A Dissertation on

THE ROLE OF COLOUR DOPPLER ULTRASOUND AND MAGNETIC RESONANCE IMAGING IN PLACENTA PREVIA

Submitted to

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY
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In partial fulfilment of the Regulations
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CERTIFICATE

This is to certify that the dissertation entitled **"THE ROLE OF COLOUR DOPPLER ULTRASOUND AND MAGNETIC RESONANCE IMAGING IN PLACENTA PREVIA"** is the bonafide original work of **Dr. S. SOWMIYA** in partial fulfillment of the requirement of the Tamilnadu Dr. M.G.R. Medical University to be held in April 2017. The period of study was from Sept 2015 to Sept 2016.

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DECLARATION

I hereby declare that the dissertation entitled **"THE ROLE OF COLOUR DOPPLER ULTRASOUND AND MAGNETIC RESONANCE IMAGING IN PLACENTA PREVIA"** was done by me in Govt. R.S.R.M. Hospital,Govt. Stanley Medical College,Chennai during the period of my postgraduate study for M.S. Branch II Obstetrics and Gynaecology from Sept 2015 to Sept 2016.

This dissertation is submitted to the Tamilnadu M.G.R. Medical University,Chennai in partial fulfillment of the University regulations for the award of M.S. degree in Obstetrics and Gynaecology.

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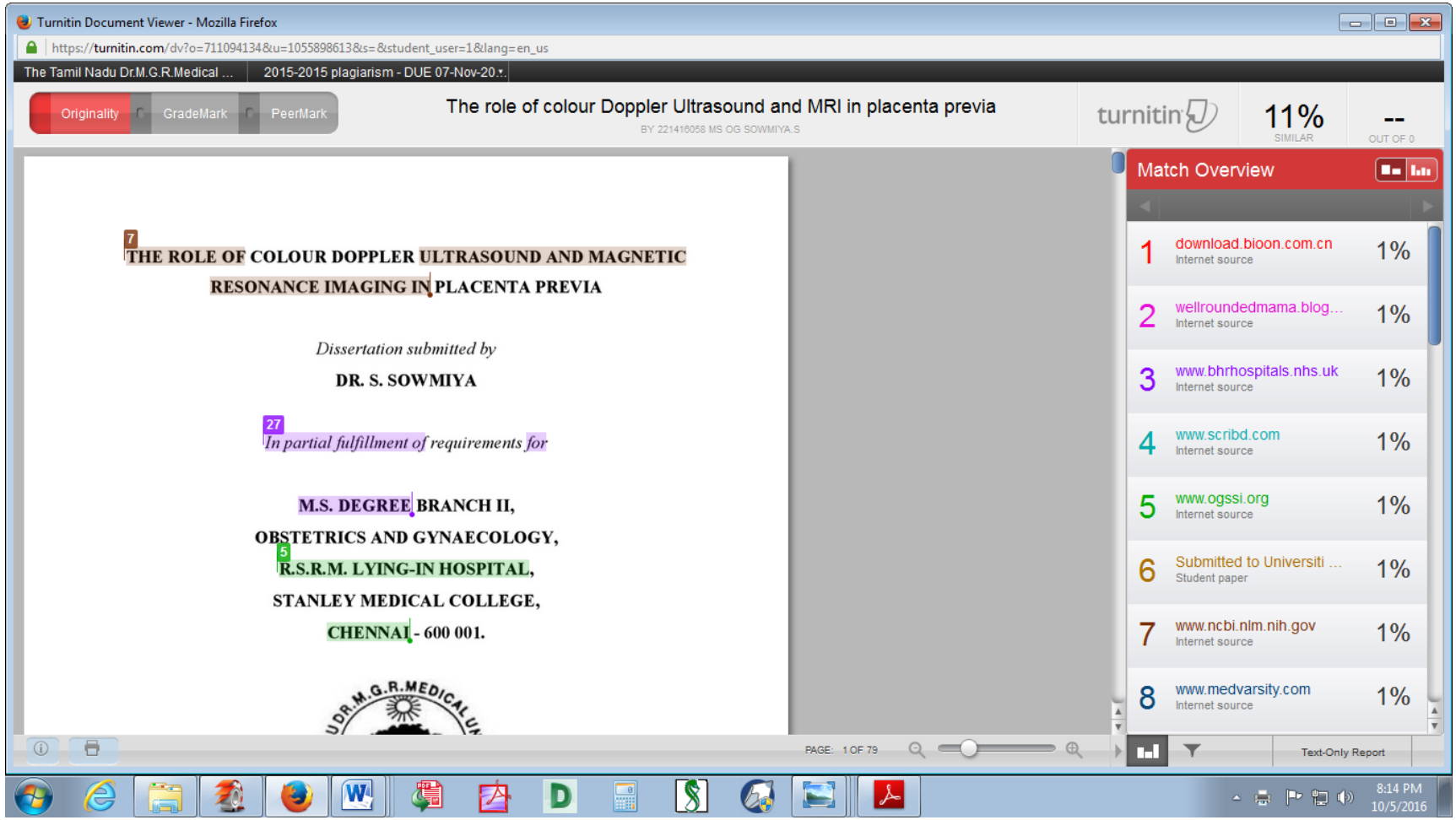
CONTENTS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CHAPTER 1

INTRODUCTION

In large majority of the cases, the placenta is situated in the upper uterine segment usually near the fundus on the posterior wall of the uterus and less frequently on the anterior wall. It may in other cases be situated wholly or partially in the lower uterine segment, resulting in placenta previa and a likelihood of hemorrhage, preterm delivery, low birth weight of the baby, maternal and fetal mortality and morbidity.

Literature reveals that antepartum hemorrhage complicates 2-5% of pregnancies of which approximately one third are due to placenta previa.

Although the cause of placenta previa is poorly understood a number of studies have established its association with such factors as advancing maternal age, multi-parity, previous caesarian section, previous spontaneous or induced abortion and multiple gestation.

With the increasing number of caesarean sections and advancing maternal age at delivery, the risk of placenta previa accreta has increased 10 fold in the past 50 years. It is important to diagnose this condition prenatally to avoid morbidity and mortality later. Various imaging

modalities used for the diagnosis are colour Doppler ultrasound, 3-D power ultrasound and MRI. This study basically focuses on the role of colour Doppler ultrasound and MRI in the study of placental localization and its penetration into the myometrium in addition to evaluating the relationship between various factors and placenta previa.

CHAPTER 2

HISTORICAL REVIEW

The word ‘Placenta’ derives from the Latin and means a’ flat cake’. It is first used to describe the after birth and is attributed to Realdus Colombus(1516-59) who used the latin word for a circular cake. The term ‘Previa’ (in Latin –“in front of”) denotes the position in relation to the presenting part.

2.1. History of Diagnosis and treatment of Placenta Previa:

- Guillemeau performed Podalic version in cases of placenta previa and by this treatment he saved the daughter of Ambrose pare, the master who had taught him the new method of version. It was followed and amplified by Mauriceau and others. Since the result was not satisfactory the obstetricians returned to the old treatment, removing the placenta.

- Siegemudin, Puzos, Smellie, recommended rupture of membrane in the treatment of hemorrhage brought about by placenta previa patialis or marginalis.

- Leroux- first recommended plugging the vagina, which Baudelocque extended to plugging of the cervix also.

- Denman – Practised ‘Pulling down a leg’ as treatment to control bleeding

1683 - Portal described first, about Placenta Previa

1709 - Schacher first demonstrated the exact relationship of placenta to the uterus on the dead subject.

1775 - Edward Rigby described the term inevitable Haemorrhage associated with low lying placenta.

1890 - Lowson Tait advocated caesarian section which-surpassed all other treatments

1927 - Bill advocated liberal use of blood transfusion and immediate casarean delivery

1945 - Macafee advocated expectant management of placenta previa

1953 - Browne at Hammersmith first used radio-isotope to localize placenta

1959	-	Loverset introduced cervical encirclege for placenta Previa
1966 to 1970	-	Gottesfeld, Donald, Kobayashi introduced the new method, trans-abdominal ultrasound to localize placenta previa
1969	-	Liggins and Hinie first described the beneficial effects of antenatal corticosteroids in lung maturity of preterm neonates
1986	-	Powell diagnosed placenta previa using MRI
1987	-	Transvaginal sonogram was introduced for diagnosis of placenta previa.
1989	-	Druzin advocated uterine packing to arrest PPH.
1992	-	Hertzberg introduced transperineal ultrasound to diagnose placenta previa

CHAPTER 3

REVIEW OF LITERATURE – PLACENTA PREVIA

3.1. Definition

Placenta previa is an obstetric complication in which the placenta is inserted partially or wholly in the lower uterine segment.

