Texila International Journal of Public Health
Special Issue-2024
DOI: 10.21522/TIJPH.2013.12.03.Art038

Anaesthetic Management of a Patient with Placenta Previa (PP) - A Case Study

Vishnuvanditha Vuppuluri[1], Selvankumar Thangaswamy[2]*
[1]*Department of Anesthesiology, Saveetha Medical College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-602105, Tamil Nadu, India*
[2]*Center for Global Health Research, Saveetha Medical College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-602105, Tamil Nadu, India*

Abstract

Placenta previa (PP) is a serious obstetric complication characterized by the abnormal placement of the placenta over or near the cervical os, leading to significant risks for both the mother and foetus during pregnancy and delivery. This case study presents the intraoperative management of a patient diagnosed with placenta previa, focusing on the clinical challenges, decision-making processes, and surgical interventions employed to ensure a favourable outcome. The patient, a 26-year-old woman, G2P1L1, was diagnosed with complete placenta previa during the MRI investigation. Given the high risk of hemorrhage and potential for peripartum hysterectomy, a multidisciplinary team approach involving obstetricians, anesthesiologists, and neonatologists was adopted. This case study highlights the importance of meticulous preoperative planning, intraoperative vigilance, and postoperative care in managing placenta previa, emphasizing strategies to minimize maternal and foetal morbidity. Through this detailed examination, this study aims to contribute to the literature on best practices for the intraoperative management of placenta previa, providing insights that can inform clinical practice and improve patient outcomes. This abstract provides a concise overview of the case study, emphasizing the key aspects of intraoperative management and its importance in handling placenta previa through radiologic interventions, such as uterine artery embolization and transcatheter arterial balloon occlusion, which play a key role in advanced anaesthetic management.

Keywords: *Anaesthetic Management, Intraoperative Management, Placenta Previa, Peripartum Hysterectomy, Radiologic Interventions.*

Introduction

After conception, blastocysts are implanted in the endometrium via apposition and then invade [1]. Normal placentation involves the invasion of endometrial cells and stroma by the trophoblastic layer of the embryo, allowing villi to lie adjacent to maternal spiral arteries [2]. Implantation abnormalities can variably arise from placental shape abnormalities, velamentous cord insertion, defective remodelling of maternal spiral arteries, abnormally located placenta and morbidly adherent placenta [3].

Placenta previa (PP) is characterized by abnormal placental placement in the lower uterine segment, with placenta previa totalis (PPT) occurring when the placenta completely covers the internal cervical os [4]. PP can sometimes be associated with abnormal placental adherence, including conditions such as placenta accreta, increta, and percreta. These issues can lead to severe peripartum hemorrhage, increasing the likelihood of

Received: 10.08.2024 ***Accepted: 01.09.2024*** ***Published on: 30.09.2024***
****Corresponding Author: selvankumar750@gmail.com***

requiring blood transfusions and contributing to maternal morbidity and mortality [5, 6]. The risk of a life-saving hysterectomy following a cesarean section (CS) for patients with PP is 30 times greater than that for patients without PP, resulting in a longer hospital stay. MAP occurs in 1 out of every 333–533 deliveries and is a leading cause of postpartum haemorrhage (PPH) and maternal mortality. It is also associated with an increased risk of major hemorrhage and, thus, with poor maternal outcomes [7].

Early antenatal diagnosis and risk assessment for significant blood loss in patients with PP are crucial for proper preparation and multidisciplinary management to improve maternal outcomes [8]. This review focuses on assessing risks and anaesthetic considerations for patients with PP who are expected to experience massive haemorrhage during CS, covering preoperative considerations, anaesthetic management, and necessary interventions.

It involves the overexpression of certain angiogenic growth factor proteins, e.g., vascular endothelial growth factor and angiopoietin-2 [9, 10]. However, the downregulation of certain antiangiogenic proteins, e.g., VEGF receptor-2, the endothelial cell tyrosine kinase receptor Tie-2, and soluble fms-like tyrosine kinase, can also be involved [11]. Since uterine artery embolization (UAE) was introduced as a treatment for postpartum hemorrhage in 1979, this procedure has been associated with technical success rates of over 90% and good clinical outcomes [12].

Case Report

A 32-year-old woman, G2P1L1, with a previous history of LSCS, presented with USG reports showing placenta previa and placenta percreta. MRI revealed bridging vessels between the uterine serosa and bladder with involvement of the bladder wall.

Intraoperative Management

For this patient, bilateral catheterization of the anterior branches of the internal iliac arteries was performed preoperatively under local anaesthesia via a 5 French femoral sheath guided by ultrasound with a Glidecath Terumo hydrophilic C1 catheter (cobra 1).

