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Obstetric Anesthesia Abstracts

Contents

An integrative multidisciplinary team approach for a patient with Fontan circulation and placenta previa

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80

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INTRODUCTION

Improving surgical technique and long-term medical management has led to a significant reduction in morbidity for patients with congenital heart disease (CHD). However, patients remain at risk of significant hemodynamic compromise during pregnancy as well as during delivery and anesthetic management. The physiologic changes and stress of pregnancy complicate safe obstetrical anesthetic care in parturients with CHD.[1]

We present a case of a pregnant patient with Fontan circulation (FC) and known placenta previa (PP). A multidisciplinary team (MDT) approach was taken to navigate the complexity of her peripartum care. Early planning allowed for safe and hemodynamically stable management of her care, including prompt hysterectomy when faced with severe postpartum hemorrhage (PPH) during her Cesarian section (CS).

CASE PRESENTATION

Granted consent, we present a case of a 22-yr-old primigravida born with tricuspid atresia, atrial septal defect and ventricular septal defect who had undergone Fontan repair. Transthoracic echocardiography (TTE) revealed good LV function, an atretic RV and good flow through the FC, with abdominal ultrasound showing PP. To develop a comprehensive peripartum plan, an MDT meeting was convened with a decision for an elective CS at 36 weeks. Management of possible PPH was discussed given the devastating impact of hypovolemia on FC. With limited options, it was decided that any placental adherence would require hysterectomy.

At 33+5weeks gestation, the patient experienced her 4th episode of antepartum hemorrhage. While bleeding resolved and she remained stable, a decision was made to proceed with her CS at 34 weeks.

In addition to standard ASA monitors, arterial line and central venous line were inserted. The anesthetic technique was a titrated epidural with lidocaine 2% and opioids. The patient was placed in the left lateral tilt position to avoid aortocaval compression which would be devastating in this patient. Intraoperative TTE was used to continuously monitor the cardiac output and volume status, with norepinephrine infusion being titrated accordingly. After

delivery of the baby and administering carbetocin-100 µg *iv*, the obstetrician identified significant placental adherence. A prompt decision was made to proceed with hysterectomy as discussed by the MDT. Adequate resuscitation was done with PRBCs, crystalloids and vasopressors to maintain hemodynamic stability. Total blood loss was 1 L. Postoperatively, the patient was admitted to intensive care unit for postpartum and cardiac care.

CONCLUSION

A CS can be life-threatening for patients with repaired CHD. Their reliance on preload makes PPH a particular challenge that demands diligent planning. The combination of these pathologies is rare and our case report emphasizes the importance of a MDT approach to ensure better maternal and fetal outcomes.

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Anesthetic management of a parturient with existing paraplegia and autonomic dysreflexia: a case report

Submission ID

69

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INTRODUCTION

Across the globe, spinal cord injuries are estimated to occur at approximately 40–80 cases/million, which includes both traumatic and non-traumatic cases.[1] While advancements in medicine support pregnancies amongst patients with spinal cord injuries, they are at a heightened risk of developing autonomic dysreflexia during labour and delivery.[2–5] Possible complications of autonomic dysreflexia include hypertensive encephalopathy, intracranial hemorrhage, and possible death.[3] Here we describe the case of a multiparous parturient with existing paraplegia at T10 sustained from a prior gunshot wound presenting at preterm gestation for a Cesarean delivery having history of autonomic hyper reflexia. We report on the initial parturient assessment, anesthetic considerations for Cesarean section, and subsequent management in the postoperative period.

CASE PRESENTATION

38-yr-old G2P1 came with a history of traumatic spinal cord injury from gunshot at T10 level, having history of autonomic hyperreflexia. She was admitted for repeat elective Cesarean section. She has a history of spinal fusion from T10 TO T12 level and history of extensive abdominal surgeries and bladder reconstruction with stoma.

On examination her vitals were blood pressure (BP) 110/70 mm Hg, heart rate (HR) 100/min, SpO_2 99% room air. She is wheel chair bound with no motor activity on B/L lower limb, she is able to sit without support, she has sensory sensation at T10 level with a patch of slight sensation at T12 level with pin on left side of abdomen which was marked circular, to check after the regional block.

Multidisciplinary team involved with complex care plan before the procedure. Patient received thoracic epidural at T8 T9 level in sitting position, checked with test dose. Awake arterial line done with 2 I/V attached to fluid warmer. Spinal anesthesia performed in sitting

position at L3L4 level and spinal dose of 0.75% bupivacaine 2 mL with 10 µg fentanyl and 150 µg of epimorph used, level of block achieved was T4 but she had Pin sensation at the T12 level, 3 mL of lidocaine with epinephrine given via epidural in reverse trendelenburgh and after 10 min there is block at T12 patchy area and height of block is T4, she required some phenylephrine boluses. Total of 9 mL local anesthetic via epidural required. Surgery was uneventful, Highest BP noted was 140/80 mm Hg, no intervention done. At end pt shifted to postanesthesia care unit.

CONCLUSION

Patients with spinal cord injury and autonomic hyper reflexia can experience childbirth with partners during Cesarean section under regional anesthesia technique without any complications. Key take home point is involvement of multidisciplinary team with complex care plan ahead of time, adequate post operative pain management with epidural. Previous case report[5] showed consideration of autonomic hyperreflexia should be given in injuries below sixth thoracic spine, as our patient had symptoms of autonomic hyper reflexia at T10 level though it was mild and these patients should be managed carefully to avoid any complications.

