Management of the unconscious pregnant patient

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The management of the unconscious pregnant patient encompasses many aspects of obstetrics and critical care. It is not uncommon to have to manage such a patient, therefore one needs to be well prepared. There is a spectrum of altered consciousness, brain death being the most extreme. The causes of unconsciousness can be general or pregnancy specific. It is important to consider the physiological changes in pregnancy when managing these patients. The immediate resuscitative measures are mostly the same as for the nonpregnant with a few modifications. It is important to remember that there are two patients involved and this can complicate management issues. A multidisciplinary approach would be prudent. The intermediate and long-term management should also involve the family. The issues of perimortem and somatic support for foetal maturity are also discussed.

Consciousness is defined by two fundamental elements: awareness and arousal. The spectrum of alterations in consciousness range from full consciousness to unconsciousness and include drowsiness, stupor, coma and brain death. It is not uncommon to be faced with the challenge of managing an unconscious pregnant patient, yet many obstetricians and clinicians find themselves ill-prepared. Up to 50% of critically ill obstetric patients admitted to an intensive care unit (ICU) in a resource-limited country have neurological involvement. The causes of unconsciousness in pregnancy may be the same as for the nonpregnant patient or they may be pregnancy specific. Management depends on the cause and avails itself to many medical and ethical issues. Although immediate management

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is straightforward, the evidence for the long-term management of the unconscious pregnant patient is lacking and based mainly on case reports and anecdotal advice. The unique physiology of the pregnant patient poses a few challenges in the management and these will be highlighted in this chapter. The outcome in most cases depends on the underlying cause and the swiftness in management. A multidisciplinary team is therefore imperative and any decisions on interventions should include family members. Other pertinent issues that deserve special mention include brain death, perimortem caesarean section and artificially sustaining a pregnancy so that foetal viability is achieved.

**Physiological changes in pregnancy that are pertinent during resuscitation of the pregnant patient**

**Cardiorespiratory**

The combination of increased heart rate and stroke volume together with decreased systemic vascular resistance results in increased cardiac output.\(^2\) In addition, blood volume increases by 30–50%, while red blood cell volume increases only to about 20%. This results in a physiological anaemia of pregnancy.\(^3\) Because of the increased plasma volume, significant losses can be compensated for, before abnormal vital signs are detected in the pregnant patient. However, blood volume in patients with severe pre-eclampsia/eclampsia may expand little if at all, thus they are more susceptible to blood loss.\(^4\) Increased vascular permeability means aggressive resuscitation with crystalloids can lead to fulminant pulmonary oedema in these patients.

Respiratory depth, tidal volume and minute ventilation increases while functional residual capacity (FRC) decreases due to elevation of the diaphragm and decreased chest wall compliance.\(^5\) All of this can lead to a rapid decline in oxygen saturation.\(^6,7\) Arterial blood gas in late pregnancy may show a compensatory respiratory alkalosis. The pregnancy state with the growing uterus, placental mass and foetus results in increased oxygen consumption. Uterine blood flow increases to about 30% compared with 2% in the nongravid uterus.\(^8\)

**Abdominal/pelvic**

Gastrointestinal motility and oesophageal sphincter tone decreases, resulting in increased risk of aspiration. This is further aggravated by the increased compression of the stomach by the growing uterus. Abdominal distention with the gravid uterus makes clinical assessment of the abdomen difficult and after 20 weeks causes aortocaval compression and decreased venous return to the heart in the supine position.\(^5,9\) The supine hypotensive syndrome affects about 10% of pregnant women.\(^6\) The uterus itself in the latter part of pregnancy is relatively thin-walled and susceptible to injury. The bladder is displaced into the abdomen and renal blood flow increases. In addition, the glomerular filtration rate increases and together with the increased blood volume can decrease the plasma levels of certain drugs, e.g. phenytoin.

**Other**

Coagulation factors vii, viii, ix, x and fibrinogen increase, resulting in a hypercoagulable state. The pituitary gland increases in size by up to 30% and is particularly susceptible to shock in the pregnant patient.\(^10\) Neurological changes that occur in pre-eclampsia/eclampsia can mimic many other conditions, e.g. head injury, and therefore a full neurological assessment is essential.

