International Journal of Innovative Research in Medical Science (IJIRMS)
Volume 04 Issue 01 Jan 2019, ISSN: 2455-8737, Imp. Factor - 4.102
Available online at - www.ijirms.in

Open Access Article | Case Report | DOI: 10.23958/ijirms/vol04-i01/526

Anaesthesia for Caesarean Section in a Jehovah's Witness with Antepartum Haemorrhage: A Case Report

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Summary

FN, a 29-year-old gravida 3 Para 2^{+2} female (with no live child), member of Jehovah's Witness sect had emergency Caesarean section under general anaesthesia with endotrachael intubation for abruptio placentae at 35 weeks of gestation.

Preoperative and postoperative packed cell volume (PCV) was 28% and 9% respectively. She received erythropoietin and iron dextran infusions. Patient developed anaemic heart failure on 3rd post-operative day which was managed successfully. She recovered completely and was discharged home on the 28th post-operative day. Management dilemmas specific to the Jehovah's Witness parturient with abruptio placentae are discussed.

Keywords: ***Anaesthesia, Caesarean-section, antepartum-haemorrhage, Jehovah's-witness.***

Introduction

The Royal College of Obstetricians and Gynaecologists (RCOG) defines antepartum haemorrhage as bleeding from the vagina after 24+0 weeks of gestation and before the birth of the baby[1]. The common causes of antepartum haemorrhage are abruptio placentae and placenta praevia. In abruptio placentae, the haemorrhage is from a normally situated placenta, whereas in placenta praevia, haemorrhage is as a result of partial separation of a low lying placenta[2]. Abruptio placenta complicates about 0.4 to 1% of pregnancies[2]. In many cases the cause is not known, but about 25 percent of the cases are associated with hypertension, trauma, a short umbilical cord, multiparity and an abnormal uterus[1,2]. Abruptio placenta could be revealed haemorrhage if there is vaginal bleeding or concealed if haemorrhage is confined to the uterine cavity.

The Jehovah's witnesses were founded by Charles Russel, a former haberdasher from Philadelphia, in early 1872 in Allpheny[3]. In 1945 the doctrine of abstinence from blood transfusion was made. In 1970 Jehovah's Witness sect (JWS) started carrying directive cards (withhold transfusion)[3]. JWS presently has membership of over 6 million active and 14 million associate-members world-wide and its publications are translated into over 200 different languages. This religious sect stems her objection from both old and new testaments that refer to sanctity of blood. Acts 15 v 28, 29 and Deuteronomy 12 v 23- 25[4]. These verses from the Holy Bible are the basis upon which the JWS refuse transfusion of homologous blood and its products thereby presenting a special challenge to the medical profession in general. In surgical practice, this challenge becomes critical when major surgery anticipating major blood loss is required[5]. The challenge has been met over the years with various innovative techniques accruing from research[5].

Caesarean section in a patient with antepartum haemorrhage is often accompanied by significant blood loss and therefore blood for replacement is customarily procured preoperatively against such eventuality. In view of the fact that Jehovah's Witnesses do not accept any form of banked blood, the anaesthetist must strategize for blood conservation. The strategies must include detailed investigations into the patient's options, the anticipated blood loss and the techniques to reduce blood loss.

Case Presentation

FN is a 29-year-old booked $G_3P_2^{+2}$ (with no live child) female, member of Jehovah's Witness sect presented in the labour ward of Federal Medical Centre, Umuahia, Abia State. She had 2 hours history of sudden abdominal pains and heavy bleeding from the vagina at 35 weeks of gestation. Pain started in the lower part of the abdomen and later became generalized. Pain waxed and waned and was not relieved by paracetamol. She later started passing clots vaginally. She had a rigid abdomen and absence of fetal kicks. There was no history of trauma or spotting in the index pregnancy. She was not a known diabetic, hypertensive or asthmatic.