At the time of delivery, the patient was planned for general anaesthesia. Two 18G i/v cannulas and arterial lines were secured. Two packs of blood were available before induction. The patient was intubated with a 7 cm cuffed ETT using IV propofol 80 mg and fentanyl 80 mcg as induction agents. Blood loss of 3 litres was observed. Following delivery of the foetus and injection of an embolic agent (IN OT), delivery of the placenta, with a small portion left behind, was performed. The embolic agent used was gel foam (diluted with a minimal amount of heparin). There was no haemodynamic instability, as rapid blood transfusion was started after delivery. Five patients with PRBC, 2 with FFP, and 1 with PLATELET were transfused intraoperatively. At the end of the surgery, the B/L femoral sheath was removed, and the patient was extubated and found to be awake. The patient shifted to the PACU. Postoperatively, the patient was managed with a TAP block and IV paracetamol.

Discussion

In managing massive obstetric haemorrhage, it is critical to follow a massive transfusion protocol and aim for early antenatal diagnosis to minimize blood loss and protect the bladder. Uterine artery embolization has been found to enhance outcomes by reducing estimated blood loss (EBL). Successful management requires a multidisciplinary team—comprising obstetricians, anesthesiologists, intensivists, neonatologists, interventional radiologists, and urologists—along with clear communication and thorough planning.

Ultrasonography is a useful mode of diagnosis in cases of placenta previa. Caesarean

section is necessary in all cases of placenta previa, and a higher incidence of emergency LSCS (60%) is needed, mainly to reduce maternal and foetal mortality due to haemorrhage [13, 14]. Ultrasound helps detect the myometrial interface, retroplacental clear space, reduced myometrial thickness, turbulent placental lacunar flow, intraplacental lacunae, and irregular bladder wall, which are findings of ultrasound of placenta accreta and percreta. There can be placental bulging into the bladder [15].

Obstetric hemorrhage is responsible for 25% to 30% of maternal deaths globally, with placenta previa being a frequent cause of antepartum bleeding [16, 17]. Placenta percreta, the most severe form of placental invasion, poses significant risks, such as bladder and bowel injuries, severe bleeding, coagulopathy, and the potential need for a peripartum hysterectomy [18].

Various endovascular procedures, including internal iliac artery occlusion, uterine artery embolization, and aortic occlusion, can help reduce blood loss. Preoperative uterine artery embolization is effective in reducing intraoperative hemorrhage [19]. Prophylactic transcatheter embolization has been reported to reduce bleeding safely in invasive placenta cases. Combined bilateral internal iliac artery balloon occlusion and uterine artery embolization can control blood loss and help preserve the uterus. Intraoperative abdominal aortic balloon occlusion has been suggested to manage blood loss effectively, regardless of placental position [20].

General anaesthesia maintains haemodynamic stability in the event of a massive haemorrhage. Combined spinal–epidural anaesthesia is another option in this case, but major blood loss may lead to hypotension [21, 22].

The “placenta accreta index” indicates the probability of placental invasion; for example, a score > 5 points was associated with a 69% probability of invasion, indicating three independent risk factors that are associated with blood transfusion in patients with PP: a) lacunae (placental hypoechoic areas), which represent abnormal placental adhesion on imaging; b) previous CS; and c) placenta covering the previous CS scar, indicating anterior or central placenta [23]. A scoring system to predict massive postpartum transfusion that considers the following five factors: a) suspicion of placental adhesion on imaging (2 points), b) previous CS (0, 1, ≥ 2: 0, 1, and 2 points, respectively), c) gestational age below 37 weeks (1 point), d) anterior placenta (1 point), and e) sponge-like appearance of the cervix (1 point) [24]. They reported that the combination of previa, clinical features, and suspicion of placental invasion was more predictive than only a suspicion of placental adhesion. Parturients with scores of 4 or 7 points had a 72% probability of massive transfusion. Another scoring model included maternal age ≥ 35 years, fetal noncephalic presentation, PPT, anterior placenta, uteroplacental hypervascularity, and multiple lacunae to predict massive postpartum blood loss [25].

Conclusion

Effective preoperative planning and strong communication within a multidisciplinary team are crucial for improving outcomes in patients with placenta previa (PP). PP can sometimes lead to significant hemorrhage, which adversely affects both maternal and neonatal health. Research has focused on identifying risk factors associated with massive bleeding and maternal morbidity in PP patients. By combining patient information with test results, interdisciplinary cooperation and discussion can guide decisions regarding anaesthesia, surgery, and the implementation of a massive transfusion protocol. Additionally, radiologic interventions, such as uterine artery embolization and transcatheter arterial balloon occlusion, can play a key role in advanced anaesthetic management.

