Observational Report

# Post Dural Puncture Headache in Fibromyalgia after Cesarean Section: A Comparative Cohort Study

Khalid M. Morsy, MBBCh, MSc, MD, Ayman M. Osman, MBBCh, MSc, MD,
Omar M. Shaaban, MBBCh, MSc, MD, and Dina H. El-Hammady, MBBCh, MSc, MD

From: Assiut University, Faculty of Medicine, Egypt

Address Correspondence:
Khalid M. Morsy, MBBCh
Assistant Professor
Assiut University Faculty of Medicine
Anesthesia and ICU
Assiut University Hospitals
Department of Anesthesiaology, ICU and pain management
Asyut, Egypt 71515
E-mail: khalidmorsy@gmail.com

Disclaimer: There was no external funding in the preparation of this manuscript.
Conflict of interest: Each author certifies that he or she, or a member of his or her immediate family, has no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted manuscript.

Manuscript received: 10-19-2015
Revised manuscript received: 1-14-2016
Accepted for publication: 2-4-2016

Free full manuscript:
www.painphysicianjournal.com

**Background:** Patients of chronic pain syndromes like fibromyalgia (FMS) when subjected to spinal anesthesia are theoretically more liable to post dural puncture headache (PDPH) as they have enhanced central nervous system sensitization and decreased descending inhibition.

**Objective:** The current study aims to verify the incidence and chronicity of PDPH in FMS patients.

**Study Design:** Case control study.

**Methods:** In a comparative control study, 70 fibromyalgia patients were scheduled for an elective cesarean delivery fibromyalgia group or Group 1. Group 2 included 70 women scheduled for elective cesarean delivery who had no history of chronic pain and is used as a control group. Both groups were compared regarding the incidence of development of PDPH in the first postoperative 48 hours and the persistence of PDPH for 7 days or more.

**Settings:** Women's Health Hospital, Assiut University, antenatal Clinic.

**Results:** The fibromyalgia group reported more PDPH (18 patients, 25.7%) as compared to the control group (10 patients, 14.3%), $P < 0.01$. PDPH persisted for 7 or more days in 8 patients in the fibromyalgia group (11.4%) while, it persisted in 2.86% of the control patients. PDPH continued for more than 3 months in 2 patients in the fibromyalgia group (2.86%)

**Limitations:** Difficulty in calculating the dose of analgesics as patients with fibromyalgia may use other analgesics due to musculoskeletal pain.

**Conclusion:** Dural puncture increases the incidence of PDPH in fibromyalgia patients in comparison with normal controls without increasing other postoperative side effects.

**Key Words:** Fibromyalgia, cesarean section, post dural puncture headache, spinal anesthesia

**Pain Physician 2016; 19:E871-E876**

Post dural puncture headache (PDPH) is the most common postoperative complication of spinal anesthesia. Age, gender, needle size and type, and performing multiple dural punctures, as well as previous occurrence of PDPH are considered as factors that influence the incidence of PDPH (1-3). A higher incidence is usually reported after cesarean section (2). The incidence is 40% with a 22 G needle and 25% with a 25 G needle (4,5). The type of spinal needle used during anesthesia also is considered an attributable factor (6). Today the use of fine gauge pencil–point needles, such as the Whitacre and Sprotte has produced a greater reduction in the incidence of PDPH, which varies with the type of procedure and patients involved. It is related to the size and design of the spinal needle used. In 1951, Whitacre and Hart (7) introduced the atraumatic spinal needle in a design which offered the handling characteristics of larger needles with a low incidence of post–spinal headache. Needle modifications since that time, such as the Sprotte et al (8) and Atraucan

(9) needles, promise further reductions in post–spinal headache. For the majority of patients who develop PDPH, the syndrome resolves spontaneously in a few days to a week. However, there are reports of PDPH persisting for months to a year (10).

Fibromyalgia syndrome (FMS) is a systemic disorder of widespread pain, a consequence of abnormal pain processing within the central nervous system (11). Fibromyalgia patients have generalized chronic musculoskeletal pain. In addition to chronic pain, these patients often present with other symptoms that include anxiety, depression, and poor physical conditioning (12). It affects 3 to 5% of the general population (13). The prevalence in women ranges from 3.4% to 10.5%, as compared with only 0.5% in men (14).