Her first confinement in 2003 ended with premature rupture of membrane and the delivery of a fresh still born male weighing 1.4 kg at 30 weeks gestation. Her second confinement in 2006 ended

with premature rupture of membrane at 28 weeks and the delivery of a live female neonate of 1.3 kg birth weight. The baby died immediately after birth from asphyxia.

FN was a young anxious parturient in obvious painful distress. She was pale, anicteric, afebrile and there was no pedal oedema. Her pulse rate was 130 beats per minute, regular, and was of moderate volume. The blood pressure was 90/60 mmHg, heart sounds were normal and there was no heart murmur. Respiratory rate was 24 breaths per minute and breath sounds were normal in both lung fields. Peripheral temperature was 36.4^0C. Abdominal examination revealed a tonically contracted gravid uterus with a fundal height of 36 weeks. Fetal heart sounds were absent. There was no organ enlargement. Vaginal examination was not done to avoid provoking more haemorrhage. A diagnosis of antepartum haemorrhage with possible intra uterine fetal death was made.

Intravenous access with two size 18-gauge medflon cannulae were secured on the left upper limb through which 1.5 litres of 0.9% saline was infused over 30 minutes to resuscitate her. The urethra was catheterised with a size 16-gauge Foley's catheter and about 150mls of urine was drained. A fluid input and output monitoring chart was opened while urgent urinalysis and clotting time were being conducted at the bedside. Packed cell volume was also carried out at the bed side using haematocrit centrifuge. Blood sample was also taken to the laboratory for urgent grouping and cross-matching. Three litres of haemacel were made available and she was scheduled for category 1 (emergency) C/S. Results of urgent tests done were: packed cell volume (%)- 28 (normal range: 40-54), Urinalysis- cloudy, nil glucose, nil protein, nil leukocytes.

Anaesthetic Management

At pre-anaesthetic review, the history and physical examination were as earlier reported. She was classified as ASA II and her airway was of Mallampati class II. The implications of her condition and refusal of blood transfusion were discussed with her privately and thereafter in the presence of her spouse. The discussion was documented and an informed consent was signed by both of them. The consultant anaesthetist and hospital administrator were informed according to the hospital protocol. The matron in ICU was also notified and bed space secured for her.

Prior to the arrival of the patient in the theatre, routine check was carried out on the anaesthetic machine and the monitors. All the anaesthetic and resuscitation drugs including ephedrine and atropine were drawn up and diluted in labelled syringes. All the intravenous fluids were warmed and kept in readiness for use. A short case conference was held and clear responsibilities were assigned to everybody involved in her management. The patient arrived the theatre fully conscious with 2 patent intravenous lines in situ. Standard routine monitoring was established. Base line vital signs were a pulse rate of 116 beats per minute, blood pressure of 110/65 mmHg, respiratory rate was 20 breaths per minute while oxygen saturation was 100% on room air.

The patient was induced intravenously with 120 mg of ketamine after premedication with 0.4 mg of glycopyrrolate. Cricoid pressure was applied at loss of verbal contact. This was followed by intravenous injection of 100 mg of suxamethonium chloride to facilitate endotracheal intubation with size 7.0 mm internal diameter cuffed portex endotracheal tube. Correct placement of the tube was confirmed by auscultation and a normal capnograph. Guedel oropharyngeal airway size 3 was inserted and the tube was secured in place with adhesive tape. Nasopharyngeal temperature probe was inserted. Ventilation was controlled manually using intermittent positive pressure ventilation with 100% oxygen at the rate of 18 to 20 breaths per minute. A total fresh gas flow of 6 litres per minute was administered to the patient via the circle absorber breathing system.

