

## Intracranial Subdural Hematoma Following Spinal Anesthesia in a Pregnant Patient: Case Report and Review of the Literature

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### Abstract

Postdural puncture headache is a well-known complication of spinal anesthesia, but the subsequent development of intracranial subdural hematoma is a serious life-threatening complication which should be urgently treated. We present the case of a 32-year-old pregnant woman who was scheduled for cesarean section. Spinal anesthesia was induced using a 25-gauge Quincke spinal needle. After 48 hours she developed postdural puncture headache which was treated conservatively and she was discharged home. On the 30<sup>th</sup> day post operatively, the patient developed intracranial subdural hematoma which was surgically evacuated in the operating room and the patient had full recovery.

Our report reviews the literature on 49 patients who developed a postdural puncture headache complicated by intracranial subdural hematoma following spinal anesthesia. Careful follow up and good communication between the anesthesiologist, the obstetrician and the neurosurgeon is essential for early diagnosis and management of possible subdural hematoma for patients developing a postdural puncture headache.

**Keywords:** Spinal anesthesia; Post dural puncture headache; subdural hematoma

### Introduction

Severe headache after spinal anesthesia in a pregnant patient has a broad differential diagnosis, including postdural puncture headache and intracranial pathologies [1]. Cerebral subdural hematoma is a serious life-threatening complication that may be misdiagnosed with postdural puncture headache [2]. It carries a high risk for morbidity and mortality if it is not detected and treated early [3]. We present a case that illustrates the importance of careful assessment of post-spinal headache as it could be more serious than just benign postdural puncture headache.

### Case Report

A 32 year old, 65-kg, 165-cm pregnant woman (G4 P3) was scheduled for cesarean section at 39 weeks gestation because of breech presentation. She was previously healthy. There was no history of hemorrhagic diathesis, use of anticoagulants or non-steroidal anti-inflammatory drugs. She was taking iron and folic acid supplementation. Preoperative laboratory tests including complete blood count and coagulation parameters were within normal limits. The patient was consented for spinal anaesthesia.

Oxygen saturation, non-invasive arterial blood pressure and heart rate were continuously monitored in the operating room. On the first attempt, spinal anesthesia was performed with the patient in sitting position with a 25-gauge Quincke type spinal needle at the L3-L4 interspace using 12.5 mg of 0.5% isobaric bupivacaine. There was no blood or paraesthesia during insertion of the needle and she had adequate block. She had uneventful intraoperative course.

Twenty-four hours after surgery the patient experienced fronto-temporal postural headache, which was treated as postdural puncture headache with bed rest, intravenous hydration and simple analgesics. Her headache was continuous even when she was discharged from the hospital on the fourth postoperative day. Following discharge

her headache worsened to the point where she could no longer nurse her baby, her headache became non-postural, and not relieved with analgesia medications.

On the 30<sup>th</sup> day postoperatively, the patient presented to the emergency room complaining of severe non-postural headache accompanied with blurring of vision, nausea and dizziness. There was no history of trauma. Neurological examination demonstrated mild upper and lower left limb weakness. A computed tomography (CT) scan revealed a 15 mm thick acute subdural hematoma involving the right cerebral hemisphere convexity causing mass effect into the underlying hemisphere sulci (Figure 1).

The patient was admitted to the hospital. A right fronto-temporal craniotomy was performed and the hematoma was evacuated. Her symptoms resolved entirely and the patient did not develop any further symptoms. She was discharged home after one week and had uneventful postoperative course during her follow up for six months.

