

# SURGICAL TERMINATION OF PREGNANCY FOR MATERNAL CARDIAC DISEASE: A SAFER OPTION?

**Sorin C. Juverdeanu**

## REZUMAT

**Introducere:** Bolile cardiace sunt una din principalele cauze de mortalitate și morbiditate maternă indirectă în Marea Britanie. În general nu se recomandă sarcina la pacientele ce suferă de insuficiență cardiacă clasa 3 și 4 NYHA (New York Heart Association), indiferent de etiologia insuficienței. Chiar și în situația în care se optează pentru întreruperea de sarcină mortalitatea și morbiditatea maternă rămân mari. La rândul său întreruperea sarcinii poate reprezenta un risc pentru compromiterea în continuare a funcției cardiace. Nu este dovedit dacă metoda chirurgicală de întrerupere este mai sigură, deoarece există doar puține dovezi. **Material și metode:** Prezentăm două cazuri de terminare chirurgicală a sarcinii în trimestrul întâi la două paciente cu diagnostic de stenoză aortică severă respectiv diagnostic de cardiomiopatie dilatativă idiopatică. A fost efectuată o analiză a literaturii pentru a studia dacă metoda chirurgicală de întrerupere a sarcinii este o metodă sigură la pacientele cu patologie cardiacă severă. **Concluzii:** Întreruperea chirurgicală a sarcinii la pacientele cu patologie cardiacă pre-existentă pare a fi o metodă sigură ce poate fi efectuată în mod planificat. Riscul anestezic poate fi diminuat prin utilizarea unui anestezic general ce determină mai puține efecte cardiovasculare. Ocitocicele pot fi utilizate cu precauție iar profilaxia endocarditei pare a nu fi necesară.

**Cuvinte cheie:** Siguranța, întreruperea medicală a sarcinii, avort, boală cardiacă

## ABSTRACT

**Introduction:** Cardiac disease is one of the leading indirect causes of maternal mortality and morbidity in the UK. Pregnancy is generally not recommended where the patient reaches functional class 3 or 4 on the New York Heart Association (NYHA) whatever the underlying condition. However if it occurs termination may be advised as the maternal mortality and morbidity is high. Even termination of pregnancy carries significant risk of further compromise to the maternal cardiac status. Whether a surgical approach is safer than the medical one it is not clear as the evidence is scarce. **Material and methods:** We present two cases of first trimester surgical termination of pregnancy for two patients suffering with severe aortic stenosis and idiopathic dilative cardiomyopathy, respectively. A literature review was performed in an attempt to ascertain whether a surgical approach would be safer in women with severe pre-existing cardiac conditions. **Conclusion:** Surgical abortion in women with pre-existing cardiac conditions seems to be safer as it can be performed in a planned manner making better use of resources. The anaesthetic risk can be minimized by preferring a general anaesthetic which has less dramatic effects on the cardiovascular function. Oxytocics can be used cautiously and endocarditis prophylaxis does not seem to be needed.

**Key Words:** safety, medical termination of pregnancy, abortion, cardiac disease

## INTRODUCTION

Cardiac disease is one of the leading indirect causes of maternal mortality and morbidity in the UK.<sup>1</sup> The situations carrying the highest risk are pulmonary hypertension (e.g. Eisenmenger syndrome), severe left ventricular outflow tract obstruction (e.g. severe aortic stenosis) and cyanotic heart disease. Pregnancy is generally not recommended where the patient reaches functional class 3 or 4 on the NYHA whatever the underlying condition. However if it occurs termination should be advised as the risks to the mother are

high (mortality 8-35% and morbidity 50%).<sup>2</sup> Even termination of pregnancy carries significant risk of further compromise to the maternal cardiac status. Whether a surgical approach is safer than the medical one it is not very clear as the evidence is scarce.

## MATERIAL AND METHODS

We present two cases of first trimester surgical termination of pregnancy in two patients suffering with severe aortic stenosis and idiopathic dilative cardiomyopathy, respectively. The discussion is focused on possible risk factors and side effects associated with both surgical and medical termination of pregnancy.

A Medline and Embase search was conducted for the words aortic stenosis, primary dilated cardiomyopathy, cardiac disease and termination/abortion from 1980 to 2006. Only one case of medical termination in a woman with primary cardiomyopathy was found.<sup>3</sup>

Obstetrics and Gynaecology Department, Royal Preston Hospital, U.K.

Correspondence to:

Dr. Sorin C. Juverdeanu, Royal Preston Hospital, Sharoe Green Lane, Fulwood, Preston PR2 9HT, UK, Tel. +44-161-4321402.

