

Multidisciplinary Team Approach is The Key to The Successful Assessment and Management of Complex Obstetric Patients

Jie Luo, and Jie Zhou

There are many risk factors that lead to high morbidities of complications and mortalities of parturients. World Health Organization reported that in 2016, about 830 women died due to complications of pregnancy and child birth every day, of which the main causes were related to interaction between pre-existing medical conditions, pregnancy and childbirth (1).

There is huge demand for labor analgesia and anesthesia. At the same time, obstetric anesthesia is one of the most highly risky, and anesthesia-related complications are the sixth leading cause of maternal mortality (2). Because of this, we strongly advocate for a multidisciplinary approach during the peripartum period. With each subspecialty team addressing their concerns, a comprehensive labor and delivery plan can be formulated, which should allow adequate time for preparation and execution. We will elaborate the concept of the multidisciplinary approach with a few case scenarios.

Scenario 1

A pregnant woman presented with acute congestive heart failure (New York Heart Association [NYHA] class IV) with elevated pulmonary artery pressure and severe mitral regurgitation. This pa-

tient had a history of intravenous drug use complicated by infective endocarditis status post bicuspid valve and tricuspid valve replacement for two times. A transthoracic echocardiography displayed severe mitral regurgitation and the pulmonary arterial (PA) pressure was 75 mm Hg. This patient opted to terminate the pregnancy but demanded to keep the intact fetus by vaginal delivery.

Pulmonary hypertension (PH) is characterized by elevated PA pressure and secondary right heart failure (3). Although pregnancies affected by PH are rare with an incidence of 1.1/100,000 women, severe PH is poorly tolerated in pregnancy, and PH is associated with a high maternal mortality of estimated between 30% and 56% (3, 4). Careful preoperative assessment, treatment and planning before delivery provided by an experienced multidisciplinary team is indispensable to optimize the cardiac function of the parturient during the peripartum period and to make decisions on mode of delivery and choice of anesthetic techniques.

Frequent prenatal visits are recommended for these patients with such complicated medical histories to identify potential worsening symptoms early on (5). A mean PA pressure greater than or equal to 25 mmHg at

rest defines PH (6). The diagnosis of PH during pregnancy requires participation of cardiology physicians, ultrasound physicians, obstetricians, and image interventional physicians with cautions if necessary. Prenatal assessments should include the medical history, PH related medications and anticoagulation during pregnancy, evaluation of cardiac function, maternal and fetal monitoring and physical examination, electrocardiogram, echocardiography, imaging and laboratory results, etc. Whether the patient should be admitted to department of obstetrics or cardiology for cardiac care depends on the multidisciplinary cooperation and decision.

A pre-delivery multidisciplinary team is usually organized with more services involved. Timing and mode of delivery should be discussed in advance among the multidisciplinary team. Vaginal delivery is preferred in women with adequate cardiac output. Cesarean delivery provides more adequate time for the team's preparation, even including the extracorporeal membrane oxygenation (ECMO) preparation if needed. A specialized obstetric anesthesia team with experienced anesthesiologists is needed, and the anesthesia concerns in parturients with PH are to avoid pain,

acidosis, and hypoxemia with careful hemodynamic monitoring and inotropes and afterload reducers being readily available (3). Determining the ideal anesthesia mode depends on the specific condition of the patients. Traditionally, the preferred anesthetic approach has been a slow neuraxial technique, such as epidural anesthesia with slow and incremental loading or low-dose combined spinal-epidural anesthesia, though it may lead to decrease in systemic vascular resistance and cardiac output (7, 8).

Scenario 2

A term pregnant woman with a faith of Jehovah's Witnesses and one prior cesarean delivery for breech presentation presented for consultation. Magnetic resonance imaging showed complete placenta previa and placenta percreta. The patient was scheduled for a cesarean delivery and possible hysterectomy.

Jehovah's Witnesses, a Christian community, currently includes approximately 6 million members worldwide, the common medical issue associated with them is their belief of refusal of blood transfusion, except for the administration of some fractionates, recombinant human erythropoietin (EPO), factor concentrates, and intraoperative cell salvage if the patient chooses it and often with very specific discretions (9). It was found that parturients who were Jehovah's Witnesses were at a 44-fold increased risk of maternal death, which is due to obstetric hemorrhage (10).