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Cesarean delivery in a 35-year-old female with mitochondrial disorder (Mitochondrial Enoyl CoA Reductase Protein Associated with Neurodegeneration [MEPAN])

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60

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INTRODUCTION

Mitochondrial disorders encompass a diverse group of genetic conditions affecting multiple organ systems, often leading to significant physical impairment. During pregnancy, these disorders may reduce energy transfer to the fetus, resulting in an elevated risk of preeclampsia, intrauterine growth restriction (IUGR), and premature delivery.[1] Mitochondrial enoyl CoA reductase protein-associated neurodegeneration (MEPAN) is an ultra-rare mitochondrial disorder caused by mutations in the *MECR* gene, affecting mitochondrial fatty acid synthesis and the respiratory chain.[2] This condition manifests with progressive neurological symptoms, including dystonia and optic atrophy. With fewer than 30 known cases globally,[3] this is the first report of Cesarean delivery in a patient with MEPAN syndrome. This report highlights the challenges of perioperative management in mitochondrial disorders and provides insight into optimizing care for such complex cases.

CASE PRESENTATION

A 35-yr-old G2P1A1 at 37 weeks gestation with a mitochondrial disorder presented for Cesarean delivery due to severe IUGR. Her symptoms included progressive dysphagia, speech difficulties, optic atrophy and reduced mobility requiring a wheelchair. Genetic evaluation confirmed MEPAN syndrome via exome sequencing after delivery.

During her preanesthetic evaluation, we performed a comprehensive review of anesthetic considerations, including potential difficult airway, aspiration risk, respiratory decompensation, neuromuscular involvement, carnitine deficiency, medications and substances to avoid, and an essential multidisciplinary approach.

Perioperatively, we used Normal Saline (NS) due to concerns about lactate metabolism from Lactated Ringer's in mitochondrial disorders. In the operating room, an arterial line was placed prior to a combined spinal-epidural (CSE) with 2.5 mL 2% mepivacaine and 10 µg fentanyl. Mepivacaine was selected due to a report of ventricular tachycardia (VT) following the administration of bupivacaine in a patient with carnitine deficiency.[4]

Following the CSE, phenylephrine infusion was required to maintain a mean arterial pressure (MAP) above 60 mm Hg. For postoperative nausea prophylaxis, she received 2 mg of intravenous ondansetron. In the recovery room, 1.5 mg of epidural morphine was given, with oral acetaminophen (675 mg BID) and hydromorphone (0.25 mg every 4 hr as needed) for postoperative pain control. Acetaminophen and hydromorphone were used judiciously due to the "energy demand of liver metabolism" and risk of respiratory depression respectively.[5]

The patient had no immediate complications but developed pneumonia on postoperative day 2, which was successfully managed with antibiotics. She was discharged home on postoperative day 4.

CONCLUSION

MEPAN is an extremely rare disorder that challenges anesthesiologists to mitigate multiple perioperative risks. This is the first documented case report of a Cesarean delivery in a patient with MEPAN. The only other documented case involved siblings who underwent deep brain stimulation for childhood-onset dystonia related to MEPAN.[6] Anesthetic considerations were adopted from this previous case report, as well as additional literature on mitochondrial disorders, and we were able to deliver a safe anesthetic for both mother and baby. Additional reports are essential to optimize care for this rare patient population.

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Diagnostic cohort study comparing the accuracy of postdural puncture headache trial criteria *versus* International Headache Society criteria for postepidural postdural puncture headache

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65

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INTRODUCTION

In obstetric anesthesia practice, epidural needles, rather than spinal needles, represent the most important source of postdural puncture headache (PDPH). Despite revision, International Headache Society (IHS) Criteria remain problematic for postdural puncture headache diagnosis after epidural needle placement (PE-PDPH). This retrospective cohort study compared the diagnostic accuracy of epidural-specific PDPH Trial Criteria with IHS International Classification of Headache Disorders (ICHD)-2 Criteria and new ICHD-3 Criteria,[1] using prospectively collected data from the Canadian PDPH Trial (*n* = 1,081).

METHODS

Following Research Ethics Board approval, case report forms from 184 women who reported a "bothersome headache or neckache" within 14 days of labour epidural placement in the PDPH Trial were assessed for PE-PDPH. During the Trial, these women received standardized follow-up, regardless of dural puncture status, to symptom resolution (maximum 1 year). In the current study, 6 anesthesiologists were randomly paired to assess these 184 cases for PE-PDPH within the first 14 days of epidural placement using either PDPH Trial Criteria, ICHD-2 or ICHD-3 Criteria. Adjudicator pairs independently assessed and diagnosed each case, and when discordance was found, re-examined the case to reach a consensus diagnosis. First pass agreement between each adjudicating pair was assessed for each set of diagnostic criteria (kappa). Consensus diagnoses for PE-PDPH were compared with independent diagnoses made by an expert headache specialist/neurologist (Umpire Reference Test) based on long-term follow-up of the same 184 cases and clinical experience. Diagnostic performance of each set of

criteria was compared using sensitivity, specificity, Likelihood Ratios (LR) and Area under the Curve (AUC) for Receiver Operating Characteristic (ROC) curves.[2]

RESULTS

Thirty-one women were diagnosed with PE-PDPH by the Umpire Reference Test. First pass agreement between adjudicators was substantial for PDPH Trial Criteria (kappa, 0.62; $P < 0.001$) and fair for both ICHD Criteria (kappas, 0.26; $P < 0.001$). Postdural puncture headache Trial Criteria were more sensitive for PE-PDPH (48%) compared with ICHD-2 (3%) and ICHD-3 (32%). All three diagnostic criteria demonstrated high specificity (97–99%). Overall diagnostic accuracy was acceptable to good for PDPH Trial Criteria (AUC, 0.73; 95% confidence interval [CI], 0.64 to 0.82; LR+, 24; LR-, 0.53; PPV, .83; NPV, .90), unacceptable for ICHD-2 (AUC, 0.56; 95% CI, 0.50 to 0.62; LR+, 1; LR-, 1; PPV, .20; NPV, .83) and low for ICHD-3 (AUC, 0.66; 95% CI, 0.57 to 0.74; LR+, 32; LR-, 0.69; PPV, .91; NPV, .88).