Email: sjuverdeanu@yahoo.co.uk

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## **CASE 1**

A 30 year old primigravida was seen in the joint Cardiology/Obstetric antenatal clinic at 8 weeks gestation. She was a Duchene muscular dystrophy (DMD) carrier and suffered with idiopathic dilative cardiomyopathy which was believed to be a rare consequence of that. A dual chamber intra-cardiac device (ICD) was inserted 4 years ago when she developed frequent episodes of non sustained ventricular tachycardia. Her medication at the time of the conception included Carvedilol, Amiodarone as well as Midodrine started following a syncope episode.

Her clinical condition was stable but the echocardiography showed an ejection fraction of only 25% with global reduction in the left ventricular function, significant dilatation of the left ventricle and mild mitral regurgitation. A chorionic villous biopsy was performed due to the 1 in 4 risk of the fetus being affected by DMD revealed that the baby was affected with the disease. The patient opted to have a surgical termination of pregnancy.

The procedure took place at 13 weeks gestation in the cardiac theatre using a combination of spinal/epidural anaesthesia. Cervical priming was undertaken with Gemeprost 1 mg vaginally. The patient had an uneventful suction-curettage with a total estimated blood loss of 100 ml. During the procedure endocarditis prophylaxis was provided in the form of Amoxicillin and Gentamycin and she also received 3 IU of intravenous oxytocin. She was admitted to the High Dependency Unit for 24 hour observation. The woman made a full, uneventful recovery being discharged after 2 days on Medroxyprogesterone acetate (Depo provera) 150 mg as contraception.

## **CASE 2**

A 25 years old Asian woman attended the ANC at 11 weeks gestation. She was suffering with mixed aortic disease and was on the waiting list for aortic valve replacement. Her first pregnancy was uneventful ending with a vaginal delivery but in the second one she had a Caesarean section at 34 weeks gestation for severe AS (peak pressure gradient = 80-90 mmHg).

The woman was found to have an aortic valve peak gradient of 80 mmHg with good left ventricular function, moderate regurgitation and a bicuspid aortic valve. She was offered surgical termination of pregnancy in view of the poor prognosis carried by her condition. The procedure was performed in the cardiac theatres with a cardiovascular surgeon in standby. General anaesthesia was preferred due to

less risk of hypotension. She had a suction curettage with an estimated blood loss of 100 ml. Later on the patient was transferred to HDU where she made an uneventful recovery. She was discharged home on the third day after receiving Medroxyprogesterone 150 mg injection as contraception.

## **DISCUSSION**

Cardiac disease is the second most common indirect cause of maternal death in the UK and it gives a maternal mortality rate of 2.2/100,000 maternities.<sup>1</sup> Pregnant women with cardiac disease should be managed by a multidisciplinary team involving an obstetrician, cardiologist, anaesthetist and genetic counselor. Risk assessment and inclusion of the patient in one of the NYHA classes are important means of predicting the outcome and establishing the appropriate course of management.

### **Surgical termination**

Surgical therapeutic abortion is one of the commonest procedures performed in early pregnancy and special considerations should be given to women with pre-existing cardiac diseases due to the increased risk of vasodilatation and myocardial depression following anaesthesia. The indications for termination could be divided into maternal and fetal. Most commonly the decision is based on the maternal cardiac status yet the social circumstances may play an important role in some cases. The fetal risk of cardiac defects particularly with maternal congenital heart disease is significantly increased (3-10%) and can constitute an indication for termination on its own.<sup>4</sup> There are two methods of performing a termination: surgical (suction-curettage) and medical (Mifepristone and Misoprostol). Currently there is no evidence on the safest approach in women with pre-existent cardiac disease and the decision rests on specific risk factors for individual heart conditions along with the side effects of the medication, possible complications of surgery and the risk of the anaesthetic.

In both our cases the surgical approach was preferred as it allowed the procedure to be performed in a more scheduled manner having readily available the right resources to obtain the best outcome. As for the severe aortic stenosis this was well justified (need for cardiovascular surgeon in standby, procedure performed in cardiac theatre) one could argue that for a patient with idiopathic cardiomyopathy the medical management could have been a safe alternative. However bleeding and pain can be quite severe and unpredictable with medical termination particularly

at gestation of more than 8 weeks which could both compromise the maternal cardiac status. Surgical termination has a relative short duration and reduced risk of failure when performed for gestations of over 7 weeks. The complication rate has been significantly reduced since the introduction of the vacuum aspiration and the use of cervical priming.<sup>5-7</sup> The table below illustrates the most frequently occurring hazards with surgical and medical termination. (Table 1)

