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Assessment of the Placenta Location in Pregnant Women with Previous Cesarean Section

تقييم موقع المشيمة للنساء الحوامل اللاتي لديهن عملية قيصرية سابقة

A thesis submitted for Partial Fulfillment of the Requirement of M.Sc. Degree in Medical Diagnostic Ultrasound.

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الايـة

قال تعالي:

((وما أوتيتم من العلم إلا قليلا))

صدق الله العظيم

الاسراء(*85*)

Dedication

I would like to dedicate my thesis to my mother and my father who have loved and taken care of me for all my life.

I also dedicate this thesis to my husband who support and encourage me

To my sisters and my brother

Acknowledgement

I thank almighty God for giving me the strength, courage and determination in conducting this study, despite all difficulties.

I would like to thank gratefully my supervisor

Dr. Ahmed Mostafa Abukonna

Abstract

This was a descriptive cross-sectional study conducted at the department of obstetrics and gynecology in Bahry Educational Hospital and Maternal Specialist Hospital and Elshaikh Ali Fadoul Hospital; it was conduct during the period from April to august 2017. The main aim was to assess the association of placenta location with previous caesarean section (CS) in pregnant women. In antenatal clinic as per protocol 56 pregnant women were scanned in their second and third trimester for fetal wellbeing and placental localization after taking a detailed obstetrical history and clinical examination. All women without previous caesarean section were excluded. Methodology the data collection from pt by data collection sheet and analyzed by SPSS.

The result of the study revealed that the fundal placenta was reported in 8.9%, posterior placenta was 21.4%, anterior placenta was 57.1%, placenta previa was 7.1% and low lying placenta was 5.4%. There was a significant difference in placental location when there is a CS scar present on the uterus. Women with a previous history of CS are significantly less likely to have a fundal placenta and more likely to have the placenta located on the anterior and posterior wall of the uterus in a subsequent pregnancy. Me was found no statistically significant difference in the incidence of low-lying placentae between the groups.

Previous CS may have a significant impact on placental location in subsequent pregnancies. The mechanism behind this effect is not clear; however this observation may provide indirect evidence that the presence of a CS scar in the uterus has a more ‘global’ effect on the endometrium than the physical presence of a scar in isolation.

المستخلص

هذه دراسة وصفية مستعرضة أجريت في قسم التوليد وأمراض النساء في مستشفى بحري التعليمي ومستشفى الولادة التخصصي ومستشفى الشيخ علي فضل. اجريت خلال الفترة من أبريل إلى أغسطس 2017. وكان الهدف الرئيسي لتقييم موقع المشيمة مع العملية القيصرية السابقة في النساء الحوامل. في عيادة الولادة وفقا للبروتوكول 56 تم فحص النساء الحوامل في الثلث الثاني والثالث من عمر الجنين و موقع المشيمة بعد أخذ التاريخ التوليد مفصل والفحص السريري. واستبعدت جميع النساء اللاتي لم يسبق لهن ولادة قيصرية.

وكشفت نتائج الدراسة أن المشيمة توجد في اعلى الرحم في8.9٪، .وكان المشيمة الخلفية 21.4٪،و كانت المشيمة الأمامية 57.1٪، كانت المشيمة المتقدمة على الجنين 7.1٪ وكان انخفاض المشيمة 5.4٪. كان هناك اختلاف كبير في موقع المشيمة عندما يكون هناك ندبة بسبب الجراحة القيصرية موجودة على الرحم. النساء الذين لديهم تاريخ جراحة قيصرية سابق هم أقل احتمالا بكثير أن يكون المشيمة في اعلى الرحم وأكثر احتمالا أن يكون المشيمة تقع على الجدار الأمامي والخلفي للرحم في الحمل اللاحق. لم نجد أي فرق ذو دلالة إحصائية في حدوث المشيمة المنخفضة بين المجموعات.

قد تكون الجراحة القيصرية السابقة لها تأثير كبير على موقع المشيمة في حالات الحمل اللاحقة. والآلية الكامنة وراء هذا التأثير ليست واضحة؛ ولكن هذه الملاحظة قد توفر أدلة غير مباشرة على أن وجود ندبة جراحة في الرحم له تأثير "عالمي" أكثر على بطانة الرحم من الوجود المادي للندبة في العزلة.

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Abbreviations	Meaning
APH	Ante-Partum Hemorrhage
CS	Cesarean Section
EVS	Endo Vaginal Study
IUGR	Intra-Uterine Growth Retardation
SCH	Sub-Chorionic Hematoma
TAS	Trans-Abdominal Study
TPS	Trans Perineal Study

Chapter one

1.1 Introduction:

Placental development is a complex process and the mechanism of placental localization is not well under-stood. Between 2 and 10 weeks after fertilization, contact between maternal and fetal tissue is dependent on the cytotrophoblast shell of the developing placenta and the decidualizing endometrium. This is a dynamic phase of the pregnancy as the placenta increases in size and complexity. Therefore, a favorable endometrial environment is essential in order to ensure the development of an adequate fetal–maternal interface. To date, it is not known if a scar on the uterus has any effect on the global endometrial environment and on placental location in particular (Betran et al., 2007).

The frequency of placenta previa decreases with increasing gestational age because of 'placental migration'. This is because the placenta-free uterine wall grows faster than placenta-covered areas. The placenta does not actually move, but the tissue upon which it is embedded expands, leading to the placenta's appearing to move up and away from the cervix. This process applies in the normal intact uterus, but it is not known if the same mechanism occurs as effectively in a scarred uterus (Belachew et al., 2017).

As rates of cesarean section continue to increase worldwide, methods for prediction, surveillance, and management of complications during pregnancy and delivery associated with previous cesarean section become increasingly important. Uterine rupture, placenta previa, and placenta accreta are well-known and potentially life-threatening complications, but are fortunately still rare conditions.

It has been reported that, among women with placenta previa, all with abnormal invasive placentae had a previous cesarean section and anterior placenta previa. Pictorial ultrasound, including measurements of myometrial thickness and 3D power Doppler at the placental site, has been used to diagnose invasive placentation (Wong et al., 2008).

1.2 **Problem of study:**

Caesarian section increase rapidly worldwide and pregnant women with history of caesarian delivery considered as risk for placenta previa so ultrasound for placenta location is very important in follow up for these women.

1.3 objectives of study:

1.3.1 General objective:

To assess the placenta location in pregnant women with previous cesarean section.

1.3.2 Specific objectives:

- To evaluate prevalence of placenta previa in pregnant women with history of cesarean section.
- To assess the common placental location site in association with cesarean section.
- To correlate placenta location to the number of cesarean section.

1.4Thesis over view:

Chapter one is introduction will discuss problem, objective of study. Chapter two is literature review will discuss (anatomy, physiology, pathology and previous study). Chapter three will discuss material and methods, Chapter four will discuss results. Chapter five is discussion, conclusion and recommendation.

Chapter two

Theoretical background and Previous Studies

2.1 Cesarean section:

A caesarean section is surgical procedure in which incisions are made through mother's abdomen and uterus to deliver one or more babies.

2.1.1 Indications of C-section:

Abnormal presentation (breech or transverse positions)

Prolonged labor or a failure to progress (dystocia)

Fetal distress

Cord prolapse

Uterine rupture or an elevated risk thereof

Hypertension in the mother or baby after amniotic rupture (the waters breaking)

Tachycardia in the mother or baby after amniotic rupture (the waters breaking)

Placenta problems (placenta previa, placental abruption or placenta accreta)

Failed labour induction

Failed instrumental delivery (by forceps or ventouse (Sometimes a trial of forceps/ventouse delivery is attempted, and if unsuccessful, thebaby will need to be born by caesarean section.)

Large baby weighing >4,000 g (macrosomia) and umbilical cord abnormalities (vasa previa, multilobate including bilobate and succenturiate-lobed placentas, velamentous insertion) (Betran et al., 2007).

Caesarean delivery is the use of surgery to deliver one or more babies. A caesarean section Complications of labour and factors increasing the risk associated with vaginal delivery, such as abnormal presentation (breech or transverse positions). Babies are usually born head first. If the baby is in another position the birth may be complicated. In a 'breech presentation' the unborn baby is bottom-down instead of head-down. Babies born bottom-first are more likely to be harmed during a normal (vaginal) birth than those born head-first. For instance, the baby might not get enough oxygen during the birth. Having a planned caesarean may reduce these problems. A review looking at planned caesarean section for singleton breech presentation with planned vaginal birth concludes that in the short term, births with a planned caesarean were safer for babies than vaginal births. Fewer babies died or were seriously hurt when they were born by caesarean. However, there was tentative evidence that children who were born by caesarean had more health problems at age two. Caesareans caused some short-term problems for mothers such as more abdominal pain. They also had some benefits, such as less urinary incontinence and less perineal pain (Betran et al., 2007).

2.2 Prevalence:

It is generally agreed that the prevalence of caesarean section is higher than needed in many countries and physicians are encouraged to actively lower the rate, as a caesarean rate higher than 10-15% is not associated with reductions in maternal or infant mortality rates. Some evidence supports a higher rate of 19% may result in better outcomes (Solheim et al., 2011).

Some of these efforts are: emphasizing a long latent phase of labor is not abnormal and not a justification for C-section; a new definition of the start of active labor from a cervical dilatation of 4 cm to a dilatation of 6 cm; and allowing at least 2 hours of pushing for women who have previously given birth and 3 hours of pushing for women who have not previously given birth (Solheim et al., 2011).

2.3 placenta development

Figure 2.1 Placenta (http//:en.wikipedia.org/placenta)

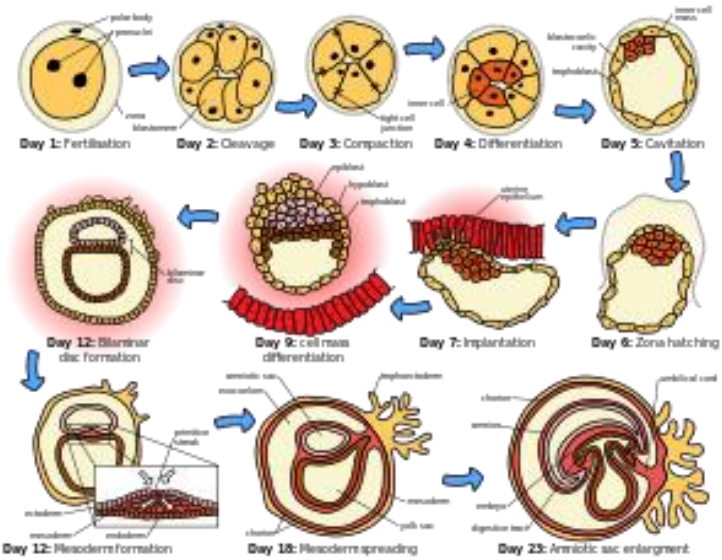

Figure 2.2 The initial stages of human embryogenesis.
(http//:en.wikipedia.org/HumanEmbryogenesis)

2.4 Further information: Placentation

The placenta begins to develop upon implantation of the blastocyst into the maternal endometrium. The outer layer of the blastocyst becomes the trophoblast, which forms the outer layer of the placenta. This outer layer is divided into two further layers: the underlying cytotrophoblast layer and the overlying syncytiotrophoblast layer. The syncytiotrophoblast is a multinucleated continuous cell layer that covers the surface of the placenta. It forms as a result of differentiation and fusion of the underlying cytotrophoblast cells, a process that continues throughout placental development. The syncytiotrophoblast (otherwise known as syncytium), thereby contributes to the barrier function 0of the placenta (Cho et al., 2008).The placenta grows throughout pregnancy. Development of the maternal blood supply to the placenta is complete by the end of the first trimester of pregnancy (approximately 12–13 weeks) (Matsubara et al., 2017).