### Discussion

Spinal anesthesia has become very popular for pregnant patients undergoing cesarean section. It has the advantage of avoidance of complications of general anesthesia and its consequences but it has its

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Ref	Age/Sex	Time for diagnosis	Predisposing factors	Needle	Symptoms
[12]	49/M	12 weeks	MP	25 G Quincke	HC and visual disturbances
[13]	24/M	?	?	25 G Quincke	HC and tinnitus
[14]	25/F	4 weeks	Pregnancy	?	Diplopia
[15]	48/F	48 hours	None	27 G Quincke	HC, right upper limb paresis
[16]	27/F	13 days	Pregnancy	25 whitacre	HC, vomiting and hemiparesis
	49/F	24 hours	None	25 whitacre	HC, ptosis and hemiparesis
[17]	73/F	5 days	None	26 G	HC and vomiting
[18]	70/F	4 days	None	24 Quincke	HC, vomiting and confusion
[19]	53/F	24 hours	?	?	Coma
[20]	39/F	21 days	None	25 G Quincke	HC
[8]	39/F	42 days	Double puncture	27 G Quincke	HC and vomiting
	32/F	40 days	Pregnancy/MP	27 G Quincke	HC
[21]	69/M	<1 day	MP	?	Hemiparesis and coma
[22]	26/F	<1 day	Pregnancy	24 G Quincke	HC, nausea and vomiting
[23]	31/F	8 days	Pregnancy/MP	26 G	HC and diplopia
[24]	29/F	20 days	Pregnancy	26 G	HC and dysphasia
[25]	38/M	3 weeks	None	26 whitacre	HC and hemiparesis
[26]	68/M	40 days	None	24 G Sprotte	HC
[27]	41/F	25 days	None	19 G	HC and diplopia
[28]	88/F	3 days	Brain atrophy	25 G Quincke	Confusion and sleepiness
[29]	38/M	40 days	None	22 G Quincke	HC
[30]	38/F	2 weeks	None	27 G	Diplopia
[31]	59/M	2 days	Brain aneurysm	27 G whitacre	HC and confusion
[32]	28/F	6 hours	Pregnancy	24 G	HC and hemiparesis
[33]	29/F	1 day	Pregnancy	24 G Sprotte	HC and vomiting
[34]	20/M	1 week	None	23 G Quincke	HC and vomiting
[35]	42/M	10 days	Anticoagulants	27 G whitacre	HC, vomiting and coma
[36]	31/F	14 days	Pregnancy	22 G	Hemiparesis
[37]	27/F	5 days	Pregnancy	26 G	Left hemiparesis and aphasia
[38]	71/M	5 days	None	22 G Quincke	HC and vomiting
[39]	39/F	6 days	MP	25 G Quincke	HC and vomiting
[40]	63/F	11 days	Anticoagulants	22 G	HC and hemiparesis
[41]	68/M	30 days	None	22 G	HC and confusion
[42]	68/M	2 weeks	MP	25 G Quincke	HC and left orbital pain
[43]	67/M	6 days	None	22 G Quincke	Coma
[44]	67/M	3 weeks	MP	25 G	Frontal HC and confusion
[45]	50/M	30 days	None	?	HC and confusion
[46]	33/F	26 days	Pregnancy	21 G	HC and confusion
[47]	63/M	29 days	None	24 G	Dysphasia and hemiplegia
[48]	70/M	21 days	None	22 G	HC, vomiting and confusion
[3]	39/F	30 days	Pregnancy	26 G	HC and left hemiparesis
[49]	67/M	10 days	None	22 G	Disorientation and hyperreflexia
[50]	37/M	6 days	MP	25 G Quincke	Coma
[51]	69/M	48 days	None	22 G	HC, diplopia and confusion
[52]	33/F	5 days	Pregnancy	26 G Pencil-point	HC, tinnitus
[52]	27/F	? days	Pregnancy	?	HC, seizures
[52]	18/F	42 days	Pregnancy	?	HC, photophobia
[52]	28/M	6 weeks	None	?	HC
[52]	24/F	2 days	?	25G Quincke	HC, tinnitus

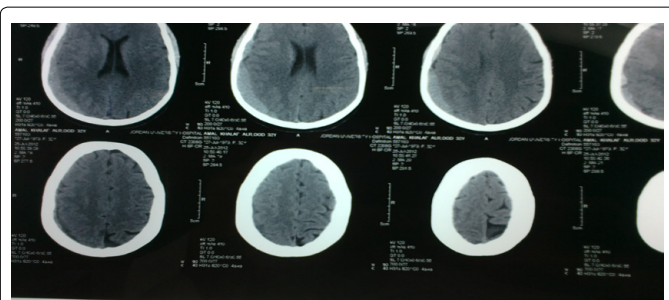
MP: Multiple puncture; HC: Headache

**Table 1:** Reported cases of intracranial subdural hematoma after spinal anesthesia.

complications like hypotension, postdural puncture headache, nerve damage, meningitis, intracerebral hemorrhage, spinal and cranial hematoma [3,4].