**Causes of unconsciousness in pregnancy (Table 1)**

A decreased level of consciousness is a marker of brain insult which can be from a plethora of causes, either permanent or transitory. Primary brain injury is when neurological damage is caused by the initial event, e.g. brain haemorrhage. Secondary brain injury is neurological damage that occurs due
to brain hypoxia from another cause, e.g. respiratory failure. Primary brain injury can be diffuse or focal. Diffuse primary brain injury can range from mild concussion to diffuse axonal injury.

Essentially, the main mechanisms of decreased level of consciousness are:

- Failure of airway or breathing – Hypoxia/hypercarbia
- Failure of circulation – Hypotension/cardiac arrest
- Failure of central nervous system

We discuss some of the more frequently seen causes of the above.

Trauma occurs in 6–7% of all pregnancies and is the leading cause of nonobstetric or co- incidental maternal deaths. Trauma was the leading cause of co- incidental deaths in South Africa during 2002–2004, accounting for 31% of co- incidental deaths (34/108). Although in most cases of trauma injuries are minor, a small percentage of patients suffer life-threatening injuries that require admission to an intensive care unit. The commonest causes of trauma are motor vehicle accidents (55%), assault (22%), falls (22%), burns (1%) and suicide. It is important to note that trauma also puts the foetus at risk with foetal loss occurring in at least 40% of critically injured pregnant patients. The foetus may be more likely than the mother to sustain significant injury after penetrating abdominal trauma in advanced pregnancy.

Resulting injuries could be classified as general and obstetric. The general injuries include bladder rupture, retroperitoneal haemorrhage, ruptured spleen or liver and spinal and central nervous system injuries. The indications for laparotomy are the same as for nonpregnant patients and may be more often indicated because of the difficulties in abdominal assessment in pregnancy. Obstetric injuries result in abruptio placenta, preterm labour and foetal demise. It is very important for the resuscitation team in casualty (accident and emergency units) to remember to consider the possibility of a pregnancy state in any women in the reproductive age group.

Cardiac arrest in pregnancy is rare with a reported incidence of approximately 1 per 30,000 pregnancies. Despite its infrequent occurrence, the critical care specialist and obstetrician needs to be competent in managing such patients. The outcome of cardiac arrest depends on the underlying cause and the vigour of initial resuscitation of the patient. The same causes of cardiac arrest that occur in the nonpregnant woman can occur in pregnancy. The more important pregnancy specific causes of cardiac arrest include venous thromboembolism, severe hypertension, sepsis, amniotic fluid embolism, haemorrhage, heart disease and iatrogenic complications, e.g. magnesium sulphate toxicity, or anaesthetic complications. Observed cardiac arrest would be a scenario where perimortem caesarean section is considered. In cases of unsuccessful management of cardiac arrest, brain death might ensue. These two important issues will be discussed later in this chapter.

Pre-eclampsia and eclampsia are important causes of cerebral complications in pregnancy, worldwide. It is the commonest reason for obstetric referral to an intensive care unit.
less common in well-resourced countries, in South Africa a population-based study found that the incidence of hypertension in pregnancy was 12.5%. Hypertensive disorders of pregnancy also accounted for 19% of maternal deaths during 2002–2004 in South Africa and 50% of these deaths had cerebral complications.

The pre-eclamptic/eclamptic patient can present with multiorgan affection including the brain. In the absence of excessive sedation or a recent convulsion, it is likely that the cause of unconsciousness in the eclamptic patient is raised intracranial pressure. This may be due to cerebral oedema, cerebral hyperaemia or intracerebral haemorrhage. The cerebral arterioles are very sensitive to changes in carbon dioxide pressure (PCO₂). A small rise causes vasodilation, increased cerebral blood flow and raised intracranial pressure. The cerebral blood flow remains remarkably constant despite considerable variations in systemic blood pressure. However, when systemic blood pressure rises to above 160-mmHg autoregulation becomes impaired such that cerebral blood flow decreases when systemic blood pressure is precipitously dropped. This together with raised intracranial pressure can cause lethal brain injury. Severe blood pressure lability together with the often accompanying thrombocytopaenia and disseminated intravascular coagulation predisposes the brain to haemorrhagic complications. The eclamptic seizure itself can lead to hypoxic ischaemic brain damage.

