INTRODUCTION

Caesarean section is the most common major operation performed on women. Some of the Short term morbidities of caesarean section include hemorrhage ***(Chamberlion 1999; Combs, 1991)***, need for blood transfusion ***(Klapholz, 1990)***, post operative fever and Endometritis ***(Newton, 1990)***. Long term morbidities include placenta preavia, placenta accreta and ectopic pregnancy ***(Almedin, 2002; Gillian, 2002; Hemminki, 1996)***. Some of complications mentioned increased by different ways of performing caesarean section operation and variation in techniques ***(Alderdice, 2003; Anderson 2004; Bamijboye, 2003; Dodd, 2004; Hofmery, 2004; Jacobs-Jakhn, 2004; Mathai, 2007)***.

The method of removing the placenta is one such procedure that may increase or decrease in the morbidity of caesarean section.

The process of placental separation starts immediately after delivery of the baby by contraction and retraction of uterine muscle which result in reduction in the size of the uterus consequently the placental bed to which the placenta is attached become smaller than the incompressible placenta, the placenta sheared off and blood vessels supplying the denuded placental bed are compressed by continued contraction and retraction of uterine muscle to reduce the bleeding and oxytocin is given after delivery of the baby to minimize blood loss ***(Cotter, 2001).***

Placental delivery types at caesarean section have been described as, placental drainage with spontaneous delivery, cord traction with spontaneous placental separation and manual removal.

In placental drainage, the end of the umbilical cord is left unclamped, placental blood drained and placenta delivers spontaneously through uterine incision, this method is not widely used ***(Sharma, 1995)***.

The two methods most frequently used are cord traction combined with external uterine massage or expression of the uterus, and manual removal. Cord traction involves gentle traction on the umbilical cord with external uterine massage after delivery of the baby and oxytocic has been given this method takes about three to five minutes ***(Cotter, 2001)***.

Manual removal of the placenta done by the use of gloved hand with gentle sawing action to separate the placenta from its placental bed, this method takes about two minutes to be done. Some obstetricians practice manual removal as they consider it quicker to deliver than cord traction. The process of manual removal of the placenta cause more bleeding ***(Chamberlion, 1999)*** and may increase the risk of infection ***(Mccurdy, 1992),*** so there is some studies ***(Anorluri et al., 2008)***, have found manual removal of placenta to increase postoperative morbidity, while other studies have not ***(Candas, 1998)***,

So the primary objective is to compare the risk of significant blood loss associated with spontaneous and manual removal of the placenta during caesarean section. The secondary outcome measures are infectious morbidity, duration of the surgery and feto- maternal transfusion ***(Michel et al., 2004)***.

AIM OF THE WORK

The aim of this work is to compare ,using the best available evidence, the effects of manual Removal of placenta and spontaneous placental delivery combined with cord traction or other methods of removal of the placenta at caesarean section.

Chapter (1)

CESAREAN SECTION

Introduction

The cesarean delivery is defined as the birth of a fetus through incisions in the abdominal wall (Laparotomy) and the uterine wall (Hysterotomy) ***(Cunningham et al., 2000).***

The terms cesarean section, cesarean delivery, and cesarean birth may be used to describe the delivery of a fetus through a surgical incision of the anterior uterine wall.

Cesarean section is a tautology; both words connote incision, Therefore, cesarean birth or cesarean delivery, are preferable terms ***(Richard et al., 1996).***

Cesarean section is the most common laparotomy done in the world today. Thus any useful refinement in the operative technique, however minimal, is likely to yield substantial benefits.

Historical Background

The exact origin of the term cesarean delivery is unclear. The popular beliefs that Julius Cesar was born in this manner with the result that the procedure became known as the cesarean operation.