Since both pregnancy and FMS commonly elicit backache, fatigue, sleep disturbance, and nausea, the interaction of these 2 conditions may result in more exaggerated symptoms. The findings of a retrospective interview study of pregnancy in women with FMS revealed that pregnancy does have an effect on FMS (15). Two groups of women with FMS participated in the study. One group of women was diagnosed with FMS prior to becoming pregnant, and the second group was diagnosed with FMS after pregnancies were completed. Women in the first group reported a worsening of FMS symptoms during the pregnancy, a need for more help with childcare, and a greater number of sick days during pregnancy than did the women in the second group. Based on analysis of in-depth interviews with 14 pregnant women with FMS, Schaefer (16) found the major experience for these women was that pregnancy is possible but may be difficult.

Patients of chronic pain syndromes like FMS may have theoretically more PDPH as they have enhanced central nervous system sensitization and decreased descending inhibition (17). FMS patients are at high risk to experience increased and prolonged postoperative pain (12).

The current study aims at verifying the incidence and chronicity of PDPH in FMS patients.

## Methods

The study was a cohort prospective study conducted at the Women's Health Hospital, Assiut University, from February 2010 through April 2014. The study was approved by the Assiut Medical School Ethical Review Board.

All pregnant women diagnosed ahead of pregnancy with FMS were approached for participation during their antenatal visits. FMS was diagnosed by the presence of widespread pain in all 4 quadrants of the body for a minimum of 3 months and at least 11 of the 18 specified tender points (18) (The American College of Rheumatology 1990 Criteria for the Classification of Fibromyalgia). Patients may still be diagnosed with FMS if they have less than 11 of the required tender points and they have widespread pain along with many of the commonly associated symptoms: fatigue, irritable bowel (e.g., diarrhea, constipation, etc.), sleep disorder (or sleep that is unrefreshing), chronic headaches (tension-type or migraines), jaw pain (including tempro-mandibular joint (TMJ) dysfunction), cognitive or memory impairment, post-exertional malaise and muscle pain, morning stiffness (waking up stiff and achy), numbness and tingling sensations, or skin and chemical sensitivities (19). They were invited to participate during their antenatal visits in case they were expected to have cesarean section (CS) as indicated by their treating physician. Women were excluded if they had one or more of the following: history of psychological disturbance, any history of chronic pain other than fibromyalgia before or during pregnancy, emergency cesarean delivery, history of PDPH, unsuccessful spinal anesthesia, or multiple dural punctures.

An age and parity matched comparison group of pregnant women with no history suggestive of FMS had been randomly invited to participate during antenatal visits (control group).

Eligible participants were asked for verbal informed consent after reading the patient information sheet or having it read to her if she was not able to read or write. The observational nature of the study as well as the confidentiality of participants' information were also explained.

### Spinal Anesthesia

Cesarean section in the 2 study groups was carried out under spinal anesthesia. Anesthesia was delivered in all cases by qualified anesthetists. The patient was given 1000 mL of crystalloid fluid as a pre-hydration therapy. All patients received a standard intrathecal dose of 2.5 mL bupivacaine 0.5% in 8% dextrose and intrathecal morphine 0.2 mg. We used Quincke Babcock 25 G spinal needles (Ghatwary Medical, Alexandria, Egypt) and considered orientation of the needle bevel parallel to the long axis of the spine. The needle was inserted at an acute angle. Intrathecal morphine 0.2 mg was the core postoperative analgesia. For breakthrough pain, patients received an intravenous injection of 30 mg

ketorolac tromethamine in 100 mL of saline (Ketolac®, ketorolac tromethamine, Amriya Pharm. Industries, Egypt). Patients were monitored by caregivers for side effects of intrathecal morphine such as nausea, vomiting, drowsiness, itching, and respiratory depression.

At the end of the surgery patients were sent to the ward and there observed for any post-spinal headache for the first 48 hours or as soon as they became ambulatory. Patients were considered to have PDPH if their complaint met the classic criteria for PDPH described as a severe, dull, non-throbbing pain usually frontooccipital in location and usually aggravated by sitting, standing, and walking. PDPH may also be associated with nausea, vomiting, visual disturbances, tinnitus, or deafness (1,20,21).

The duration of the headache was monitored by phone every day until the headache disappeared. If the headache persisted after 15 days, patients were further contacted through telephone calls every week until the headache disappeared or up to 8 months after surgery.

The treatment for PDPH given to the patients was the same in the 2 groups and included bedrest, good hydration, and simple analgesics that contain caffeine. If the PDPH continued for more than one week, a standard epidural blood patch was considered.

