



Long-term Complications of Unintentional Dural Puncture During Labor Epidural Analgesia: A Case-Control Study.

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Introduction

- Epidural analgesia is commonly used to manage pain in childbirth. The technique is efficient, safe and allows conversion to surgical anesthesia if necessary.
- The epidural catheter insertion may be complicated by an unintentional dural puncture (UDP), a complication frequently associated with postdural puncture headache (PDPH)⁽¹⁾.
- PDPH symptoms may be self-limited and managed by conservative measures but if they fail, an epidural blood patch (EBP) is regarded by many as the ultimate treatment⁽²⁾.
- There is increasing, but still limited evidence on the long-term implications of PDPH and its treatment⁽³⁾.

Primary objective: to investigate if patients who sustained an UDP during epidural catheter placement for childbirth at our institution have a higher risk of developing chronic headache, low back pain, visual or auditory impairment.

Methods

Research Ethics Board approval and patient's informed consent.

Study design

1:1 Case-control study with patients who delivered at our institution from January 2015 to December 2019.

Cases

Patients who received epidural analgesia and sustained an UDP.

Controls

Patients who received epidural analgesia but did not sustain an UDP.

1:1 matching

Cases and Controls were matched for date of delivery, age and body mass index.

Inclusion criteria

- Cases of recognized UDP defined as visualisation of cerebral spinal fluid through the 17-gauge Tuohy needle or through the epidural catheter during the epidural catheter insertion.

Exclusion criteria

- Presence of pre-existing chronic headache or backache.

All cases and controls were recruited at least six months after the epidural placement to ensure that chronicity of complications was well-established.

Data collection

- All patients completed an online survey with validated questionnaires ⁽⁴⁻⁹⁾ for diagnosis of chronic headache and chronic back pain.
- We used dichotomic (yes/no) questions to look for the presence of chronic visual and auditory impairment.
- We looked at a composite outcome, which was defined as the presence of any of the chronic symptoms including headache, back pain, auditory or visual impairment.
- We added questions derived from the Pain Disability Index (PDI) Questionnaire ⁽¹⁰⁾ to evaluate the impact of the most bothersome symptoms on the patient's daily activities.

Survey software

- The online survey was created using Simple Survey (Outsidesoft Solutions inc., Quebec, Canada).

Statistical analysis

- Cases and Controls were compared using the McNemar test for categorical variables and the paired student t test for continuous variables.
- Multivariate conditional logistic regression analysis was conducted to compare the binary outcomes and a quantile regression model was applied to compare the continuous outcomes.



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Results

- 63 case-control pairs were studied.
- There was no difference in age, height, weight, BMI, mode of delivery, presence of scoliosis and use of ultrasound for epidural insertion assistance between the dural puncture group and the control group.
- **Patients who sustained a dural puncture during their epidural catheter insertion had a higher risk of developing chronic headache and chronic back pain** than patients who did not sustain a dural puncture (Table 1).
- The **incidence of chronic auditory impairment was also higher in the dural puncture group** (Table 1).
- **The odds of developing at least one of the chronic symptoms in the case group was almost 2 times higher compared to the control group** (Table 1).
- Patients in both groups who developed chronic symptoms completed the Pain Disability Index (PDI) questionnaire to assess the level of disability attributed to those symptoms. The median PDI total score in the case group was not different from the control group (Table 1).

Table 1. Comparison of outcomes of interest				
Characteristics	Control	Case	p-value	AOR (95%CI)
# Patients	63	63		(Case vs Control)
Headache, %(n/N)	4.8 (3/63)	14.3 (9/63)	0.057	3.67 (1.05, 12.82)
Backache, %(n/N)	19.1 (12/63)	39.7 (25/63)	0.009	2.67 (1.25, 5.72)
Hearing impairment, %(n/N)	1.6 (1/63)	14.3 (9/63)	0.01	9.98 (1.21, 82.62)
Visual impairment, %(n/N)	6.4 (4/63)	7.9 (5/63)	0.74	1.33 (0.33, 5.40)
Composite outcome, %(n/N)	27.0 (17/63)	52.4 (33/63)	0.005	2.95 (1.42, 6.11)
				Adjust Diff (95%CI) (case vs control)
Total PDI score, median (IQR)	4 (0, 17)	7 (0, 20)	0.27	-4.0 (-14.6, 6.62)



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Results

- We performed a subgroup analysis to assess if the performance of an **epidural blood patch** would affect the incidence of developing chronic headache, backache and visual or auditory impairment. There was **no difference between those receiving or not receiving epidural blood patch** (Table 2).

Table 2. Subgroup analysis: Comparison of outcomes of interest in patients receiving or not an epidural blood patch				
Characteristics	Non-Epidural blood patch	Epidural blood patch	p-value	OR (95%CI)
# Patients	48	15		(Epidural blood patch vs non-Epidural blood patch)
Headache, %(n/N)	10.4 (5/48)	26.7 (4/15)	0.2	3.12 (0.72, 13.63)
Backache, %(n/N)	35.4 (17/48)	53.3 (8/15)	0.22	2.08 (0.64, 6.74)
Hearing impairment, %(n/N)	12.5 (6/48)	20.0 (3/15)	0.43	1.75 (0.38, 8.06)
Visual impairment, %(n/N)	8.3 (4/48)	6.7 (1/15)	0.99	0.79 (0.08, 7.62)
Composite outcome, %(n/N)	47.9 (23/48)	66.7 (10/15)	0.2	2.17 (0.65, 7.32)
				Diff (95%CI) (case vs control)
Total PDI score, median (IQR)	6 (0, 19)	13.5 (2, 32)	0.28	-1.0 (-24.1, 22.1)

Discussion

- The incidence of chronic complications following UDP in our study is in keeping with those reported in previous similar studies:
 - Webb et al ⁽³⁾ reported chronic headache in 28% and chronic back pain in 43% of patients sustaining UDP.
 - Binyamin et al ⁽¹¹⁾ noted the presence of chronic headache and chronic back pain in 16.1% and 17.9% of patients respectively, amongst those who sustained UDP and did not receive EBP.
 - Similar to Binyamin et al ⁽¹¹⁾, we did not observe any difference in the incidence of chronic symptoms associated with the EBP performance. However, Webb et al ⁽³⁾ reported a lower incidence of both headache and backache in patients who received EBP.
- This case-control study is one of the first to investigate all possible long-term symptoms associated with UDP, **including visual and auditory disturbances**. Our study also looked at a much longer duration of follow up compared to prospective cohort studies published to date.
- Our study suggests that **patients who sustain UDP** during epidural catheter placement for labor pain management **are at higher risk of developing chronic headache, chronic lower back pain and chronic auditory symptoms**.
- The use of EBP does not seem to affect the incidence or severity of these outcomes; however, the number of events may have been too small to draw that conclusion, and **further studies are warranted**.

References

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