. Therefore, we aimed to determine the current practice and ideas in the management of PDPH in the Turkish obstetric population and to provide awareness of the responders about new solutions with a survey. The response rate was 70%. The management strategies against accidental dural puncture during epidural insertion were to leave the catheter in situ as a spinal catheter (36%, n = 28) or to re-site it at a different level (64%, n = 50). Although these results might reflect the current practice of this small sample, in order to follow the changes in these strategies and to catch almost a standard approach for the prevention and management of PDPH which is a serious complication affecting morbidity in this particular population, further surveys including most of the centers are required.

Key words : Obstetric anaesthesia ; complications ; postdural puncture headache, epidural blood patch, prevention and treatment.

Postdural puncture headache (PDPH) is the most common complication of neuraxial anaesthesia which could occur any time when the dura mater is punctured. The incidence of PDPH is high in the obstetric patient because of sex, young age and the widespread application of regional anaesthesia in this field (1). Therefore, many obstetric anaesthesiologists are obliged to handle this complication. There are surveys and meta-analysis concerning the management of PDPH in the obstetric population published in the literature. After the meta-analysis presenting the database for the studies regarding PDPH in the anaesthesia literature (2), a survey was done in UK to evaluate the management of inadvertent dural puncture in the obstetric patients and the results were compared with their previous results (3). Since no specific survey has been done in this field in our country yet, we primarily aimed to determine the current practice and ideas in the management of PDPH in a small sample reflecting roughly the commonly preferred approaches and

secondly to provide awareness of the responders with this particular entity.

METHODS

The management of PDPH in the obstetric population was assessed by a questionnaire (Appendix 1) including twenty-four questions. Surveys were given to the participants of the regional anaesthesia session of the 39th National Congress of the Turkish Society of Anesthesiology and Reanimation after approval of the Congress President and the moderators of that session. Participants were asked to submit their surveys either to the surveyors or send it via e-mail to the contact person later.

Microsoft Excel[®] software was used to aid the data analysis of the questionnaire including twenty-four questions. Data were presented as number and/or percentage.

RESULTS

Of the 111 questionnaires distributed, 78 of them returned with a response rate of 70%. The responders consisted of 21 (26.92%) residents, 25 (32.05%) fellows, 21 (26.92%) academic staff and the remaining 11 (14.11%) did not identify any degree.

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Table I

Prophylactic measures to prevent PDPH following recognized accidental dural puncture

During delivery	
None	15 (19.2%)
Limit 2 nd stage	11 (14.1%)
Avoid pushing	16 (20.5%)
Leave spinal catheter for 24 h	24 (30.7%)
Variable	12 (15.3%)
After delivery	
Encouragement of fluid intake	63 (81%)
Regular paracetamol/NSAID/codeine	46 (59%)
Blood injection before catheter removal	8 (10%)
Crystalloid infusion epidurally before catheter removal	15 (19%)
Prophylactic blood patch within 24 h of delivery	10 (12%)
Variable	12 (15%)

The number of participants who have audited the inadvertent dural puncture during labour or cesarean section was 27 (35%). The incidence of PDPH was evaluated as rare ($n = 37$, 47%). The number of participants having written guidelines for the management of accidental dural puncture was 8 (10%). The majority of the responders (64%, $n = 50$) did not have any written guidelines, while 3 (4%) participants stated that guidelines were under the process of writing and the remaining 17 (22%) did not reply.

When accidental dural puncture during epidural insertion was recognized, the catheter was left in situ and used as a spinal catheter (36%, $n = 28$) or re-sited epidurally at a different level (64%, $n = 50$).

Different prophylactic measures were suggested to prevent PDPH during delivery. The majority of the responders reported to leave the spinal catheter for 24 h as an option during delivery. After delivery, increased fluid intake (81%, $n = 63$), medical treatment such as, paracetamol, NSAID or codeine (59%, $n = 46$), epidural blood injection (10%, $n = 8$), epidural crystalloid infusion/bolus administration before catheter removal (19%, $n = 15$), or prophylactic epidural blood patch (EBP) within 24 h of delivery (12%, $n = 10$) were the options (Table I).

Following accidental dural puncture, 5 (7%) participants advised mobilization as early as possible and 42 (54%) participants advised bed rest in the postpartum period during 6, 12 or 24 h (Table II).