A multidisciplinary medical team is necessary and needed to work together on these patients

before delivery, including maternal-fetal medicine, gynecology, obstetrics, anesthesiology, hematologists, blood bank, perfusion, interventional radiology, neonatology, other laboratory staff, nurses, midwives (11, 12). The two main medical considerations for these parturients in the antenatal period are the optimization of hematological status and making prophylaxis and treatment plans for possible large blood loss during and after delivery.

A prenatal plan should be developed, including the usage of perioperative EPO and iron, preparation for probably intraoperative acute normovolemic hemodilution (ANH), cell salvage, tranexamic acid, uterine artery embolization (11). Every effort should be made to pursue minimally invasive approaches. Practice trainings were reported to effectively reduce the incidence of postpartum hemorrhage (13). A senior obstetrician must perform or supervise the procedures of delivery. Anesthesiologists need to prepare for possible massive blood loss by leading and coordinating with other team members.

Ethical and legal issues should also be taken into consideration. The refusal of blood transfusion must be informed with ethically appropriate considerations to be compliant with local legal statute. Nevertheless, ethical and legal consultations are needed for the medical team.

Scenario 3

A pregnant woman with a fetus carrying the ultrasonic diagnosis of myelomeningocele decided to undergo an in-utero repair for myelomeningocele.

Recent advances in prenatal diagnosis have made fetal surgery as a possible treatment for a wide variety of fetal diseases. Myelomeningocele is the most common form of congenital central nervous system defect compatible with life, affecting an estimated 5 to 10 pregnancies per 10,000 in the United States, prenatal repair for which results in improved neurofunctional outcomes as compared to postnatal repair (14, 15). In the criteria for fetal surgery developed by the International Fetal Medicine and Surgery Society, a multidisciplinary team should necessarily be established (16). The entire multidisciplinary team should include members from the diagnostic imaging, obstetrics, pediatric surgery, anesthesiology, maternal fetal medicine, neonatology, nursing, and social work (17).

The diagnosis of specific malformations and diseases of fetus that can be considered for in-utero intervention need the participation of prenatal genetic counseling, ultrasound physician, imaging physician and obstetrician. The fetal benefits should outweigh the possible fetal and maternal risks when choosing the fetal surgery as the first treatment, and a thorough informed consent process is needed. Related appropriate ethical and legal considerations should be safeguarded. Maternal counseling prior to the procedure should be unbiased and accurately reflect the most recent data, and a detailed discussion of maternal and fetal risks, the sequence of perioperative events, and a neonate resuscitation plan in case of an emergent delivery for fetus greater than 24 weeks gestation should be ex-