**Table 1.** Surgical vs. medical termination: most common complications.

Complications	Surgical TOP	Medical TOP
Haemorrhage	No significant difference in Hb post-abortion as compared with medical termination. <sup>8,9</sup>	Longer period of bleeding but no significant change in Hb. <sup>8,9</sup>
Infection	No difference <sup>8,9</sup>	No difference <sup>8,9</sup>
Failure	2.3 : 1000 <sup>10</sup>	2.5 : 100
Perforation	1-4 : 1000 <sup>10</sup>	N/a
Cervical trauma	1 : 100 <sup>10</sup>	N/a
Pain	1 : 100 <sup>8</sup>	More severe with advancing gestation <sup>9</sup>
Retained products of conception requiring re-evacuation	3.1:100 (up to 9 weeks) <sup>9</sup> 2.1:100 (11-13 weeks) <sup>8</sup>	4.8:100 (up to 9 weeks) <sup>9</sup> 5.4:100 (11-13 weeks) <sup>8</sup>

### Anaesthesia

Anaesthesia is an important risk factor when surgical termination is contemplated. A general anaesthetic is normally preferred to a single shot spinal which may cause a dramatic reduction in the systemic vascular resistance and blood pressure.<sup>11</sup> Patients with a very tight aortic valve do not tolerate blood loss, hypotension and tachycardia being at an increased risk of left ventricular failure and arrhythmias. Similarly any variations in the cardiac output may offset the compensatory mechanisms in women with a severely decreased ejection fraction (e.g. idiopathic dilative cardiomyopathy). An incremental regional anaesthesia using epidural and subarachnoid catheters may be an option in less severe cases as the block could be established slowly and any haemodynamic changes dealt with expeditiously.

### Medical termination

Medical termination is routinely performed in the UK using oral mifepristone 200 mg followed in 36-48 hrs by vaginal misoprostol 600 µg. Mifepristone is an orally active synthetic steroid with antiprogesterone and antiglucocorticoid activities used as an abortifacient in conjunction with misoprostol. The main adverse events reported with the mifepristone used alone as abortifacient are bleeding and infection.<sup>12</sup> A systematic analysis of morbidity and mortality with this drug revealed five cases of death due to septic shock in healthy, young women, three of them being related to a rare bacterium, *Clostridium sordellii*. An interesting theory has recently been published linking the rapid onset of sepsis with mifepristone's blockade of glucocorticoid receptors at doses of more than 400 mg.<sup>13</sup> However the occurrence of these complications seems to be sporadic and at higher doses than the standard ones used in the UK. The risk of haemorrhage with mifepristone alone is high particularly at gestations of more than 49 days. Although the sequential use of mifepristone and misoprostol reduces the risk of bleeding haemostatic curettage may still be needed in up to 2.6% of cases.<sup>8</sup>

Prostaglandins (PGs) of the E-type are potent vasodilators in most species and in most vascular beds. The effects of prostaglandins on human circulation have been evaluated outside the pregnancy on healthy subjects. Brecht et al showed that 400 mcg of misoprostol although did not alter the blood pressure, it significantly increased the heart rate (63 vs 59 beats/min).<sup>14</sup> This was not clinically significant in healthy subjects but might compromise the cardiac status of a woman with severe pre-existing heart disease. An US prospective observational study showed that 600 mcg of misoprostol administered to healthy women undergoing midtrimester pregnancy termination had negligible effect on maternal pulse, mean arterial pressure and standard cardiac indices.<sup>15</sup> However these findings can not be generalized to patients suffering with cardiovascular disease due to their special haemodynamic status which could make them more susceptible to the effects of prostaglandins.

### Use of oxytocics

Oxytocin is a widely used drug in surgical terminations which initiates uterine contraction. Its primary haemodynamic effect is vasodilatation via receptors on vascular endothelium that trigger the nitric oxide pathway. A randomized, double blind study conducted in the UK showed a small but statistically significant drop in mean arterial pressure following a 10 IU bolus of oxytocin.<sup>16</sup> There was also a large, statistically significant increase in heart rate

and cardiac output at 1 min following 5 units and 2 mins after 10 units. All these findings are particularly relevant in women suffering with cardiac disease who are unable to mount compensatory increases in cardiac output. Therefore oxytocin boluses should be avoided in such patients and uterine massage followed by slow infusions of 20 units over 4 hrs if necessary would be preferable instead.

### **Infective endocarditis prophylaxis**

There are many anecdotal publications which suggest causal associations between various procedures and bacteraemia and between procedures and endocarditis. Recent guidelines by the British Society for Antimicrobial Chemotherapy (BSAC) and the American Heart Association (Wilson et al. 2007) have challenged the existing dogma by highlighting the prevalence of bacteraemias that arise from everyday activities such as toothbrushing, the lack of association between episodes of IE and prior interventional procedures, and the lack of efficacy of antibiotic prophylaxis regimens.<sup>17,18</sup> Although the most recent NICE (National Institute of Clinical Excellence) guideline recommends no antibiotic prophylaxis at all there are suggestions from other expert groups that high risk patients may still benefit from it. This includes patients who had previous infective endocarditis, cardiac valve replacement surgery (prosthetic valves) or a surgically constructed systemic or pulmonary shunt or conduit. The antibiotic combination of choice in obstetrics and gynaecology would be amoxicillin 1 g iv and gentamycin 1.5 mg/kg iv given just before procedure or at the induction of anaesthesia. However the actual procedure itself needs to be considered as it carries different degrees of risk. For example surgical termination of pregnancy has a 5% risk of bacteraemia but this very rarely leads to endocarditis. Therefore the use of antibiotics is of doubtful benefit for such procedures even in high risk patients.