As for the treatment of PDPH, thirty-three (42%) participants preferred conservative methods such as encouraging fluid intake and medications. EBP was considered as soon as PDPH was diagnosed (8%, $n = 6$) or it was preferred when conser-

Table II

Mobility after delivery following accidental dural puncture

Mobilized as early as possible	5 (7%)
Bed rest	
6 h	2 (3%)
12 h	12 (15%)
24 h	28 (36%)

Table III

Methods routinely used for the treatment of PDPH

Conservative treatment	33 (42%)
Blood patch as soon as PDPH diagnosed	6 (8%)
Blood patch after failed conservative treatment	50 (64%)
Different measures	7 (9%)

vative methods failed (64%, $n = 50$) (Table III). Sixteen (20%) participants reported that they preferred to wait 24 hours, whereas twenty-nine (37%) participants waited more than 24 hours before EBP.

The most common preferred medical treatment agents following fluid intake were NSAIDs and codeine (79% and 42%, respectively). Theophylline, hydrocortisone, ergometrine, strong opioids, ACTH and, sumatriptan were preferred by the rest of the participants (Table IV).

The risk of another dural puncture and backache following EBP were explained to the mother before performing the procedure (20% and 21%, respectively). Fifty (64%) participants obtained consent before EBP; twenty-seven (35%) of them were written and twenty-three (29%) of them were verbal. Thirty-six (46%) participants routinely checked the patient's body temperature, 28 (36%) requested a white blood cell count and 10 (13%) requested a blood culture before epidural blood patch. Intravenous catheterization before EBP was performed undoubtedly by the majority (69%).

The EBP was performed in the recovery room ($n = 32$, 41%), in the labour ward ($n = 10$, 12%), in the patient's room ($n = 6$, 7%) and in another place such as operating theatre and antenatal ward ($n = 21$, 26%). The EBP was performed either by one person ($n = 2$, 3%) or with the help of an anaesthesia resident or a staff member ($n = 58$, 74%). Forty-five (58%) participants preferred ECG, fifty-one (65%) preferred blood pressure monitoring and forty-nine (63%) preferred pulse oximetry while performing EBP.

Early mobilization after an EBP was usual. Before full mobilization, 47% of the participants advised 2 hours and 23% of the participants advised 4 hours of bed rest. Most patients were discharged

Table IV

Non-invasive methods routinely used for the treatment of PDPH

Encourage fluid intake	71 (91%)
Paracetamol/NSAID/codeine	62 (79%)
Caffeine	33 (42%)
Theophylline	18 (23%)
Intravenous hydrocortisone	4 (5%)
Ergometrine	4 (5%)
Strong opioids	3 (4%)
Intramuscular injection of ACTH	3 (4%)
Sumatriptan	1 (1%)
Other medications	8 (10%)
No recommendation	4 (5%)

after the procedure. Women discharged after 1 h, 2 h and 3-6 h were 4% (n = 3), 15% (n = 12) and 44% (n = 34), respectively. Also, 12% of the participants stated that they kept the patient more than 6 hours for follow-up.

Participants were asked about the advices at discharge following a successful blood patch. Twenty-one (27%) participants advised bed rest, 17 (22%) participants advised increased fluid intake, 14 (18%) participants advised to contact whenever headache recurred and the rest of the participants advised to report fever, weakness or numbness and to keep the intervention site clean.

After an unsuccessful EBP, another EBP was never considered (n = 28, 36%) or repeated (n = 29, 37%). Five (6%) of the participants performed the EBP more than twice. Unusually payment was not requested (n = 32, 41%), but a few anesthesiologists requested payment in the event of repeat blood patch (n = 7, 9%). Besides, half of the participants did not give any information about the procedure.

Routine follow-up after discharge was carried out by calling and office visits (45%, n = 35). On the other hand, no routine follow-up was done unless the patient required any information after discharge (n = 22, 28%).

Forty-nine (63%) participants would consider further investigations, if two blood patches were unsuccessful or the headache recurred to exclude other possible causes for the headache. Patients were referred to neurology (52%, n = 40). Additionally, computed tomography scanning and magnetic resonance imaging would be requested (n = 20, 24% and n = 22, 28% respectively). A few (6%) participants stated that they would perform diagnostic lumbar puncture.

The two most common reasons for using intrathecal catheters were to allow immediate analgesia for labour and to avoid another dural puncture.