Epilepsy affects about 0.5% of all pregnancies. Approximately one-third of patients experience worsening of seizure control in pregnancy. Status epilepticus is defined as ongoing seizures lasting more than 30 min or recurrent seizures without full recovery of consciousness. The actual incidence of this medical emergency in pregnancy is unknown. After 30 min of continuous seizures, permanent maternal brain injury can occur. In the 2002–2004 Saving Mother's Report there were 6 deaths from status epilepticus.

Amniotic fluid embolism is a rare but catastrophic complication of pregnancy. The associated mortality is in the range of 10–86%. The management of amniotic fluid embolism and other causes of acute collapse in pregnancy, for example obstetric haemorrhage and thromboembolic events, are discussed elsewhere in this issue.

Sepsis is another important cause of altered consciousness in resource-limited countries. Sepsis has been identified as the primary diagnosis in many obstetric intensive care unit admissions. Infections in critically ill obstetric patients can be classified as pregnancy-related, nonpregnancy-related and nosocomial infections. When the physiological changes that occur in sepsis are superimposed on the changes that accompany pregnancy a life-threatening situation may be created.

Nonpregnancy-related sepsis that encompasses opportunistic infections associated with HIV is the biggest contributor to maternal mortality in South Africa and this may be mirrored in many other resource-poor countries as well. Pneumocystis carinii pneumonia is reported to represent the most common cause of AIDS-related death in pregnancy. HIV-infected patients may present with florid septic shock or with a more insidious onset of impaired level of consciousness from intracranial infections like meningitis, tuberculomas and neurocysticercosis or pneumocystis carinii respiratory infections. To the critical care specialist running a busy ICU the decision to burden the ICU with these patients who often have not even commenced HAART becomes an arduous one. Prior to the era of HAART the high cost and the low cost effectiveness of ICU admissions for HIV-infected patients presented many medical, social and ethical dilemmas.

More recently, with the advent of HAART, HIV is no longer considered a terminal illness but a chronic disease and the prognosis for HIV-infected patients admitted to ICU with sepsis may be improving. However, in reviewing the recent mortality figures for SA it seems that in under-resourced countries this may not yet be the case. In such countries plagued by HIV and AIDS where HAART remains elusive, sepsis is a dominating cause of both obstetric ICU admissions and maternal death. Munnur et al. in their comparison of ICU admissions in an American and an Indian public hospital further display the stark disparities between affluent and poor countries.

Intracranial haemorrhage is rare but carries a high mortality. In the 2000–2002 triennium of the Confidential Enquiries into maternal deaths in the UK there were 34 deaths from primary brain injury. These were due to subarachnoid haemorrhage, intracerebral haemorrhage and epilepsy. The relative risk of intracerebral and subarachnoid haemorrhage is increased in pregnancy compared with nonpregnant females. Extradural haemorrhage is unusual, accounting for 0.5% of all head injuries.
Early recognition is important, since with appropriate treatment prognosis is good. Subdural haemorrhage is more common and carries a high mortality rate.

Other cerebral causes of unconsciousness are rare and are usually presented as case reports, and include stroke in the young women, cerebral arteriovenous malformations, tumours, multiple sclerosis and hypermagnesaemia.

Assessment and initial management of the unconscious pregnant patient (Fig. 1)

Fig. 1. Algorithm for resuscitation of the unconscious pregnant patient.
On admission, as much information that can be gleaned from the family, paramedics or witnesses needs to be attained. In general, resuscitation algorithms are the same as for nonpregnant patients with a few special considerations. Detailed step-by-step resuscitation guidelines are beyond the scope of this paper. The ACLS Provider Manual from the American Heart Association has a detailed algorithm. Our aim is to highlight the special considerations in resuscitating the pregnant unconscious patient.

To optimise resuscitation of the pregnant unconscious patient the clinician must be aware of the physiological changes that occur in pregnancy and how they impede and challenge resuscitation. The availability of a multidisciplinary team including critical care specialist, surgeon, anaesthetist, obstetrician and neonatologist can only improve the outcome. During resuscitation it is essential to also determine the cause of impaired consciousness so that appropriate, specific treatment can be instituted, e.g. magnesium sulphate for eclampsia.