Postdural puncture headache (PDPH) is a frequent, unpleasant complication of lumbar puncture and spinal anesthesia. The mechanism that is proposed for this phenomenon is the persistent

leakage of cerebrospinal fluid through the dural puncture site, leading to the caudal displacement of the brain with traction on pain-sensitive structures and the thin subdural bridging veins, possibly causing a slow and constant blood leakage from these veins [5]. The blood can accumulate over time causing subdural hematoma and leading to symptoms of high intracranial pressure.



**Figure 1:** Computed tomography (CT) of the head showing acute subdural hematoma involving the right cerebral hemisphere convexity measuring 15 mm in maximal width and causing mass effect into the underlying right hemisphere sulci.

PDPH has certain features which can help in diagnosis and management; it usually appears within the first 24-48 hours after puncture, located on the frontal or occipital regions or both worsening significantly upon assuming the upright position and improving significantly upon lying down. It may persist up to 2 weeks and generally responds well to conservative management (hydration, bed rest, simple analgesics and epidural blood patch). Additional symptoms may include neck pain, nausea, emesis, interscapular pain, photophobia, diplopia, dizziness, and change in hearing, visual blurring, cranial nerve palsies and radicular upper extremity symptoms [6].

The occurrence of subdural hematoma increases the intracranial pressure which can be associated with non-postural headache, vomiting, convulsions, hemiplegia, confusion, sleepiness and coma. The main problem is that the differentiation between the neurological symptoms of intracranial hypotension and subdural hematoma can be difficult, but the most important warning sign is the change in headache characteristics from postural to non-postural.

Our patient developed postural headache in the first few days which was treated conservatively before discharge from the hospital. She was lost to follow up for about 14 days when she started to have a change in the characteristics of her headache to more severe non-postural headache. At that time we thought that the patient may have an intracranial pathology which should be investigated but she refused to be admitted to the hospital due to social reasons despite the clear clinical advice which delayed the diagnosis. She did not present to the hospital until her headache became intolerable and associated with other neurological symptoms.

Predisposing factors for PDPH and subsequent development of subdural hematoma include, pregnancy, dehydration, multiple dural punctures, using thick needles, coagulopathy, cerebral vascular abnormalities, brain atrophy and alcohol consumption [3]. The only contributing factor in our case was pregnancy as we used a 25 Gauge spinal needle (the smallest needle in our province), and CSF flow was detected at first attempt. However using fine needles does not eliminate the possibility of occurrence of this complication as reported here and in other literature cases [7,8].

It seems that venous congestion during pregnancy can make bridging veins more susceptible to rupture. Sudden increases in venous pressure of these dilated veins by coughing or abdominal compression during labor and delivery can lead to an augmentation of tension, especially at the subdural portion of bridging veins [9]. It is widely believed that pregnancy increases the risk of stroke. Reports have shown that the incidence of intracerebral hemorrhage is increased

in the six weeks after delivery [10]. There are also reported cases of spontaneous spinal epidural hematoma during pregnancy [11].

Review of the literature disclosed 49 cases of intracranial subdural hematoma after spinal anesthesia (Table 1). In 15 patients the only predisposing factor was pregnancy. There was no predisposing factor in 20 patients. Headache was present in 37 patients. A 27 gauge needle was used in 6 patients. The age of patients ranged between 20 to 88 years. The earliest diagnosis of subdural hematoma was six hours after spinal anesthesia and the latest was 12 weeks. Two patients were on anticoagulants, one patient had brain aneurysm, nine patients had multiple punctures and four patients died.