Conflict of Interest

The authors have no conflicts of interest to declare that are relevant to the content of this case study.

Acknowledgement

The authors have to acknowledge Saveetha Medical College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University for providing the facilities for the report preparation.

References

[1]. Nasrollahi, S. H, Farzan Meher, M, Faryadras, M. 2021, Comparison of the Effect of Arginine and Fluid Therapy in Pregnant Women with Oligohydramnios. 463–452ا. Doi:10.52547/armaghanj.26.4.452.

[2]. Kawahata, K, Takahashi, J, Yasuda, Y, Tanimura, I. 1990, Studies on the Ultrastructure And Polystyrene Particle Permeability Of Trophoblastic Layers in the rat Placenta. *Nihon Chikusan Gakkaiho.* 61: 433–437. Doi:10.2508/chikusan.61.433.

[3]. Redline, R. W. 2018, Placental Size, Shape, And Umbilical Cord Abnormalities. Placental and Gestational Pathology. *Cambridge University Press*; 157–180. Doi:10.1017/9781316848616.017.

[4]. Adiyaman, D, Kuyucu, M, Atakul, B. K, Can, D, Özeren, M, Koç, A, et al. 2022, Can the Cell-Free DNA Test Predict Placenta Accreta Spectrum Or Placenta Previa Totalis? *Z Geburtshilfe Neonatol.* 226: 92–97. Doi:10.1055/a-1579-1338.

[5]. Russo, R. M, Carver, A, Clifford, C, Rolston, A, Uppal, S, Napolitano, L. M., 2022, A team Approach To Peripartum Hemorrhage Control Incorporating Resuscitative Endovascular Balloon Occlusion of The Aorta. *J Trauma Acute Care Surg*. 93: e89–e94. Doi:10.1097/TA.0000000000003612.

[6]. Sharma, N, Saravanan, M, Saravanan, L, Narayanan, S. 2019, The Role of Color Doppler In Assisted Reproduction: A narrative review. *Int J Reprod Biomed (Yazd).* doi:10.18502/ijrm.v17i10.5484.

[7]. Hantoushzadeh, S, Poorabdoli, M, Parsaei, M, Zargarzadeh, N, Masoumi, M, Khotbesara, S. E, et al. 2024, Predicting The Outcomes of *in vitro* Fertilization using Baseline Maternal Serum Inflammatory Markers: A Retrospective Cohort Study. *Am J Reprod Immunol*. 92: e13900. Doi:10.1111/aji.13900.

[8]. Courdier, C, Boudjarane, J, Malan, V, Muti, C, Sperelakis-Beedham, B, Odent , S, et al. 2023, Antenatal Ultrasound Features of Isolated Recurrent Copy Number Variation in 7q11.23 (Williams syndrome and 7q11.23 duplication syndrome). *Prenat Diagn*. 43: 734–745. Doi:10.1002/pd.6340.

[9]. Han, S. Y, Jun, J. K, Lee, C-H, Park, J. S, Syn, H. C. 2012, Angiopoietin-2: A Promising Indicator For The Occurrence of Severe Preeclampsia. *Hypertens Pregnancy.;*31: 189–199. Doi:10.3109/10641955.2010.507844.

[10]. Chakrabarti, S. 2023, Ovarian Reserve Analysis in Subfertile Women Based on Physical, Ultrasound and Hormonal Parameters. *Gynecol Endocrinol*. 39. Doi:10.1080/09513590.2023.2214616

[11]. Zhu, A. X, Finn, R. S, Mulcahy, M, Gurtler, J, Sun, W, Schwartz, J. D, et al. 2023, Supplementary Methods From A Phase Ii and Biomarker Study of Ramucirumab, a Human Monoclonal Antibody Targeting the VEGF receptor-2, As First-Line Monotherapy in Patients With Advanced Hepatocellular Cancer. Doi:10.1158/1078-0432.22448424.v1.

[12]. Tzanis, A. A, Antoniou, S. A, Gkegkes, I. D, Iavazzo, C., 2024, Uterine artery Embolization Vs Myomectomy for The Management of Women with Uterine Leiomyomas: A Systematic Review And Meta-Analysis. *Am J Obstet Gynecol.* 231: 187-195. Doi:10.1016/j.ajog.2024.01.014.