Table V

Possible reasons for insertion of an intrathecal catheter following accidental dural puncture

Allow immediate analgesia for labour	21 (27%)
Avoid another dural puncture	15 (19%)
Reduce the incidence of PDPH	9 (11%)
Reduce the severity of PDPH	6 (7%)
Reduce the incidence and severity of PDPH	13 (17%)
Only in difficult cases such as obesity and multiple attempts	8 (10%)
No recommendation	48 (62%)

Table VI

Recommendations to reduce the incidence of accidental dural puncture

Obtain senior help after two failed attempts when performing epidural	46 (59%)
Saline for loss of resistance	38 (49%)
Use of 18-G Tuohy needle	35 (45%)
No obstetric anesthetic cover by residents with less than 18 months of experience	34 (43%)
Others	4 (5%)
No recommendation	12 (15%)

They also believed that intrathecal catheters reduced the incidence and severity of PDPH (Table V). While some of the participants considered that the intrathecal catheters reduced the incidence of PDPH (n = 24, 31%), some preferred to remove the intrathecal catheter as early as possible (n = 23, 29%). The main reasons given were the potential dangers of catheter misuse (n = 9, 11%) and the risk of infection (n = 11, 14%). Also, three (4%) participants stated that intrathecal catheters did not have any advantage in reducing the incidence of PDPH.

Twenty (25%) participants kept the catheter for 12-48 hours, since they felt this would minimize the risk of PDPH. Four (5%) of them kept it for 12 hours, while fourteen (18%) of them for 24 hours, 1 (1%) for 36 hours and 1 (1%) for 48 hours.

When the participants were asked if they would recommend any measures to reduce the incidence of accidental dural puncture, the majority of the participants (59%) told that they would ask one of the senior's help after two failed attempts when performing an epidural block. The rest of the recommendations are summarized in Table VI.

Finally, fifty percent of the participants stated that it was necessary to have a written guideline at the end of the survey.

DISCUSSION

The last UK survey showed that the management of accidental dural puncture and PDPH in obstetric patients had considerably changed when compared with the 1993 survey (2). Therefore, our initial raw data might be used to follow the improvement related to our country when further large multicenter either national or international surveys are done in this field. We evaluated the current practice of the congress participants about the management of PDPH with a twenty-four questions survey similar to the questionnaire form BARAZ and COLLIS (3). By doing this we not only determined the current management strategy of that small sample but also provided the awareness of these participants on the importance of preparation of a written guideline.

There are several approaches for the management of the PDPH after recognizing accidental dural puncture with a Tuohy needle during epidural insertion. One of them is to use the catheter intrathecally, leading to an inflammatory reaction to seal the hole (4-7). This approach has been presented in a sequential therapy later (8, 9). It has been recommended that when unintentional dural puncture occurs during epidural insertion, the cerebrospinal fluid (CSF) in the loss of resistance syringe should be injected back to the subarachnoid space, then the catheter should be introduced into the subarachnoid space and left in situ for 12-20 hours (8, 9): 3-5 ml preservative free saline should be initially injected followed by bolus and continuous doses of intrathecal analgesics. In the present survey, the rate of intrathecal catheter placement was 36% which was less than the rate of resiting the epidural catheter at a different level (64%). Those rates were reported to be 28% (intrathecal catheter) versus 41% (resiting epidural catheter) and the remaining with either option preference (31%) according to UK practice. The two most common indications for using intrathecal catheters were to allow immediate analgesia for labour and to avoid another dural puncture in this survey because leaving a catheter in the dural tears would prevent leakage of CSF and would incite an inflammatory reaction to seal the hole (8, 9).

Several prophylactic measures for prevention of PDPH have been reported following recognized accidental dural puncture during and after delivery. Although 2nd stage pushing correlated with PDPH in parturients (10), the present survey revealed that nearly 19% of participants did nothing and 20% avoided pushing but 30% left the spinal catheter for

24 hours (30%), whereas limiting 2nd stage and variable options during delivery were 14% and 15%, respectively. According to the UK survey done in 2003, nothing was done with a higher rate (69%) than ours and the rates of limiting the 2nd stage and avoiding pushing were 18 and 11%, respectively. The management directed to the period after delivery in the survey consisted of encouragement of fluid intake, regular paracetamol/NSAID/codeine treatment, blood injection before catheter removal or prophylactic blood patch within 24 hours of delivery. Since the goal is to restore CSF pressure, excessive hydration is usually recommended and supported with the pharmacological treatment (6, 11). Many participants recommended increased fluid intake and/or regular paracetamol/NSAID/codeine treatment to their patients in this survey. However, it has been reported that the benefit of aggressive hydration stimulating CSF production has not been proved and additionally it might result in diuresis that would prevent lying flat which might worsen PDPH (11).