In humans, the placenta averages 22 cm (9 inch) in length and 2–2.5 cm (0.8–1 inch) in thickness, with the center being the thickest, and the edges being the thinnest. It typically weighs approximately 500 grams (just over 1 lb). It has a dark reddish-blue or crimson color. It connects to the fetus by an umbilical cord of approximately 55–60 cm (22–24 inch) in length, which contains two umbilical arteries and one umbilical vein. The umbilical cord inserts into the chorionic plate (has an eccentric attachment). Vessels branch out over the surface of the placenta and further divide to form a network covered by a thin layer of cells. This results in the formation of villous tree structures. On the maternal side, these villous tree structures are grouped into lobules called cotyledons. In humans, the placenta usually has a disc shape, but size varies vastly between different mammalian species (Matsubara et al., 2017).

2.5 Placental circulation:

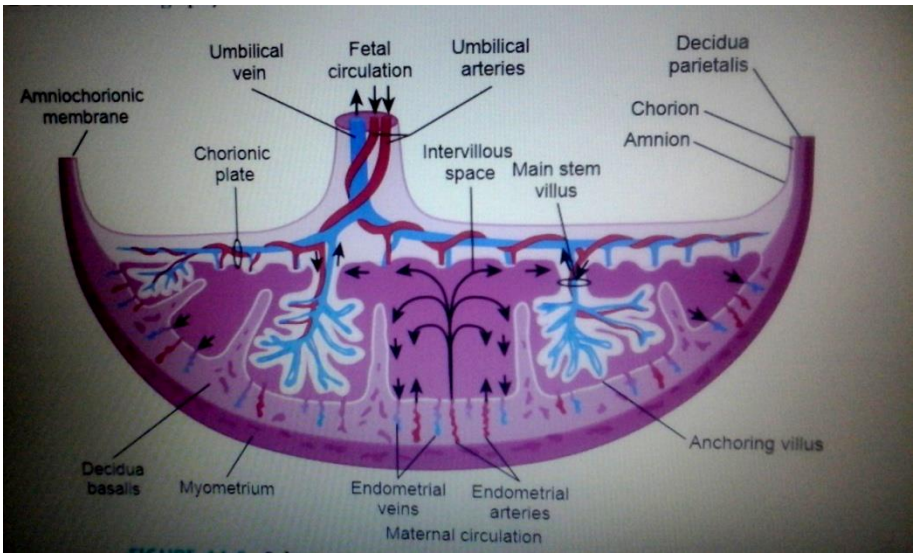

Figure 2.3 Maternal blood fills the intervillous space, nutrients, water, and gases are actively and passively exchanged, then deoxygenated blood is displaced by the next maternal pulse.(http//:placentas.wordpress.com)

2.5.1 Maternal placental circulation:

In preparation for implantation of the blastocyst the uterine endometrium undergoes "decidualisation". Spiral arteries in decidua are remodeled so that they become less convoluted and their diameter is increased. The increased diameter and straighter flow path both act to increase maternal blood flow to the placenta. There is relatively high pressure as the maternal blood fills intervillous space through these spiral arteries bathes the fetal villi in blood, allowing an exchange of gases to take place. In humans and other hemochorial placentals, the maternal blood comes into direct contact with the fetal chorion, though no fluid is exchanged (Fuchs et al., 2008).

As the pressure decreases between pulses, the deoxygenated blood flows back through the endometrial veins. Maternal blood flow is approximately 600–700 ml/min at term (Fuchs et al., 2008).

2.5.2 Fetoplacental circulation:

Deoxygenated fetal blood passes through umbilical arteries to the placenta. At the junction of umbilical cord and placenta, the umbilical arteries branch radially to form chorionic arteries. Chorionic arteries, in turn, branch into cotyledon arteries. In the villi, these vessels eventually branch to form an extensive arterio-capillary-venous system, bringing the fetal blood extremely close to the maternal blood; but no intermingling of fetal and maternal blood occurs ("placental barrier"). Endothelin and prostanoids cause vasoconstriction in placental arteries, while nitric oxide causes vasodilation. On the other hand, there is no neural vascular regulation, and catecholamines have only little effect (Becker et al., 2001).

The fetoplacental circulation is vulnerable to persistent hypoxia or intermittent hypoxia and reoxygenation, which can lead to generation of excessive free radicals. This may contribute to pre-eclampsia and other pregnancy complications. It is proposed that melatonin plays a role as functions nutrition. The placenta intermediates the transfer of nutrients between mother and fetus. The perfusion of the intervillous spaces of the placenta with maternal blood allows the transfer of nutrients and oxygen from the mother to the fetus and the transfer of waste products and carbon dioxide back from the fetus to the maternal blood. Nutrient transfer to the fetus can occur via both active and passive transport. Placental nutrient metabolism was found to play a key role in limiting the transfer of some nutrients. Adverse pregnancy situations, such as those involving maternal diabetes or obesity, can increase or decrease levels of nutrient transporters in the placenta potentially resulting in overgrowth or restricted growth of the fetus (Belachew et al., 2017).

2.5.3 Placental Size and Growth

There is less emphasis nowadays in measurements of the placenta largely because the information is of limited diagnostic value. Thus, the placenta is not routinely measured. The most popular measurement is placental thickness (data on placental area, volume, and weight estimates have all been studied and reported in the literature). As a guideline, placental thickness should be measured if the placenta appears to be either thick or thin. Placental thickness measurements should be made near the mid portion or center of the placenta with one caliper placed at the amniochorionic surface (chorionic plate) and the second caliper placed at the basal surface perpendicular to the amniochorionic surface (Proctor et al., 2009).

The measurement should exclude retroplacental veins, myometrium, fibroids, and contractions of the uterus that might incorrectly increase the measurement. In a normal pregnancy, placental thickness increases with gestational age. As a rule of thumb, the mean thickness of the placenta in millimeters is roughly equal to the gestational age in weeks (e.g. at 20 weeks, mean placental thickness is 20 mm; at 28 weeks, mean placental thickness is 28 mm; and at 36 weeks, mean placental thickness is 36 mm) (Hunter et al., 2015).

2.6 Physiology of the placenta:

Waste products excreted from the fetus such as urea, uric acid, and creatinine are transferred to the maternal blood by diffusion across the placenta. Immunity IgG antibodies can pass through the human placenta, thereby providing protection to the fetus in utero. This transfer of antibodies begins as early as the 20th week of gestational age, and certainly by the 24th week. This passive immunity lingers for several months after birth, thus providing the newborn with a carbon copy of the mother's long-term humoral immunity to see the infant through the crucial first months of extrauterine life. IgM, however, cannot cross the placenta, which is why some infections acquired during pregnancy can be hazardous for the fetus.

Furthermore, the placenta functions as a selective maternal-fetal barrier against transmission of microbes. However, insufficiency in this function may still cause mother-to-child transmission of infectious diseases (Korkmaz et al., 2013).

The first hormone released by the placenta is called the human chorionic gonadotropin hormone. This is responsible for stopping the process at the end of menses when the Corpus luteum ceases activity and atrophies. If hCG did not interrupt this process, it would lead to spontaneous (Sekiguchi et al., 2013)

2.7 Placenta pathology:

2.7.1 Placenta previa:

The term "placenta previa" refers to a placenta that is "previous" to the fetus in the birth canal. The incidence at delivery is approximately 0.5% of all pregnancies. Bleeding in the second and third trimesters is the hallmark of placenta previa. This bleeding can be life threatening to the mother and fetus. With expectant management and cesarean delivery, both maternal and perinatal mortality have decreased over the past 40 years (Sekiguchi et al., 2013).

The term 'placenta praevia' should only be used after 28 weeks. The differentiation of placental positions has historically been performed by digital assessment of the lower uterine segment and placenta through the cervix. Using this potentially hazardous method of evaluation placental position was classified as complete placenta previa, partial placenta previa, incomplete placenta previa, marginal placenta previa, low-lying placenta, and placenta distant from the internal cervical os (Young et al., 2014).

The use of ultrasound to evaluate the position of the placenta in the uterus has both improved knowledge of the placenta within the uterus and simplified terminology with respect to placental position. Complete placenta previa describes the situation in which the internal cervical os is totally covered by the placenta. Marginal placenta previa denotes placental tissue at the edge of or encroaching on the

internal cervical os. A low placenta is one in which the placental edge is within 2 cm, but not covering any portion, of the internal cervical os. The terms “incomplete placenta previa” and “partial placenta previa” have no place in the current sonographic assessment of placental position and should be used only by a clinician performing a digital examination when a “double setup” is necessary to determine where the leading edge of the placenta lies (Fuchs et al., 2008).

2.7.2 Placenta accreta:

A placenta that is abnormally adherent to the uterine wall after delivery is termed placenta accrete. Placenta accreta occurs if the placenta invades the myometrium more deeply, and placenta percreta refers to a placenta that at least in part protrudes through the uterine serosa. Placenta accreta, increta, and percreta are serious complications of pregnancy associated with maternal blood loss, need for hysterectomy, and retained products of conception Although placenta accreta (or increta or percreta) can occur in any pregnancy, important risk factors include prior uterine surgery (with risk increasing with increasing number of prior cesarean deliveries), placenta previa, unexplained elevated maternal serum alpha-fetoprotein (MS-AFP), increased maternal cell-free placental lactogen, and advancing maternal age (Fuchs et al., 2008).

Several sonographic signs are associated with placenta accreta. The presence of a coexisting placenta previa in the majority of cases makes it particularly likely that the adherent portion of the placenta will be low in the uterus, in the region of a prior cesarean section scar. This simple fact makes the evaluation of these placentas much more straight forward with the transvaginal ultrasound probe (Cho et al., 2008).

Sonographic findings of placenta accreta include loss of the normal hypoechoic retroplacental-myometrial interface, thin-ning or disruption of the hyperechoic

subvesicular uterine serosa, presence of focal exophytic masses, and numerous placental lakes (Fuchs et al., 2008).

The color Doppler ultrasound findings suggestive of placenta previa accreta include diffuse lacunar blood flow throughout the placenta, dilated vascular channels between the placenta and bladder or cervix, absence of the normal subplacental venous flow, and the demonstration of vessels crossing the placental-myometrial disruption site . Three-dimensional sonography may also be helpful for evaluation of vascular anatomy in the setting of a placenta accrete (Fuchs et al., 2008).

2.7.3 Placenta abruption:

Placental abruption is defined as separation of the placenta prior to the delivery of the fetus. Placental abruption is one of the worrisome causes of vaginal bleeding in the latter part of pregnancy because it contributes to perinatal mortality.

Patients typically present with third-trimester vaginal bleeding associated with abdominal or uterine pain and labor (Fuchs et al., 2008).

Risk factors: History of prior abruption, hypertension, prolonged rupture of membranes, IUGR, chorioamnionitis, polyhydramnios, maternal thrombophilias, maternal substance use (tobacco, alcohol, cocaine), maternal trauma, and advanced maternal age are all risk factors for placental abruption.