Firstly, secure an airway. Patients with reduced level of consciousness are more likely to have a compromised airway because their tongue falls back. Assess breathing and position the patient appropriately. Taking cognisance of the altered physiology of respiration and the increased oxygen requirements of the pregnant patient, one should quickly establish 100% oxygenation. Oedema of the upper airway, increased breast size and generally increased weight makes intubation difficult. The use of cricoid pressure is recommended during intubation to minimise aspiration in the unconscious pregnant patient. Intravenous access and ensuring circulation is as per management in the nonpregnant patient, as adequate blood pressure is required to maintain cerebral perfusion.

During cardiopulmonary resuscitation (CPR), cardiac output is estimated to be about 30% of normal, so uteroplacental blood flow is markedly reduced even with optimal performance of chest compressions. Cardiopulmonary resuscitation is done in the same way as for nonpregnant patients, however, it is essential to relieve aortocaval compression by positioning the pregnant patient in a left lateral inclination. Just simply repositioning the patient can improve cardiac output by 30%. A Cardiff resuscitation wedge has been specifically designed at a 27° angle to relieve aortocaval compression without jeopardising the force required for cardiac compressions. This wedge should be readily available in all emergency areas but if not available other manoeuvres like manual displacement of the uterus while the patient is supine or the use of an alternate object or “human wedge” might be employed. Raising the patient's legs will improve venous return.

Once airway, breathing and circulation have been established then a quick score of the level of consciousness should follow, keeping in mind that an altered level of consciousness is a marker of brain injury and the deeper the unconscious state the more serious the injury. Pupillary responses and neurological assessment should be conducted. If primary brain injury is suspected then a computed axial tomography (CT) of the brain is indicated.

Nanson and colleagues give evidence to suggest that the defibrillation requirements do not change significantly during pregnancy. Regarding pharmacological therapy in resuscitation, the general principle is use whatever is necessary to save the mother because the mother’s survival is given priority and foetal survival depends on successful resuscitation of the mother.

Once immediate resuscitation is instituted and maintained and life-threatening injuries treated then only does one consider the foetus. In the stabilised patient, foetal well-being can be determined by an obstetrician and appropriate management instituted while maintaining resuscitation of the mother. One must consider the available neonatal services and discuss timing of delivery with the neonatal team to optimise the neonatal outcome. It should also be the task of the obstetrician to exclude pregnancy specific complications and conditions, e.g. preterm labour or abruptio placentae. By this stage, review of all laboratory and radiological investigations can be done and managed accordingly. Particularly in pregnancy the patients Rhesus blood type is an important additional test as anti-D immunoglobulin may be necessary after trauma in pregnancy.

The Surviving Sepsis Campaign guidelines of management are largely utilised by intensivists to manage severe sepsis and septic shock. Septic patients usually have depleted intravascular volumes, and therefore fluid replacement is a priority. Aggressive resuscitation with full septic screening to identify and eradicate the source of sepsis early is the mainstay of treatment in septic patients. The majority of infections are polymicrobial, and therefore early use of empirical antibiotics is reasonable until septic screen results guide treatment.
Cardiopulmonary resuscitation during pregnancy can cause complications for mother and foetus. Maternal injuries include fracture of ribs, ruptured spleen or uterus. Foetal complications can arise from maternal hypotension, hypoxia or alkalosis and exogenous or endogenous catecholamines which may constrict the uterine artery.52

Management of the unconscious eclamptic

A special consideration in patients with severe pre-eclampsia/eclampsia is that their intravascular volume is constricted so the cardiac output achieved with CPR is likely to be even less. The combination of reduced intravascular volume and increased capillary permeability makes fluid management very complex and dangerous. Judicious use of fluids with close monitoring would be prudent to prevent complications like acute pulmonary oedema. Monitoring in the form of central venous pressure and pulmonary artery wedge pressure may be necessary especially in the patient who requires fluid resuscitation in the background of renal shut down. The pre-eclamptic/eclamptic patient more often than not is oedematous, making intubation that much more difficult. ICU admission may be indicated purely on the basis of airway support following laryngeal oedema.