Anaesthesia was maintained with two intermittent boluses of iv ketamine 25 mg. Muscle relaxation was maintained with 6 mg of pancuronium bromide. Analgesia was achieved with bolus intravenous dose of tramadol 100mg and paracetamol 1g. Intraoperative blood pressure ranged from 110 mmHg to140 mmHg systolic and 65 to 90 mmHg diastolic. The pulse rate ranged from 96 to 128 beats per minute. Oxygen saturation was between 94 and 98% intraoperatively. ECG showed normal sinus rhythm while the capnograph showed normal tracing and end tidal carbon dioxide ($EtC0_2$) ranged between 3.5 and 5.0 kPa. Core temperature by nasopharyngeal probe ranged from 36.6 to 37^0C. Axillary temperature was from 36.4 to 36.8^0C. Estimated blood loss was about 3.5 litres. Patient received a total of 5 litres of fluid, made up of 1.5 litres of haemacel and 3.5 litres of normal saline. The urine output was about 200mls. Duration of surgery was 50 minutes.

At the end of surgery, residual neuromuscular paralysis was reversed with intravenous neostigmine (2.5 mg) and glycopyrrolate (0.4 mg). The oropharynx was cleared and patient was extubated fully awake. Post-extubation $Sp0_2$ while breathing room air was below 90% and supplementary oxygen (100%) by face mask at 6 litres per minute was continued to maintain saturation at 98%. The immediate postoperative vital signs were a pulse rate of 98 beats per minute and blood pressure 110/65 mmHg. The immediate postoperative PCV before her transfer to the ICU was 9%.

Surgery and Findings

A lower segment caesarean section was carried out by the most experienced surgeon on duty and a fresh still born male weighing 2.8 kg was delivered. Intravenous ergometrine 0.4 mg was administered at the delivery of the anterior shoulder and 20 units of oxytocin was added to 500mls of normal saline that flowed at 125mls/hour. There was a retroplacental clot and the placenta weighed 0.7 kg.

Postoperative Management

On patient's arrival in the ICU, oxygen administration by nasal catheter was continued. Her vital signs were: pulse-100 beats per minute, blood pressure-100/70mmHg, respiratory rate-26 breaths per minute, temperature-36.9^0C and oxygen saturation was 97%. Postoperative fluid therapy consisted of 1liter of 5% dextrose in 0.9% saline to alternate with 1litre of 0.9% saline every 8 hours for 24 hours. Antimicrobials consisted of intravenous ampiclox (500 mg) 6 hourly, gentamycin (80mg) 8hourly and metronidazole (500 mg) 8 hourly. She was also commenced on intravenous erythropoietin 3000 iu per week and intravenous iron dextran. Postoperative analgesia was achieved with intravenous tramadol 100 mg 8 hourly for the first 48 hours. On the first day, she was started on graded oral fluid; semi solid feeds were introduced later in the day along with double dose haematinics (folic acid 5mg 3

times daily, ferrous gluconate 400mg, 3 times daily). After 48 hours oral ampiclox 500 mg 6 hourly and metronidazole 400 mg 8 hourly were commenced for 5 days. His PCV remained 9% on the 1st postoperative day.

The patient developed anaemic heart failure on the 3rd postoperative day. She was placed in the cardiac position and commenced on intravenous frusemide 40 mg 12 hourly while still on oxygen by nasal prongs as prescribed by the physicians. Her PCV was still 9%. Serial PCV done on the 4th, 5th, 6th, 7th, and 8th postoperative days were 10%, 10%, 12%, 13% and 14% respectively. Skin sutures were removed on the 8th day. The patient's heart failure started resolving on the 9th day. She made a progressive improvement and was discharged to the ward on the 14th day. Her PCV before transfer to the ward was 16%. She was finally discharged home on the 20th day.

Discussion

Bloodless medicine and surgery which is defined as a team approach that reduces blood loss and uses the best available alternatives to allogeneic transfusion therapy while focusing on the provision of the best possible medical care to all patients started in 1980 at the request of Jehovah's Witnesses who wanted hospitals where they could receive best medical care and have their desire to avoid blood transfusion respected[6]. The usual practice of autologous preoperative blood collection and storage is not accepted by Jehovah's Witness. Techniques of intraoperative salvage are not accepted by some Jehovah's Witnesses. They accept cardiopulmonary bypass (CPB) and dialysis because the circuit is considered part of the circulation[7]. Some Jehovah's Witnesses accept autologous normovolaemic haemodilution (ANH) provided the patient is not separated from the blood bag after the phlebotomy is performed. Anaesthetists are obliged to honour the principle of autonomy which states that patients have final authority over what is done to them when they sign a waiver that relieves the Physician of responsibility for any consequences of blood refusal. An announcement in 2000 in the Watchtower magazine, however said because of ambiguity in the Bible individuals are free to decide about therapies using the biological compound that make up the blood components e.g. Gamma globulin and clotting factors[7].