A subplacental hematoma between the placenta and uterine wall is a placental abruption. This should be differentiated from a subchorionic hematoma, in which the hematoma is underneath the chorion, not the placenta. Although a subchorionic hematoma can occur anytime during pregnancy, it is more common in the first half of pregnancy. Preplacental hematoma is a rare condition likely caused by bleeding from fetal vessels and located on the fetal surface of the placenta under the chorion. History of placental abruption or previous Caesarian section increases the risk by a factor of 2.3 (Fuchs et al., 2008).

2.7.4 False thickening of the placenta

False placental thickening may be seen with placental abruption if the retroplacental hematoma has the same echogenicity (isoechoic) as the normal placental tissue. Color Doppler may be helpful in distinguishing true placental thickening from pseudo thickening. With true placental thickening, the normal intraplacental vascular network should be seen from the chorionic to basal surface; with abruption and a retroplacental hematoma, color will be seen in the placental tissue and be lacking in the hematoma (Ishikawa et al., 2006).

The graph shows there is significant variance in normal placental thickness at different gestational ages. This graph indicates the placenta appears to grow until term but at a slower rate in the third trimester. A placental thickness greater than 4 cm is considered abnormal at any gestational age. Less than 2.5 cm at or greater than 35 weeks is considered too thin. The four conditions most commonly associated with placental thickening are:

a) Diabetes mellitus, especially gestational diabetes and class A, B, and C

b) Immune and nonimmune fetal hydrops

c) Fetal infections (e.g. cytomegalovirus)

d) Chromosomal abnormalities, especially triploidy Small or thin placentas are most commonly associated with maternal hypertensive disease, severe IUGR, and severe diabetes mellitus (class D, E, R). Rarely, a thin placenta may be due to a membranous placenta (placenta membranacea or diffusa) which is a thin, poorly functional placenta that covers the entire surface of the chorionic sac.

The placenta may also appear unusually thin with severe polyhydramnios as it is stretched over a large surface area of the uterine wall (Allen et al., 2002).

2.7.5 Placental Tumours

All primary and secondary tumours of the placenta are rare. The most common tumour of the placenta by far is chorioangioma. Other primary tumours of the

placenta include teratoma and choriocarcinoma. Choriocarcinoma is most likely to develop secondary to hydatidiform mole. Melanoma is reported to be the most common tumour to metastasize to the placenta. Various angiomatous tumours of the placenta ranging widely in size have been described and because of the resemblance of their components to the blood vessels and stroma of the chorionic villus, the term chorioangioma is the most appropriate designation (Alvarez-Goris et al., 2016).

Macroscopic placental chorioangiomas are reported to occur with an incidence of1 in 16,000 to 1 in 1,500 deliveries. The incidence of clinically insignificant, microscopic chorioangiomas (not detectable with ultrasound) is reported to be as high as 1 in 100 placent as. Small lesions (3 cm in diameter) are usually not associated with fetal or maternal complications. The most common fetal and maternal complications are IUGR, fetal hydrops (due to fetal congestive heart failure), polyhydramnios, and premature labour. Chorioangiomas may also associate with elevated maternal serum alpha-fetoprotein in the absence of other placental or fetal anomalies (Alvarez-Goris et al., 2016).

Sonographically, chorioangiomas typically appear as solid placental masses bulging towards the fetal surface of the placenta. In contrast, fibroids arising from the retroplacental uterine wall cause a bulging effect on the maternal surface of the placenta and the serosal surface of the uterus. Chorioangiomas have a variable echo appearance from solid, homogeneous masses resembling placental tissue to complex masses with septae. The vascularity of chorioangiomas is variable and may affect outcome. Retroplacental hematoma (clot) appears as a mass of variable echogenicity between the uterine wall and the uterine surface of the placenta. A fresh hematoma may be more echogenic than the placenta and with aging gradually becomes less echogenic. An isoechoic hematoma may mimic a thick

placenta although modern systems with good contrast resolution will generally (Niknejadi et al., 2016).

2.7.6 Subchorionic Hematoma (SCH)

SCH is also known as extramembranous or extrachorionic hematoma. With SCH, the chorioamniotic membrane appears to bulge towards the amniotic cavity due to the hematoma between the uterine wall and membrane. This finding is seen more frequently than a retroplacental hematoma. SCH seen in the first trimester and in the early second trimester is associated with threatened abortion. An early pregnancy SCH appears as a fluid collection in the uterine cavity. Before 10-11 weeks gestation, the amnion is still separate from the chorion and one will see the amniotic and chorionic cavities (Miyake et al., 2015).

2.7.7 Placenta Membranacea

Classically, this term describes a thin membranous placenta covering the entire or greater part of the chorioamniotic membrane. The expression membranacea is somewhat misleading, for this form of placenta is not necessarily either thin or membranous. The essential feature of the anomaly is that all or most of the chorioamniotic membranes are covered on their outer (endometrial) aspect by functioning chorionic villi. Exceptionally, there may be a focal thickening to form a placental disc, but more commonly the gestational sac is diffusely covered by villous tissue, albeit of varying thickness (Ravangard et al., 2013).

In nearly all instances there is recurrent vaginal bleeding in the late first and second trimesters the consequence of which is either spontaneous abortion or premature labor. The bleeding is due to the fact that the placenta membranacea must also, of necessity, be placenta previa. Fetal survival is usually hampered by prematurity and IUGR (Ahmed and Gilbert-Barness, 2003).

2.7.8 Placenta Annularis

Define as a ring-shaped placenta which surrounds the gestational sac. This type of placenta is considered by some investigators to be a variant of placenta membranacea. It is associated with an increased risk of ante- and postpartum bleeding and IUGR (Allen et al., 2002).

2.7.9 Placenta Extrachorialis

Placenta extrachorialis or extrachorial placenta is a placenta in which the membranes and decidua have an abnormal relationship to the amniochorionic surface of the placenta (resulting in a chorionic surface that is smaller than the basal surface). Placenta circummarginate represents a minor degree of this abnormality and is not of clinical significance (asymptomatic and very unlikely to be recognized with prenatal ultrasound). Placenta circumvallate results in significant raising and folding of the membranes at the edge of the placenta forming a raised ring of tissue. Placenta circumvallate is usually asymptomatic however it may be associated with antepartum hemorrhage (APH) and premature labour (Proctor et al., 2009).

2.8 Ultrasound of placenta:

2.8.1 Normal placenta appearance:

The normal placenta appears as a sonographically uniform structure with mid amplitude echoes. In the third trimester, the placenta generally appears less homogeneous and may have small anechoic or hypoechoic areas of different pathological etiologies. Calcium deposits are seen in the majority of placentas in the third trimester and appear as high amplitude (white) linear echoes. The fetal or amniochorionic surface of the placenta (generally referred to by authors as the chorionic plate) forms a strong interface with the amniotic fluid. This surface is very angle dependent (specular reflector) and appears as a bright (white) echo

when the sound beam strikes at normal incidence (perpendicular to the interface) (Fuchs et al., 2008).

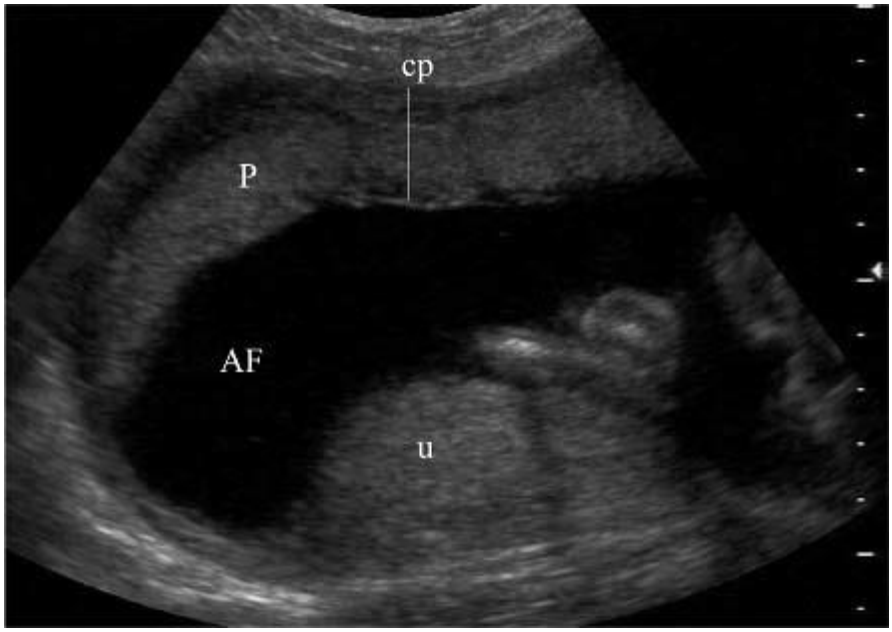

Figure (2.4) Localizing the placenta from a longitudinal, midline section of the uterus. Note the homogeneous echo pattern of the anterior wall placenta (P) and the bright echoes produced from the chorionic plate (cp) that demarcates the interface between the placenta and the amniotic fluid (AF) (Horton et al., 2010).

Posterior uterine wall was Routine evaluation of the p abortion of the fetus. The corpus luteum also produces and. Routine evaluation of the placenta with colour Doppler is now favoured to rapidly find the placental cord insertion site and to detect vascular abnormalities in the placenta and the retroplacental uterine wall (Horton et al., 2010).

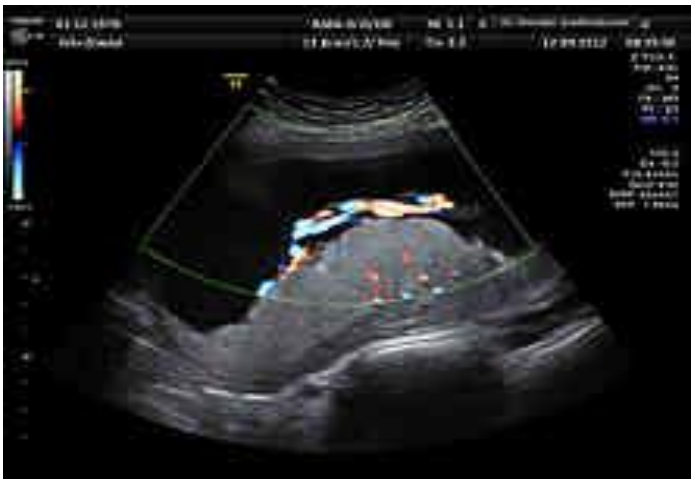

Figure (2.5) Color doppler image show posterior placenta and umblical cord. (Horton et al., 2010).

The retroplacental uterine wall consists of the richly vascular myometrium and decidua basalis. These tissues are distinctly hypoechoic in comparison to the placenta. After 18 weeks gestation, the normal anterior retroplacental uterine wall (sometimes referred to as the subplacental complex or the retroplacental space) has an average thickness of 9.5 mm. The sonographic diagnosis of placental creta depends on this normal hypoechoic zone being invaded by more echogenic villi and appearing thinner or not seen (Oppenheimer et al., 2001).

2.8.2 Sonographic technique:

The equipment and transducer deemed most appropriate for the obstetrical ultrasound study may be used). If the system has electronic beam focussing, the focal zone should be adjusted to optimally visualize the placenta. The placenta is best identified by scanning the uterus longitudinally and is easily recognized by its more echogenic pattern compared with that of the underlying myometrium (Oppenheimer et al., 2001).