DISCUSSION

Postdural puncture headache Trial Criteria demonstrated overall superior diagnostic performance for PE-PDPH compared with IHS ICHD-2 and IHS ICHD-3 during the first 14 days after labour epidural insertion compared with the Umpire Reference Test (long-term follow-up). This is consistent with findings from the embedded diagnostic study in the Canadian Multicentre PDPH Trial which compared ICHD-2 Criteria *vs* the PDPH Trial Criteria using senior anesthesiologist expert adjudicators. Although IHS ICHD-3 criteria clearly outperformed IHS ICHD-2 Criteria, PDPH Trial Criteria showed overall better performance suggesting that these criteria are preferred as part of development of a new diagnostic pathway for PE-PDPH.

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Effect of nalbuphine hydrochloride on postoperative pain and chills of Cesarean section patients undergoing combined anesthesia

Submission ID

10

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INTRODUCTION

To investigate the effects of nalbuphine hydrochloride on operative vital signs, postoperative pain and chills in Cesarean section patients undergoing combined lumbo-epidural anesthesia.

METHODS

A total of 120 patients who underwent Cesarean section in our hospital from January 2021 to January 2023 were selected, and all of them were given combined lumbal-epidural anesthesia during the operation. They were randomly divided into control group and observation group, with 60 cases in each group. In the observation group, the umbilical cord was clamped and nalbuphine hydrochloride was injected immediately after delivery, while the control group was injected with equal volume 0.9% sodium chloride solution. The changes of hemodynamic indexes (mean arterial pressure [MAP] and heart rate [HR]) of the two groups were compared before and after operation at 6, 12, and 24 hr. The visual analogue scale (VAS) was used to evaluate the pain degree at 6, 12, and 24 hr after surgery. Ramasy sedation score (RSS) was used to evaluate the sedation degree of patients at 6, 12, and 24 hr after surgery. The occurrence of chills in two groups was compared by Wrench chills grading. The adverse reactions of the two groups were compared, including nausea and vomiting, hypotension, bradycardia, dry mouth, hyperhidrosis, vertigo, and drag reaction.

RESULTS

There was no significant difference in MAP and HR between the two groups before and 6, 12, and 24 hr after surgery ($P > 0.05$). The VAS of both groups decreased gradually with time, and the VAS of the observation group was lower than that of the control group at 6/12/24 hr after surgery, which were (3.26 ± 0.62 *vs* 2.66 ± 0.59, 2.73 ± 0.57 *vs* 2.06 ± 0.47, 1.96 ± 0.59 *vs* 1.58 ± 0.53), respectively. The difference was statistically significant ($P < 0.05$). The RSS of both groups decreased gradually with time, and the RSS of the observation group were lower than those of the control group at 6/12/24 hr after surgery, which were (3.62 ± 0.37 *vs* 3.13 ± 0.42, 3.12 ± 0.43 *vs* 2.65 ± 0.32, 2.03 ± 0.29 *vs* 1.58 ± 0.28), respectively. The difference was statistically

significant ($P < 0.05$). The incidence of postoperative chills in observation group was lower than that in control group ($\chi^2 = 3.927$; $P = 0.048$). There was no significant difference in the incidence of postoperative adverse reactions between the two groups ($\chi^2 = 1.745$; $P = 0.186$).

DISCUSSION

The administration of nalbuphine hydrochloride in combination with anesthesia for Cesarean section is helpful to maintain the stability of postpartum vital signs, improve sedation and analgesia, prevent and alleviate postoperative chills, and has less adverse reactions and high safety.

REFERENCES

N/A

Mode of anesthesia and postpartum discharge: a secondary analysis of a historical population-based cohort

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114

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INTRODUCTION

The rate of Cesarean deliveries (CDs) in Canada has risen by 30% since 2000, reaching 28% of all deliveries in 2016, significantly exceeding the World Health Organization's recommended rate of 10–15%.[1,2] Cesarean deliveries are associated with maternal complications and impose a substantial financial burden on the health care system.[3] Neuraxial anesthesia (NA) is the preferred approach for CDs, due to its favorable safety profile. General anesthesia (GA) however, still remains necessary for emergent situations or when NA is contraindicated.[4] Maternal length of stay (LOS) from delivery to discharge, is a widely recognized measure of obstetric care quality and may differ based on anesthetic choice.[5] Another key metric is maternal location of discharge (LOD), which evaluates whether patients are discharged home or require transfer to another health care facility. This study investigates the influence of anesthetic choice on maternal LOS and LOD using provincial population-level perinatal data.

METHODS

With institutional ethics approval, this secondary analysis utilized a population-level historical cohort of CDs in a Canadian province, from 1 January 2014 to 1 January 2022. Data were sourced from the provincial perinatal database, which collects validated hospital record data for all maternal admissions in the province. The primary outcome was maternal LOS, calculated from the time of delivery to discharge. Maternal LOD (home *vs* hospital) was a secondary outcome. Mode of anesthesia was the primary predictor, with additional covariates analyzed including sociodemographic characteristics, maternal comorbidities, pregnancy complications, indications for CD, and hospital-level factors. Descriptive statistics summarized baseline characteristics. Bivariate analyses, including Yuen's *t* tests, robust ANOVA, and regression with polynomial contrasts, explored associations between individual covariates and LOS. Multivariate analysis using robust linear regression models examined the relationship between anesthesia type and LOS, adjusting for clustering by hospital with mixed-effects models. Generalized estimating equations (GEE) were applied to model the secondary outcome (LOD), with hospital included as a random effect. Sensitivity analyses tested alternative hospital-level models. Statistical significance was set at $P < 0.001$, and results were presented as effect sizes with 95% confidence intervals (CI).