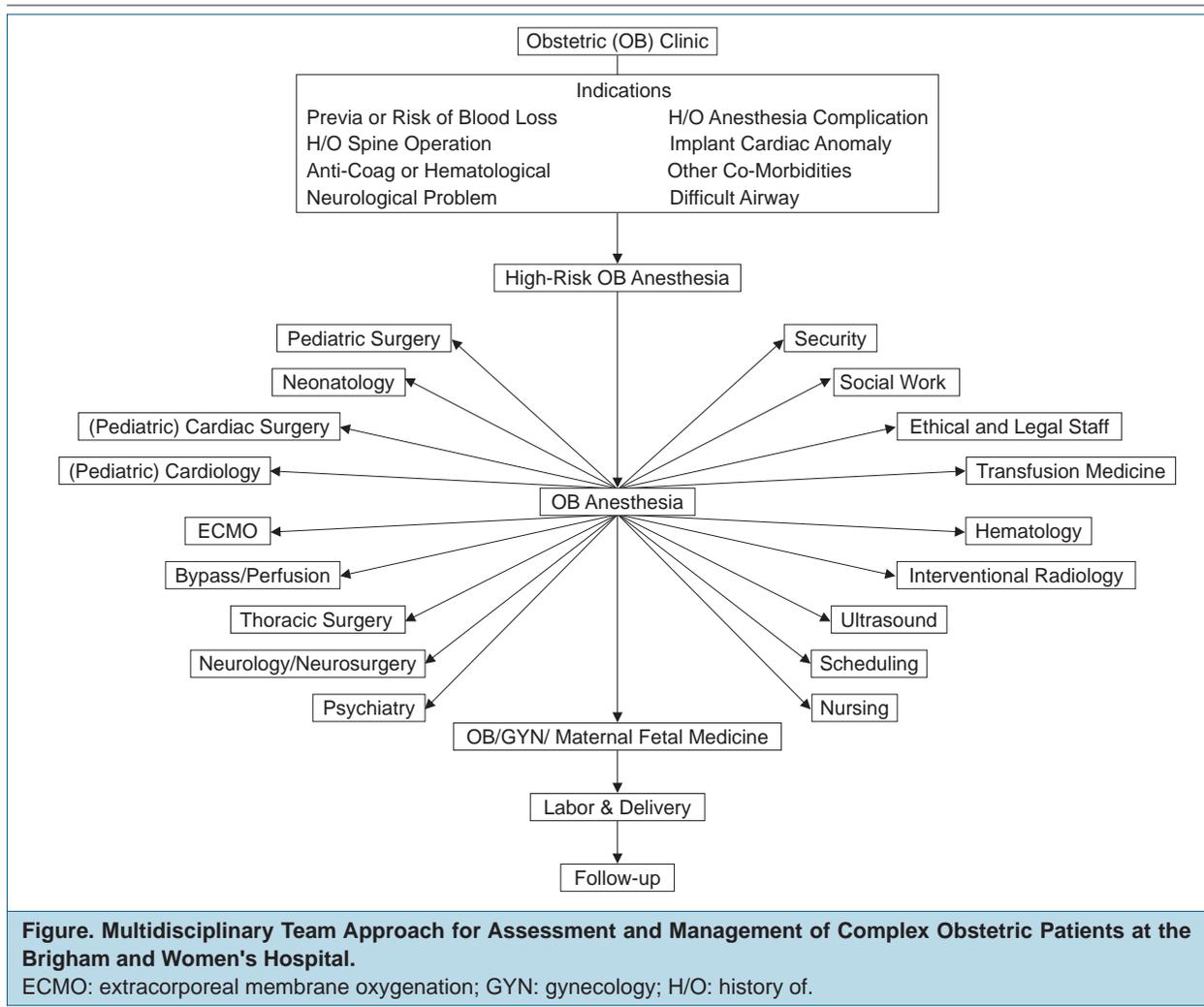


Figure. Multidisciplinary Team Approach for Assessment and Management of Complex Obstetric Patients at the Brigham and Women's Hospital.

ECMO: extracorporeal membrane oxygenation; GYN: gynecology; H/O: history of.

plained clearly.

The preoperative assessments should be started before the elective surgery to allow an adequate time for the maternal decision and consent, obtain a detailed evaluation, and make an appropriate multidisciplinary plan. In addition to maternal counseling by multidisciplinary team, inter-team conference is often needed to resolve issues in relation to collaboration between the different team and sometimes between hospitals, if the patient needs to be transferred.

Anesthesiologists' practice is challenged by the need to offer optimal anesthesia both for the

mother and fetus. For this purpose, in addition to the maternal physiology, the fetal physiology, analgesia and anesthesia should be taken into consideration as well. The management of the maternal uterine tone is the most important task for the maternal anesthesia team. Adequate monitoring of fetal physiologic changes can decrease the intraoperative fetal demise. Fetal anesthesia during open fetal surgery is provided primarily by the placental transfer of maternally administered anesthetics such as volatile agents and intramuscular or intravenous opioid analgesics to the fetus (18).

Discussion

Although different cases may require different members and specific approaches from a multidisciplinary team, there are some common characteristics in the flow of establishment. A flow chart of establishing a multidisciplinary team approach for assessment and management of complex obstetric patients in our hospital is shown in Figure.

It is common for a parturient to be across many different shifts and multiple handoffs between the members of the team. The potential errors among such a large group and a long time may easily

occur and be magnified if the co-operations between members of the team are not effective. A sentinel alert issued by the U.S. Joint Commission revealed that most cases of perinatal death and injury are caused by deficiency of culture and communication failures among a team (19). Teamwork training programs are recommended to improve parturient and fetus safety and outcomes.

A multidisciplinary teamwork training program using simulation can provide a risk-free environment to practice skills of communication, role clarification, and mutual support, which is becoming more widely accepted (20). The pre-delivery assessment and plan for management should be discussed and consensus should be reached among the multidisciplinary team, all the contents of which should be documented in the notes clearly for review in order to facilitate the

multidisciplinary cross-talk. Anesthesiologists can play a leading role in the actions in the pre-delivery period.

From the Department of Anesthesiology, Perioperative and Pain Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston, USA.

Correspondence to Dr. Jie Zhou at jzhou5@bwh.harvard.edu.