Several circumstances weaken this explanation. First, the mother of Julius Cesar lived for many years after his birth in

(100 BC.) and as late as the 17th century, the operation was almost invariably fatal. Second, the operation, whether done on living or dead women, it is not mentioned by any medical writer before the middle ages ***(Cunningham et al., 2002).***

It has been widely believed that the name of the operation is derived from a Roman law, supposedly created by Numa Pompilius (8th century BC). Ordering that the procedure be done upon women dying in the last few weeks of pregnancy in hope of saving the child. This explanation holds that this lex regia, later called lex cesarea and the operation itself became known as the cesarean operation ***(Percival et al., 1980).*** The term cesarean may have arisen in the middle ages from the latin verb caedere (to cut), and the term section is delivered from the latin verb seco (cut) ***(Sewell and Washington, 1993).***

The first authenticated cesarean delivery was performed by Trautmann of wittenberg in 1610, with the mother succumbing to post-operative infection (25) days later ***(Larry et al., 2002).***

In 1769, A uterine incision in the lower uterine segment was suggested as early by Robert Wallace, but was not done until a century later ***(Sewell and Washington, 1993).***

Although, the cesarean birthes performed in Paris between 1787 and 1876 demonstrated that 100% of maternal mortality rate, mostly due to infection or hemorrhage ***(Sewell and Washington, 1993).***

In 1846, The introduction of diethyl ether anaesthetic agent at Massachusetts General Hospital were increased the feasibility of major abdominal operations although, mortality rates for cesarean birth still high secondary to infections and bleeding ***(Richard et al., 1996).***

In 1876, Eduardo Porro, an Italian Professor recommended hysterectomy combined with cesarean birth to control uterine hemorrhage and prevent systemic infection ***(Steven et al., 1996).*** And it is considered the first major surgical advance in the technique of the cesarean section ***(Miller, 1992).*** Eduardo Porro technique resulted in a dramatic decline in the maternal mortality ***(Spreet et al., 1958).***

In 1882, Max Saenger introduced the technique of suturing the uterus. He advocated performing a vertical incision in the uterus that avoided the lower uterine segment, then he closed the uterus in two layers by using silver wire for the deep suture and fine silk for the superficial serosa ***(Sewell and Washington, 1993).***

In 1926, Munro Kerr recommended a semilunar uterine incision with the curve directed upward. The only objection to this incision was the danger of extending into the uterine vessels at the edges of the incision. However, Kerr argued that using careful technique, the vessels could be avoided ***(Larry et al., 2002),*** It was to reduce and contain the risk of sepsis. This was modified by ***Pfaneuf (1931)*** into the present day upward low transverse uterine incision ***(Cunningham et al., 2001).***

In 1928, Alexander Fleming discovered a penicillin and its use as a drug became widespread after it was purified in 1940 ***(Richard et al., 1996).***

In the late of 1980s and 1990s, one layer suturing the uterus and pelvic peritoneal non closure were also advocated. The first evaluation of these modifications was described by Michael Stark and colleagues in 1995s, using a technique that took the name of the hospital that most contributed to its development, The Misgav-Ladach ***(Xavier et al., 2005).***

Cesarean Birth Rates

Before 1955, the cesarean birth rate remained relatively stable in the range of (2-5%). Data from the Chicago Lying-In Hospital had showed a five-fold increase in the cesarean birth rate from (0.6%) in 1910 to (3%) in 1928 ***(Richard et al., 1996).***

The rate of cesarean delivery has increased dramatically over the past decade. Medically elective cesareans are amajor factor contributing to this rise ***(Miesnik and Reale, 2007).***

The prevalence of cesarean delivery (CD) in the United States is at a record high 31.1% of all births (2006 data), representing an increase of 50% in the past decade alone ***(Hamilton et al., 2007).***

The overall rate reflects a marked upswing in the frequency of primary CD and a sharp decline in the frequency

of vaginal birth after CD. In certain emerging economies, such as Brazil, CD rates are even higher, exceeding 75%in the urban private sector ***(Kilsztjan et al., 2007).***

At a time when developed nations are beginning to examine critically this continued increase in surgical deliveries, women in many parts of the world do not even have access to the procedure. Approximately 12% of deliveries are estimated to occur via CD in the developing world as low as 8% if births in China are excluded ***(Stanton and Holtz, 2006).***

The World Health Organization (WHO) advocates an ‘‘optimal’’ national CD rate between 5% and 15% of all births, which suggests that levels less than 5% indicate limited availability for a significant proportion of the population.