A posterior placenta is more difficult to visualize in its entirety due to attenuation and shadowing from the overlying fetus. If indicated, positioning the patient in a

left or right posterior oblique position may be helpful in better visualizing a posterior placenta. For the standard trans-abdominal study (TAS), the bladder should be adequately distended to optimize visualization of the cervix and lower uterine segment and to show the relationship of the placenta to the internal os. Over distention of the bladder distorts the appearance of the cervix and lower uterine segment and may lead to the false positive diagnosis of placenta previa.

Endovaginal (EVS) or transperineal (TPS) techniques should be performed whenever TAS does not adequately show the relationship of the placenta to the internal os (e.g. due to attenuation by fetal parts or the patient presents with an empty bladder) and there is a high index of suspicion of placenta previa (e.g. patient presents with third trimester bleeding) (Oppenheimer et al., 2001).

2.9 Previous studies:

The relationship between previous cesarean section and subsequent development of placenta previa and placenta previa with accrete has been assessed by (To and Leung, 1995), The records of all patients delivered with the diagnosis of placenta previa during the 10-year period from 1984 to 1993 were reviewed, the result that From a total of 50,485 deliveries, 421 (0.83%) had placenta previa, 43 (10.2%) of whom had a history of previous cesarean section. The incidence of placenta previa was significantly increased in those with a previous cesarean section (1.31%) compared with those with an unscarred uterus (0.75%) (R.R. 1.64). This risk increased as the number of previous cesarean sections increased (R.R. 1.53 for one previous section, 2.63 for two or more). The incidence of an anterior placenta previa and placenta accreta was significantly increased in those with previous cesarean scars. The incidence of placenta accreta was 1.18% among patients with placenta previa, 80% being in patients with previous cesarean section. The relative risk for placenta accreta in patients with placenta previa was 35 times higher in those with a previous cesarean section than in those with an unscarred uterus.

Study of (Ahmed et al., 2015) aimed to identify the association of placenta previa with multiparity and previous caesarean section in pregnant women. In antenatal clinic as per protocol 200 pregnant women were scanned in their second and third trimester for fetal wellbeing and placental localization after taking a detailed obstetrical history and clinical examination. All women with or without symptoms of placenta previa showing placental implantation in lower uterine segment on ultra sound scan were documented. After completion of the two years data regarding the detailed obstetrical and surgical history were recorded in a questionnaire and analyzed using SPSS Software. Sixty five women were diagnosed as cases of placenta previa. The overall incidence of placenta previa was found to be 32.5% (65 women). Out of these 7 were primigrvidas, 12 were multiparous, 34 were grand multiparous .It was clearly evident from the study that placenta previa is associated with multiparity and previous caesarean section. Placenta previa was highly significantly associated with previous caesarean section ($P = 0000 < 0.05$). As well as, with multiparity and the association was found to be as high as previous caesarean section ($P = 0000 < 0.05$).

Chapter three

Material and method

3.1 Materials:

3.1.1 Subjects:

Total sample of 56 pregnant women with history of caesarian section were include in the study. Pregnant women with no history of caesarian section were excluded.

3.1.2 Machine used:

Ultra sound machine with transducer frequency 3.5MHz, Mindary machine model DP2200 (2008), made in Germany.

3.2 Method:

3.2.1 Technique used:

Verbal informed consent for the examination was obtained from each patient. The women were scanned in supine position; coupling agent was applied to ensure good contrast, curve linear transducer putted longitudinally below women umbilicus.

The placenta was located transabdominally with a normally filled bladder; for the purposes of this study and to obtain consistent findings between all operators, it was decided to have only five placental-location subgroups. If the placenta was thought to be ‘right anterior’, it was classified as ‘anterior’, and similarly ‘left posterior’ was considered to be ‘posterior’. Therefore, placental locations were recorded using the following five subgroups: anterior, posterior, fundal, low-lying and previa.

3.2.2 Data collection:

This is descriptive cross section study conduct at the department of obstetrics and gynecology in Bahry educational hospital and maternal specialist hospital and Elshaikh Ali Fadoul hospital; it was conduct during the period from April to august

2017. The data obtained from the patients include (7) variables (age, gravidity, parity, number of caesarian section, placenta site, placenta pathology and gestational age).

3.2.3 Data analysis:

The data were analyzed using (SPSS Software) statistical social package for social sciences (Version 20 SPSS, Chicago, Illinois USA). Descriptive statistics were calculated for every measured variable, in order to evaluate the studied sample. All analyses were performed using descriptive frequency and crosstabs probabilities and a P value of $p < 0.05$ was considered statistically significant.

3.2.4 Ethical approval:

The ethical approval was granted from the hospital and the radiology department; which include commitment of no disclose of any information concerning the patient identification.

Chapter four

Results

Table (4.1) shows descriptive Statistics.

	N	Minimum	Maximum	Mean	Std. Deviation
Age (years)	56	18	39	29.34	5.118
Gravidity	56	2	9	4.11	1.846
Parity	56	1	8	2.93	1.746
Number of Cesarean Section	56	1	6	2.34	1.352
Gestational age(weeks)	56	17	39	30.96	5.507

Table (4.2) shows the frequency distribution of Placenta site

	Frequency	Percent	Valid Percent	Cumulative Percent
Fundal	5	8.9	8.9	8.9
Posterior	12	21.4	21.4	30.4
Anterior	32	57.1	57.1	87.5
Previa	4	7.1	7.1	94.6
Low Lying	3	5.4	5.4	100.0
Total	56	100.0	100.0	

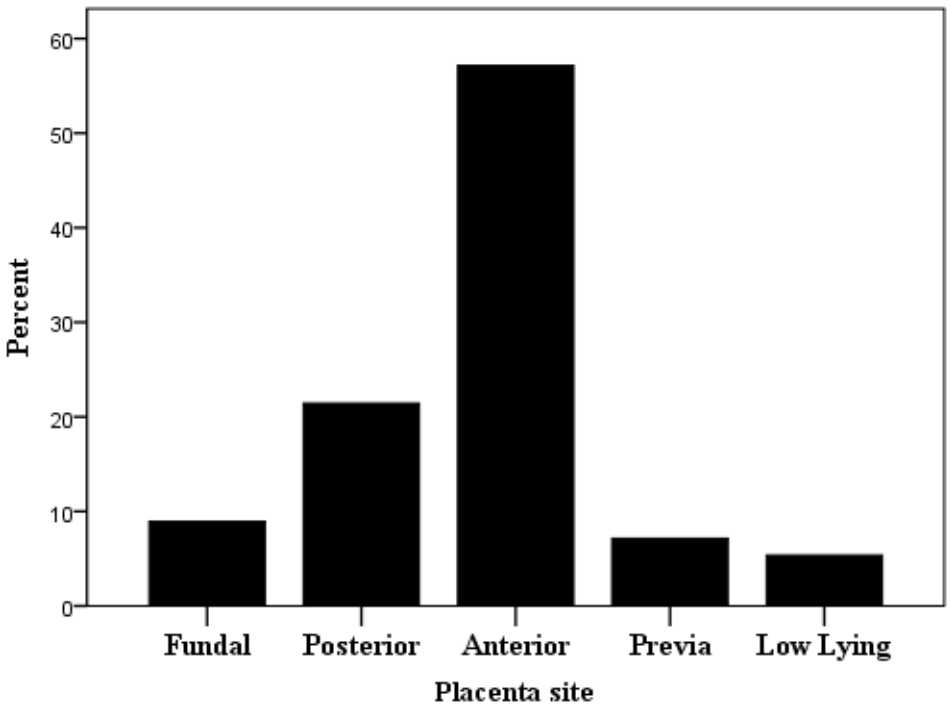

Figure (4.1) shows the frequency distribution of Placenta site

Table (4.3) shows crosstabulation between placenta site and number of cesarean section.

Placenta site * Number of Cesarean Section Crosstabulation									
			Number of Cesarean Section						Total
			1	2	3	4	5	6	
Placenta site	Fundal	Count	2	2	1	0	0	0	5
		% within Placenta site	40.0%	40.0%	20.0%	0.0%	0.0%	0.0%	100.0%
	Posterior	Count	6	4	0	1	1	0	12
		% within Placenta site	50.0%	33.3%	0.0%	8.3%	8.3%	0.0%	100.0%
	Anterior	Count	10	12	3	6	0	1	32
		% within Placenta site	31.2%	37.5%	9.4%	18.8%	0.0%	3.1%	100.0%
	Previa	Count	0	0	1	1	1	1	4
		% within Placenta site	0.0%	0.0%	25.0%	25.0%	25.0%	25.0%	100.0%
	Low Lying	Count	0	1	2	0	0	0	3
		% within Placenta site	0.0%	33.3%	66.7%	0.0%	0.0%	0.0%	100.0%
Total		Count	18	19	7	8	2	2	56
		% within Placenta site	32.1%	33.9%	12.5%	14.3%	3.6%	3.6%	100.0%

Table (4.4) shows crosstabulation between number of parity and placenta location.

Parity * Placenta site Cross tabulation								
			Placenta site					Total
			Fundal	Posterior	Anterior	Previa	Low Lying	
Parity	1	Count	2	5	5	0	0	12
		% within Parity	16.7%	41.7%	41.7%	0.0%	0.0%	100.0%
	2	Count	1	4	11	0	1	17
		% within Parity	5.9%	23.5%	64.7%	0.0%	5.9%	100.0%
	3	Count	2	1	5	1	2	11
		% within Parity	18.2%	9.1%	45.5%	9.1%	18.2%	100.0%
	4	Count	0	1	2	1	0	4
		% within Parity	0.0%	25.0%	50.0%	25.0%	0.0%	100.0%
	5	Count	0	0	4	1	0	5
		% within Parity	0.0%	0.0%	80.0%	20.0%	0.0%	100.0%
	6	Count	0	1	4	1	0	6
		% within Parity	0.0%	16.7%	66.7%	16.7%	0.0%	100.0%
	8	Count	0	0	1	0	0	1
		% within Parity	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Total		Count	5	12	32	4	3	56
		% within Parity	8.9%	21.4%	57.1%	7.1%	5.4%	100.0%

Chapter five

Discussion, Conclusion and Recommendations

5.1 Discussion:

This was descriptive study which included 56 pregnant women aged between 18-39, with mean age 29.3 ±5.118 and gravidity between 2-9 with mean 4.11±1.846 and parity between 1- 8 with mean 2±1.7. The mean number of caesarian section was 2 ±1.3.

The result of the study showed that the fundal placenta was 8.9%, posterior placenta was 21.4%, anterior placenta was 57.1%, placenta previa was 7.1% and low lying placenta was 5.4% (Figure 4.1). The incidence of placenta previa varies between different reports. Me was found, 2.0%, for women with at least one prior cesarean section is similar to that previously reported by (1.31%) et al. (To and Leung, 1995). This results disconfirm the results of Naji et al. (Naji et al., 2013) stating that more placentae are posterior in women with a previous cesarean section. On the contrary, I found a majority of the placentae to be anterior, which also holds true for placenta previa.