Epidural injections of blood, saline or dextran have been considered to relieve the symptoms of PDPH (7, 11, 12). In the present survey, the rate of epidural blood injection and crystalloid infusion before catheter removal were 10% and 19%, respectively. Epidural saline and dextran produce the same mass effect as autologous epidural blood, but their effect is short lived (7, 11, 12). Additionally, no inflammatory response promoting dural healing is produced by dextran, and both epidural saline and dextran do not accelerate the closure of the dural hole (7).

This survey demonstrated that the incidence of prophylactic blood patch was 12%. It has been reported that prophylactic blood patch did not decrease the incidence of PDPH but did shorten the duration and severity of PDPH symptoms without increasing the backache or other adverse effects (13).

According to the UK survey, 85% of units had written guidelines for the management of accidental dural puncture (3), whereas our study shows that only 10% of the Turkish teams established such guidelines. The majority of the responders (64%) did not have any written guidelines, while 4% stated that it was under the process of writing and the remaining 22% did not reply. Fortunately, fifty percent of the participants stated that it was necessary to have a written guideline at the end of the survey.

COHEN *et al.* (14) reported that the incidence of PDPH in patients receiving continuous spinal analgesia via a 20 gauge catheter inserted after

unintentional dural puncture was 20%. No PDPH was observed in patients scheduled for cesarean section when accidental dural puncture was followed postoperatively by continuous spinal analgesia through an intrathecal catheter in a retrospective study of COHEN *et al.* (15). CHARSLEY *et al.* (16) effectively prevented PDPH by keeping the intrathecal catheter following accidental dural puncture and intrathecal injection of 10 ml of normal saline prior to removal of the intrathecal catheter. On the contrary to them, NORRIS *et al.* (17) found that inserting an intrathecal catheter for at least 2 hours and providing continuous spinal anaesthesia after dural puncture did not seriously decrease the incidence of PDPH in their prospective study. No relationship has been found between the severity of headache and the use of a spinal catheter in the National Obstetric Anaesthetic Database of 1999 (18). However, KUCZKOWSKI *et al.* (12) claimed that the intrathecal catheter placement and keeping it for 12-20 hours minimized CSF loss and prevented PDPH.

As quite similar as the UK survey in which 26 units kept the catheter in situ for 18-36 hours, 26% of our participants responded that they would keep the catheter for 12-48 hours. The documentation of the duration of catheterization is controversial. The duration of keeping the catheter in situ might vary between 12-20 hours to 24 hours from author to author which would be an important factor in the prevention of PDPH (8, 19).

Re-siting an epidural catheter is one of the traditional approaches. Similar to UK survey in 2005 ; our results have shown that, the majority of participants preferred re-siting the epidural catheter (70%). The main reasons given were the potential dangers of catheter misuse and the risk of infection. RUTTER *et al.* (3) reported that, the rates of PDPH were 71 and 81% after intrathecal catheter insertion and re-siting process, respectively. We have recently demonstrated that re-siting the epidural catheter after recognizing accidental dural puncture during epidural insertion could have successfully prevented the development of PDPH if continuous basal infusion of Patient Controlled Epidural Analgesia for postoperative analgesia is administered by preventing CSF leakage during the first 48 hours (20).

Like in the UK survey, when conservative treatment failed , blood patch was the most widely chosen treatment (68%) for PDPH . Although there is little evidence that increased fluid intake has any therapeutic effect (8), encouragement of fluid intake and caffeine 300-500 mg are recommended (8).

The effect of neuraxial saline administration is controversial. CHARSLEY *et al.* (16) reported a PDPH

rate of 32% and 62% in the patients received intrathecal saline or nothing, respectively. There was a statistically significant difference in need for epidural blood patch application between these patients (16). The epidural crystalloid infusion/bolus administration before catheter removal rate descended to 5% in the UK survey of 2005 when compared with a rate of 70% in the survey of 1993. There are no studies demonstrating either a sustained rise in CSF pressure or accelerated closure of the dural perforation after the administration of epidural saline (8). Successful treatment of persistent PDPH headache after spinal anaesthesia was provided by epidural administration of fibrin glue injection (21). Fibrin glue has been proposed to repair spinal dural perforations by preventing CSF leakage in a rat model (22). Lately 2 ml of fibrin glue was administered percutaneously at the site of the CSF leak to reverse the coma due to the intracranial hypotension in a 68 year-old man having a 2-day history of generalized headache (23).