3.2. Classification

3.2.1. F.J. Browne classifies placenta previa into four degrees.

a) Placenta dips into the lower uterine segment by its lower margin, the greater part of it being in the upper uterine segment.

b) Edge of the placenta reaches the internal OS.

c) Placenta overlap the internal OS when closed but does not cover it entirely when fully dilated

d) Placenta is low in attachment that its centre roughly corresponds to the centre of the internal OS when fully dilated.

3.2.2. Latest Classification: Williams 2001

1. Low lying placenta

   The placenta is implanted in the lower uterine segment such that the placenta edge actually, does not reach the internal OS but is in close proximity to it.

2. Marginal Placenta Previa

   The edge of the placenta is at the margin of the internal OS.

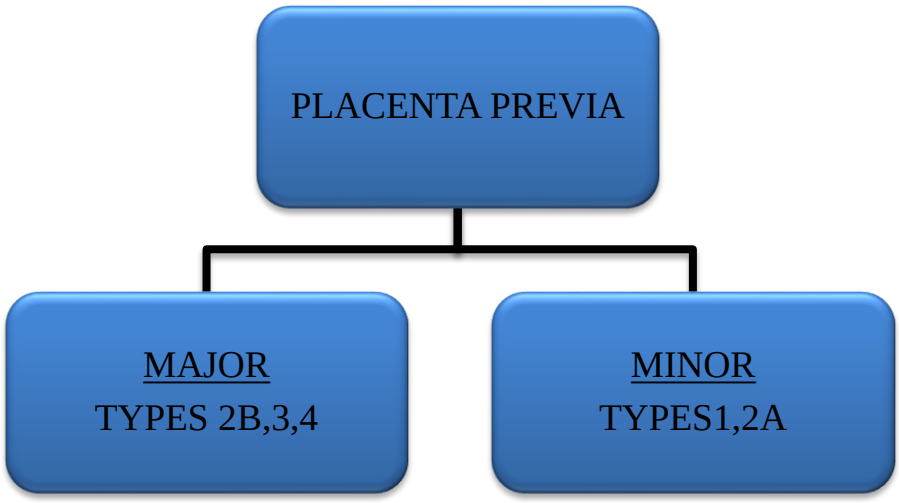
3. Partial placenta previa

   The internal OS is partially covered by placenta.

4. Total placenta previa

   The internal cervical OS is covered completely by placenta.

Each of the first 3 types are further subdivided into type A and type B depending on the situation of placenta in relation to uterine wall,either anterior or posterior. Posterior placenta previa is even more dangerous as



it discourages the engagement of head and also that it gets compressed in labour interfering with perfusion.Basically placenta previa is divided into 2 subdivisions: major and minor as given above.

In a recent Fetal imaging workshop sponsored by National Institute of Health(Dashe,2013),the following classification of placenta previa was recommended:

Placenta previa – internal os is covered either partially or completely by the placenta.(type 3,4)

Low – lying placenta – implantation in the lower uterine segment such that the placental edge does not reach the internal os and remains outside a 2 cm wide perimeter around the os(type 1,2).

3.2.3. Transvaginal ultrasound classification:

Transvaginal sonography has refined the diagnosis of placenta previa depending on the ability to measure the distance between placental edge to the internal cervical os accurately.Oppenheimer formulated a classification based the transvaginal ultrasournd measurements.[1]

TRANSVAGINAL ULTRASOUND CLASSIFICATION OF PLACENTA PREVIA (OPPENHEIMER)

DISTANCE OF PLACENTA FROM OS	PREGNANCY OUTCOME
>20mm	Caesarean not indicated
11 - 20 mm	Low risk of bleeding and caesarean
0 - 10 mm	High risk of bleeding and caesarean
Overlapping os by any distance	Caesarean indicated

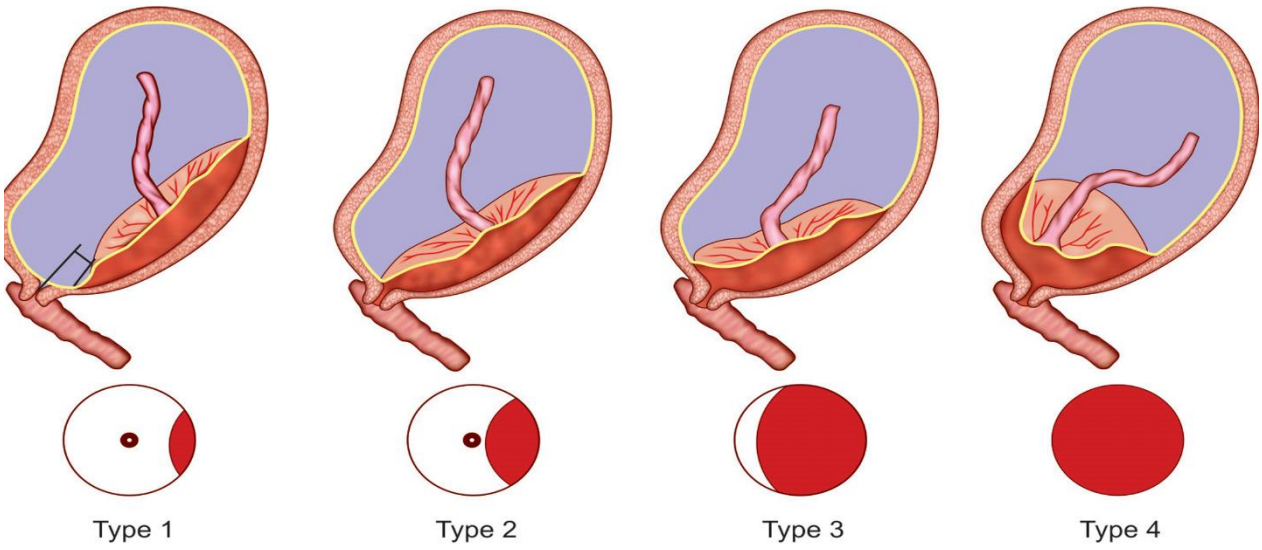


Figure 3.1:Classification of placenta previa

3.3. Incidence

The incidence of placenta previa varies greatly from one series to another, ranging from 1 to 167 to 1 to 327 pregnancies. Moreover approximately 1 in 200 pregnancies, with the incidence ranging from 0.29 -1.24% in different studies (Fraser and Watson 1989).

The incidence of the different types are approximately, the following

Total Placenta Previa	23% to 31.3%
Partial Placenta previa	20.6% to 33%
Low Lying placenta previa	37% to 54.9%

3.4 Etiological and Associated Factors

No specific etiology can be found for most cases of low placental implantation. The etiology of placenta previa is multifactorial. Due to some local aberration in uterine blood supply, the differentiation between chorionic frondosum and chorionic laevae does not occur and the blastocyst which usually implants in the thicker and receptive endometrium of upper uterine segment gets implanted in the endometrium of the isthmus or over a previous lower segment uterine

scar. As a whole, under perfusion and under vascularization caused by atrophy or inflammation are often quoted etiological factors for low implantation. In addition to this, increased placental surface area also has an etiological role. The other probable risk factors are as follows:-

3.4.1. Maternal Age

As the maternal age increases, frequency of placenta previa increases(Biro,2012).The FASTER TRIAL, which included >36,000 women, cited the frequency of previa to be 0.5% for <35yrs and 1.1% for >35yrs(Cleary-Goldman,2005).Women older than 40 years have nearly nine fold greater risk than women under the age of 20 years. (Ananth CV 1996).[2]

3.4.2. Gravidity

Placenta previa is higher among women gravid more than four. (Abu- Heija et al., 1999).[3]

3.4.3. Parity

As the parity increases,the risk for placenta previa increases. Placenta preiva occurs in 0.2% of nulliparopus women and upto 5% of grand –mulipara.(Laverty P.L. 1990).[4]

3.4.4. Ethinic origin and socio-economic status

Slightly higher incidence is reported in Black. Asian women residing in the United States are increased risk of placenta previa.(Taylor 1995)[5] . Studies show that no independent relationship emerged with socio-economic factors.