I have shown that there is a significant difference in placental location when there is a CS scar present on the uterus. Women with a previous history of CS are significantly less likely to have a fundal placenta and more likely to have the placenta located on the anterior and posterior wall of the uterus in a subsequent pregnancy. I found no statistically significant difference in the incidence of low-lying placentae between the groups, though this may have been due to the low numbers of low-lying placentae encountered overall. My data also suggest that the presence of a CS scar does not influence placental migration in the event of a low-lying placenta. My observations suggest that the presence of a CS scar influences placentation. However, the significance of this observation is not clear. There are

various possible mechanisms that may play a role. The presence of a CS scar might alter myometrial contractility and so disrupt the normal contraction waves seen in the endometrium (Bulletti and de Ziegler, 2006). In addition, disruption of the junctional zone of the uterus may also be a contributory factor. Finally uterine scarring may have a deleterious effect on decidualization, a process that occurs in all species where implantation causes breaching of the luminal endometrial epithelium. There is a growing body of evidence to suggest that compromised placental development and its subsequent effects on pregnancy outcome are caused by impaired decidualization (Salker et al., 2010). Should the presence of a CS scar compromise decidualization quality, this may have implications for potential fertility, likelihood of miscarriage and placental development. This concept seems plausible, especially as research is increasingly focusing on the uterine inflammatory response and its association with successful implantation.

This study confirms that a previous CS may have a significant impact on placental location in subsequent pregnancies. The mechanism behind this effect is not clear, however this observation may provide indirect evidence that the presence of a CS scar in the uterus has a more ‘global’ effect on the endometrium than the physical presence of a scar in isolation.

5.2 Conclusion

U/s is most accurate in detection of placenta location from its first appearance until labor. The most common location was anterior placenta, the least common location was low laying placenta and previa. The prevalence of placenta previa was 7.1. Number of CS had significant effect in placenta location. the parity was not effected on placenta location.

5.3 Recommendations:

- The sonologist should be more accurate in determine of entire length of placeta and document both upper and lower margin.
- Further studies should be done large sample volume and control group to compare the prevalence of placenta privia on both groups.
- Further studies should be done to assess other pregnancy associated complication with previous CS.

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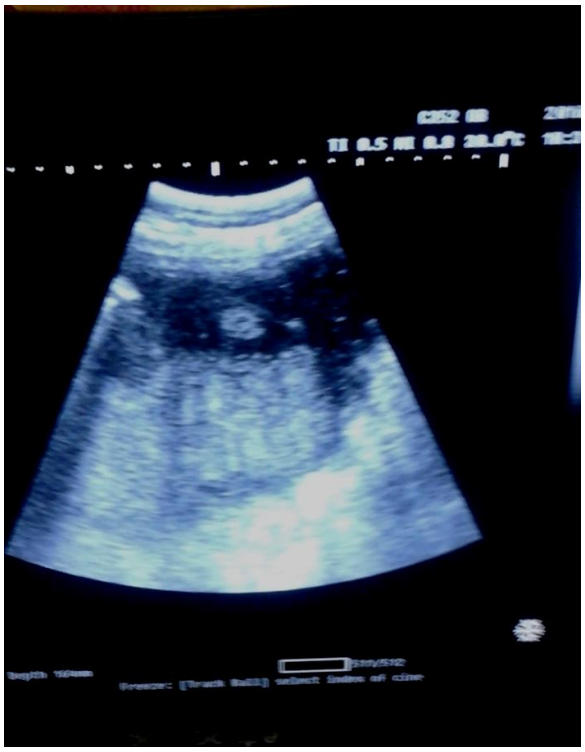
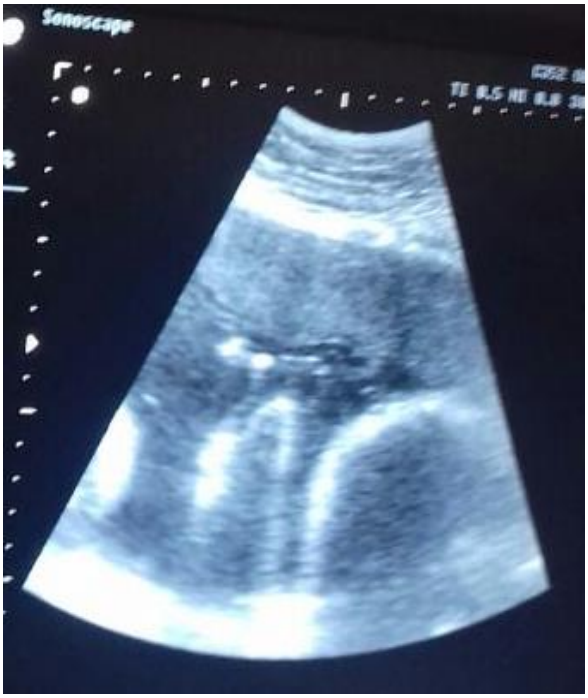
Appendices

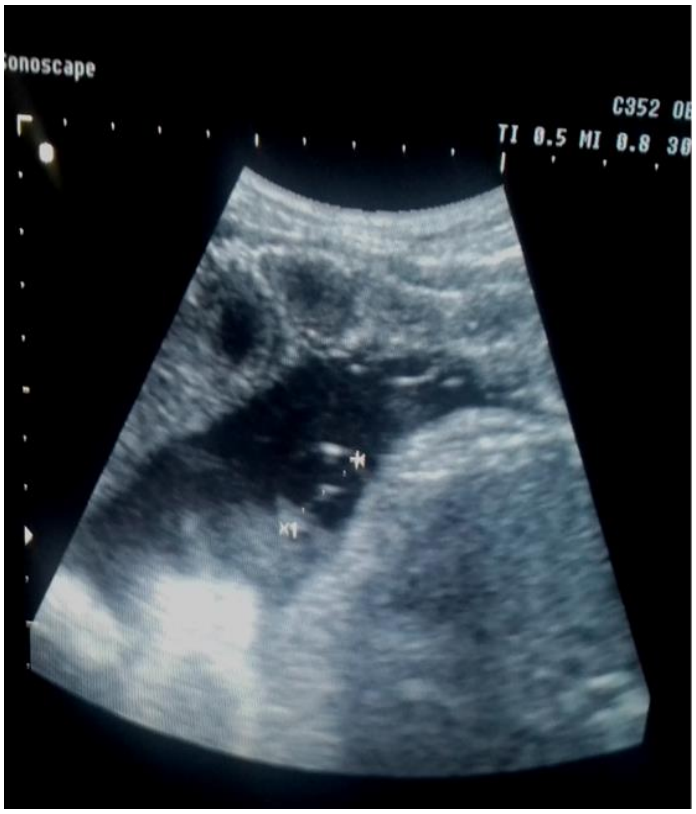
Appendix (1)



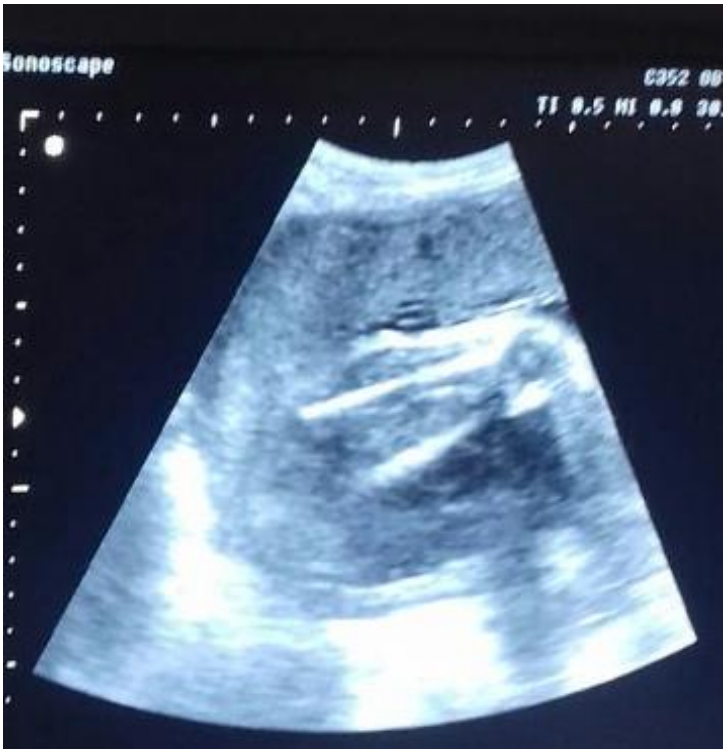
Ultrasound image (1) shows posterior placenta at 38 weeeks in PG women with one Cs



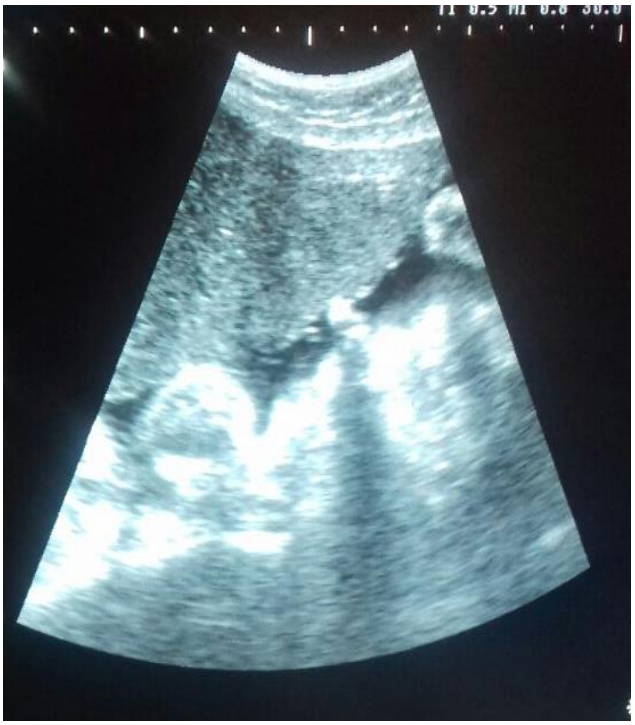
Ultrasound image (2) shows anterior placenta at 37 weeks +6 day in PG women withone cesarean section



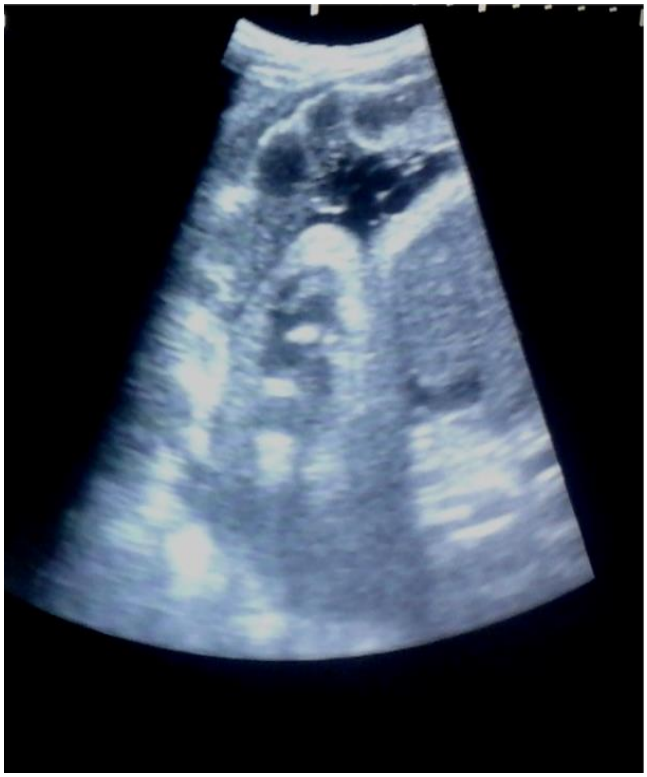
Ultrasound Image (3) show anterior placenta at 37 week