The authors declare no conflicts of interest.

Citation: Jie Luo, Jie Zhou. Multidisciplinary team approach is the key to the successful assessment and management of complex obstetric patients. *J Anesth Perioper Med* 2017; 4: 144-7. doi:10.24015/JAPM.2017.0025

1. World Health Organization. Maternal mortality. Updated November 2016. (Accessed January 17, 2017, at <http://www.who.int/mediacentre/factsheets/fs348/en/>.)
2. Hawkins JL, Koonin LM, Palmer SK, Gibbs CP. Anesthesia-related deaths during obstetric delivery in the United States, 1979-1990. *Anesthesiology* 1997;86:277-84.
3. Običan SG, Cleary KL. Pulmonary arterial hypertension in pregnancy. *Semin Perinatol* 2014;38:289-94.
4. Bassily-Marcus AM, Yuan C, Oropello J, Manasia A, Kohli-Seth R, Benjamin E. Pulmonary hypertension in pregnancy: critical care management. *Pulm Med* 2012; 2012:709407.
5. Meng ML, Landau R, Viktorsdottir O, Banayan J, Grant T, Bateman B, et al. Pulmonary Hypertension in Pregnancy: A Report of 49 Cases at Four Tertiary North American Sites. *Obstet Gynecol* 2017;129:511-20.
6. Hoepfer MM, Bogaard HJ, Condliffe R, Frantz R, Khanna D, Kurzyna M, et al. Definitions and diagnosis of pulmonary hypertension. *J Am Coll Cardiol* 2013;62: D42-50.
7. Rex S, Devroe S. Anesthesia for pregnant women with pulmonary hypertension. *Curr Opin Anaesthesiol* 2016;29:273-81.
8. Sen S, Chatterjee S, Mazumder R, Mukherji S. Epidural anesthesia: A safe option for cesarean section in partu-

rient with severe pulmonary hypertension. *J Nat Sci Biol Med* 2016;7:182-5.

9. Zeybek B, Childress AM, Kilic GS, Phelps JY, Pacheco LD, Carter MA, et al. Management of the Jehovah's Witness in obstetrics and gynecology: a comprehensive medical, ethical, and legal approach. *Obstet Gynecol Surv* 2016;71:488-500.
10. Singla AK, Lapinski RH, Berkowitz RL, Saphier CJ. Are women who are Jehovah's Witnesses at risk of maternal death? *Am J Obstet Gynecol* 2001;185: 893-5.
11. Mauritz AA, Dominguez JE, Guinn NR, Gilner J, Habib AS. Blood-conservation strategies in a blood-refusal parturient with placenta previa and placenta percreta. *A A Case Rep* 2016;6:111-3.
12. Mason CL, Tran CK. Caring for the Jehovah's Witness Parturient. *Anesth Analg* 2015;121:1564-9.
13. Rizvi F, Mackey R, Barrett T, McKenna P, Geary M. Successful reduction of massive postpartum haemorrhage by use of guidelines and staff education. *BJOG* 2004;111:495-8.
14. Kahn L, Mbaibuke N, Valle-Giler EP, Garcés J, Moore RC, Hilaire HS, et al. Fetal surgery: the ochsner experience with in utero spina bifida repair. *Ochsner J* 2014;14:112-8.
15. Peranteau WH, Adzick NS. Prenatal surgery for myelomeningocele. *Curr Opin Obstet Gynecol* 2016;28: 111-8.
16. Harrison MR, Filly RA, Golbus MS, Berkowitz RL, Callen PW, Canty TG, et al. Fetal treatment 1982. *N Engl J Med* 1982;307:1651-2.
17. American College of Obstetricians and Gynecologists. ACOG Committee opinion no. 550: maternal-fetal surgery for myelomeningocele. *Obstet Gynecol* 2013; 121:218-9.
18. Ferschl M, Ball R, Lee H, Rollins MD. Anesthesia for in utero repair of myelomeningocele. *Anesthesiology* 2013;118:1211-23.
19. The Joint Commission. Sentinel event alert, issue 30: preventing infant death and injury during delivery - July 21, 2004. (Accessed January 17, 2017, at https://www.jointcommission.org/sentinel_event_alert_issue_30_preventing_infant_death_and_injury_during_delivery/.)
20. Deering S, Johnston LC, Colacchio K. Multidisciplinary teamwork and communication training. *Semin Perinatol* 2011;35:89-96.