3.4.5. Multiple Gestation

Strong and Brar [6] 1989 showed that the incidence of placenta previa is 0.55% for twins as compared with 0.31% in singleton gestations. On the contrary, François *et al.*, 2003, reported that the occurrence and complications of placenta previa did not differ between singleton and multiple gestations. [7]

3.4.6. Endometrical damage

A six fold increase in the risk of placenta previa following therapeutic termionation of pregnancy in the first trimester has been reported. The risk of placenta previa may be increased in a dose response fashion by multiple sharp curettage abortions. However vaccum aspiration does not confer an increased risk. (Johnson LG 2003).[8]

3.4.7. Previous Caesarian Section

Various studies states that the incidence increases with the number of previous caesarian deliveries.[9] It was 1.9% with two prior caesaraians and 4.1% with 3 or more. The risk is highest in the pregnancy immediately following caesarian section. Placenta previa shows preference to anterior uterine wall in 67% in scarred uterus. The relative risk for placenta accreta in patients with placenta preiva was 35 times higher in those with a previous caesarian section than in those with an unscarred uterus.[10]

3.4.8. Uterine scars and pathology

Uterine scars from surgical procedure such as myomectomy, endometritis submucous fibroids adenomyosis and uterine adhesions may be predisposing factors to placenta previa.

3.4.9. Smoking and cocaine abuse

In western countries cigarette and cocaine abuse contribute to the increasing incidence of placenta previa.Handler (1994) reports that pregnant women who smoke more than 20 cigarettes per day are over two times more likely to experience placenta preiva and pregnant women who use cocaine are 1.4 times more likely to experience placenta previa than non users.[11]

Other associations include anemia, closely spaced pregnancies and tumours distorting the uterine contour.

First trimester threatened abortion associated with about 21/2 fold risk of placenta previa than in general obstetric population have been reported in different studies.[12]

3.4.10. Associated Pregnancy Complications

- Spontaneous abortion
- The frequency of pregnancy induced hypertension is decreased among the pregnancies with placenta previa.(Liberman JR.1991)[13]
- Congenital malformations have been reported to occur twice as commonly in fetus of mothers with placenta previa (Brenner et al.. 1978)[14]
- Abnormal fetal presentations such as breech, shoulder and compound presentations are seen in about 30-35 percent of cases.[15]
- Placenta membranecea, Marginal or vellamentous cord insertions. Succenturiate lobe,bipartite placenta, fenestrated placenta, placenta accreta and precreta have all more commonly found in placenta previa.

- Placenta previa may be associated with placenta accrete increta or percreta. Placenta accrete occurs in about 5% of women with an unscarred uterus and placenta previa and 24% of women with one previous caesarian section (Clark and Colleagues 1985).[16]

- The recurrence rate following a prior placenta previa is 4-8%. 10% of women with placenta previa have a co-existing abruption (Hibbard 1988).[17]

3.4.11. Placenta Accrete Syndromes

Abnormally implanted, invasive or adherent placenta are referred to as placenta accrete syndromes. It is derived from the Latin word ‘ac-+crescere to grow from adhesion or to adhere or coalescence or to become attached to(Benirschke,2012).These include any abnormally adherent placenta with myometrial adherence because of partial or total absence of decidua basalis and imperfect development of the fibrinoid or Nitabuch layer. With the increasing era of caesarean section, the incidence of placenta accrete syndromes have increased. Although placenta accreta is very rare (0.004%) in women with a normally situated placenta, it occurred in 9.3% of women with placenta previa according to data from Southern California (Comstock,2005).Hyperinvasiveness (Pri-

Paz, 2012) and constitutional endometrial defect(Benirschke and colleagues 2012) are documented in many accrete cases. In history of previous uterine trauma, there is increased vulnerability of the decidua to trophoblast invasion following incision into decidua(Garmi,2012).