RESULTS

Of 18,925 CDs, the median postpartum LOS was 3.1 days, with LOS being longer for GA compared to NA (3.3 *vs* 3.1 days respectively). Multivariate analysis revealed GA was associated with small increase in LOS (adjusted coefficient, 0.11 days; 95% CI, 0.04 to 0.018), although this result was not statistically significant ($P = 0.002$) (Fig. 1). Significant predictors of longer LOS are identified in Fig. 1. For maternal LOD, hospital discharge was rare (1%). Covariates that were significant predictors of hospital discharge were lower neonatal Apgar scores at 1 min (adjusted OR, 7.08; CI, 5.25 to 9.55; $P < 0.001$) and at 5-min (adjusted OR, 3.88; CI, 2.28 to 6.62; $P < 0.001$), preterm birth (adjusted OR, 6.52; CI, 3.88 to 10.98; $P < 0.001$) and maternal heart disease (adjusted OR, 9.83; CI, 3.67 to 26.31; $P < 0.001$) (Fig. 2). General anesthesia was associated with a higher likelihood of hospital discharge in bivariate analysis, this effect was not significant in the multivariate analysis after adjusting for confounders.

DISCUSSION

This study highlights the nuanced role of anesthesia in postpartum outcomes following CD. General anesthesia was not independently associated with longer LOS. However, we used conservative multiple-comparison adjustment which may increase the risk of type-II error. General anesthesia was associated with an increased likelihood of maternal discharge to hospital in bivariate analysis, however, this effect was not significant after adjusting for other factors. These results emphasize that while GA is necessary is specific situations, the impact on maternal outcomes is likely driven by other maternal and neonatal risk factors.

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Fig. 1 Predictors of days to maternal discharge from a multivariable linear model with hospital as a binary variable (CI = 95%)

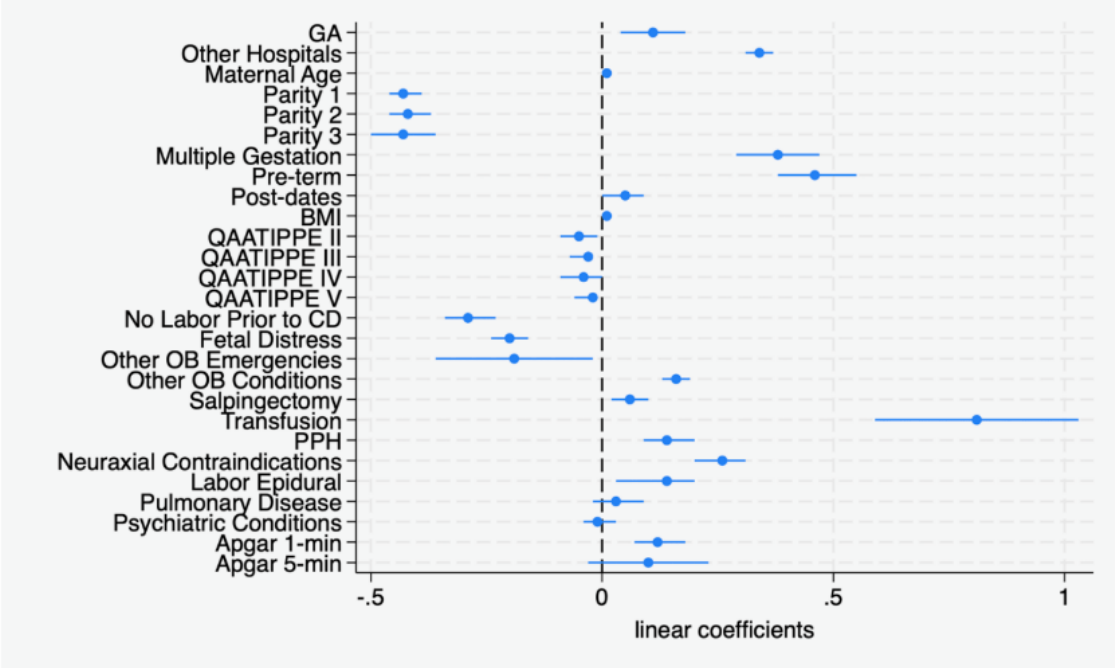
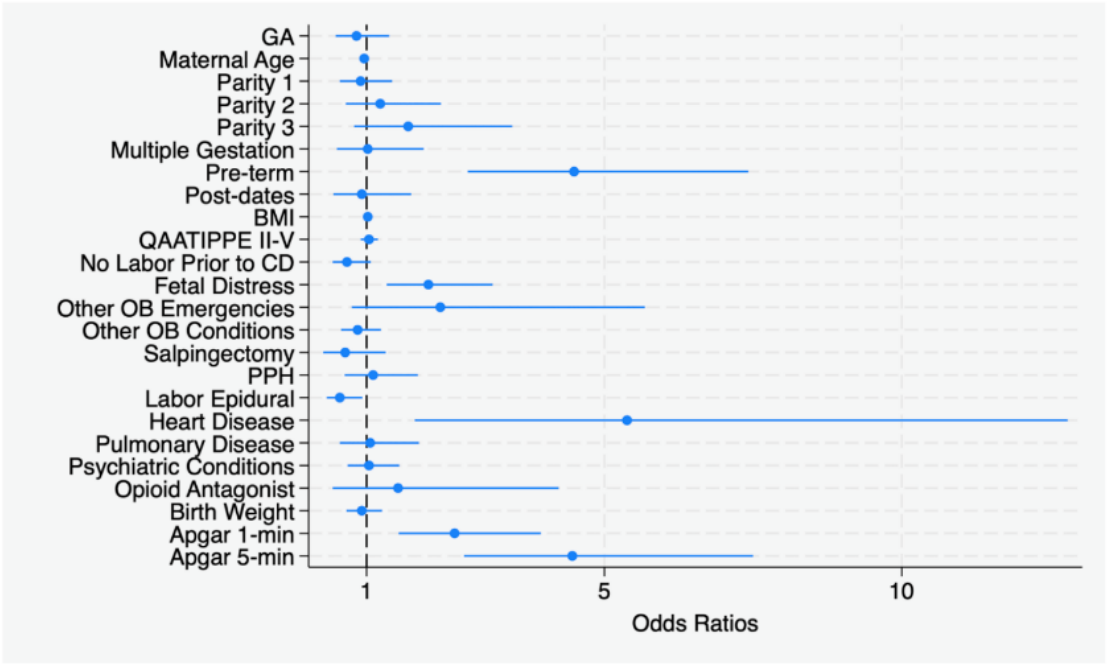