Cerebral oedema is evident in about 70% of patients who present with unconsciousness associated with eclampsia. The pattern of oedema is predominantly vasogenic oedema, the cause of which is not clear but may be related to the general vasculopathy of pre-eclampsia that allows transudation of plasma into the cerebral tissue. This is worsened by recurrent seizures, very high blood pressure, hypoxia and raised PCO2.53 Therefore, the aims of management of the unconscious eclamptic patient should include:

- Maintenance of airway and respiration to improve oxygenation and reduce the PCO2. In many cases the heavily sedated or unconscious eclamptic cannot maintain their own airway, especially if nursed supine. Furthermore, facial and laryngeal oedema worsen the situation. If there is any difficulty in maintaining the airway and ventilation the patient should be intubated and ventilated (22). It is recommended that any patient with a Glascow Coma Scale of less than 9 should be intubated.22
- Rapid control of seizures. The choice of anticonvulsant could be as per local protocols.
- Magnesium sulphate infusion is standard treatment for severe pre-eclampsia/eclampsia to prevent seizures but care must be exercised to prevent toxicity as it can result in fatal cardiorespiratory arrest.54
- Careful control of blood pressure with continuous monitoring of vitals including blood pressure, pulse, and electrocardiograph. Excessive and precipitous lowering of blood pressure in these patients must be avoided as this could cause reduced cerebral blood flow and cerebral ischaemia in the background of raised intracranial pressure. The increased PCO2 can then also worsen the cerebral oedema.23
- Delivery is the cornerstone in the management of severe pre-eclampsia/eclampsia. Little consideration is given to the gestational age of the foetus as delivery is purely in maternal interest.23
- In our centre where eclampsia is a common condition, we administer high dose steroids in the form of dexamethasone to reduce cerebral oedema in all patients with eclampsia and an altered level of consciousness. The evidence for such practice is purely observational and is based on the use of steroids in head injuries on the assumption that cerebral oedema is present and may lead to clinical improvement.

Perimortem caesarean section

The Confidential Enquiry into Maternal Deaths in the UK (1985–1987), introduced the term perimortem caesarean section for cases where the patient was moribund or in extremis or was on cardiopulmonary resuscitation before the caesarean section and showed no signs of recovery afterwards.55 In their latest triennial report on maternal deaths, 21% of the caesarean sections were perimortem or postmortem caesarean sections and 40% of those babies survived. This is almost twice that in the previous report.56

In the unconscious pregnant patient with a viable foetus who does not respond to resuscitative efforts, a perimortem caesarean section should be done. The decision to deliver is twofold. Firstly, there is data,
albeit not of a high level, to suggest that delivery in the second half of pregnancy may improve resuscitation efforts and improve chances of maternal survival\textsuperscript{57–60}, and delivery of the foetus will result in:

- Decreased aortocaval compression, improving venous return and cardiac output
- Increased intravascular volume by autotransfusion and thus increased cardiac output
- More effective chest compressions
- Increased FRC and improved oxygenation
- Decreased oxygen consumption\textsuperscript{61}

Since the 1980s, unexpected maternal recoveries following perimortem caesarean section were reported.\textsuperscript{62–64} The American Heart Association recognises caesarean section as an effective part of resuscitation in the near-term pregnant patient.\textsuperscript{65}

Secondly, delivery is a chance to save one of your two patients at least. More often than not the family may not be present to make such decision in the acute situation. For the obstetrician this poses a difficult decision because one does not want to bear the responsibility of delivering a severely asphyxiated baby. Reviews of case reports, however, have shown good outcomes.\textsuperscript{58,66,67} The time of delivery is the key factor in prognosticating the outcome for the foetus. Katz et al. recommended that if the foetus is delivered within 4 min of arrest, chances of neurologically intact survival is markedly increased.\textsuperscript{66,68} The recommendations of the Saving Mothers’ Lives Report also reinforce this guideline and go on to state that otherwise outcomes are universally poor. In addition, they state that the delivery should take five minutes to facilitate resuscitation.\textsuperscript{56}