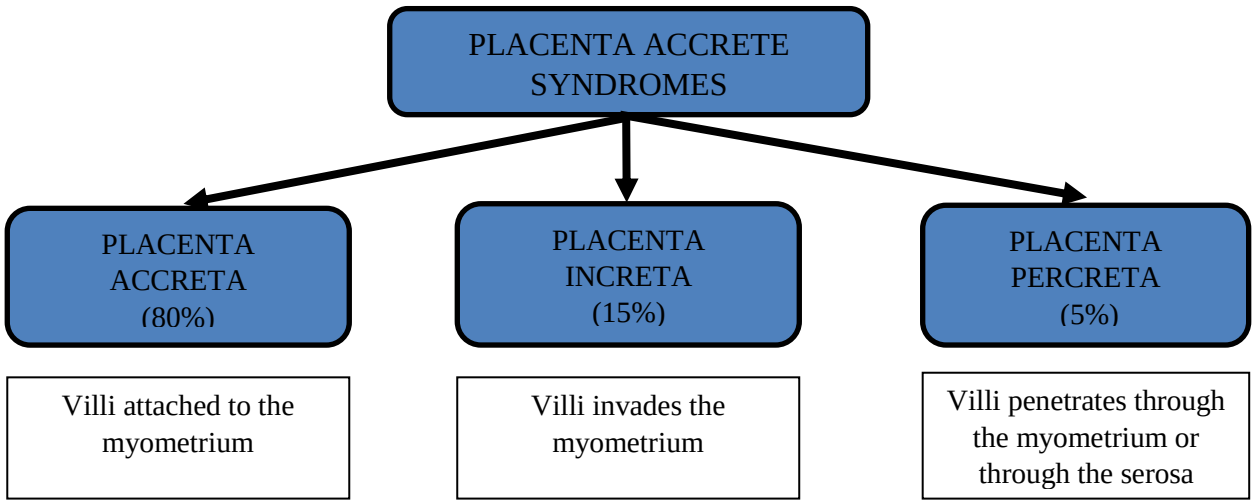


Figure 3.2:*Placenta Accrete Syndromes -classification*

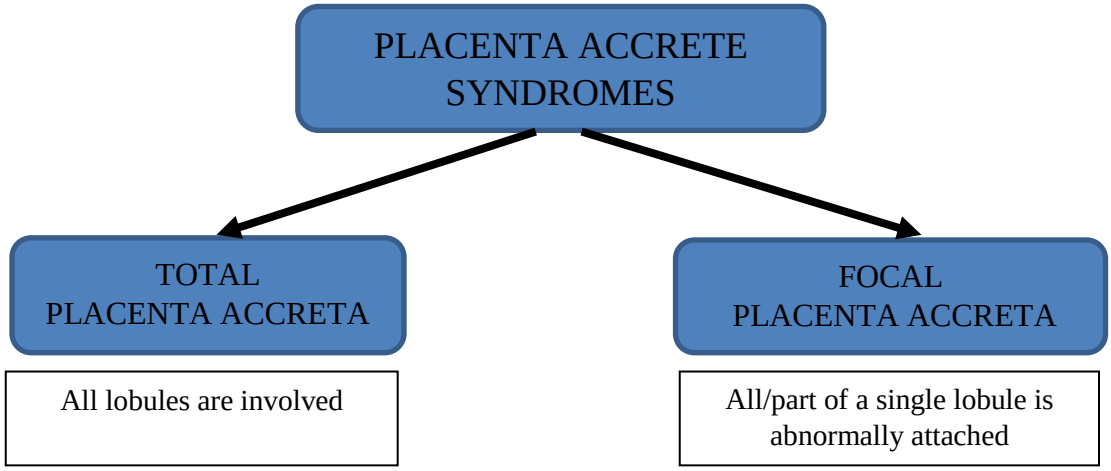


Figure 3.3: Placenta Accrete Syndromes

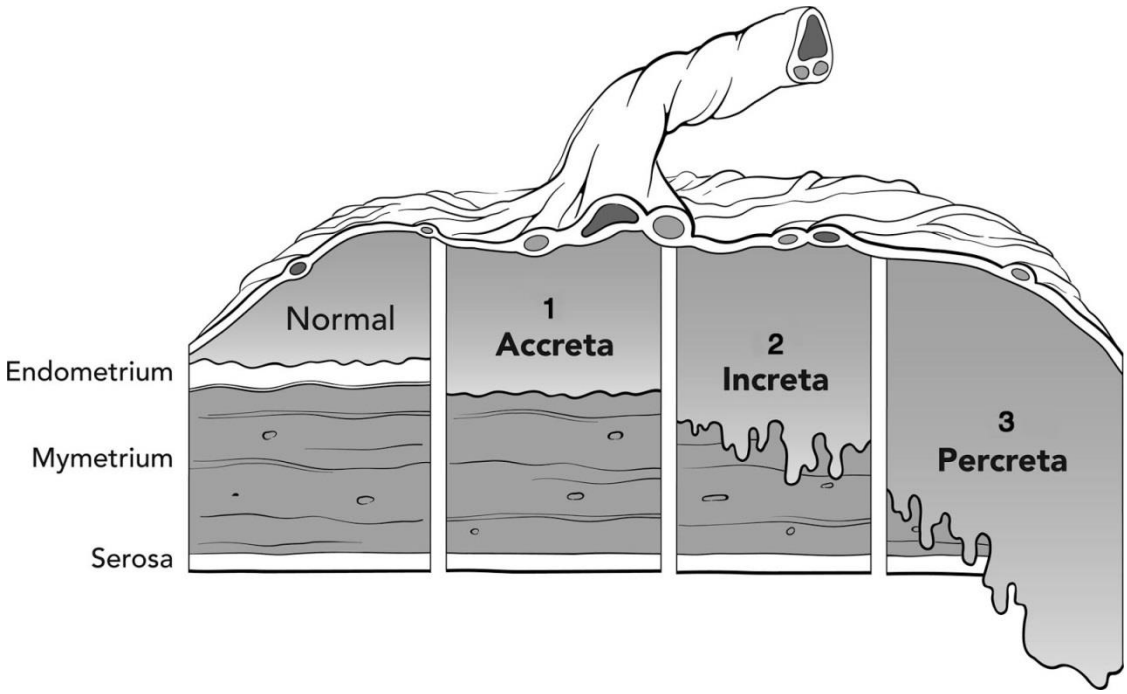


Figure 3.4. Placenta Accrete Syndrome

3.5. Clinical Presentation

The most characteristic event in placenta previa is “painless haemorrhage”[18]. The classical features are sudden onset, painless, apparently causeless and recurrent bleeding. Bleeding that which occurs in a women with placenta previa who had otherwise had an uneventful prenatal course and that which occurs without warning or pain or contractions is termed as “sentinel bleed”. The bleeding usually caeses and only to recur later. Fortunately the initial bleeding is rarely so profuse as to prove fatal. It has a peak incidence around the 34th week. Frequently bleeding has its onset without warning. Preterm delivery is increased in women with placenta previa with bleeding or the presence of uterine

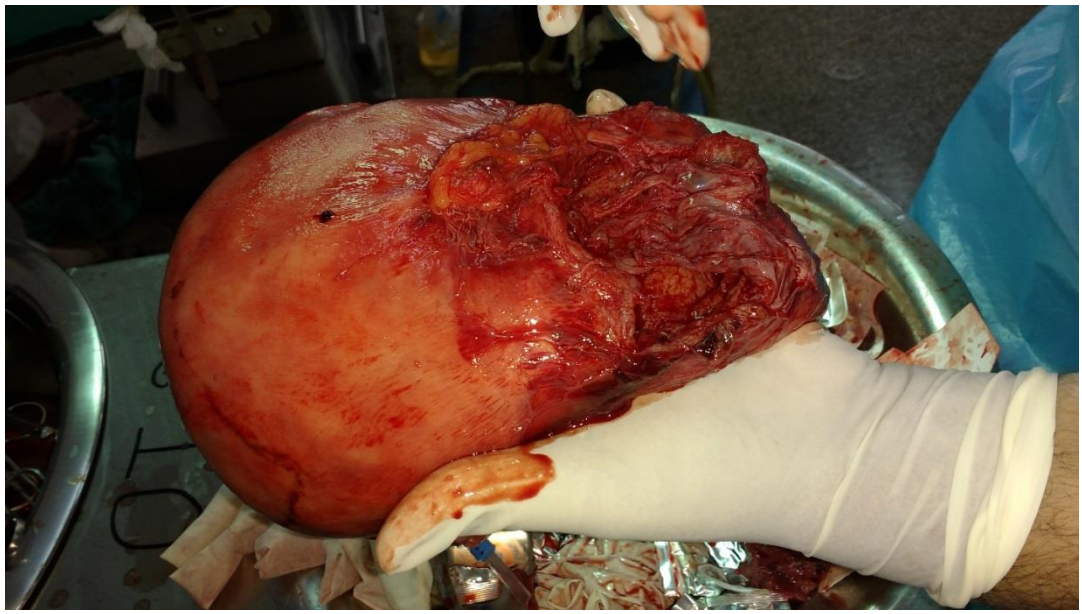


Figure 3.5 Hysterectomy specimen of a case of placenta increta

contraction. Fetal distress in unusual unless the haemorrhage is severe enough to cause maternal hypovolemic shock. Disseminated intravascular coagulation rarely occurs in connection with placenta previa.[19]

3.6. Diagnosis

3.6.1. History

This includes enquiring about the patient's age, obstetric code, gestational age, history of prior similar painless bleeding episodes and the amount of bleeding and whether it is associated with contractions.

3.6.2. Clinical Examination

3.6.2.1. General condition

General condition is proportionate to the visible blood loss. But in the tropics, the picture is often confusing due to pre-existing anemia.

3.6.2.2. Abdominal Examination

The size of the uterus is proportionate to the period of gestation. The uterus feels relaxed, fetal parts are easily felt, without any tenderness. The presenting part will be found higher in major degree of bleeding.

Slowing of the fetal heart on pressing the head down into the pelvis which soon recovers promptly when the pressure is released is suggestive of the presence of low lying placenta specially of posterior type (Stallworthy's sign).

3.6.2.3. Vulval Inspection

1. To note whether the bleeding is still active or ceased.
2. Character of the blood-bright red or dark colored and the amount of blood loss are to be assessed.

3.6.2.4. Speculum Examination

Per speculum examination may be deferred until evidence that the placenta previa does not exist is obtained, as extra uterine causes of antepartum hemorrhage are usually benign and thus need not be diagnosed urgently.

3.6.2.5. Vaginal Examination

Vaginal examination should never be done just for the purpose of diagnosis as it is likely to provoke bleeding.

3.6.2.6. Double setup Examination

Examination of the cervix is never permissible unless the woman is in an operative room with all the preparation for immediate caesarian delivery. With the advent of endovaginal ultrasound the double setup examination belongs to the history of medicine.

3.6.3. Ultrasound

With the advent of recent technological advances in ultrasonography, with its reliability, and interpretation, radiographic and isotopic techniques became outdated.

3.6.3.1. Transabdominal ultrasound (TAS)

It is the simplest, most precise and safest method for placental localization.It is used for quick initial screening. The average accuracy presented is about 96% with its false positive(full bladder) and false negative(fetal head low in pelvis) rate up to 6% and 8% respectively (Lagin,1996)[20].

Factors which decrease the visibility with TAS include the following:-

- Maternal obesity
- Attenuation of the ultrasound beam by the fetal presenting part.

- Myometrial contraction, placental thickness, cervical effacement and extra amniotic blood clots from partial separation of a placenta previa may also leads to a false impression of the position of the placental lower edge.

- Distended urinary bladder

Therefore all studies should be done with full bladder first, followed by stepwise emptying prior to reporting.

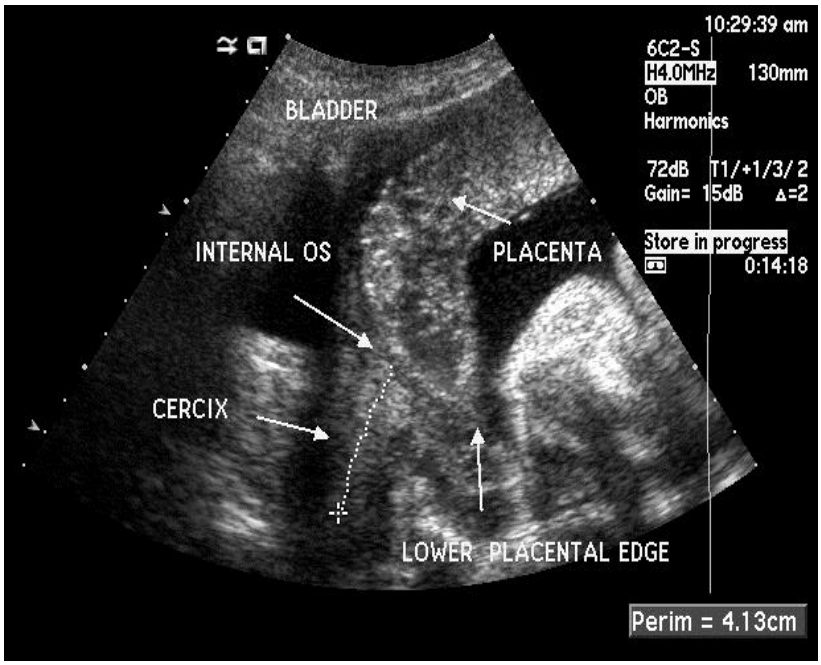


Figure 3.6: *Transabdominal usg picture of placenta previa*

3.6.3.2. Transvaginal Ultrasound (TVS)

It is the diagnostic technique of choice for placenta previa.It is the most accurate(100%)modality of imaging for previa.It is safe and accurate than TAS in locating the placenta especially for the posteriorly situated.While examining,the advocates of TVS recommends that the probe should be inserted no more than 3 cm into the vagina and the angle between the axis of the cervix and that of the vaginal probe should be at least 44^0 with an angle which is sufficient to prevent the probe from inadvent slipping into the cervix. None has experienced any hemorrhagic complications [Cunningham 1989][21].