In the 49 cases reported here, 41 patients required surgical drainage. Conservative treatment is indicated for small blood collections without deviation of the structures in the intracranial midline that do not cause relevant clinical repercussions. Our patient had surgical evacuation of the hematoma due to the mass effect into the underlying hemisphere sulci which caused her neurological symptoms (headache, right-sided weakness, blurring of vision, nausea and dizziness).

The delayed diagnosis, in many cases, implies that subdural hematoma wasn't taken into consideration as a complication of spinal anesthesia. Fortunately our patient had complete recovery despite the delay in diagnosis and the surgical evacuation of the hematoma. As a result of this case, we have modified our practice so that every patient is instructed regarding this possible complication and asked to contact the anesthesiologist in the case of a change in the characteristics of the headache, that is, from postural to non-postural.

The true incidence of subdural hematoma after spinal anesthesia may be greater than the published case reports. This suggests that headaches following spinal anesthesia can be a diagnostic challenge for the clinician. Subdural hematoma must be suspected when headache persists despite conservative treatment or when a non-postural character appears. The presences of neurological deficits, seizures, signs of intracranial hypertension, or alterations of consciousness are additional late warning signs.

In conclusion, patients developing PDPH unrelieved by conservative measures, as well as the change of PDPH from postural to non-postural, require careful follow-up for early diagnosis and management of possible subdural hematoma. Investigation with a head CT or MRI is mandatory. Pregnant women seem to be more susceptible to the formation of subdural hematoma after spinal anesthesia.

## References

1. De Tommaso O, Caporusio A, Tagariello V (2002) Neurological complications following central neuraxial blocks: are there predictive factors? *Eur J Anaesthesiol* 19: 705-716.
2. Acharya R, Chhabra SS, Ratra M, Sehgal AD (2001) Cranial subdural haematoma after spinal anaesthesia. *Br J Anaesth* 86: 893-895.
3. Zeidan A, Farhat O, Maaliki H, Baraka A (2006) Does postdural puncture headache left untreated lead to subdural hematoma? Case report and review of the literature. *Int J Obstet Anesth* 15: 50-58.
4. Ulivieri S, Oliveri G, Dell'Acqua S (2009) Intracerebralhaematoma following spinal anaesthesia for caesarean section: case report. *G Chir* 30: 109-111.
5. Yamashita T, Friede RL (1984) Why do bridging veins rupture into the virtual subdural space? *J Neurol Neurosurg Psychiatry* 47: 121-127.
6. Mokri B (2003) Headaches caused by decreased intracranial pressure: diagnosis and management. *Curr Opin Neurol* 16: 319-326.
7. Valença MM, Amorim JA, Barros MVG (2007) Risk factors for postdural puncture headache: experience with spinal anesthesia. *Cephalalgia* 27:716-717.