There is conflicting evidence regarding 2nd stage pushing and its effect on the incidence and severity of PDPH (10, 24). Although in the UK survey the majority of the units have not any restriction for the second stage, in our survey 20% of participants preferred to avoid pushing. In contrast to the UK survey, most of our participants suggested bed rest at a rate of 54%. There was no evidence that longer bed rest after cervical or lumbar puncture was better than immediate mobilization or a short period of bed rest in reducing the incidence of headache in the meta-analysis done by THOENNISSEN *et al.* (25).

The epidural blood patch (EBP) is a widely accepted for the treatment of choice for PDPH. SANDESC *et al.* (26) found that, EBP was the first choice of treatment for PDPH and significantly superior to the conventional treatment without affecting pain. In our survey, many of the participants preferred EBP after failed conservative treatment (64%), only 8% of them preferred EBP as soon as the headache was diagnosed. National Obstetric Anaesthetic Database showed that EBP was performed within two days of delivery in only 42% women (18). SCAVONE *et al.* (13) found that, EBP did not have any effect on the incidence of PDPH, but had an effect on the duration of the headache. It has been reported by RAFFIN *et al.* (27) that long lasting PDPH secondary to an unintentional dural puncture during epidural anaesthesia was successfully relieved by one EBP after more than seven years. Regarding the incidence of PDPH in patients with a history of PDPH,

KUCZKOWSKI (28) stated that once patient suffered from PDPH, she should be considered as a candidate for a subsequent PDPH. Eventually, SANDESC *et al.* (26) recommended not to delay EBP more than 24 hours after the diagnosis of severe PDPH.

Since this particular complication could affect morbidity and increase the hospital length of stay (29), it is vital initially to learn the current status and then to define prevention and treatment strategies for PDPH in every obstetric anaesthesia unit. According to the present survey, re-siting epidural catheter at a different intervertebral space or using epidural catheter as an intrathecal catheter was preferred for the prevention of PDPH in case of recognized accidental dural puncture and noninvasive methods consisting of encouragement of fluid intake and drugs were routinely used for the treatment of PDPH. Although these results showed the current practice of this small sample, in order to follow the change in these strategies and to catch almost a standard approach for the prevention and management of PDPH further surveys including most of the centers are required. We believe this survey might be helpful in the preparation of a written standardized management strategy of PDPH for the centers do not have it yet.

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Annexe 1

UNIT :

DEGREE :

- Resident
- Senior
- Academic

ADDRESS :

PHONE NUMBER :

E-MAIL :

1. Does your unit audit the incidence of inadvertent dural puncture during the insertion of an epidural catheter for pain relief in labour ?

- Yes
- No

If yes, how often ?

- Common
- Occasionally
- Other, please specify

2. Do you have written guidelines for the management of accidental dural puncture in your unit ?

- Yes
- No
- In the process of writing them

3. How is a recognized accidental dural puncture managed in your unit ?

a) At insertion of catheter, what action is followed when a dural tap is recognized ? (*Please choose one or more of the followings*)

- Feed the catheter and use it as spinal
- Re-site at a different site
- Other, please specify

b) After delivery, the patient is

- Mobilized as early as possible (no restriction)
- Advised bed rest 6 h 12 h 24 h (please encircle)

c) What prophylactic measures are recommended to avoid postdural puncture headache (PDPH) following an accidental dural puncture ?

During delivery

- Do not treat any different during labour
- Limit second stage to minutes
- Avoid pushing in 2nd stage of labour ?
- If chose to feed the catheter spinally leave spinal catheter for 24 h
- Other measures, please specify

After delivery

- Encourage fluid intake
- Regular paracetamol/codeine/NSAID
- Inject blood through existing epidural catheter before removal
- Crystalloid bolus through existing epidural catheter before removal
- Prophylactic blood patch within 24 h of delivery
- Other measures, please specify

d) What is your treatment choice for post dural puncture headache in your unit ?