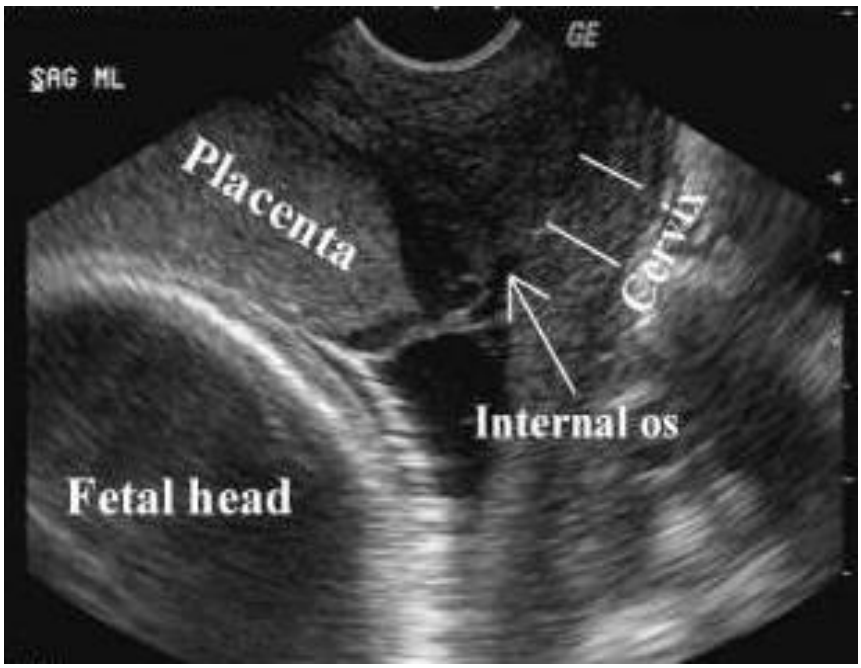


Figure3.7*: Transvaginal usg picture of placenta previa*

3.6.3.3. Transperineal Ultrasound

90% positive predictive value and 100% negative predictive value were reported by Hertzberg [1992][22.]

Transabdominal scan should be performed first and if placenta previa is suspected,TVUS should be proceeded with.If placenta previa is diagnosed in the second trimester,ultrasonography should be repeated at 28 – 32 weeks with a final evaluation at 36 weeks.

Two measurements should be made during ultrasonography:

1. The actual distance between the placental edge and internal os.
   - 0mm - placental edge is touching the internal os
   - 2cm - low lying placenta, vaginal delivery may be offered in the absence of bleeding.

2. If the placenta is covering the os, the extent that the placenta covers the internal os should be documented.
   - Partial previa – if it reaches across the internal os.
   - Total previa – if it crosses the internal os and goes to other side of the cervix.

3.6.3.4. Transvaginal color Doppler

TVS color Doppler imaging improve the diagnostic accuracy in the prediction of the placenta accrete in patients with persistant placenta previa. It is also used to diagnose vasa pevia.The Colour Doppler criteria for diagnosing placenta accreta are as follows[23]:

- ✓ Diffuse intraparenchymal lacunar flow
- ✓ Focal intraparenchymal placental lacunar flow
- ✓ Bladder- uterine serosa interphase hypervascularity
- ✓ Prominent subplacental venous complex
- ✓ Loss of subplacental Doppler vascular signals

  Lacunar flow pattern is directly proportional to abnormally adherent placenta.