A number of international comparisons have been made with regard to cesarean birth rates, Brazil, African, and United States women have a higher cesarean delivery rate than either Australia, Belgium and Czechoslovakia ***(Aron et al., 2000).***

Teaching hospitals have a lower cesarean delivery rates rather than non teaching hospitals ***(Sanchez et al., 1994).***

Types of cesarean section:

Based on the time of C.S at time of decision making:

Emergency C.S: ideally the C.S should be done within the next 30 minutes. Some examples are: abruption placenta,

cord prolapse, scar rupture, scalp ph less than 7.2 and prolonged FHR deceleration less than 80 bpm ***(Keith et al., 2007).***

Elective C.S: the main principle being to carry out C.S as late as possible in gestation without compromising the maternal or fetal health. It is generally done around 39 weeks as the incidence of tachypnea of the newborn is much less after this gestation. These are cases where there is an indication for C.S but there is no urgency and examples include: placenta previa with no active bleeding, malpresentation, history of previous hysterotomy or vertical incision C.S, past history of repair of vesico-vaginal or recto-vaginal fistulae or stress incontinence, HIV infection ***(Keith et al., 2007).***

Indications for Cesarean Delivery

The indications and proportions of cesarean delivery will vary from country to country and from hospital to hospital. Nonetheless, there are four main indications that account for 60-90% of all cesarean sections. These include: repeat cesarean section (35-40%), dystocia (20-35%), breech (10-15%) and fetal distress (10-15%) ***(Baskett and Arulkumaran, 2002).***

Cesarean section for previous cesarean section

One of the most common indications for cesarean section is previous cesarean section ***(Taffel et al., 1991).*** When the most common cesarean section was the classical cesarean section clinicians feared scar rupture in attempting normal vaginal

delivery and repeat cesarean section was considered mandatory for all subsequent births. However, it rapidly became clear that lower segment cesarean section was not associated with disastrous rupture and the concept of trial of normal vaginal delivery became current ***(McMahon et al., 1996).***

A repeat cesarean delivery can be performed at (39) weeks of gestation or later ,if an elective cesarean delivery is performed prior to (39) weeks of gestation fetal lung maturation must be documented by amniocentesis. If a patient has poor dating criteria, awaiting for the onset of spontaneous labor is another option ***(American College of Obstetricians and Gynecologists, 1997).***

Surgical techniques of cesarean section:

The safety of the procedure has improved while surgical techniques do vary from surgeon to surgeon and from time to time, good adherence to basic surgical principles and an awareness of recognized methods of doing cesarean sections will minimize morbidity ***(Kirk, 1998).***

Cesarean birth remains the most common intra-peritoneal surgical procedure in obstetrical and gynecological practice. Frencois M. first reported its use in the 17^{th} century, but perhaps the most significant technical evaluation occurred in the late 19^{th} century when uterine wall suturing led to a marked reduction in the mortality associated with procedure ***(Xavier et al., 2005).***

1- Pre-operative preparations:

The cesarean delivery will need the same pre-operative care as any major surgery plus additional consideration for the fetus. Determination of hemoglobin and hematocrit value is important prior to surgery and blood should be available for immediate transfusion if acquired.

Patients with prolonged rupture of membrane must be given an appropriate antibiotic before operation which in this cases is not considered a prophylactic antibiotic, but actually treatment of present infection ***(Danforth et al., 1985).***

2-Anaesthesia:

The gestational age and medical condition of the mother must be taken into consideration prior to the choice of an anaesthetic agent ***(Larry et al., 2002).*** For the safety of the patient, spinal or epidural anaesthesia is usually best for cesarean delivery if the clinical circumstances permit ***(Myerscough, 1982).***

In the recent studies, all women were operated on under general type of anaesthesia using halothane with its known properties of uterine relaxation so, its use may have increase the importance of quick haemostasis ***(Magann et al., 1993).***

3- Position of the patient:

The woman's position may be supine or with a lateral tilt ('Lat-eral tilt for caesarean section' ***(Wilkinson, 2006a)***.