Having considered that if a patient presents in cardiac arrest or is apparently dead and if the baby is viable, it would be prudent to do the delivery because case reports have shown neurologically intact infant survival after longer intervals of cardiac arrest.\textsuperscript{69–71} A review of all postmortem caesarean sections reported in the Confidential Enquiries over the past 25 years pointed out that there was no case of long-term survival with neurological disability. If the infant survives the first few days its chance of neurologically intact survival is good.\textsuperscript{67}

The evidence does point in favour of perimortem caesarean to contribute to maternal survival as well as allowing resuscitation of the viable foetus. There is no role for emergency hysterotomy if the foetus is not viable as this does not improve maternal resuscitation efforts nor does it allow foetal survival. Most experts agree that in this setting the doctrine of emergency or implied consent applies and beneficence to the viable foetus takes precedence. To our knowledge there has not been any liability against the obstetrician for performing a perimortem caesarean section.

**Prolonged unconsciousness and somatic support of the mother to achieve foetal maturity**

The term coma is derived from the Greek word “koma” and is defined as a state of extreme unconsciousness with loss of wakefulness and awareness and whereby the patient cannot react to the surrounding environment and cannot be aroused by external stimuli or internal needs.\textsuperscript{43} The Glasgow Coma Scale is the universally accepted scoring system to grade the level of consciousness. Brain death is the most severe form of unconsciousness where there is permanent unconsciousness, irreversible absence of brainstem function, including complete loss of respiratory drive.\textsuperscript{72} The UK utilises the definition of brainstem death while the US and other countries use the term whole brain death. The pathology is either severe cerebral hypoxia-ischaemia or brainstem injury from coning or direct brainstem vascular events.\textsuperscript{73} Persistent vegetative state (PVS) is described as a loss of cerebral function with preserved brainstem function.\textsuperscript{43}

Management of patients with prolonged coma, PVS and brain death in pregnancy is complex and challenging both medically and ethically, especially because evidence for management and outcomes are based purely on case reports. Highly specialised and expensive supportive care is required to preserve vital functions and prolong somatic survival in these patients. In pregnancy the indication for prolonged intensive care is to achieve foetal viability so that at least one of the two patients survive. In general, the other indication is to harvest organs for transplantation, which together with criteria for brain death is “shrouded” by much controversy worldwide.\textsuperscript{73,74}

Decision making regarding the management of the pregnant patient with prolonged unconsciousness requires a multidisciplinary medical team but ultimately the decisions of the family should
be respected. If it is decided to continue the pregnancy, full supportive care is instituted to maintain vital functions and a maternal milieu as far as possible. In the case reports reviewed by Bush et al., the pregnancies continued till maternal or foetal decompensation or spontaneous delivery. All of the cases of brain death were delivered by caesarean section. Most cases had successful neonatal outcomes. Some case reports included long-term follow-up of the child to assess for neurological status and outcomes were good. Unfortunately, given the limited data, firm conclusions about foetal outcome in severe maternal brain injury cannot be made. Mode of delivery should be individualised.

With brain death the patient needs full respiratory, circulatory and nutritional support whereas patients in a PVS have respiratory and cardiovascular control and require less somatic support. Bush et al. reviewed 15 case reports of PVS in pregnancy and compared outcomes with 11 published cases of brain death in pregnancy. They found that the mean latency between maternal brain injury and delivery was significantly shorter in the brain dead patients as compared with those in a PVS. Furthermore, the gestational ages at delivery and birth weights were earlier and smaller respectively in the brain dead group, suggesting a better foetal prognosis in women with PVS compared with brain death. Survival in patients with PVS can be years whereas brain death survival is usually in terms of weeks.

Once monitoring of the foetus is commenced, a bedside Caesarean section pack and neonatal resuscitation equipment must be available at all times. Although the brain dead patient and those in a PVS are believed to be insensate to pain there is still controversy regarding analgesic and anaesthetic requirements. Many anaesthetists feel uncomfortable withholding anaesthesia and analgesia during surgery. Ayorinde et al., described a case report of a pregnant woman in PVS who received an epidural and delivered vaginally.