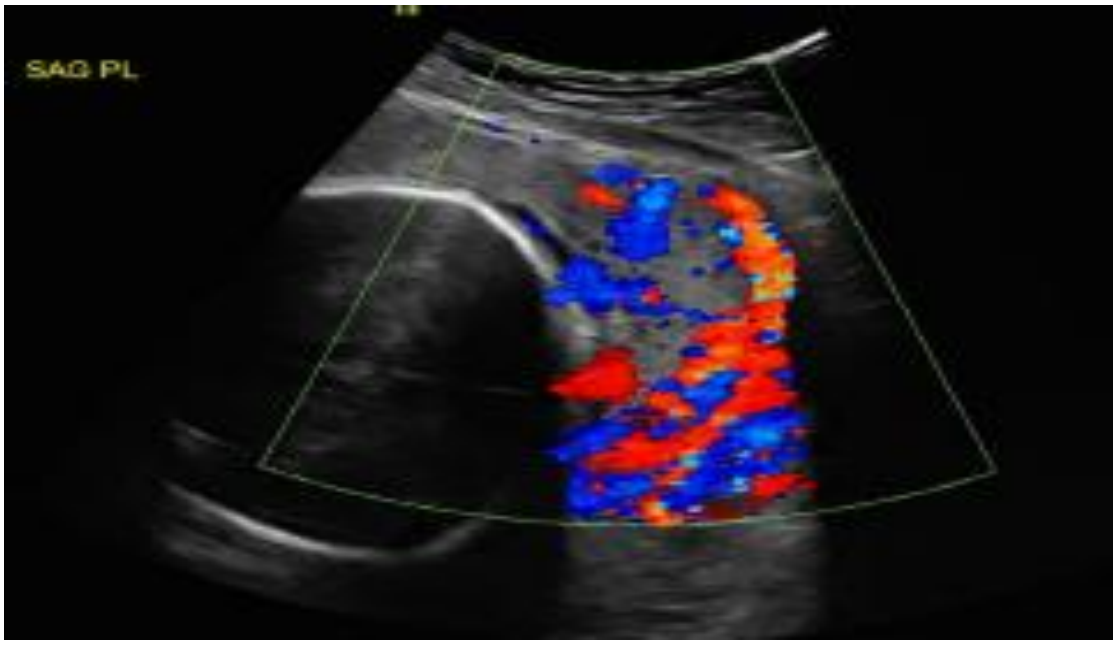


Figure 3.8: Diffuse intraplacental lacunae

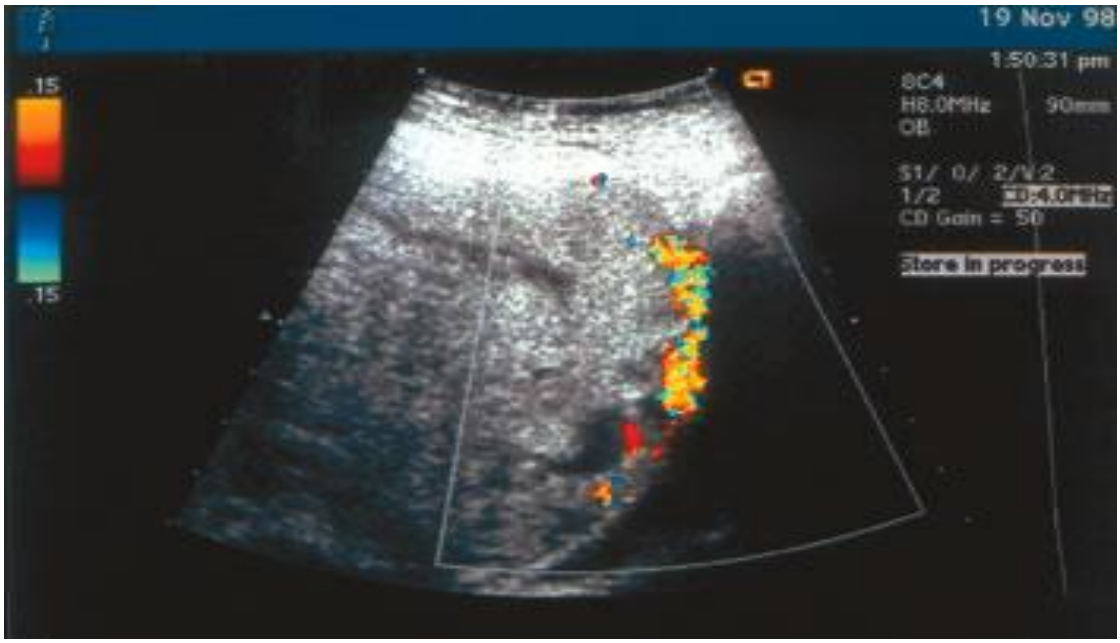


Figure 3.9: *Prominent Subplacental Venous Complexes*

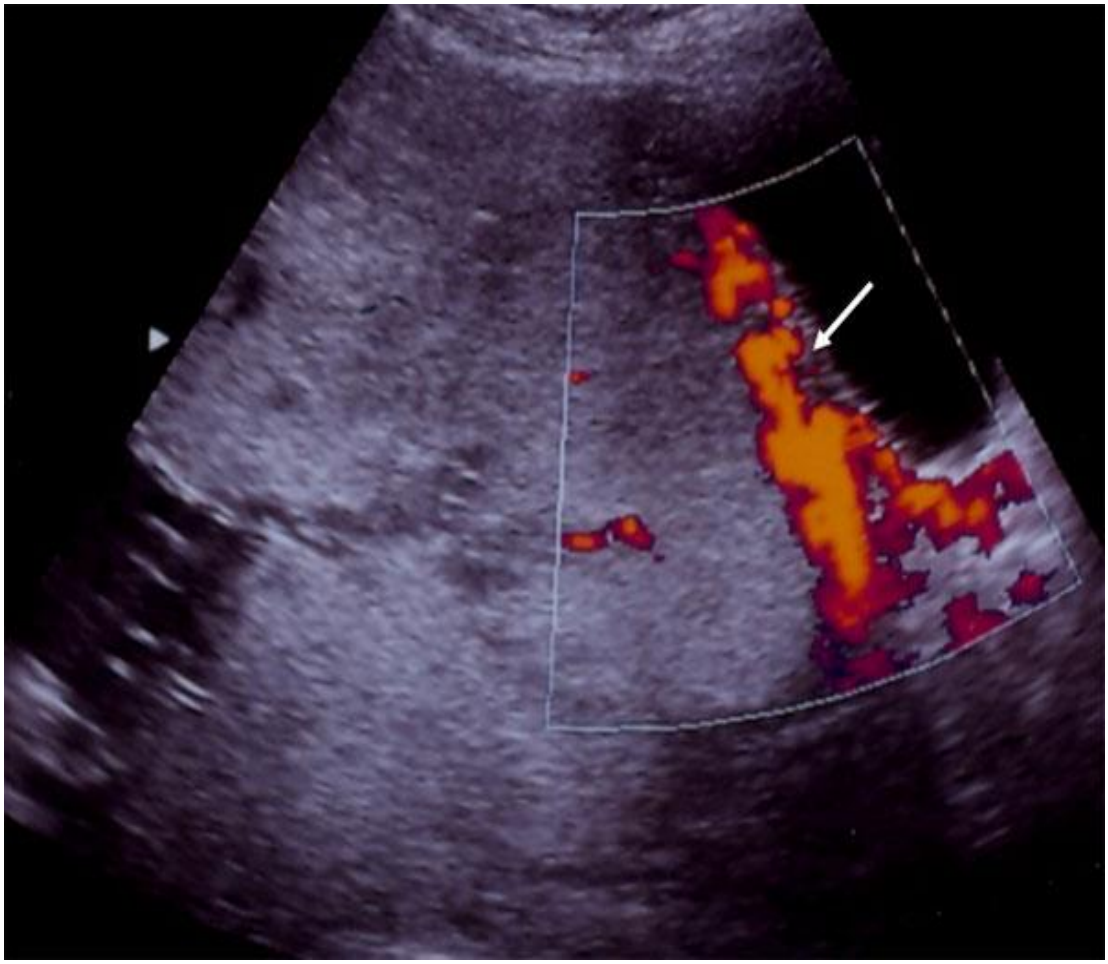


Figure 3.10: Bladder uterine serosa hypervascularity

3.6.4. Magnetic Resonance Imaging

MRI is the most precise method of diagnosing placenta previa and its associated complications. But, at present, due to high cost, it is available in limited numbers of centers and generally used for selected cases. The duration of the examination with MRI for a placenta previa is approximately 20 minutes.[24]

The advantages of MRI are:

- Can be done without full bladder
- Removes operator error
- Useful in posterior placenta
- To diagnosis placenta accrete and percreta.

MRI is a complementary technique in diagnosing placenta accrete and is usually reserved when USG is inconclusive or incomplete.MRI features of a normal placenta are as follows:

- Homogeneous placenta
- Thin, regularly spaced placenta
- Normal subplacental vascularity
- Triple layered sandwich appearance of the myometrium
- Normal gravid uterus with smooth contour in the shape of a pear

MRI features of placenta accreta are as follows[25]:

- ✓ Markedly heterogeneous placenta
- ✓ Thick intraplacental dark bands
- ✓ Disorganized abnormal intraplacental vascularity

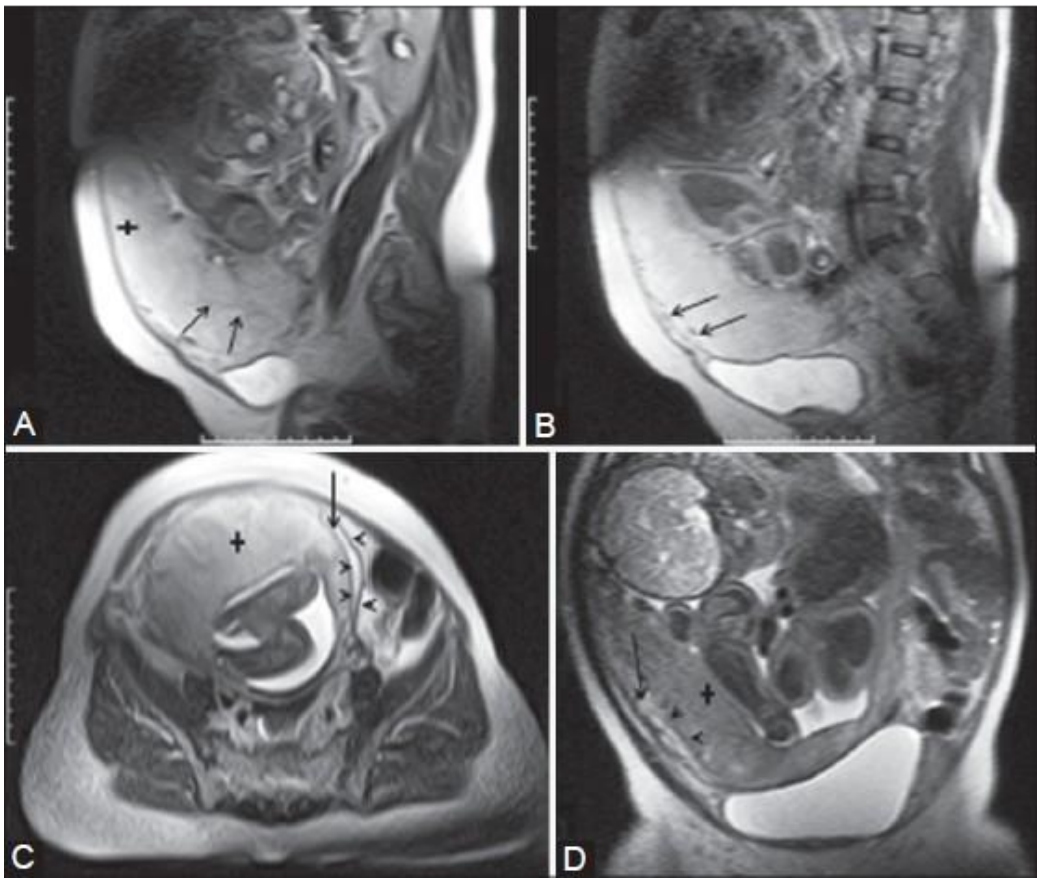


Figure 3.11: MRI appearance of normal placenta

A*)homogeneous placenta(+) with normal placental septa(arrows)*

B) *Normal sub placental vascularity(arrows)*

C)&D)*Axial & Coronal view showing homogeneous placenta(+) and triple layered endometrium.*

- ✓ Uterine bulging
- ✓ Focal myometrial interruptions(high specificity for percreta and increta)
- ✓ Tenting of urinary bladder(highly specific for percreta)