[13]. Xiong, W, Li, X, Liu, T, Ding, R, Cheng, L, Feng, D, et al. 2022, Potential Resolution of Placenta Previa from the 28th-to the 36th-Week of Pregnancy: A Retrospective Longitudinal Cohort Study. placenta. 126: 164–170. Doi:10.1016/j.placenta.2022.07.006.

[14]. Ethirajan, S, Ariff ,N. B. M, Kamalakannan, V. V. 2023, A Fibrothecoma of the Ovary With Proliferative Endometrium in Postmenopause Women With Chronic Kidney Disease: A Rare Case Report! *J SAFOG.* 15: 251–253. Doi:10.5005/jp-journals-10006-2210.

[15]. Noël, I, Ghesquiere, L, Guerby, P, Maheux-Lacroix, S, Bujold, E, Moretti, F., 2024, Clinical Risk Factors for Placenta Accreta or Placenta Percreta: A Case-Control Study. *J Obstet Gynaecol Can*. 46: 102294. Doi:10.1016/j.jogc.2023.102294

[16]. Huang, S, Zuo, Q, Wang, T, Tang, X, Ge, Z, Lu, H, et al. 2022, Maternal and Neonatal Outcomes of Repeated Antepartum Bleeding In 493 placenta Previa Cases: A Retrospective Study. *J Matern Fetal Neonatal Med.*35: 5318–5323. Doi:10.1080/14767058.2021.1878495.

[17]. Ariff, N. B. M, Govindarajan, R, Baskaran, P. 2023, Efficacy of Mifepristone And Misoprostol Compared To Misoprostol Alone In The Medical Management of the First-Trimester Missed Miscarriages. *J SAFOG*. 15: 304–307. Doi:10.5005/jp-journals-10006-2228.

[18]. Kumar, H. S. A, Naik, M, Fatima, S. A. 2024, Emergency Peripartum Hysterectomy (EPH): A Retrospective Study of Indications, Maternal and Perinatal Outcome in a Tertiary Care Hospital. *J SAFOG*. 16: 393–396. Doi:10.5005/jp-journals-10006-2451.

[19]. Russ, M, Hees, K. A, Kemmer, M, Richter, R, Kröncke, T, Schnapauff, D, et al. 2022, Preoperative Uterine Artery Embolization In Women Undergoing Uterus-Preserving Myomectomy For Extensive Fibroid Disease: A Retrospective Analysis. *Gynecol Obstet Invest*. 87: 38–45. Doi:10.1159/000521914.

[20]. Treffalls, R. N, DuBose J. J, Brenner, M, Piccinini, A, Inaba, K, Scalea, T. M, et al. 2024, Outcomes Associated With Aortic Balloon Occlusion Time In Patients with Zone 1 Resuscitative Endovascular Balloon Occlusion of the Aorta. *J Surg Res.* 296: 256–264. Doi:10.1016/j.jss.2023.12.044.

[21]. Bansal, H, Cyriac, J, Singh, R, Ray, S. 2024, Efficacy of Combined Spinal–Epidural Anaesthesia In Mitigating Cardiovascular Stress During Emergency Caesarean Section in a Primigravida With Ruptured Right Sinus Of Valsalva Aneurysm – A Case Report. *Indian J Anaesth*. 68: 735–736. Doi:10.4103/ija.ija_308_24.

[22]. Gouthaman, S, Maharajan, S, Soundarajan, J. C. B. 2020, Retrograde Retroperitoneal Type B1 Radical Hysterectomy In Distorted Pelvic Anatomy: Our Experience. *Indian J Gynecol Oncol.* 18. Doi:10.1007/s40944-020-00445-0.

[23]. Hasegawa, K, Ikenoue, S, Tanaka, Y, Oishi, M, Endo, T, Sato, Y, et al. 2023, Ultrasonographic Prediction Of Placental Invasion In Placenta Previa By Placenta Accreta Index. *J Clin Med*. 12. Doi:10.3390/jcm12031090.

[24]. Kim, J-W, Lee, Y-K, Chin, J-H, Kim, S-O, Lee, M-Y, Won, H-S, et al. 2017, Development of a Scoring System To Predict Massive Postpartum Transfusion in Placenta Previa Totalis. *J Anesth.*31: 593–600. Doi:10.1007/s00540-017-2365-8.

[25]. Kato, K, Nagamatsu, T, Yamaguchi,S, Ichinose, M, Sayama, S, Toshimitsu, M, et al. 2023, Changes in Fetal Presentation In The Preterm Period And The Prediction of Non-Cephalic Delivery. *J Matern Fetal Neonatal Med.* 36: 2141564. Doi:10.1080/14767058.2022.2141564