Fig. 2 Adjusted predictors of location of maternal discharge (OR > 1 indicating more likely to be discharged to hospital), including sensitivity analysis to account for hospital clustering (CI = 95%)



BMI = body mass index; GA = general anesthesia; PPH = postpartum hemorrhage; QAATIPPE = quintile of annual (after-tax) income per person equivalent

Table Distribution of outcomes and subject characteristics by mode of anesthesia for Cesarean section

Variable	General Anesthesia n=1342	Neuraxial n=17583	Complete sample N=18925
Maternal days to discharge			
Median [25-75%tile]	3.3 [2.7 – 4.5]	3.1 [2.3 – 3.9]	3.1 [2.3 – 3.9]
Maternal location of discharge			
Home			
Hospital	1291 (7%)	17442 (93%)	18733 (99%)
Missing	49 (30%)	113 (70%)	162 (0.9%)
			10 (0.1%)
Hospital Type			
Tertiary Hospital	449 (4%)	9941 (97%)	10 390 (55%)
Other Hospitals	893 (10%)	7642 (90%)	8535 (45%)
Annual CD under GA			
2014	169 (7%)	2196 (93%)	2365 (12%)
2015	150 (7 %)	2058 (93%)	2208 (12%)
2016	143 (6%)	2175 (94%)	2318 (12%)
2017	175 (8%)	2109 (92%)	2284 (12%)
2018	161 (7%)	2120 (93%)	2281 (12%)
2019	173 (7%)	2253 (93%)	2426 (13%)
2020	169 (7%)	2202 (93%)	2371 (13%)
2021	202 (8%)	2470 (92%)	2672 (14%)
Maternal age (y)			
Mean (SD)	30 (5.8)	31 (5.3)	
Parity			
0	683 (8%)	8365 (92%)	9048 (48%)
1	367 (6%)	6208 (94%)	6575 (35%)
2	171 (8%)	2104 (92%)	2275 (12%)
3	120 (12%)	904 (88%)	1024 (5%)
Number of Fetuses			
1	1255 (7%)	16354 (93%)	17609 (93%)
2	87 (7%)	1173 (93%)	1260 (6.7%)
3	0 (0%)	56 (100%)	56 (0.3%)
Gestational Age			
Term	868 (6%)	13568 (94%)	14436 (76%)
Pre-term	327 (13%)	2132 (87%)	2459 (13%)
Post-dates	146 (7%)	1867 (92%)	2013 (11%)
Maternal BMI			
Mean (SD)	33.9 (7.4)	33.7 (7.0)	
Missing			2441 (15.5%)
Neonatal 1-min Apgar			
Low	465 (20%)	1880 (80%)	2345 (12.4%)
Normal	858 (5%)	15644 (95%)	16502 (87.2%)
Missing			78 (0.4%)
Neonatal 5-min Apgar			
Low	202 (26%)	579 (73%)	781 (4.2%)
Normal	1120 (6%)	16943 (94%)	18063 (95.4%)
Missing			81 (0.4%)
Quintile of Annual (After-Tax) Income per Person-Equivalent			
I	299 (8%)	3250 (92%)	3549 (19%)
II	275 (8%)	3415 (92%)	3690 (20%)
III	318 (8%)	3823 (92%)	4141 (22%)
IV	232 (6%)	3912 (94%)	4144 (22%)
V	205 (6%)	3065 (94%)	3270 (17%)
Labor Status			
No Labour Prior to CD	532 (5%)	9678 (95%)	10210 (54%)
All Others	810 (9%)	7905 (91%)	8715 (46%)
Primary Indication for CD			
FDS	500 (11%)	3994 (89%)	4494 (24%)
APL, PLC, SUR	120 (53%)	107 (47%)	227 (1%)
All Others	708 (5%)	13453 (95%)	14161 (75%)
Other Obstetrical Conditions			
Yes			
No	685 (9%)	6836 (91%)	7521 (40%)
	657 (6%)	10747 (94%)	11404 (60%)
Tubal ligation during CD			
Yes	91 (6%)	1557 (94%)	1648 (9%)
No	1251 (7%)	16026 (93%)	17277 (91%)
Blood Transfusion			
No Transfusion	1253 (7%)	17414 (93%)	18667 (98.7%)
Ante/Intrapartum	19 (48%)	21 (52%)	40 (0.2%)
Postpartum	42 (31%)	92 (69%)	134 (0.7%)
Other	28 (33%)	56 (67%)	84 (0.4%)
Post-partum Hemorrhage			
No	1018 (6%)	15892 (94%)	16910 (89%)
Yes	324 (16%)	1691 (84%)	2015 (11%)
Potential Contraindications to NA			
No	1297 (7%)	17245 (93%)	18542 (98%)
Yes	45 (12%)	338 (88%)	383 (2%)
Continuous Labor Analgesia			
No			
Yes	933 (7%)	11626 (93%)	12559 (66%)
	409 (6%)	5957 (94%)	6366 (34%)
Heart Disease			
No	1327 (7%)	17400 (93%)	18727 (99%)
Yes	15 (8%)	183 (92%)	198 (1%)
Pulmonary Disease			
No	1216 (7%)	16394 (93%)	17610 (93%)
Yes	126 (10%)	1189 (90%)	1315 (7%)
Neurologic Illness			
No	984 (6%)	14323 (94%)	15307 (81%)
Yes	358 (10%)	3260 (90%)	3618 (19%)
Psychiatric Illness			
No	985 (6%)	14324 (94%)	15309 (81%)
Yes	357 (10%)	3259 (90%)	3616 (19%)
Opioid Antagonist Therapy			
No	1302 (7%)	17439 (93%)	18741(99%)
Yes	40 (22%)	144 (78%)	184 (1%)