8. Amorim JA, Remígio DS, DamázioFilho O, de Barros MA, Carvalho VN, et al. (2010) Intracranial subdural hematoma post-spinal anesthesia: report of two cases and review of 33 cases in the literature. *Rev Bras Anesthesiol* 60: 620-629, 344-9.
9. Ravindran RS, Viegas OJ, Tasch MD, Cline PJ, Deaton RL, et al. (1981) Bearing down at the time of delivery and the incidence of spinal headache in parturients. *Anesth Analg* 60: 524-526.
10. Sharshar T, Lamy C, Mas JL (1995) Incidence and causes of strokes associated with pregnancy and puerperium. A study in public hospitals of Ile de France. Stroke in Pregnancy Study Group. *Stroke* 26: 930-936.
11. Szkup P, Stoneham G (2004) Case report: spontaneous spinal epidural haematoma during pregnancy: case report and review of the literature. *Br J Radiol* 77: 881-884.
12. Krishnakumar K, NilayChatterjee, AdeshShrivastava, Josemine Davis, Suresh Nair N (2013) Subdural hematoma following spinal anesthesia treated with epidural blood patch and burr-hole evacuation: A case report. *Middle east journal of anesthesiology* 22: 117-120.
13. DoĀyanay F, Pırbudak L, GĀıı R, Alptekin M, Kaplan N (2013) Postspinalsubacut subdural hematoma: case report. *below Agri* 25: 129-132.
14. Hassen GW, Kalantari H (2012) Diplopia from subacute bilateral subdural hematoma after spinal anesthesia. *West J Emerg Med* 13: 108-110.
15. Bisinotto FM, Dezena RA, Fabri DC, Abud TM, Canno LH (2012) Intracranial subdural hematoma: a rare complication following spinal anesthesia: case report. *Rev Bras Anesthesiol* 62: 88-95.
16. Moradi M, Shami S, Farhadifar F, Nessori K (2012) Cerebral subdural hematoma following spinal anesthesia: report of two cases. *Case Rep Med* 2012: 352028.
17. Hagino T, Ochiai S, Watanabe Y, Senga S, Saito M, et al. (2012) Acute onset of intracranial subdural hemorrhage five days after spinal anesthesia for knee arthroscopic surgery a case report. *Journal of medical case reports* 6: 75-78.
18. Park IB, Moon SY, Kim YY, Kwon YE, Lee JH (2011) Acute-on-chronic subdural hematoma by spinal anesthesia in a patient with undiagnosed chronic subdural hematoma-A case report-. *Korean J Anesthesiol* 61: 75-78.
19. Machurot PY, Vergnion M, Fraipont V, Bonhomme V, Damas F (2010) Intracranial subdural hematoma following spinal anesthesia: case report and review of the literature. *Acta Anaesthesiol Belg* 61: 63-66.
20. Katircioglu K, Aydin O, Ozkalkanli MY, Savaci S (2009) Cranial subdural haematoma: a rare complication of spinal anaesthesia. *Eur J Anaesthesiol* 26: 793-795.
21. Rocchi R, Lombardi C, Marradi I, Di Paolo M, Cerase A (2009) Intracranial and intraspinal hemorrhage following spinal anesthesia. *Neurol Sci* 30: 393-396.
22. Dawley B, Hendrix A (2009) Intracranial subdural hematoma after spinal anesthesia in a parturient. *Obstet Gynecol* 113: 570-573.
23. Ramos-Aparici R, Segura-Pastor D, Edo-Cebollada L, Vila-Sánchez M (2008) Acute subdural hematoma after spinal anesthesia in an obstetric patient. *J Clin Anesth* 20: 376-378.
24. Verdu MT, Martínez-Lage JF, Alonso B, Sánchez-Ortega JL, García-Candel A (2007) Non-surgical management of intracranial subdural hematoma complicating spinal anesthesia. *Neurocirugia (Astur)* 18: 40-43.
25. Acharya R (2005) Chronic subdural haematoma complicating spinal anaesthesia. *Neurol Sci* 25: 348-350.
26. Landman UN, Jerome RM, Glass PS (2005) Subdural hematoma after atraumatic spinal. *J Clin Anesth* 17: 379-381.
27. Alilou M, Halefadi S, Caidi A, Kabbaj S, Ismaili H, et al. (2003) Cranial subdural haematoma following spinal anaesthesia. *Ann FrAnesthReanim* 22: 560-561.