### Follow-up and Data Collection

The antenatal cards of the eligible consenting cohort of pregnant women were labeled for participation at the time of delivery in case any of them had delivered by CS and spinal anesthesia. The surgeon who performed the cesarean delivery, the pain physician, and the antenatal care physician were not further involved in data gathering or patient care.

A resident physician who was not in charge of labor or antenatal care carried out the postoperative data collection for 48 hours. The surgeon, the resident physician, and the caregivers were blind regarding FMS diagnosis. Inquiries about PDPH were conducted by telephone 2 days later, and then every day for 15 days, and then every week up to 8 months, if needed, by the same resident.

### Sample Size, Power, and Statistical Analysis

The data were collected and entered on Microsoft access data base analysis using the Statistical Package for Social Science (SPSS Inc., Chicago, version 13). Comparisons between the groups were done using the Student's t-test to compare the mean values between groups in scale variables and the $\chi^2$ test for dichotomous variables. A *P* value of less than 0.05 was considered significant.

The sample size calculation was based on the primary outcome (the incidence of PDPH in FMS patients). Previous studies reported an incidence of PDPH of 0% (R) using 2-sided chi-square ($\chi^2$) test with $\alpha$ of 0.05. Assuming that fibromyalgia patients have about 30% more post spinal headache, a sample size of 140 patients (70 in each group) is needed with 80% power to detect 30% difference between the 2 groups assuming a lost to follow-up rate of 10% (Epi-info™, CDC, USA).

## Results

Of the 2,830 women assessed for eligibility during their antenatal visits (asked about history of chronic pain of more than 6 months duration), 293 patients were diagnosed to have FMS, 15 of them refused to participate, and 8 were excluded for not meeting the inclusion criteria. Seventy FMS women were allocated to the fibromyalgia group (group 1) after they have delivered by CS with spinal anesthesia. The control group (group 2) included 70 women who had no history of chronic pain and met the inclusion criteria and were willing to participate. The 2 groups were similar regarding age (23.9 ± 2.4 years vs. 24.2 ± 3.5 years), parity (2.1 ± 1.1 vs. 2.2 ± 1.2), and gestational stage (38.6 ± 1.4 weeks vs. 38.7 ± 1.4 weeks) (Table 1). Group 1 reported more PDPH within the first 48 hours (18 patients, 25.7%) when compared to group 2 (10 patients, 14.3%), $P < 0.01$. PDPH persisted for 7 days in 8 patients in group 1 (11.4%) while it persisted for 7 days in 2 patients in

Table 1. *Demographic data of patients included.*

| | Group 1 (FMS group) | Group 2 (Control group) |
|---|---|---|
| Number of patients | 70 | 70 |
| Age | 23.9 ± 2.4 years | 24.2 ± 3.5 years |
| Parity | 2.1 ± 1.1 | 2.2 ± 1.2 |
| Gestational age | 38.6 ± 1.4 weeks | 38.7 ± 1.4 weeks |

* No statistical difference between both groups as regards demographic data ($P > 0.05$).

group 2 (2.86%). Four patients in group 1 received an epidural blood patch on the seventh postoperative day and the PDPH disappeared immediately. However, one of them continued to complain of persistent headache with no postural element in it and characteristics similar to migraine headache, but resistant to classic migraine therapy. The headache responded only to pregabalin 100 mg twice daily. The other 4 patients with persistent PDPH refused epidural blood patch treatment. Their PDPHs disappeared for 2 of them at the tenth postoperative day. The remaining 2 patients had persistent PDPH for 3 months and their headache was resistant to all treatment modalities including pregabalin. Both of them agreed to receive an epidural blood patch after 3 months. The PDPHs disappeared immediately after the patch treatment; however, both patients complained of persistent headache with no postural element in it and characteristics similar to migraine headache, but resistant to classic migraine therapy. Their headaches did not respond to pregabalin 100 mg twice daily alone.

One patient in group 2 received an epidural blood patch and her PDPH disappeared immediately. The other patient who refused epidural blood patch treatment continued to have PDPH until the twenty-eighth postoperative day.

The number of patients reporting nausea and vomiting, and itching were comparable in both groups (19 in group 1 vs. 20 in group 2 and 19 in group 1 vs. 20 in group 2 for both nausea and vomiting, and itching, respectively) (Table 2). No patients in the current study reported drowsiness or respiratory depression.