Perioperative and anesthetic management of placenta accreta spectrum at an academic centre: an 11-year retrospective cohort study

Submission ID

140

AUTHORS

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INTRODUCTION

Placenta accreta spectrum (PAS) disorder represents a significant global threat due to its association with severe postpartum hemorrhage, contributing to maternal and perinatal mortality. The rising incidence is largely linked to increasing Cesarean delivery rates. Managing PAS involves complex surgical challenges, with a primary focus on mitigating obstetric hemorrhagic and reducing the risk of organ damage. Multidisciplinary care—including obstetric anesthesiologists, obstetricians, gynecological oncologists, radiologists, and critical care specialists—has been shown to improve clinical outcomes.[1]

At our institution, anesthetic practices have evolved, emphasizing neuraxial techniques and pre-incision tranexamic acid use.[2] Since 2018, internal iliac artery balloon (IIA) placement has been discontinued, and cell salvage has become standard. The changes were implemented considering the reported complications with IIA balloon placement.[3] The aim of this study was to evaluate the impact of these anesthetic and surgical changes on maternal and perinatal outcomes in PAS patients.

METHODS

This was a retrospective cohort study of patients diagnosed with PAS at our institution between 1 January 2013 and 31 December 2023. Ethics approval was obtained from the Research Ethics Board. Patients were identified from a specialized PAS database. Inclusion criteria were singleton pregnancies with surgically and pathologically confirmed PAS undergoing emergency or elective procedures, including conservative (uterus-preserving) or non-conservative (Cesarean hysterectomy) management. Placenta accreta spectrum diagnoses were established antenatally by a dedicated team of maternal-fetal medicine and radiology specialists using

standardized imaging methods, including second- and third-trimester ultrasound and magnetic resonance imaging.

Patient characteristics and clinical data were anonymized and stored in a secure database. Variables collected included emergent or scheduled delivery, surgical procedure, primary anesthesia technique, conversion rates to general anesthesia (GA), transfusion of blood products and complications. Comparisons were made for outcomes before and after 2018.

Continuous variables were summarized using mean (SD) or median [IQR], while categorical variables were expressed as frequencies (%). Statistical analyses included Fisher's exact test and logistic regression to explore associations. All analyses were performed using STATA 14.0 (StataCorp LLC, College Station, TX, USA).

RESULTS

We identified 193 patients with PAS during the study period: 2013–2017 (n = 58) and 2018–2023 (n = 135). Patient characteristics, anesthesia and surgical details are in the Table. Regional anesthesia was planned in 94% cases, and 17% were converted to GA; 73% of these conversions occurred postdelivery, mainly for intraoperative pain and major bleeding. Hysterectomy was performed in 84% of cases.

Significant changes were identified across two time periods including increased use of IIA ligation (13% *vs* 81%; $P < 0.01$), cell saver (64% *vs* 84%; $P < 0.01$), and decrease in uterine artery ligation (60% *vs* 21%; $P < 0.01$) and placement of IIA balloons (81% *vs* 0%; $P < 0.01$) after 2018. Despite this, blood loss and transfusion of blood products remained unchanged. General aneesthesia was associated with a higher blood loss than regional anesthesia by 882 (314) mL. Complication rates remained low across the two time periods.

DISCUSSION

Changes in surgical techniques did not affect patient outcomes including transfusion or complication rates. These findings suggest that advanced techniques can be used with ease in patients with PAS without the need for IIA balloon placement, while maintaining a low complication rate.

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Perioperative management of a patient with paroxysmal nocturnal hemoglobinuria for Cesarean delivery: a case report

Submission ID

116

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INTRODUCTION

Paroxysmal nocturnal hemoglobinuria (PNH) is a rare acquired hematologic disorder involving complement-mediated hemolysis. The hallmarks include hemolysis, risk of major thromboembolic complications, bone marrow failure, and renal failure. Thus, PNH poses an increased risk of morbidity and mortality and requires careful management involving an interdisciplinary team.

The advent of biologics has revolutionized PNH management. While the use of eculizumab during pregnancy is well-documented, pegcetacoplan—a newer agent—has demonstrated superiority in maintaining hemoglobin levels, offering an advanced option in PNH management.

The anesthetic management of pregnant women with PNH is of particular concern to anesthesiologists. Existing case reports on Cesarean deliveries in patients with PNH primarily describe the use of general anesthesia, typically in those receiving eculizumab therapy. The purpose of this review is to highlight the anesthetic management of a pregnant woman with a known diagnosis of PNH who has been managed with pegcetacoplan and underwent spinal anesthesia

CASE PRESENTATION

A 24-yr-old primiparous woman with a history of PNH presented for elective Cesarean delivery at 37+2 weeks. Diagnosed five years earlier, her PNH was initially managed with Pegcetacoplan but transitioned to Eculizumab during pregnancy due to its more common use in pregnancy. However, this led to suboptimal disease control and significant anemia, requiring 1–2 packed red blood cell (pRBC) transfusions weekly to maintain hemoglobin levels between 80–100 $g \cdot L^{-1}$. In the third trimester, Pegcetacoplan was reinstated, achieving stable control without further transfusions.

The patient was also on daily Fragmin 5,000 IU subcutaneous for thromboprophylaxis, continued into the postpartum period due to the thrombotic risk associated with PNH.
The patient presented to hospital for elective Cesarean delivery at 37+2 weeks. At time of admission, her hemoglobin was 105 $g \cdot L^{-1}$, platelets were 126 × 10^9/L, and her last pRBC transfusion was eight weeks prior. For her Cesarean delivery, spinal anesthesia was carefully

administered, supplemented with intrathecal morphine for postoperative pain management to minimize sympathetic stimulation. An arterial line and two large-bore intravenous catheters were placed given risks of acute thrombosis and hemolysis.