4- Catheterization:

Single catheterization before starting the procedure to avoid injury of the bladder is recommended. The use of an indwelling catheter after cesarean section under epidural is thought to lessen the risk of urine retention and the need for repeat catheterization ***(Hema and Johanson, 2001).***

5- Preparations of the skin:

Before surgery, the skin of the abdomen must be scrubbed at the evening with a (4%) chlorhexidine sponge for at least two minutes. The same procedure was repeated the next morning. The pubic hair must be removed from the operative field using a disposable razor, and the skin was scrubbed with a solution of (.5%) chlorhexidin in alcohol.

6- The incisions:

(1) Skin incisions:

Length of the skin incision: Whatever the chosen incision, the length of the incision should be adequate, with a minimum width of (15) cm. is recommended. This can be done by an Allis test, since the ease of delivery is related to the length of the incision ***(Ayers and Morley, 1987).***

a- Vertical Incision: A vertical midline incision allows a less vascular, rapid entry and good exposure of both the abdomen and pelvis. This incision may be indicated in cases of urgency ***(Ellis et al., 1984).***

b- Pfannenstiel Incision: Pfannenstiel introduced his incision in 1900. This incision is extensively used because of its excellent cosmetic results, along with the benefits of early ambulation and a low incidence of wound disruption, wound dehiscene and hernia. The incision which is made in semilunar manner, should follow a curve of semilunar skin. The average incision begins and ends (2-3) cm. below and medial to the anterior superior iliac spines.

The pfannenstiel incision involves dissection of the sub-cutaneous layer and the anterior rectus sheath and, when extended into the external and oblique muscles may result in injury to the ilio-inguinal and ilio-hypogastric nerves in addition use of this incision limits views of the upper abdomen and may increase the blood loss and haematoma because of the increased dissection ***(Ellis et al., 1984).***

c- Maylard incision: The Maylard incision is made approximately (1) cm. higher than the pfannenstiel incision and it involves cutting the rectus muscle transverse and ligating the inferior epigastric artery to provide good access to the pelvis ***(Helmkamp and Krebs, 1990).***

d- Joel-Cohen Incision:

The 'Joel Cohen' abdominal incision is used. This is a straight transverse incision through skin only, 3 cm below the level of the anterior superior iliac spines (higher than the Pfannenstiel incision). The subcutaneous tissues are opened only in the middle 3 cm. The fascia is incised transversely in

the midline then extended laterally with blunt finger dissection ***(Joel-Cohen, 1977; Wallin, 1999).*** Finger dissection is used to separate the rectus muscles vertically and laterally and open the peritoneum. All the layers of the abdominal wall are stretched manually to the extent of the skin incision. The bladder is reflected inferiorly. The myometrium is incised transversely in the midline but not to breach the amniotic sac, then opened and extended laterally with finger dissection. Interrupted sutures are used for the closure of the myometrium. Retrospective studies have suggested that these methods reduce operating time blood loss and postoperative hospital stay ***(Song, 2006).*** Various modifications of the Joel-Cohen technique have been described ***(Franchi, 1998; Ferrari, 2001; Stark, 1995; Wallin, 1999).***

A retrospective comparison found that the classical Joel-Cohen incision was associated with statistically less postoperative blood collection in the abdominal wall, pouch of Douglas and lower uterine segment than the modified incision, but the differences were small ***(Malvasi, 2007).***

(2) Uterine incision:

Before an incision is made, rotation of the uterus should be noted (it is usually dextro-rotated) and, if possible corrected, so that the incision will not be a symmetrical, risking extension on the opposite side.