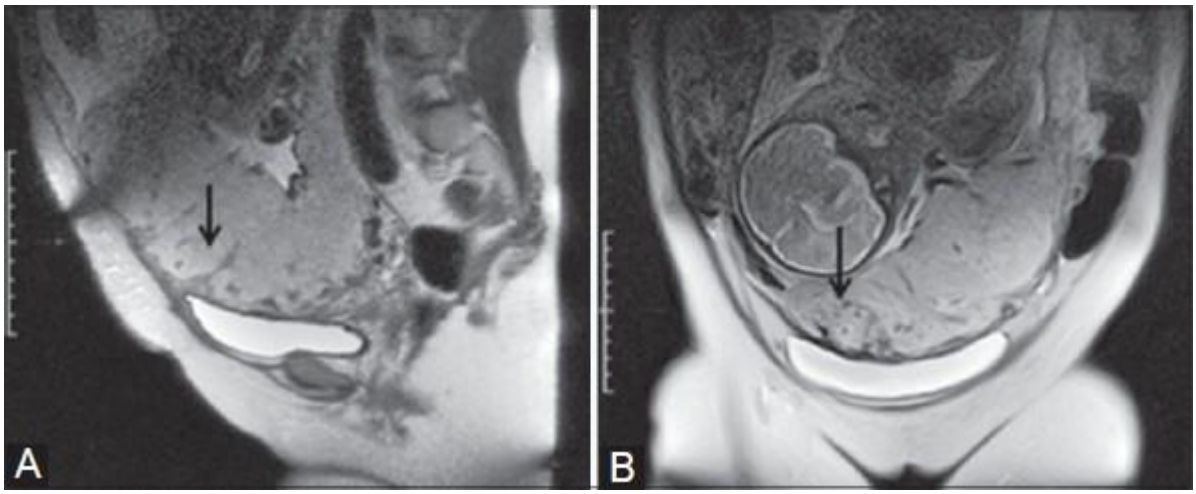


Figure 3.12:A)&B).Sagittal & Coronal MR images showing a complete previa with increta heterogenous placenta(arrows)due to thick intraplacental bands and abnormal vascularity.

3.6.5. Radio graphy

a) Cystography- It is now only of historic interest
b) Soft tissue radiography
c) Detection of placental calcification
d) Radio isotope localization of placenta with I^{131},I,TC^{99},Cr^{51}

3.6.6. Infra-red thermography

This is of historical interest which is no longer in use now a days.

3.7. Transmigration

The term migration is clearly a misnomer. The majority of placenta previa diagnosed in second trimester resolves by term.The incidence of placenta previa early in pregnancy ranged between 5 to 15%[26]. But the incidence at term is 0.5%.

This is known as placental migration. This occurs due to

- ✓ Differential growth of upper and lower segment of the uterus.
- ✓ Growth of placenta implanted in the lower segment towards the more vascular upper segment,along with atrophy of the distal part.

Migration depends on:

- ➢ Gestational age at diagnosis: earlier the gestational age at diagnosis,more the chances of migration.
- ➢ Extent covering the os: Placenta covering the os are less likely to migrate;25% persists as previa. Marginal placenta previa diagnosd early in gestation are more likely to migrate and only 2.5% persists as previa.

- Location:Placentae in the anterior wall are less likely to migrate than those in the posterior wall.

3.8. Differential Diagnosis[27]

1. Abruptio placentae
2. Marginal sinus rupture
3. Vasa Previa
4. Bloody show
5. Local Causes
    - Cervicitis
    - Cervical erosion
    - Endocervical polyps
    - Cancer of cervix
    - Vaginal infections
    - Foregin bodies
    - Genital lacerations
    - Degenerating uterine myomata

3.9. Management

Management strategies are based on the following:

- The maternal condition and amount of bleeding

- Fetal condition (gestational age and expected birth weight)
- Neonatal facilities.

3.9.1. Antenatal Management

Inpatient management is still appropriate for women with major placenta previa in the third trimester. Prior to delivery all women with placenta previa and their partners should have had antenatal discussion regarding delivery and possible blood transfusion requirements. Studies show that patients undergoing cerclage have reached more advanced gestational ages and larger birth weights than patients treated with expectant management alone. On the contrary, the RCOG guidelines defers from the above statements, pointing out the use of cervical cerclage is not backed up by sufficient evidence. [28]

Tocolysis for treatment of uterine activity in the presence of bleeding due to placenta previa can be useful[29]. Magnesium sulfate has become the drug of choice for the treatment of patients with placenta previa [30]. If ritodrine or terbutaline are used, the maternal vital signs should be in the normal range and there should be no bleeding.

3.9.2. Management of patients with severe bleeding

Patients with placenta previa should be managed in a tertiary center with neonatal facilities. The efficient management plan includes:

3.9.2.1. Life support measure[31]

- If the patient is in shock two intravenous line with a 16 gauge cannula should be established.
- 20 ml of blood should be obtained for evaluating complete blood count.
- 4 units of blood should be crossmatched.
- Fluid replacement and blood transfusion to be started.
- Intensive observation and monitoring.
- Assessment of renal function and establishment of central venous pressure line.

There is no evidenvce to support the use of autologous blood transfusion for placenta previa. (Dismoor MJ,1995)[32].

3.9.2.2. Fetal Evaluation

No time is usually available for an in depth fetal evaluation, while establishing the life support measures. However fetal heart rate monitoring and ultrasound examination should be performed to determine fetal number, position, estimated fetal weight and placental localization.

3.9.2.3. Absolute Indication for Delivery

- Persistent haemorrhage causing maternal haemodynamic instability at any stage in pregnancy.
- Bleeding of any type at fetal maturity and fetal distress at viable gestations.

3.9.2.3.1. Delivery

Patients with placenta previa presenting with severe bleeding should be delivered by caesarian section irrespective of the type of placenta previa. Any women going to theatre with known placenta previa should be delivered by the most experienced obstetrician available.

3.9.2.3.2. Anesthesia

The anesthesia of choice for the patient who is bleeding or who may bleed is general anesthesia with endotracheal intubation. However recent evidence from the USA suggests that regional anesthesia can be safe. Frederisken MC *et al*.,(1999) and Praekh N 2000[33] *et al*., also observed the same in their studies.

3.9.2.3.3. Type of Incision

In most cases a transverse uterine incision is made. Due to the occasional risk of fetal bleeding resulting from an incision into an anterior placenta, a vertical incision is sometimes recommended in these circumstances. When difficulties are encountered with transverse lower segment incisions these maybe converted to T, J, or U shaped incisions.

The surgeon can reach the fetus by either cutting directly through the placenta or by reaching around the placenta caudally or laterally. The former approach may be quicker but to be discouraged generally as it can result in severe fetal haemorrhage[34].

3.9.3. Post-partum haemorrhage

Because of the poorly contractile nature of the lower uterine segment there may be uncontrollable haemorrhage following placental removal. The various methods to control blood loss discussed by the experts are as follows:

- Uterotonic agents administered systemically or infiltrated localy may help.
- Bimanual compression.
- Uterine Packing.
- Aortic compression (DHSS 1986).
- Over sewing the implantation site.
- Figure of ‘8’ suture.
- Circular interupped suture around the lower segment above and below the transverse incision (Cho and collegues 1991).
- B lynch suture[35] (brace suture).
- Modified B lynch suture.
- Isthmic cervical apposition suture.