- Drugs (see below)
- Perform epidural blood patch as soon as PDPH is diagnosed
- Perform epidural blood patch after failure of conservative treatment
- Other treatment, please specify

e) Please specify the non-invasive methods of treatment that are routinely used to treat PDPH in your unit (*Please choose one or more of the followings*)

- Encourage fluid intake
- Regular paracetamol/codeine/NSAID
- Strong opioids
- Sumatriptan
- Ergometrine
- Theophylline
- Caffeine (i.v. or oral)
- i.m. injection of ACTH
- i.v. hydrocortisone
- Other treatment, please specify

4. How long is waiting period for epidural blood patch in your unit ?

- 12 hours
- 24 hours
- More than 24 hours
- There is not any time restriction

5. What information would you give to the mother regarding the success of epidural blood patch ?

- Complete relief %...
- Partial relief %...
- No relief %...
- Another blood patch %...
- Complications :
 - (i) Another dural puncture
 - (ii) Backache

6. What type of informed consent do you obtain prior to epidural blood patch ?

- Verbal consent
- Written consent
- None

7. What parameters are routinely checked before performing epidural blood patch in your unit ?

- White cell count
- Patient's temperature
- Others, please specify

8. Are routine blood cultures taken when performing blood patch ?

- Yes
- No

9. Where are epidural blood patches done in your unit ?

- In labour ward
- Patient room
- Emergency room
- Recovery room
- Others, please specify

For ambulatory patient

- In labour ward
- Patient's room
- Emergency room
- Recovery room
- Others, please specify

10. Do you insist on i.v cannulation before performing blood patch ?

- Always
- Usually
- Occasionally
- Never

11. Do you perform blood patch alone or with any assistance (anaesthesia technician, resident, senior etc)?

- Alone
 - With assistance
12. What kind of monitorization do you apply for blood patch ? (Please choose one or more of the followings)
- EKG
 - Non-invasive blood pressure
 - Pulse oximetry
 - Nothing
13. After performing blood patch, what would you advise the patient?
- Lie flat for 2 h and then mobilise
 - Lie flat for 4 h and then mobilise
 - Others, please specify.....
14. If the blood patch is successful, when is the ambulatory patient discharged home ?
- After 1 hour
 - After 2 hours
 - After 3-6 hours
 - Others, please specify
15. What advice would you give to the mother at discharge ?
.....
16. Do you repeat blood patch ?
- Yes (If yes, do you repeat more than two times
 Yes No)
 - No
17. Does repeated blood patch require extra charge in your unit?
- Yes
 - No
18. Do you follow up patient after blood patch via telephone or office visits ?
- Yes
 - No, unless the patient requires
19. If two blood patches were unsuccessful or the headache recurs, would you consider any investigation to exclude the other possible reasons ?
- Yes
 - No
- If yes, please tick appropriately :
- CT scan
 - MRI
 - Lumbar puncture
 - Neurologist opinion
 - Others, please specify
20. Do you routinely follow up women with PDPH after discharge ?
- No
 - Via telephone

- Outpatient follow up
- Via obstetrician
- No, unless the patient requires

The following two questions will be answered by the participants, that prefer the use of intrathecal catheters after dural puncture.

21. Please state why you would choose to feed the catheter spinally following accidental dural puncture ?
Please tick (one or more) appropriately indicating the most important one first

- To allow immediate analgesia for labour
- To avoid another dural puncture
- Reduce the incidence of PDPH
- Reduce the severity of PDPH
- Reduce the incidence and severity of PDPH
- Only in difficult cases (e.g. obesity, multiple attempts)

22. When is the spinal catheter removed ?

- a) Remove as soon as the catheter is not required (please indicate the reason(s))
- To avoid the risk of catheter misuse
 - To avoid the risk of infection
 - Leaving spinal catheter in does not prevent PDPH
 - Others, please specify
- b) Leave the catheter for some time following inadvertent dural puncture to minimize risk of headache (please tick the appropriate time period which starts from time of insertion)
- 12 h
 - 18 h
 - 24 h
 - 36 h

23. Do you recommend any measures to reduce the incidence of accidental dural puncture in your unit ?

- Obtain senior help after two failed attempts when performing epidural
- No obstetric anaesthetic cover by SHOs with less than 18 months of experience
- Saline for loss of resistance
- Encourage use of 18 g Tuohy needle
- Others

24. Do you think that it is necessary to have written guidelines for the management of accidental dural puncture in your unit ?

- Yes
- No

Please return to the surveyors or send it via e-mail to gunaydin@gazi.edu.tr

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