Anaesthesia for surgical procedures with a high risk of major haemorrhage is being increasingly undertaken in Jehovah's Witnesses who desire that their wishes for avoiding transfusion be respected5. Previously, Jehovah's Witnesses have been refused surgery on moral and ethical grounds with the physicians unable to come to terms with the strictures required by the religious convictions of these patients[8]. With the acceptance of extracorporeal circulation by the Jehovah's Witnesses and the numerous reports of successful 'bloodless' surgery, many surgeons and anaesthetists now view the care of these patients as a challenge to the scientific basis of surgical management[5,9]. This has helped to improve the standard of care such that conservative attitudes regarding homologous blood transfusion are now common place[5].

Diagnosis of abruptio placenta can be confirmed by abdominal ultrasonography which may reveal the presence of retroplacental clot[1]. Viability of the fetus can also be established using ultrasonography. Ultrasonography is therefore indicated in the management of abruption and should be used where available. Bedside pregnancy test, PCV and clotting time may be adequate in an emergency, if time permits. Based on religious grounds blood transfusion, including replacement of coagulation factors and platelets which are often necessary in abruption placenta were avoided and the patient was actively resuscitated with crystalloids based on the estimated blood loss in the labour ward before transfer to the theatre.

Blood conservation techniques are the mainstay of the management of the Jehovah's Witness patient who refuses any form of blood transfusion[5]. These techniques should be applied preoperatively, intraoperatively and in the postoperative period. The preoperative management of a Jehovah's Witness should include a search for causes of anaemia and treating them to have a favourable outcome. Treatment of malaria, worm infestation, stoppage of NSAIDS, antibiotics like B-lactam that cause anaemias and other drugs associated with increased bleeding should therefore be considered for elective cases. Amanor-Boadu and colleagues suggested that oral ingestion of haematinics such as iron, folic acid, vitamin C over a period of two weeks has been shown to increase the haemoglobin by 1gm[10]. Studies have also shown that subcutaneous recombinant erythropoietin in the dose of 100 iu/kg plus intravenous iron for 4 to 5 days has improved PCV by 2-7%[6,10,11]. Limiting phlebotomy to necessary diagnostic testing, reduction in volume of blood drawn for laboratory test, performing multiple tests per sample and non-invasive monitoring should be included as strategies to blood conservation. Minimizing non-diagnostic iatrogenic blood loss is another strategy to blood conservation[13,14].

The physical examination should include a search for splenomegaly, petechiae, ecchymosis, purpura, and other diseases associated with haemostatic dysfunction by Ganon and colleague[13]. Laboratory investigations should include serum ferritin, peripheral blood smear and faecal microscopy to help with perioperative improvement of the patient's condition in elective cases. Coagulation tests if time permits should include: PT, PTT, bleeding time platelet count, fibrinogen concentration and fibrin degradation products[14,15]. The liver and renal function tests are also important. Haematologist should also be invited in cases of abnormal bleeding. In an emergency such as seen here, bedside clotting time, urinalysis and PCV may be done.

Preoperatively the ethical and legal aspects of anaesthetic management should be properly addressed[16]. The ethical and legal aspects of anaesthetic management of Jehovah's Witnesses have confidentiality as a major aspect[16,17]. Patients must have their privacy and be physically and emotionally free from intrusion when they approve the use of blood transfusion and to share their personal information. Anaesthetists must be very careful not to share the information with the family members or others through inadvertent comments or public discussions. That was why at the preanaesthetic visit, this patient was reviewed privately to enable her make decisions on blood transfusion, after which the implication of her refusal of blood transfusion was clearly explained to her.