Specific concerns in the long-term management of the unconscious pregnant patient include:

- Fluid resistant hypotension due to vasodilation and myocardial dysfunction that may require inotropic support
- Hypovolaemia from dehydration, diabetes insipidus, fluid restriction and third space losses
- Basal lung collapse and pneumonia – both are common complications
- Renal hypoperfusion due to hypovolaemia and cardiac dysfunction
- Diabetes insipidus – worsens dehydration and hypernatraemia and may require desmopressin and hyponatraemic fluid replacement
- Glycaemic control – critically ill patients are prone to hyperglycaemia
- Metabolic derangements, which include hypokalaemia, hypomagnesaemia, and hypocalcaemia
- Thermoregulation – hypothermia occurs but no vasoconstriction and shivering occurs in response therefore temperature monitoring is vital
- Adrenal insufficiency – especially the septic patient may require corticosteroid administration
- Thromboprophylaxis – agents like unfractionated heparin, low molecular weight heparin and recombinant activated protein C are required due to prolonged immobilisation
- Stress ulcer prophylaxis
- Enteral nutrition
- Nosocomial sepsis – frequent screening and early treatment are important
- Preterm labour – close monitoring for contractions and of the foetus and use of steroids to achieve lung maturity will improve outcomes.

Ethical considerations in prolonged unconsciousness

There are many ethical dilemmas in the long-term management of the severely brain injured pregnant woman. Matters of concern include whether to continue the support or let the patient die, who is the responsible decision maker, should one act in the interest of mother or foetus, the use of an individual as an object or incubator and the decision to burden an intensive care unit and utilise resources on one patient at the cost of many other patients with common, less serious conditions. The latter would apply mainly to resource-limited settings where the budget for health care is spread thin. The application of the ethical principles of beneficence, nonmaleficence, autonomy and justice should guide decisions. Unfortunately, the majority of pregnant patients do not make advanced directives. Most states in the USA have standard advanced directives written into statute and most
institutions that receive medical funds must enquire about this of all patients. Despite this, only 10–15% of persons complete advanced directives. Without the patients previously expressed wishes, one relies on the family who understandably find this very stressful both emotionally and financially.

Summary

Unconsciousness in pregnancy is a prelude to severe, often permanent morbidity and mortality. The unconscious pregnant patient presents many challenges, both medically and ethically. The preconception that it is a rare occurrence needs to change as many clinicians will find themselves faced with such a patient only to be ill-prepared to meet the challenge. It is important for emergency and critical care units to repeatedly train their staff and audit their units. Data on the unconscious pregnant patient is lacking and developing a global data collection system would be highly informative.

The unique maternal milieu must be considered when caring for these patients, especially in the acute resuscitation phase. Ignorance of the physiological changes in pregnancy can be lethal for the patient, therefore swift teamwork is mandatory. There are a plethora of causes of altered consciousness in pregnancy, some often untreatable. The management can be delineated into immediate resuscitation, maintenance of resuscitation, management of the specific cause, assessment and management of the foetus and finally palliative care. Perimortem caesarean section is a reasonable intervention which may be the only salvation in most cases. Where the pregnant patient has irreversible brain injury, somatic support to allow foetal maturity usually has a good outcome for the foetus, but is highly stressful for both medical personnel and the family. There is a need for clear institutional guidelines to assist in decision making for these patients. Although young adults are often not concerned with issues of mortality, the pregnant state may be an important opportunity for the obstetrician to discuss advanced directives.

Practice points

- All clinicians involved in the care of women should be well prepared to manage the unconscious pregnant patient.
- One needs to understand the physiological changes in pregnancy and adapt resuscitation accordingly.
- The causes of altered consciousness are many and especially the pregnancy specific causes must be considered.
- The relative frequency of the different causes is variable depending on where in the world one works, for example eclampsia in South Africa is a common cause.
- The management of these patients is a multidisciplinary team approach with inclusion of family members.
- One must be prepared at all times for undertaking a perimortem Caesarean in the emergency room.
- With advancements in critical care we will be seeing an increase in prolonged somatic support of the permanently brain injured pregnant woman.

Research agenda

- Develop a global database for obstetrics critical care especially in resource-limited countries.
- Establish sepsis rates and outcomes in the critically ill/ICU obstetric patient.

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