## Discussion

PDPH is one of the most common complications of spinal anesthesia. Cerebral spinal fluid (CSF) leakage into the epidural space through a needle-induced dural hole has been suggested as the main mechanism responsible for this syndrome. One hypothesis is that decrease in CSF volume results in an increased blood volume and vasodilation because the sum of the volumes of the brain matter, CSF, and blood must remain the same. The second hypothesis is that the decrease in CSF volume results in sagging of the brain in the cranial vault when the patient is in the upright position, which pulls on the falx cerebri, cerebral blood vessels, and tentorium, resulting in positional headache (22,23).

The current work is the first to report incidence for PDPH in FMS patients, as a model of chronic pain patients. The incidence for PDPH nearly doubled in FMS patients when compared to controls. We may explain this higher incidence of PDPH in FMS patients as their enhanced central nervous system sensitization and decreased descending inhibition (17) which may result in exaggerated pain perception. Psychophysical experiments, neurophysiological pain equivalents, and imaging studies have all conclusively shown that pain processing in patients with fibromyalgia differs from normal controls (13,24,25). Chronic pain patients are at more risk for developing acute pain.

Pregabalin is an antiepileptic drug and a structural analogue of gamma-aminobutyric acid (GABA). Pregabalin binds to the alpha-2-delta subunit of the N-type calcium channels, and modulates calcium influx at

Table 2. *Incidence of PDPH, PONV, and itching in both studied groups.*

| | Group 1 (FMS group) | Group 2 (Control group) |
|---|---|---|
| *PDPH in the 1st 48 hours<br>-No.<br>-Percent | <br>18<br>25.7% | <br>10 **<br>14.3% |
| *PDPH persisting 7 days<br>-No.<br>-Percent | <br>8<br>(11.4%) | <br>2 ***<br>(2.86%) |
| *PDPH persisting 3 months<br>-No.<br>-Percent | <br>2<br>(2.86%) | <br>0 ***<br>(0%) |
| *Postoperative Nausea and Vomiting (PONV) | 19 | 20 |
| * Postoperative Itching | 19 | 20 |

* ($P > 0.05$) ** ($P > 0.01$) *** ($P > 0.001$)

nerve terminals, and thus, reduces the release of several neurotransmitters, including glutamate, noradrenaline, serotonin, dopamine, and substance P (26). Pregabalin was shown to be effective in several animal models of neuropathic pain, incisional injury, inflammatory injury, and formalin induced injury (27). Recent studies have shown that chronic oral pregabalin inhibits measures of central sensitization in the electrical hyperalgesia model in human volunteers (28). Its efficacy in inhibiting central sensitization may explain its efficacy in the treatment of headache in fibromyalgia patients and augments our assumption that FMS patients reported more PDPH due to their central abnormal hypersensitive pain processing. Also, pregabalin is well documented as a treatment for fibromyalgia. The exact mechanism of action of pregabalin is not well understood but clinical experience and our observations have demonstrated its analgesic efficacy and safety in PDPH.

## Conclusion

Dural puncture increases the incidence of PDPH in fibromyalgia patients in comparison to normal control without any increase in other postoperative side effects.