General non-blood transfusion and therapeutic management principles include prompt consultation with senior specialist with experience in managing patients without allogeneic transfusion. Recognition and control of abnormal bleeding are essential. Kickler advised that prompt action to secure haemostasis in the

actively bleeding patient who refuses blood transfusion is life saving[15]. That was one of the reasons a consultant anaesthetist was invited and the most experienced scrub nurse on duty scrubbed for the surgery. The most experienced surgeon with a good knowledge of anatomy and the passage of aberrant vessels was also invited to perform the caesarean section on this patient.

Parturients are usually treated as patients with a full stomach because of delayed gastric emptying caused by the effect of progesterone on the smooth muscles of the gastrointestinal tract[18]. The pressure of the gravid uterus on the stomach also compromises the integrity of the lower oesophageal sphincter, thus increasing the risk of aspiration. Premedication with metoclopramide, a prokinetic agent may be indicated to facilitate gastric emptying. Ranitidine reduces gastric volume and acidity and its use is also beneficial. Glycopyrrolate was used as a premedicant because it is a better antisialogue and has less chronotropic effect when compared to atropine. Already her pulse rate was high due to hypovolaemia. Further increase in the heart rate with atropine may increase myocardial oxygen demand which may predispose the patient to myocardial ischaemia.

Ketamine increases cardiovascular activity and is an agent of choice for the poor risk patient[19]. It is an induction agent of choice for this patient with hypovolaemia. Hypnosis and analgesia were maintained with intermittent doses of ketamine. Ketamine has potent analgesic effect and can be used as a sole anaesthetic agent[19]. Etomidate, if available is cardio-stable and can be used but its side effect on the adrenals has limited its use in anaesthetic practice[20]. Thiopentone causes hypotension and was therefore, not ideal for this patient. Propofol though has a strong antiemetic activity will cause prolonged apnoea and reduction in blood pressure[21], so it was avoided.

A rapid sequence induction was done because this was a case of full stomach with a consequent increased risk of regurgitation and aspiration. There was no contraindication to the use of suxamethonium chloride. It has a rapid onset of action and provides optimal muscle relaxation for smooth intubation. Rocuronium bromide if available may also be used because its rapid onset of action provides good intubating conditions and it is also recommended as drug of choice where suxamethonium is contraindicated[22].

Minimizing oxygen demand by sedation, muscle relaxation, mechanical ventilation, adequate and appropriate analgesia are vital in blood conservative surgery. Pancuronium increases cardiovascular activity[23]. It was considered proper for maintenance of muscle relaxation. Pancuronium was used because the patient was making enough urine. Vecuronium, where available, should be used because it is more cardio-stable. Atracurium releases histamine and causes hypotension[23] therefore, has limited use in this patient. High flow oxygen (6 litres/minute) was administered by intermittent positive pressure ventilation to improve patient's condition. Most of the anaesthetic inhalational agents are associated with vasodilatation and hypotension therefore were avoided in this patient.

Combination of surgical and anaesthetic blood conservation techniques namely: meticulous surgical haemostasis, minimizing blood loss and rigorous intraoperative blood management are necessary. Strategies which may be employed intraoperatively are prompt haemostasis, optimal condition of all the instruments and equipment including diathermy[5,9,10]. Circulatory compromise was counteracted here by the use of colloid (Haemacel) and crystalloid (normal saline). It has been established that the replacement requirement for blood loss when using crystalloids is three or fourfold the volume of blood lost and that of colloid solutions is equivalent to the blood loss[24]. Hypervolaemic haemodilution which involves rehydration of the patient with adequate maintenance fluids to allow for loss of diluted red cells should also be considered. Hypotensive anaesthesia and regional techniques may also be used to reduce blood loss[9]. These were not done here because of the hypovolaemic state of the patient.