Delivery was uneventful, and the procedure was well tolerated under neuraxial technique. Postoperatively, her hemoglobin levels ranged from 86–92 $g \cdot L^{-1}$, with a peak lactate dehydrogenase of 378 $U \cdot L^{-1}$ (normal < 270) on postoperative day 1. She remained hemodynamically stable throughout her recovery and was discharged home on postoperative day 3.

CONCLUSION

This case underscores the intricacies of managing a patient with paroxysmal nocturnal hemoglobinuria during pregnancy. We describe the successful use of neuraxial technique for anesthetic management for Cesarean delivery. Key factors contributing to the successful outcome included the critical role of multidisciplinary collaboration including hematology and obstetrics, and the use of a novel medication to control PNH during pregnancy.

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Peripartum transverse myelitis with intrathecal catheter placement after accidental dural puncture

Submission ID

51

AUTHORS

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INTRODUCTION

Labour epidurals are considered safe, and the rate of severe neurological complications is exceedingly rare.[1] As the use of this mode of analgesia increases, it becomes more important to report on adverse events. One risk of epidural anesthesia is accidental dural puncture.[2] A proposed, yet controversial, method of providing labour analgesia following accidental dural puncture is the use of an intrathecal catheter.[3] Transverse myelitis is an acquired neurological disorder characterized by the inflammation of the spinal cord.[4] Symptoms can include motor, sensory, and autonomic dysfunction, depending on the location of myelitis, with the thoracic spine being the most affected region.[4] In this report, we present a parturient who presented with acute transverse myelitis after a complex peripartum course involving an intrathecal catheter, single-shot spinal anesthetic, and general anesthesia for a Cesarean delivery. Patient consent, in accordance with our local institutional guidelines, was obtained for this case report.

CASE PRESENTATION

A term 36-yr-old G6T4A1L4 presented for induction of labour due to gestational diabetes. As her labour began, an epidural was placed at L2/3 with clear loss of resistance, negative aspiration for blood or cerebrospinal fluid, and a negative test dose. It was loaded with 0.125% bupivacaine, and a continuous infusion was initiated. Shortly afterwards, the patient experienced chest heaviness, tinnitus, bilateral lower extremity motor block, and a sensory block to T6. Glucose testing confirmed intrathecal catheter placement, and the catheter was used for labour analgesia. Labour failed to progress, necessitating a Cesarean delivery. Due to inconsistent analgesia, a single-shot spinal was performed. Following delivery of the baby, we converted to general anesthesia for uncontrolled pain, despite additional intravenous analgesia. This was uncomplicated, and the patient was extubated. Postoperatively, the patient developed severe left-sided painful paresthesias, allodynia, and left leg weakness. When delineating the timeline of her symptoms, she noted a few days before epidural insertion she began experiencing mild paresthesias in the same region. However, she reported her symptoms worsened following neuraxial anesthesia. Urgent magnetic resonance imaging spine and

neurology consult were obtained. Magnetic resonance imaging revealed a T2 hyperintensity and subtle cord expansion at T10–T11, consistent with thoracic transverse myelitis (Figure). Extensive work-up for infectious and inflammatory causes was negative. She was treated with intravenous methylprednisolone (1 g/day for three days), leading to improvement by postoperative day 2. At 25 days postepidural insertion, her left leg strength had fully recovered, and sensory symptoms partially improved.

CONCLUSION

This report highlights the importance of considering transverse myelitis in patients presenting with neurological symptoms after neuraxial anesthesia. Transverse myelitis has been described as a rare complication of neuraxial anesthesia, and in many of these cases, no clear causal relationship has been identified.[5] It remains unclear if the patient had pre-existing transverse myelitis or if it was caused or exacerbated by neuraxial anesthesia. Her symptoms, however, did worsen after neuraxial attempts, underscoring the importance of screening for neurologic deficits in an anesthesia consult prior to labour analgesia. Anesthesiologists should also involve appropriate specialists early when encountering neurological symptoms.

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Spinal epidural lipomatosis and neuraxial anesthesia: an unpredictable association—a case report

Submission ID

31

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INTRODUCTION

Neuraxial anesthesia is safe and widely used in obstetrics. One of the most severe, albeit rare complications is epidural hematoma and nerve damage (< 1 in 200,000 cases).[1,2] Spinal Epidural Lipomatosis (SEL) is a rare condition, characterised by accumulation of fatty tissue in the epidural space, often associated with chronic steroid use and obesity.[3] Spinal epidural lipomatosis can be an incidental finding on magnetic resonance imaging (MRI) or symptomatic due to narrowing of the spinal canal and compression of the surrounding neural structures. Spinal epidural lipomatosis can increase the risk of nerve trauma and cause unpredictable anesthetic block.[4] The literature offers limited evidence on the efficacy of neuraxial anesthesia and the related complications in these patients, due to the uncommon nature of the condition. We present a case of SEL discovered during pregnancy following a complication of spinal anesthesia.

CASE PRESENTATION

A 38-yr-old G2P0 patient at 20 weeks gestation required emergency cerclage for a short cervix. She was American Society of Anesthesiologists (ASA) Physical Status class II with active smoking, obesity and adjustment disorder. She had no contraindications and consented for spinal anesthesia. In the sitting position, an aseptic technique at L3–L4 with a 25G Whitacre obtained clear cerebrospinal fluid after 2 attempts. Adequate surgical block was achieved with injection of hyperbaric bupivacaine 7.5 mg, without immediate complications.

Eight hours postoperatively, she presented with tremors of the lower limbs and back pain. On postoperative day 4, the tremors persisted and were associated with hypoesthesia from the mid-thighs to the lower third of the calves. An MRI demonstrated an epidural hemorrhage 2 mm anteriorly and posteriorly causing a small mass effect on the nerve roots with a residual spinal canal of 9 mm from L3–L5, a herniated L2–L3 disc, and posterior SEL. Neurosurgery recommended conservative treatment. Hematology work-up was normal. Complete resolution of symptoms occurred after one month.

