

# Anesthetic considerations for cesarean section in the parturient with familial cardiomyopathy

W. L. WOOD, K. M. KUCZKOWSKI and B. R. BEAL

**Abstract :** Dilated cardiomyopathy (DCM) is a heart muscle disease characterized by ventricular dilatation and impaired systolic cardiac function. DCM is defined by the presence of : a) fractional myocardial shortening less than 25% ( $> 2$  SD) and/or ejection fraction less than 45% ( $> 2$  SD) ; and b) left ventricular end diastolic diameter (LVEDD) greater than 117% excluding any known cause of myocardial disease. Familial dilated cardiomyopathy (FDC) accounts for 20-48% of all DCM cases, and is defined by the presence of two or more affected relatives with DCM meeting the above diagnostic criteria or a relative of a DCM patient with unexplained sudden death before the age of 35 years. We herein present the first reported case in the literature of a parturient with FDC undergoing urgent Cesarean section (secondary to worsening cardiac function) and briefly highlight anesthetic considerations for parturients with this heart condition.

**Key words :** Pregnancy, heart disease, cardiomyopathy ; familial, Cesarean section, obstetric anesthesia.

## INTRODUCTION

Dilated cardiomyopathy (DCM) is a heart muscle disease characterized by ventricular dilatation and impaired systolic function. Patients with DCM suffer from heart failure, arrhythmia, and are at risk of premature death. DCM has a prevalence of one case out of 2500 individuals with an incidence of 7/100,000 (but may be under diagnosed). DCM is defined by the presence of : a) fractional myocardial shortening less than 25% ( $> 2$  SD) and/or ejection fraction less than 45% ( $> 2$  SD) ; and b) left ventricular end diastolic diameter (LVEDD) greater than 117% excluding any known cause of myocardial disease (1).

Familial dilated cardiomyopathy (FDC) may account for 20-48% of DCM. A FDC is defined by the presence of : a) two or more affected relatives with DCM meeting the above criteria ; or b) a relative of a DCM patient with unexplained sudden death before the age of 35 years. We herein present the first reported case in the literature highlighting anesthetic considerations for a NYHA (New York

Heart Association) Class III FDC parturient undergoing urgent cesarean section (for worsening cardiac function).

## REPORT OF CASE

A 38 year old G8P3 woman with FDC presented at 32<sup>6/7</sup> weeks for urgent cesarean section. The patient had been followed by a cardiologist and medically managed in the hospital for 7 weeks with digoxin, furosemide, metoprolol and fluid restriction. During her hospital course her symptoms worsened and eventually she was unable to walk more than fifteen yards without experiencing shortness of breath and fatigue. Preoperatively she received 500 ml of hetastarch 8% over 30 minutes intravenously (i.v.). A right arterial line, right internal jugular central catheter and epidural catheter were placed. A T4 sensory level of anesthesia was obtained with 4 ml incremental epidural dosing of lidocaine, 2% and sodium bicarbonate, 8.3% over a 15 minute period for a total of 16 ml. The patient remained hemodynamically stable throughout the surgery. Total i.v. fluids included 1000 ml of hetastarch, 8% and 500 ml of albumin, 5%. Total urine output was 150 ml and estimated blood loss was 500 ml. She delivered a male newborn with APGAR scores of 8 and 9 respectively at one and five minutes. After the newborn was delivered 20 units of oxytocin was added to 500 ml of

Wenonah L. WOOD, M.D., Fellow in Obstetric Anesthesia; Krzysztof M. KUCZKOWSKI, M.D. ; Associate Professor of Anesthesiology and Reproductive Medicine, Director of Obstetric Anesthesia ; Benjamin R. BEAL, M.D., Resident in Anesthesiology.

Departments of Anesthesiology and Reproductive Medicine, University of California San Diego, San Diego, California, USA.

**Correspondence address :** Krzysztof M. Kuczowski, M.D., Department of Anesthesiology, UCSD Medical Center, 200 West Arbor Drive, San Diego, CA 92103-8770. Tel. : (619) 543-5720. Fax : (619) 543-5424. E-mail : kkuczowski@ucsd.edu.

hetastarch and given as a continuous i.v. infusion over 30 minutes. For postoperative pain relief 2 milligrams of preservative free morphine was given through the epidural catheter which is the standard of care at the University of California, San Diego. Postoperatively the patient was monitored in the surgical intensive care unit (SICU) for 24 hours. The mother was discharged home on postoperative day 5 without postpartum complications.