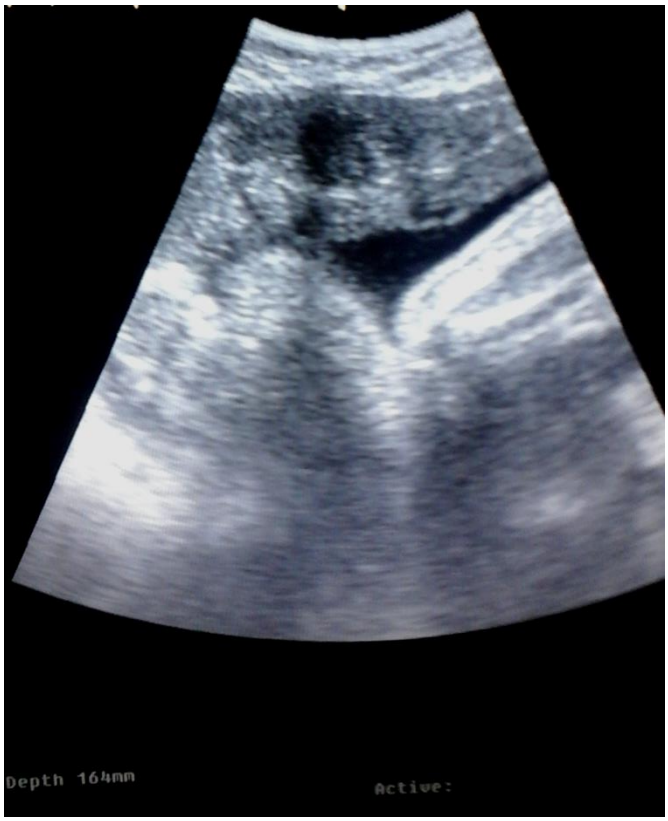
Ultrsound image (4): shows anterior placenta at30 weeks



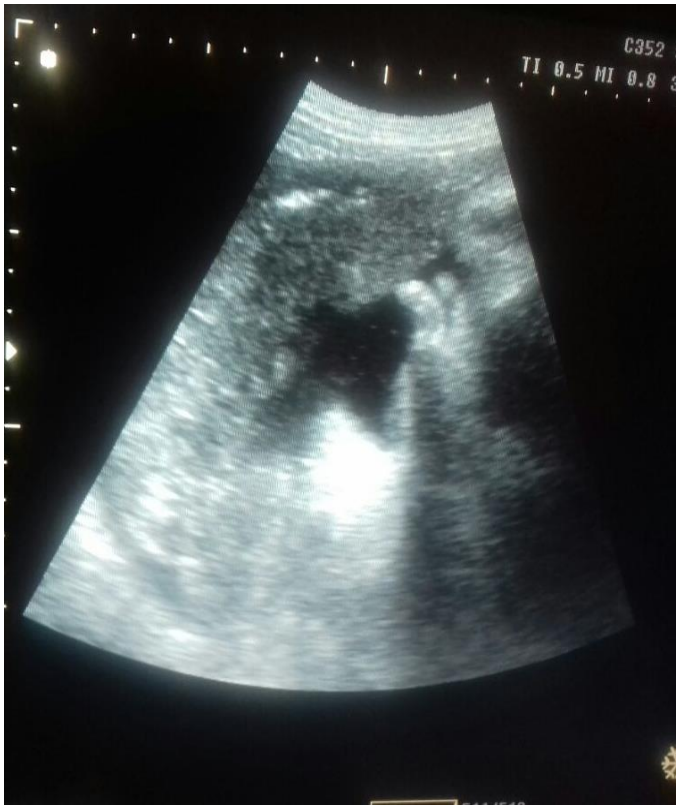
Ultrasound image (5)shows anterior placenta at 33 weeks with one cesarean section



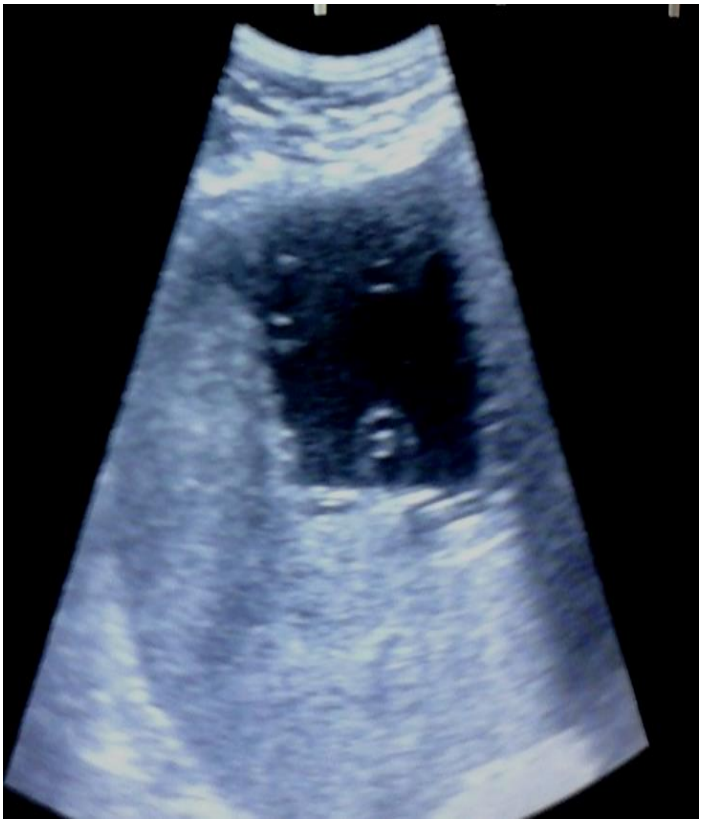
Ultrasound image (6) shows anterior placenta at 37 weeks+ 5 days



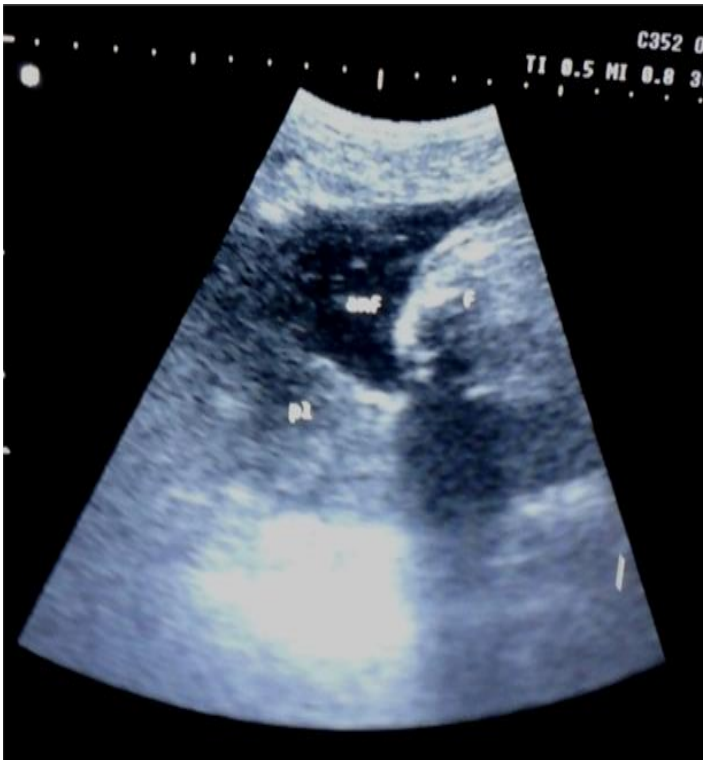
Ultrasound image(7) shows anterior placenta at 36 weeks GA



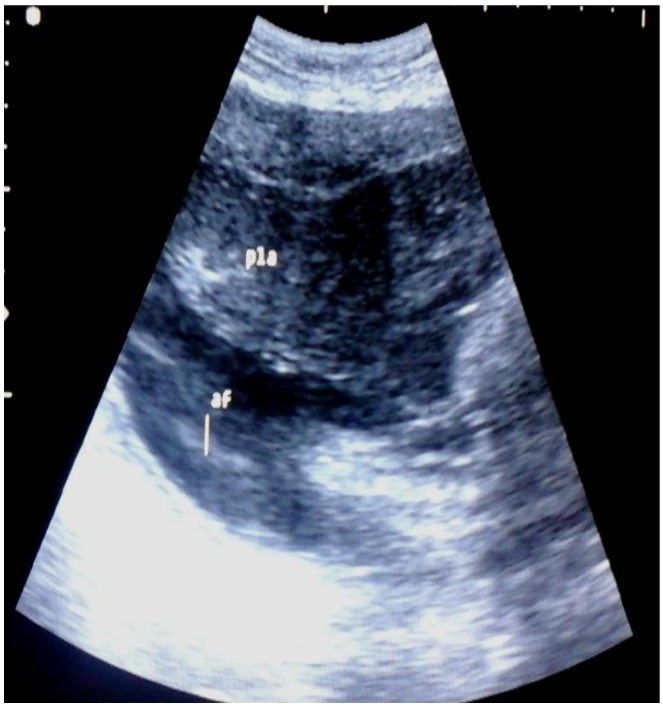
Ultrasound image (8) shows fundal placenta at 39 weeks with one cesarean section



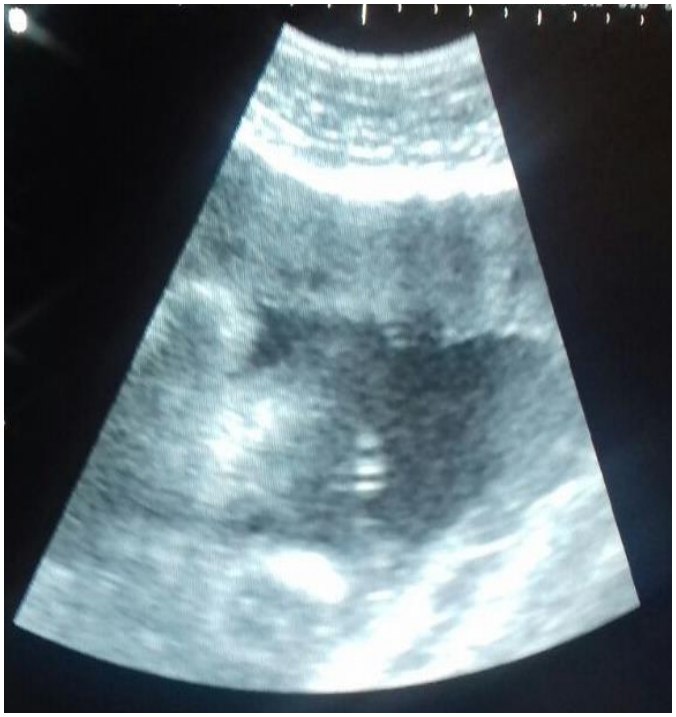
Ultrasound image (9) shows posterior placenta at 34 weeks