At 38 weeks, she presented in labour, and analgesia with PCA remifentanil was insufficient. The patient consented to epidural analgesia, which was effective and without complication. Due to failure to progress, a Cesarean delivery was performed using the epidural

catheter. Despite 15 mL of lidocaine 2% with epinephrine 1:200,000, the sensory block with ice was T4 on the right and T7–8 on the left and required IV remifentanil and dexmedetomidine to complete the surgery. No neurological complications were observed postoperatively and the patient was discharged on postoperative day 2.

CONCLUSION

Spinal epidural lipomatosis was discovered following spinal anesthesia for cerclage, and complicated by epidural hemorrhage and transient neurological disorder. The anesthetic plan for labour was multidisciplinary and determined that SEL was not a contraindication for neuraxial analgesia. Although epidural labour analgesia was effective, epidural anesthesia demonstrated an unpredictable block. Some SEL case reports suggest avoiding neuraxial techniques, others report the absence of complications.[4,5] By reducing the size of the spinal canal, SEL could promote the onset of neurological symptoms even with minimal epidural bleeding. Assessment of neurological symptoms in patients with SEL prior to anesthesia is therefore fundamental in the decision-making process.

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The angle labour pain questionnaire demonstrates good to excellent test-retest reliability and performance for pain measurement during preterm labour

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41

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INTRODUCTION

Women in preterm labour are usually omitted from labour analgesia trials.[1] Research is needed to better understand their pain experiences, including how they differ from term labour, and to improve their labour pain relief. These goals are best achieved by using multidimensional pain tools developed and validated for use in labouring women. This instrument validation study builds on our previous instrument development and validation work for the Angle Labor Pain Questionnaire (A-LPQ) which focused on women with term labour.[2,3] The current study examined the test-retest reliability (primary outcome) and performance of the A-LPQ during preterm labour. Concurrent assessments with the Angle Pictorial Pain Mapping and Ranking Tool (A-PPMRT) provided additional insight into the nature of preterm labour pain and its variability between women.

METHODS

The study employed a single group, two-test research design. The multidimensional A-LPQ was administered once during each of two test sessions, held 20-min apart, to women in early active preterm labour (≥ 24 to < 37 weeks) without pain relief. This was followed by assessment of changes in participants' pain between test sessions on the Patient Global Impression of Change Scale.

Overall pain intensity on the Numeric Rating Scale (NRS) and Verbal Rating Scale (VRS), as well as pain coping on the Pain Mastery Scale (PMS), were concurrently measured, along with NRS scores for common types of labour pain (e.g., uterine contraction pain, back pain) and/or their depictions on the A-PPMRT. Test-retest reliability of the A-LPQ was examined with Intraclass Correlation Coefficients (ICC). Internal consistency, content validity, convergent validity, sensitivity to change and responsiveness were also examined (secondary outcomes).

RESULTS

Sixty participants were analyzed, half of whom were nulliparous. Most women (62%, 37/60) had moderate to late preterm pregnancies (≥ 32 to < 37 weeks); remaining participants had extremely to very preterm gestations (≥ 24 to < 32 weeks). Moderate pain was reported by half of women while one quarter reported severe or agonizing pain on both tests. A-LPQ scores demonstrated good to excellent test-retest reliability (ICC's 0.82–0.92; $P < 0.001$) and acceptable to excellent internal consistency (A-LPQ scores $\alpha \geq 0.92$, subscales $\alpha = 0.71–0.92$). Content validity of The Enormity of the Pain and Fear/Anxiety subscales was supported by strong correlations with NRS scores for unbearable pain ($r \geq 0.71$) and anxiety ($r = 0.71$), respectively, all $P < 0.001$. Content validity of Uterine Contraction Pain, Birthing Pain, and Back Pain/Long Haul subscales was supported by concurrently measured NRS scores and/or drawings of the physical labour pain these three subscales reflect based on A-LPQ development. Convergent validity, sensitivity to change, and responsiveness were also supported.

DISCUSSION

Our findings support use of the A-LPQ for the measurement of pain during early, active preterm labour. We believe we are the first study to describe the nature and variability of preterm labour pain. Use of virtually identical methods in our past work with women in term labour shows that severe or agonizing pain is more common during preterm labour compared with term labour at the same stage.[3] Findings suggest that preterm labour pain should be measured as distinct from term labour in pain research. Better knowledge of preterm labour pain will assist with recognition of its onset and progression.

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Table Participant demographic characteristics

Characteristic		***n*=60**
		Mean (SD[a]) or Median [IQR[b]]
Age (y)		32.6 (4.8)
BMI [c]		30.8 (6.9)
Singleton gestation (yes) (n/N [%])		53/60 (88.3)
Gestational age (weeks)		33.1 (3.8)
Gestational Age by Group (n/N [%]):		
Extremely preterm gestation (≥24 to <28 weeks)		8/60 (13.3)
Very preterm gestation (≥28 to <32 weeks)		15/60 (25.0)
Moderate to Late preterm gestation (≥32 to <37 weeks)		37/60 (61.7)
Birthweight (g)		2184.5 (761.3)
Cervical dilation (cm)		2.6 (1.4)
Contraction frequency at study entry (min)		5.8 [4.7, 6.9]
Magnesium received (yes) (n/N [%])		13/60 (21.7)
Delivery Mode (n/N[%])	SVD	40/60 (66.7)
	Forceps	1/60 (1.7)
	C-section	17/60 (28.3)
	Vacuum	2/60 (3.3)
Highest Level of Education Completed (n/N[%])	High School	7/60 (11.7)
	Community College	19/60 (31.7)
	University	34/60 (56.7)
Current Marital Status (n/N[%])	Married	41/60 (68.3)
	Common Law	15/60 (25.0)
	Single	4/60 (6.7)
Self-identified Racial Background (n/N[%])	Caucasian	29/60 (48.3)
	Latin American	4/60 (6.7)
	Asian	11/60 (18.3)
	Black	10/60 (16.7)
	Indigenous	1/60 (1.7)
	Other	5/60 (8.3)