## References


1. Reid JA, Thorburn J. Headache after spinal anesthesia. *Br J Anaesth* 1991; 67:674-677.
2. Cesarini M, Torrielli R, Lahaye F, Mene M, Cabrio C. Sprotte needle for intrathecal anaesthesia for Caesarean section: Incidence of postdural puncture headache. *Anaesthesia* 2003; 45:656-658.
3. Corbey MP, Bach AB, Lech K, Frørup AM. Grading of severity of postdural puncture headache after 27- gauge Quincke and Whitacre needles. *Acta Anaesthesiol Scand* 2001; 41:779-784.
4. Barker P. Headache after dural puncture. *Anaesthesia* 1989; 44:696-697
5. Flaatten H, Rodt S, Rosland J, Vamnes J. Postoperative headache in young patients after spinal anaesthesia. *Anaesthesia* 1987; 42:202-205.
6. Halpern S, Preston R. Postdural puncture headache and spinal needle design. Metaanalyses. *Anesthesiology* 1994; 81:1376-1383.
7. Hart JR, Whitacre RG. Pencil point needle in the prevention of post-spinal headache. *JAMA* 1951; 147:657-658.
8. Sprotte G, Schedel R, Pajunk H. An 'atraumatic' universal needle for single-shot regional anesthesia: Clinical results and a 6 year trial in over 30,000 regional anesthesias. *Reg Anaesth* 1987; 10:104-108.
9. Holst D, Mollmann M, Ebel C, Hausman R, Wendt M. In vitro investigation of cerebrospinal fluid leakage after dural puncture with various spinal needles. *Anesth Analg* 1998; 87:1331-1335.
10. Vandom LD, Dripps RD. Long term follow up of patients who received 10,098 spinal anesthetics. Syndrome of decreased intracranial pressure (headache and ocular and auditory difficulties). *JAMA* 1956; 161:586-591.
11. Staud R, Craggs J, Perlstein W, Robinson M, and Price D. Brain activity associated with slow temporal summation of C-fiber evoked pain in fibromyalgia patients and healthy controls. *Eur J Pain* 2008; 12:1078-1089.
12. Caumo W, Schmidt AP, Schneider CN, Bergmann J, Iwamoto CW, Adamatti LC, Bandeira D, Ferreira MB. Preoperative predictors of moderate to intense acute postoperative pain in patients undergoing abdominal surgery. *Acta Anaesthesiol Scand* 2002; 46:1265-1271.
13. Newmann L. Buskila D. Epidemiology of fibromyalgia. *Curr Pain Headache Rep* 2003; 7:362-368.
14. Wolfe F, Ross K, Anderson J, Russell IJ, Hebert L. The prevalence and characteristics of fibromyalgia in the general population. *Arthritis Rheum* 1995; 38:19-28.
15. Ostensen M, Rugelsjoen A, Wigers SH. The effect of reproductive events and alterations of sex hormone levels on the symptoms of fibromyalgia. *Scandinavian Journal of Rheumatology* 1997; 26:355-360.
16. Schaefer KM. Lived experience of pregnancy in women with fibromyalgia. Lighting the Way: The AWHONN 2002 Convention, p.44.
17. Pogatzki-Zahn EM, Englbrecht JS, Schug SA. Acute pain management in patients with fibromyalgia and other diffuse chronic pain syndromes. Current Opinion in *Anaesthesiology* 2009; 22:627-633.
18. Wolfe F, Smythe HA, Yunus MB, Bennett RM, Bombardier C, Goldenberg DL, Tugwell P, Campbell SM, Abeles M, Clark P, Adel G. Fam MD11,Farber SJ, Fiechtner JJ, Franklin MC, Gatter RA, Hamaty D, Lessard J, Lichtbroun AS, Masi AT, Mccain GA, Reynolds WJ, Romano TJ, Russell IJ and Sheon RP. The American College of Rheumatology 1990 Criteria for the Classification of Fibromyalgia. *Arth & Rheum* 1990; 33:160-172.
19. Rothschild B. Fibromyalgia: An explanation for the aches and pains of the nineties. *Comprehensive Therapy* 1991; 17:9-14.
20. Weeks SK. Postpartum headache. In: Chesnut DH (ed). *Obstetric Anesthesia: Principles and Practice*. 3rd ed. Mosby, Philadelphia, PA, 2004, pp 564-574.
21. Harrington BE. Postdural puncture headache and the development of the epidural blood patch. *Reg Anesth Pain Med* 2004; 29:136-163.
22. Headache Classification Subcommittee of the International Headache Society. The International Classification of Headache Disorders. 2nd edition. *Cephalalgia* 2004; 24:1-160.
23. Arendt K, Demaerschalk BM, Wingerchuk DM, Camann W. Atraumatic lumbar puncture needles: After all these years, are we still missing the point? *Neurologist* 2009; 15:17-20.
24. Abeles AM, Pillinger MH, Solitar BM,

Abeles M. Narrative review: The pathophysiology of fibromyalgia. *Ann Intern Med* 2007; 146:726-734.

25. Staud R, Cannon RC, Mauderli AP, Robinson ME, Price DD, Vierck CJ Jr. Temporal summation of pain from mechanical stimulation of muscle tissue in normal controls and subjects with fibromyalgia syndrome. *Pain* 2003; 102:87-95.
26. Fink K, Dooley DJ, Meder WP, Suman-Chauhan N, Duffy S, Clusmann H, Göthert M. Inhibition of neuronal Ca(2+) influx by gabapentin and pregabalin in the human neocortex. *Neuropharmacology* 2002; 42:229-236.
27. Gajraj NM. Pregabalin: Its pharmacology and use in pain management. *Anesth Analg* 2007; 105:1805-1815.
28. Chizh BA, Göhring M, Tröster A, Quartey GK, Schmelz M, Koppert W. Effects of oral pregabalin and aprepitant on pain and central sensitization in the electrical hyperalgesia model in human volunteers. *Br J Anaesth* 2007; 98:246-254.