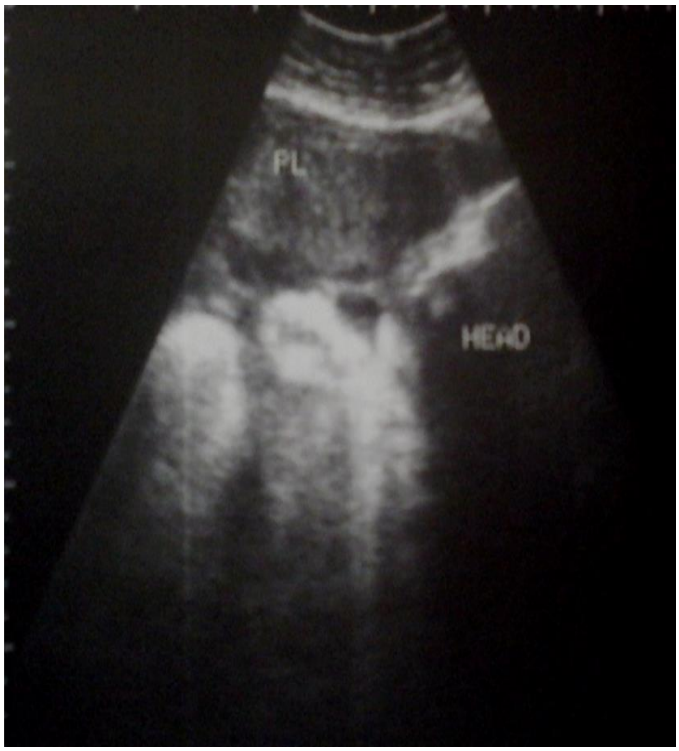
Ultrasound image(10) shows posterior placenta at 28 weeks



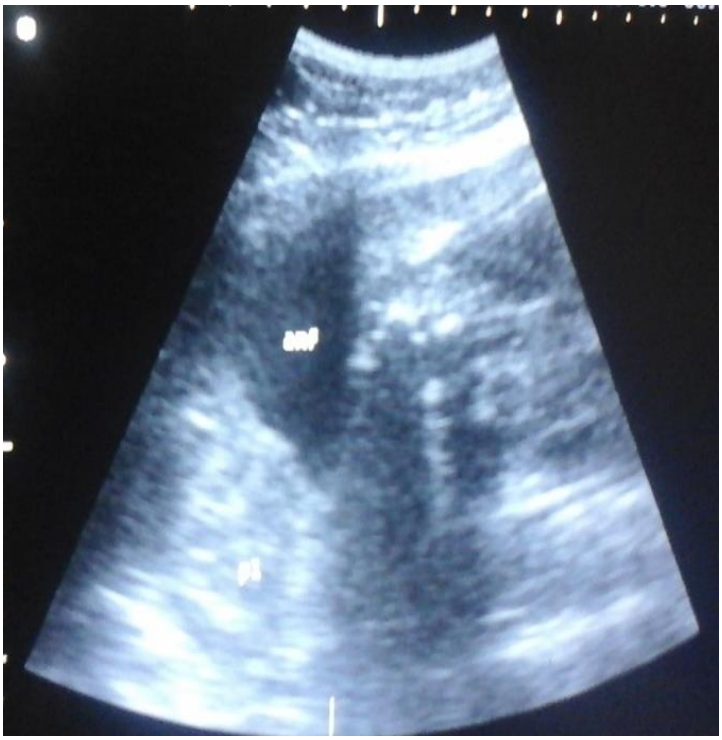
Ultrasound image (11) shows anterior placenta at 32 weeks +5 day in PG women with 4 cesarean section

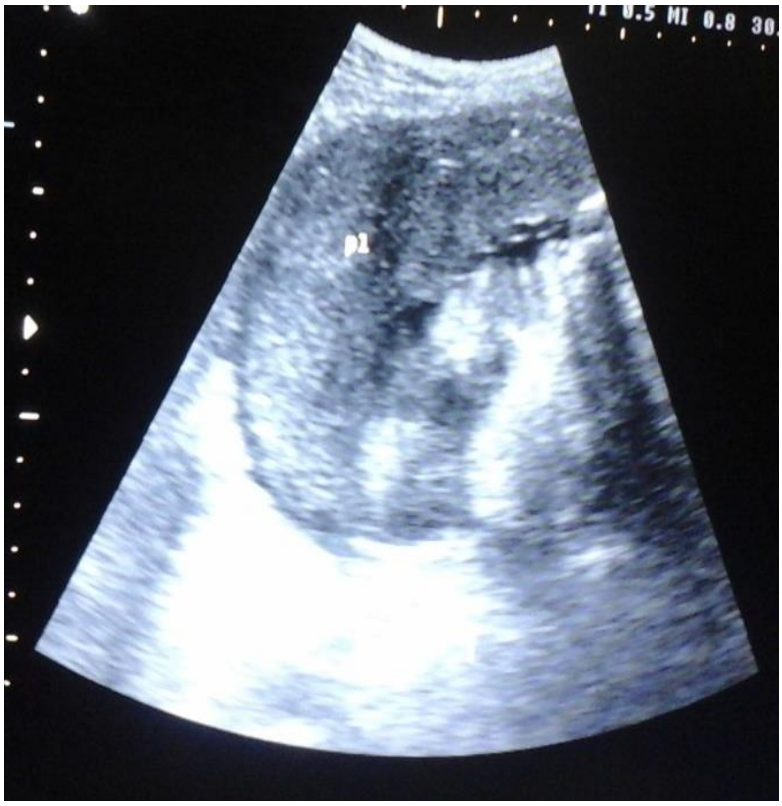


Ultrasound image (12) shows anterior placenta at 37 weeks

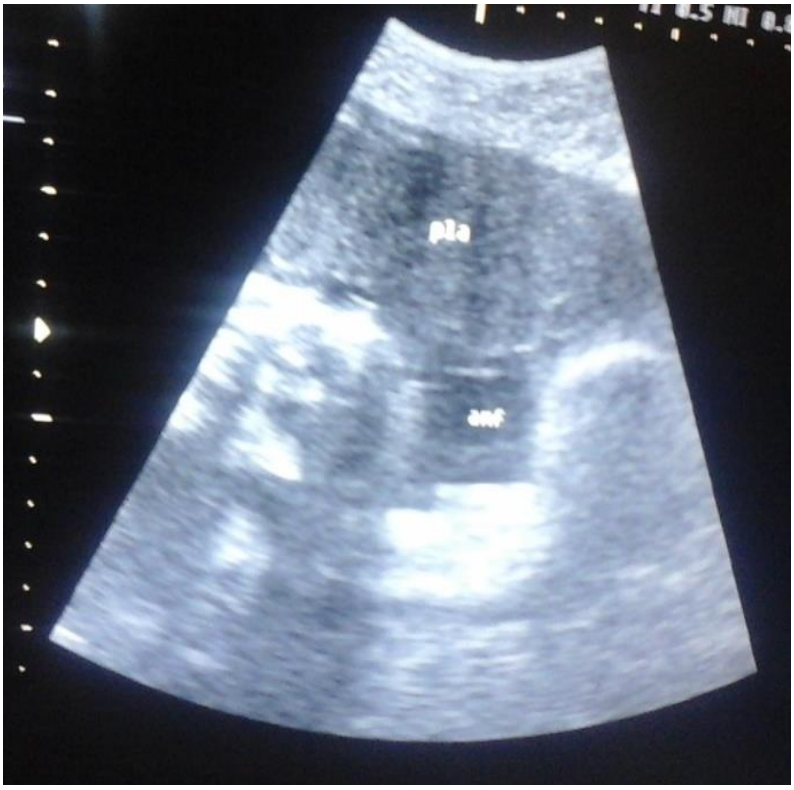


Ultrasound image (13) shows anterior placenta at 31 weeks

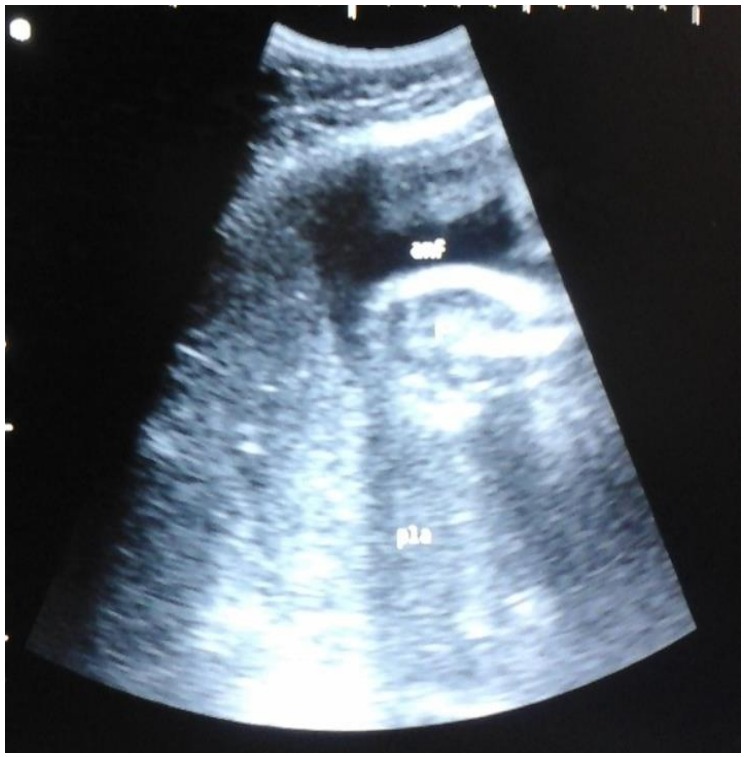

Ultrasound image (13) shows posterior placenta at 34 weeks



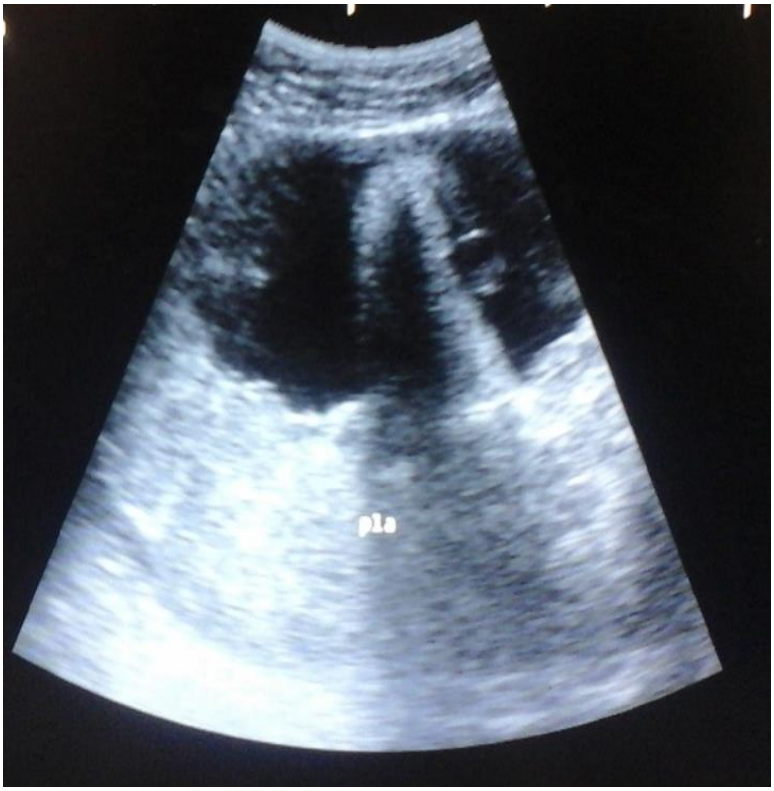
Ultrasound image (14) shows anterior placenta at 39 week +3 d