### **CONCLUSION**

Pregnant women with cardiac disease should be managed by a multidisciplinary team. Women with severely compromised cardiac status may require therapeutic abortion. The medical termination of pregnancy seems to be more risky partly due to the combination of drugs used which may have significant cardiovascular effects on women with pre-existing cardiac disease. Moreover pain, severe haemorrhage and risk of failure are significantly increased and may

contribute as well. Surgical approach can be undertaken in a more scheduled manner and the anaesthetic risk can be minimized by using a general anaesthetic. Oxytocics can be used cautiously and endocarditis prophylaxis is not needed.

### **REFERENCES:**

1. Royal College of Obstetricians and Gynaecologists. Why Mothers Die 2000–2002 - The Sixth Report of Confidential Enquiries into Maternal Deaths in the United Kingdom. London: RCOG press; 2004.
2. Expert consensus document on management of cardiovascular disease in pregnancy. The task force on the management of cardiovascular disease during pregnancy of the European Society of Cardiology. *Eur Heart J*. 2003; 24: 761-81.
3. Yacoub A, Martel MJ. Pregnancy with primary dilated cardiomyopathy. *Obstet Gynecol* 2002; 99:928-30.
4. Samuel C. Siu et al. Prospective Multicenter Study of Pregnancy Outcomes in Women with Heart Disease. *Circulation* 2001, 104: 515.
5. Kulier R, Fekih A, Hofmeyr GJ et al. Surgical methods for first trimester termination of pregnancy. *Cochrane Database Syst Rev* 2001;(4).
6. World Health Organization Special Programme of Research. Vaginal administration of 15-methyl-PGF<sub>2a</sub> methyl ester for preoperative cervical dilation. *Contraception* 1981;23:251–9.
7. Singh K, Fong YF, Prasad S et al. Randomized trial to determine optimal use of vaginal misoprostol for pre-abortion cervical priming. *Obstet Gynecol* 1998;80:795–8.
8. Ashok P W, Kidd A. A randomized comparison of medical abortion and surgical vacuum aspiration at 10-13 weeks gestation. *Hum Reprod* 2002 vol 17, no 1: 92-8.
9. Henshaw RC, Najy SA. A comparison of medical abortion (using mifepristone and gemeprost) with surgical vacuum aspiration: efficacy and early medical sequelae. *Hum Reprod* 1994; vol 9 no 11:2167-172.
10. Zhou W, Nielsen GL, Møller M et al. Short-term complications after surgically induced abortions: a register-based study of 56 117 abortions. *Acta Obstet Gynecol Scand* 2002 Apr;81(4):331-6.
11. Ray P, Murphy G J. Recognition and management of maternal cardiac disease in pregnancy. *Br J Anaesth* 2004 93(3): 428-39.
12. Gary M, Harrison J. Analysis of severe adverse events related to the use of mifepristone as an abortifacient. *Ann Pharmacother* 2006 Feb;40(2):191-7. Epub 2005 Dec 27.
13. Sitruk-Ware. Mifepristone and misoprostol sequential regimen side effects, complications and safety. *Contraception* 2006 Jul;74(1):48-55. Epub 2006 May 15
14. Brecht T. Effects of misoprostol on human circulation. *Prostaglandins*, 1987, vol./is. 33 Suppl/(51-60)
15. Ramsey PS, Hogg BB, Savage K. Cardiovascular effects of intravaginal misoprostol in the mid trimester of pregnancy. *Am J Obstet Gynecol* 2000, 183, 5: 1100-2.
16. Pinder AJ, Dresner M. Haemodynamic changes caused by oxytocin during caesarean section under spinal anaesthesia. *Int J Obstet Anesth* 2002 11. 156-59.
17. Gould FK, Elliott TSJ. Guidelines for the prevention of endocarditis: report of the Working Party of the British Society for Antimicrobial Chemotherapy. *J Antimicrob Chemother* 2006 Jun;57(6):1035-42
18. Wilson W. Prevention of infective endocarditis: guidelines from the American Heart Association: a guideline from the American Heart Association Rheumatic Fever, Endocarditis and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group. *J Am Dent Assoc* 2007 Jun;138(6):739-45, 747-60.