Other intraoperative considerations in the management of JWS should involve an approach which uses haemostatic surgical instrument like electrocautery, argon beam coagulator, ultrasonic scapel, radiofrequency thermal ablation, water jet dissector and micro wave device and laser[9]. None of these instruments was available for use in this patient. Use of systematic haemostatic agents like aprotinin tranexamic acid, epsilon, aminocaproic acid, desmopressin, conjugated estrogen and octreotide where available can also be life saving[5,25]. Factors VII, VIII and IX are now available as recombinant products. Topical haemostatic agents, such as fibrin glue, platelet gel, collagen hemostat, gelatin foam, calcium alginate, surgicel and oxycel should also be considered[9]. Topical vasoconstrictors like epinephrine and cocaine may also help blood conservation[5]. Intraoperative volume replacement could be with the oxygen carrying per fluorocarbon and haemoglobin solutions but their use is yet to be fully developed[16,26,27].

Autologous blood transfusion which has four different types namely: preoperative blood donation, acute normovolaemic haemodilution, intraoperative blood collection and postoperative blood collection was employed in the management of JWS as early as 1818. They were then referred to as Watch Tower Society and preoperative donation of autologous blood bank was established in 1930[8]. In 1961, accepting a blood transfusion became grounds for expulsion from the religion[8]. Intraoperative autotransfusion using a cell saver in a closed circuit system is acceptable to some JWS[28]. Autologous blood transfusion was not applied to this patient because it is contraindicated in pregnancy. Intraoperative and postoperative blood collections were not considered because of fear of amniotic fluid embolism. Use of anti-shock trousers and keeping patient in the trendelenburg position[15] should be considered in shocked patient. This patient did not go into shock.

Maintenance of surveillance for blood loss and physiological deterioration was important in safe patient care therefore monitoring of arterial oxygen saturation, end tidal carbon dioxide, ECG, urine output, core temperature and blood pressure were ensured. Hypothermia could cause shivering with increased oxygen demand in the myocardial and peripheral muscles. It could also cause stimulation of sympathetic nervous system. Use of warm fluids, regulation of theatre temperature and adequate draping of this patient were also ensured. Postoperatively, oxygen therapy may be required if PCV is critically low. With adequate blood volume more oxygen will be transported dissolved in solution. Where there is enough supply of oxygen elective postoperative mechanical ventilation should be considered. Haemoglobin should be improved with intravenous iron dextrin and erythropoietin

ferrous sulphate, folic acid, vitamin B complex and vitamin C[5,9-11,29].

Management of acute heart failure should include basic measures like sitting the patient in an upright position with high concentration oxygen delivered via a face mask, correction of anaemia, low salt diet and bed rest as was done for this patient. Close monitoring and frequent reassessment may be required in the early phase of treatment. Urinary catheterisation facilitates accurate assessment of fluid balance, while arterial blood gases provide valuable information about oxygenation and acid-base balance[30]. Intravenous loop diuretics, such as furosemide, induce transient venodilatation, when administered to patients with pulmonary oedema, and this may lead to symptomatic improvement even before the onset of diuresis. Loop diuretics also have additional benefit of increasing the renal production of prostaglandins which is a vasodilator. Parenteral opioids (morphine or diamorphine) are important adjunct in the management of severe acute heart failure, by relieving anxiety, pain, and distress and reducing myocardial oxygen demand. Intravenous opiates and opioids also produce transient venodilatation, thus reducing preload, cardiac filling pressures, and pulmonary congestion[30]. In the absence of morphine, tramadol was used and found useful. Short term inotropic support may be valuable in cases of severe refractory heart failure in which the cardiac output remains critically low. The heart failure as seen here was caused by anaemia and was short lived and therefore did not require any inotropic support. It got resolved as soon as her anaemic state improved.

Conclusion

The major problem of the Jehovah's Witness is their restriction on blood transfusion. A proper understanding of the multidisciplinary approach to bloodless surgery and application of preoperative, intraoperative and postoperative methods of blood conservation is necessary. Use of alternatives to allogenic blood wherever possible and appropriate may be life-saving. Elective postoperative mechanical ventilation where facilities are available is often indicated.

Sponsors: None

Conflicts of interest: None

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