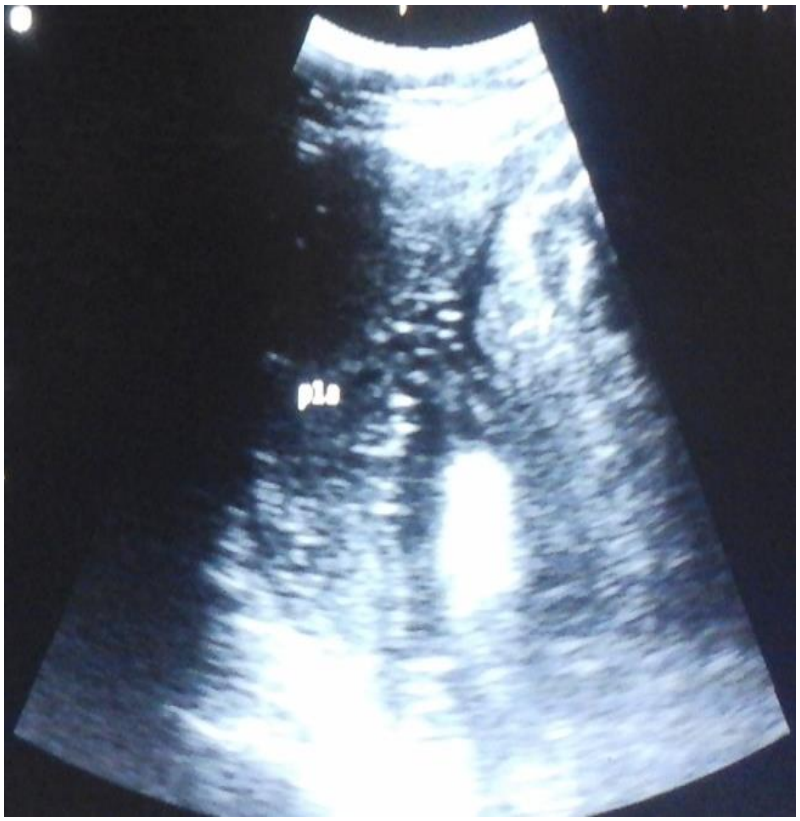
Ultrasound image number(15) shows anterior placenta at 34 weeks



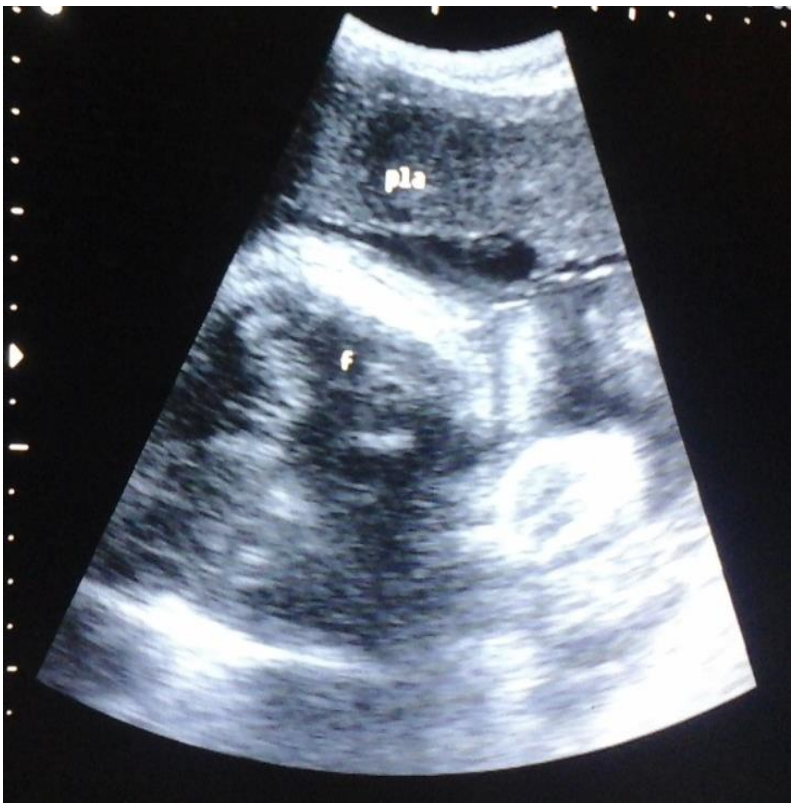
Ultrasound image number(15) shows posterior placenta



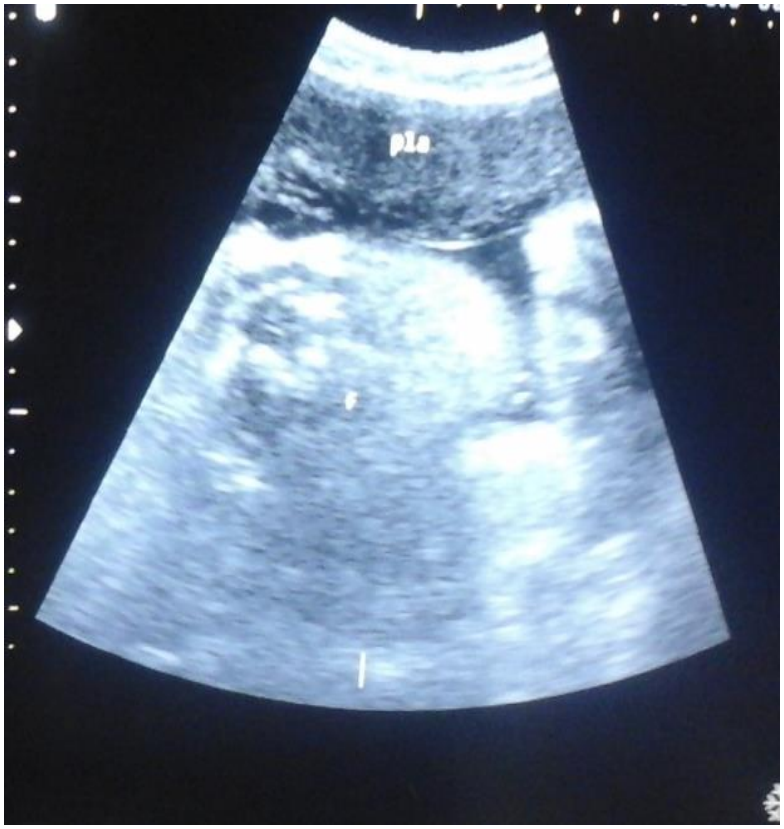
Ultrasound image number(16) shows posterior placenta at 26 weeks +4 day



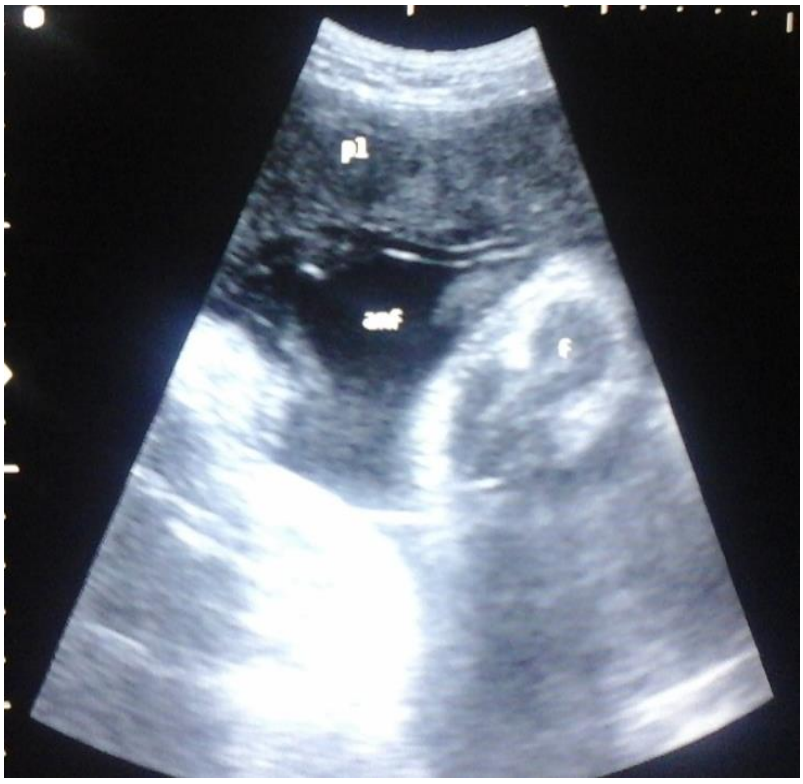
Ultrasound image number (17) shows fundal placenta at 35 week+4day



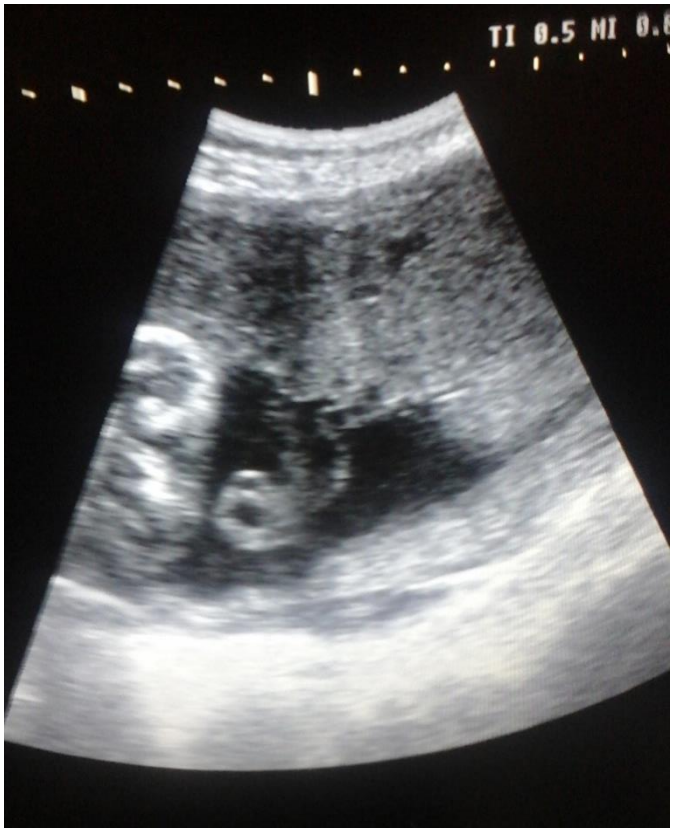
Ultrasound image (18) shows anterior placenta at 34 weeks



Ultrasound image (19) shows anterior placenta at 35 weeks + 1 day



Ultrasound image (20) shows anterior placenta at 30 weeks



Ultrasound image number(21) shows anterior placenta at 38 weeks

Appendix (2)

Sudan University of Science &Technology

College of Graduate Studies

Data collection sheet

Assessment of placenta location in pregnant women with previous cesarean section in khartoum state 2017

Personal information:

1. Age ( )

2. Gravidity ( )

3. Parity ( )

4, Number of cesarean section ( )

Sonographic finding:

5. Placenta site:

Anterior ( ) posterior ( ) fundal

low lying ( ) previa ( )

6. Presence of placenta pathology:

Yes ( ) No ( )

7. Gestational age:

( ) Weeks