28. Tan ST, Hung CT (2003) Acute-on-chronic subdural haematoma: a rare complication after spinal anaesthesia. See comment in PubMed Commons below *Hong Kong Med J* 9: 384-386.
29. Kelsaka E, Sarihasan B, Baris S, Tur A (2003) Subdural hematoma as a late complication of spinal anesthesia. *J Neurosurg Anesthesiol* 15: 47-49.
30. Slowinski J, Szydlik W, Sanetra A, Kaminska I, Mrowka R (2003) Bilateral chronic subdural hematomas with neurologic symptoms complicating spinal anesthesia. *Reg Anesth Pain Med* 28: 347-350.
31. Wells JB, Sampson IH (2002) Subarachnoid hemorrhage presenting as post-dural puncture headache: a case report. *Mt Sinai J Med* 69: 109-110.
32. Sharma K (2002) Intracerebral hemorrhage after spinal anesthesia. *J NeurosurgAnesthesiol* 14: 234-237.
33. Eggert SM, Eggers KA (2001) Subarachnoidhaemorrhage following spinal anaesthesia in an obstetric patient. *Br J Anaesth* 86: 442-444.
34. Acharya R, Chhabra SS, Ratra M, Sehgal AD (2001) Cranial subdural haematoma after spinal anaesthesia. *Br J Anaesth* 86: 893-895.
35. Cantais E, Behnamou D, Petit D, Palmier B (2000) Acute subdural hematoma following spinal anesthesia with a very small spinal needle. *Anesthesiology* 93: 1354-1356.
36. Akpek EA, Karaaslan D, Erol E, Caner H, Kayhan Z (1999) Chronic subdural haematoma following caesarean section under spinal anaesthesia. *Anaesth Intensive Care* 27: 206-208.
37. Mantia AM (1981) Clinical report of the occurrence of an intracerebral hemorrhage following post-lumbar puncture headache. *Anesthesiology* 55: 684-685.
38. Bjärnhall M, Ekseth K, Boström S, Vegfors M (1996) Intracranial subdural haematoma—a rare complication following spinal anaesthesia. *Acta Anaesthesiol Scand* 40: 1249-1251.
39. Bisinoto FMB, Martins Sobrinho J, Augusto CM (2012) Hematoma subdural encefálicoapósanestesiassubaracnoidea. *Rev Bras Anesthesiol*, 1993; 43:199-200.
40. Ortiz M, Aliaga L, Baturell C, Preciado MJ, Aguilar J, et al. (1991) Intracranial subdural haematoma—a rare complication after spinal anaesthesia. *Eur J Anaesthesiol* 8: 245-248.
41. Van de Kelft E, De la Porte C, Meese G, Adriaensen H (1991) Intracranial subdural hematoma after spinal anesthesia. *Acta Anaesthesiol Belg* 42: 177-180.
42. Macon ME, Armstrong L, Brown EM (1990) Subdural hematoma following spinal anesthesia. *Anesthesiology* 72: 380-381.
43. Béal JL, Royer JM, Freysz M, Poli L, Wilkening M (1989) Acute intracranial subdural hematoma of arterial origin after spinal anesthesia. *Ann Fr Anesth Reanim* 8: 143-145.
44. Blake DW, Donnan G, Jensen D (1987) Intracranial subdural haematoma after spinal anaesthesia. *Anaesth Intensive Care* 15: 341-342.
45. Giamundo A, Benvenuti D, Lavano A (1985) Chronic subdural haematoma after spinal anaesthesia. Case report. *J NeurosurgSci*, 29:153-155.
46. Miyazaki S, Fukushima H, Kamata K (1983) Chronic subdural hematoma after lumbar-subarachnoid analgesia for a cesarean section. *Surg Neurol* 19:459-460.
47. Jonsson LO, Einarsson P, Olsson GL (1983) Subduralhaematoma and spinal anaesthesia. A case report and an incidence study. *Anaesthesia* 38: 144-146.
48. Rudehill A, Gordon E, Rähn T (1983) Subduralhaematoma. A rare but life-threatening complication after spinal anaesthesia. *Acta Anaesthesiol Scand* 27: 376-377.
49. Newrick P, Read D (1982) Subduralhaematoma as a complication of spinal anaesthetic. *Br Med J (Clin Res Ed)* 285: 341-342.
50. Pavlin DJ, McDonald JS, Child B (1979) Acute subdural hematoma an unusual sequela to lumbar puncture. *Anesthesiology*, 1979; 51:338-340.
51. Welch K (1959) Subdural hematoma following spinal anesthesia. *Arch Surg* 79:49-51.
52. Nakanuno R, Kawamoto M, Yuge O (2007) Intracranial subdural Hematoma following dural puncture, *MASUI* 56:395-403.