## DISCUSSION

The prevalence of cardiac disease in pregnancy has been estimated to range between 0.4-4.1% (2). Maternal outcome correlates best with functional classification of the patient according to the criteria of the NYHA. NYHA Class III patients have a maternal mortality rate of 5-15% and a perinatal mortality rate of 20-30% (2). Management of parturients with FDC includes salt restriction, diuretics, beta blocking agents, inotropic agents, heparin and limiting intravascular fluid volume. The choice of anesthesia depends on the type of lesion and its severity (3). Epidural anesthesia provides the least amount of alteration in maternal hemodynamics during cesarean section.

Combined spinal-epidural (CSE) is a popular technique for repeat cesarean sections because of the ability to prolong duration of anesthesia and the fast onset of spinal. A case report for peripartum cardiomyopathy described the titrated CSE technique was used successfully (4). Although spinal anesthesia may be appropriate for some patients with well-compensated lesions, adequate intravascular volume management to maintain maternal preload, systemic vascular resistance (SVR), and hemoglobin-oxygen saturation is necessary. A continuous spinal anesthesia or single injection spinal anesthesia were avoided due to the potentially dangerous and dramatic falls in SVR and arterial pressure in our patient with uncompensated FDC. General anesthesia which may result in profound myocardial depression or even lead to cardiac arrest was avoided. Due to the increased risk of aspiration and difficulty with the airway, general anesthesia has a higher associated risk of morbidity and mortality.

Preoperatively, our patient's medications were continued (including digoxin and metoprolol). Although anticoagulation therapy is usually indicated in these patients due to increased risk of thrombotic events (5) the morning dose of subcutaneous heparin, 5,000 units was delayed for placement of

epidural catheter according to the guidelines on neuraxial anesthesia and anticoagulation (7). Our patient was given colloids perioperatively. The CVP was used to guide fluid status and remained less than 12 cmH<sub>2</sub>O throughout the case. We chose to use carefully titrated epidural anesthesia using incremental dosages of lidocaine (2% solution) which is the standard of practice at the University of California, San Diego (due to the faster onset than bupivacaine and more economical than ropivacaine and levobupivacaine). We continuously monitored the arterial blood pressure and CVP. Ephedrine and phenylephrine were prepared for possible hypotension, however no vasopressors were necessary during the case due to the hemodynamically stability of the patient throughout the procedure. Except for the standard epidural test dose of lidocaine 45 milligrams and epinephrine 15 micrograms, epinephrine-containing solutions were avoided for epidural anesthesia to avoid tachyarrhythmias (7).

## CONCLUSION

The successful management of the parturient with FDC depends on the cooperative efforts of the obstetrician, the cardiologist and the anesthesiologist involved in the peripartum care. Careful titration of epidural infusion and i.v. fluids (colloids in our case) perioperatively was the key to hemodynamic stability and a good outcome in our patient. As peripartum management of parturients with DCM is not well defined approach to labor analgesia and surgical anesthesia in a pregnant woman with FDC is one if individuality.

## Acknowledgement

Presented in part at the Annual Meeting of the Society for Obstetric Anesthesia and Perinatology (SOAP 2008) in Chicago, Illinois, USA, April 30-May 3, 2008.

## References

1. Taylor M. R. G., Carniel E., Mestroni L., *Review Cardiomyopathy, familial dilated*, ORPHANET JOURNAL OF RARE DISEASES, 2006, **1**, 27.
2. Velickovic I. A., Leicht C. H., *Continuous spinal anesthesia for cesarean section in a parturient with severe recurrent peripartum cardiomyopathy*, INT. J. OBSTET. ANESTH., 2004, **13**, 40-43.
3. Shnaider R., Ezri T., Szmuk P., *et al.*, *Combined spinal-epidural anesthesia for Cesarean section in a patient with peripartum dilated cardiomyopathy*, CAN. J. ANAESTH., 2001, **48**, 681-683.

4. Pryn A., Bryden F., Reeve W., *et al.*, *Cardiomyopathy in pregnancy and cesarean section : Four case reports*, INT. J. OBSTET. ANESTH., 2007, **16**, 68-73.
5. Kuczkowski K. M., Zundert A. V., *Anesthesia for pregnant women with valvular heart disease : the state-of-the-art*, J. ANESTH., 2007, **21**, 252-257.
6. Horlocker T., Wedel D., Benzon H., *et al.*, *Regional Anesthesia in the Anticoagulated Patient : Defining the Risks (The Second ASRA Consensus Conference on Neuraxial Anesthesia and Anticoagulation)*, REG. ANESTH. PAIN MED., 2003, **28**, 172-197.
7. Frost D. A., Dolak J. A., *Cesarean section in a patient with familial cardiomyopathy and a cardioverter-defibrillator*, CAN. J. ANESTH., 2006, **53**, 478-481.