- Uterine artery ligation.
- Lower uterine vessel ligation.
- Internal Iliac artery ligation.
- Step wise devascularisation.
- Arterial embolization.
- Argon beam coagulator.
- Surgical Management – caesarian hysterectomy (Total hysterectomy)

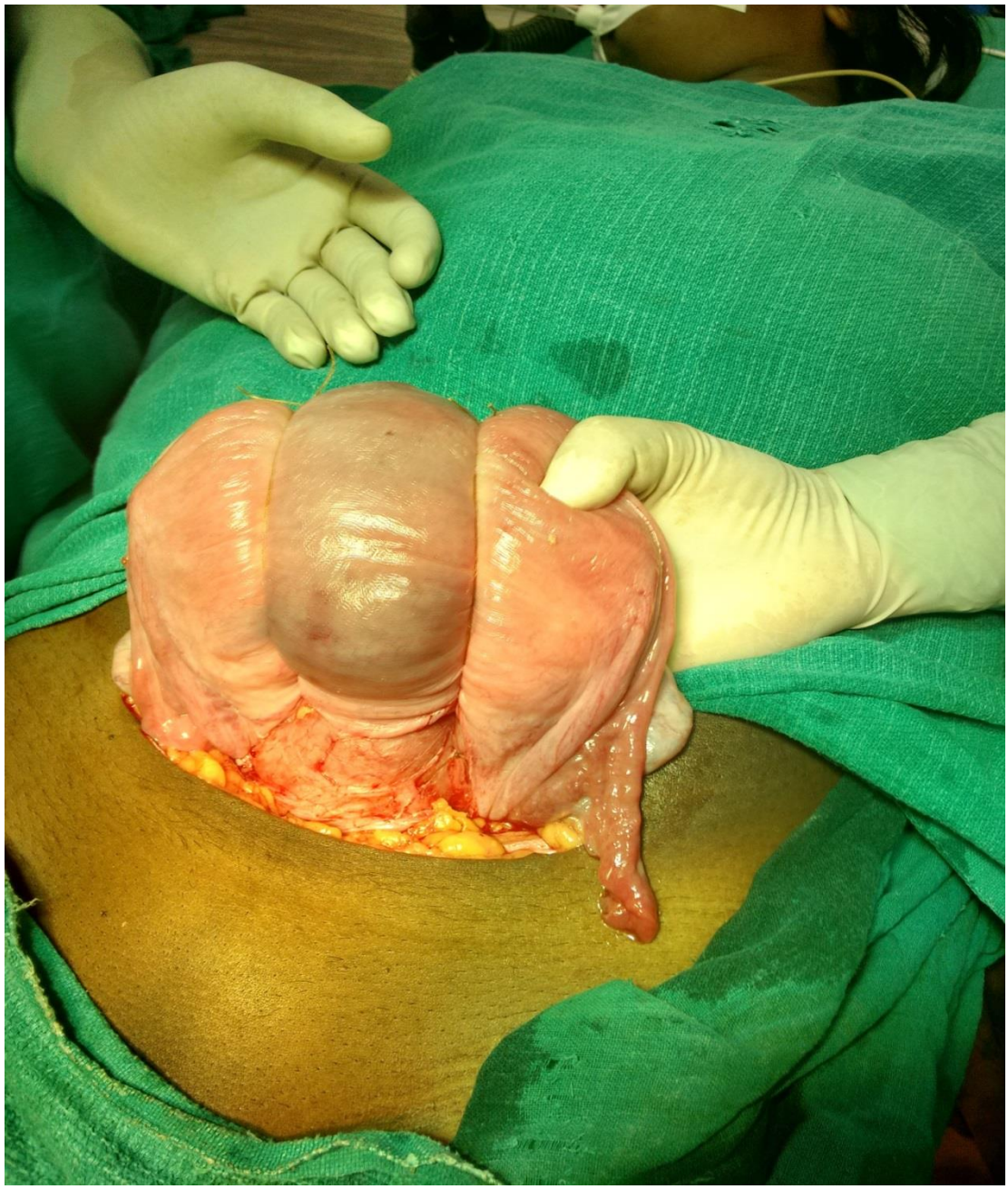


Figure 3.13*:Modified B – Lynch sutures*

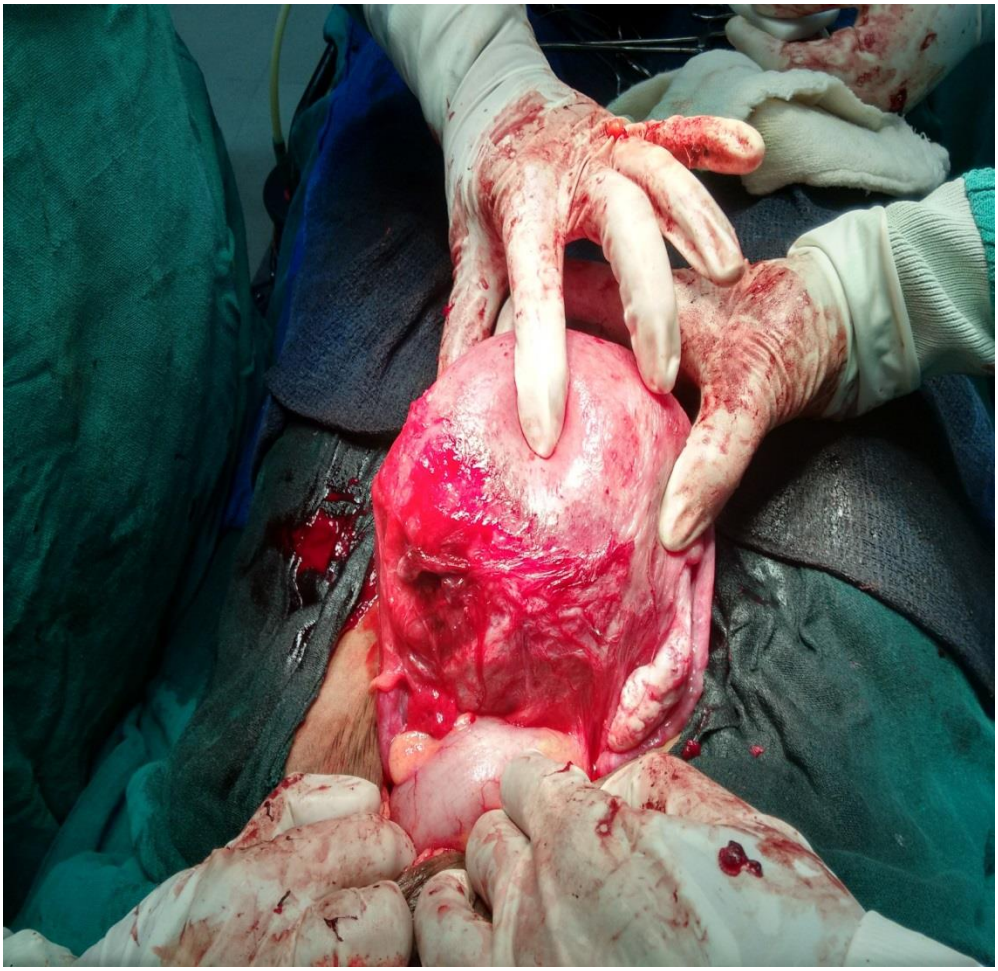


Figure 3.14:*A Case of Placenta increta procceded to hysterectomy*

3.9.4. Summary of Expectant management

- ✓ Selection criteria. Only patients in stable conditions and remote from term.
- ✓ The patient should stay in the hospital for the duration of her pregnancy.
- ✓ Complete bed rest with limited bathroom facilities.
- ✓ Tocolysis.
- ✓ Betamethsone 12mg im 24 hours apart - two doses or

  Dexamethasone 6mg im 12 hours apart - four doses

  A Cochrane systemic review indicates that even a single dose of antenatal corticosteroids reduces significantly the risk of intraventricular haemorrhage and neonatal mortality in preterm babies in addition to respiratory distress syndrome[37].
- ✓ $FeSO_4$ orally 3 times daily.
- ✓ Stool softeners, high residue diet.
- ✓ Test weekly blood count,maintain Hb level above 11g/dl using blood transfusion if necessary.

- ✓ Avoidance of per vaginal examination, intercourse, douching and pessaries.

- ✓ Criteria for delivery

Before 36 weeks indications are mostly maternal conditions or recurrent bleeding. After 36 weeks terminate pregnancy as soon as a mature L/S ratio is obtained.

Trial of vaginal delivery is appropriate in cases with a placenta to os distance > 2cm, cases where the placenta is more than 2 cm from internal os have a greater than 60% chances of vaginal delivery[38]. Vaginal delivery can also be considered for patients with pre viable gestations or intrauterine fetal demise.

3.9.5. Fetal Risks

Different authors present the following fetal risks in their series.

- Premature delivery.
- Low birth weight.
- Sub optional fetal growth.
- Sudden intra uterine death.

- The risk of neonatal mortality was higher for babies born to women with placenta previa than for babies born to women

without placenta previa who were delivered at greater than or equal to 37 weeks of gestation.

- Anemia
- Respiratory distress syndrome/ Birth asphyxia
- Perinatal mortality has been declined from 60% in 1990 to 2.3% in 1999.
- High risk for sudden infant death syndrome (SIDS).
- Long term follow-up shows normal growth and psychomotor development but a small increase in the incidence of neurological abnormalities.

3.9.6. Maternal Risks

- Antepartum, intrapartum and postpartum haemorrhage.
- Anaesthetic and surgical risks.
- Blood transfusion hazards.
- Air embolism.
- Postpartum sepsis with ascending infection through raw placental bed.

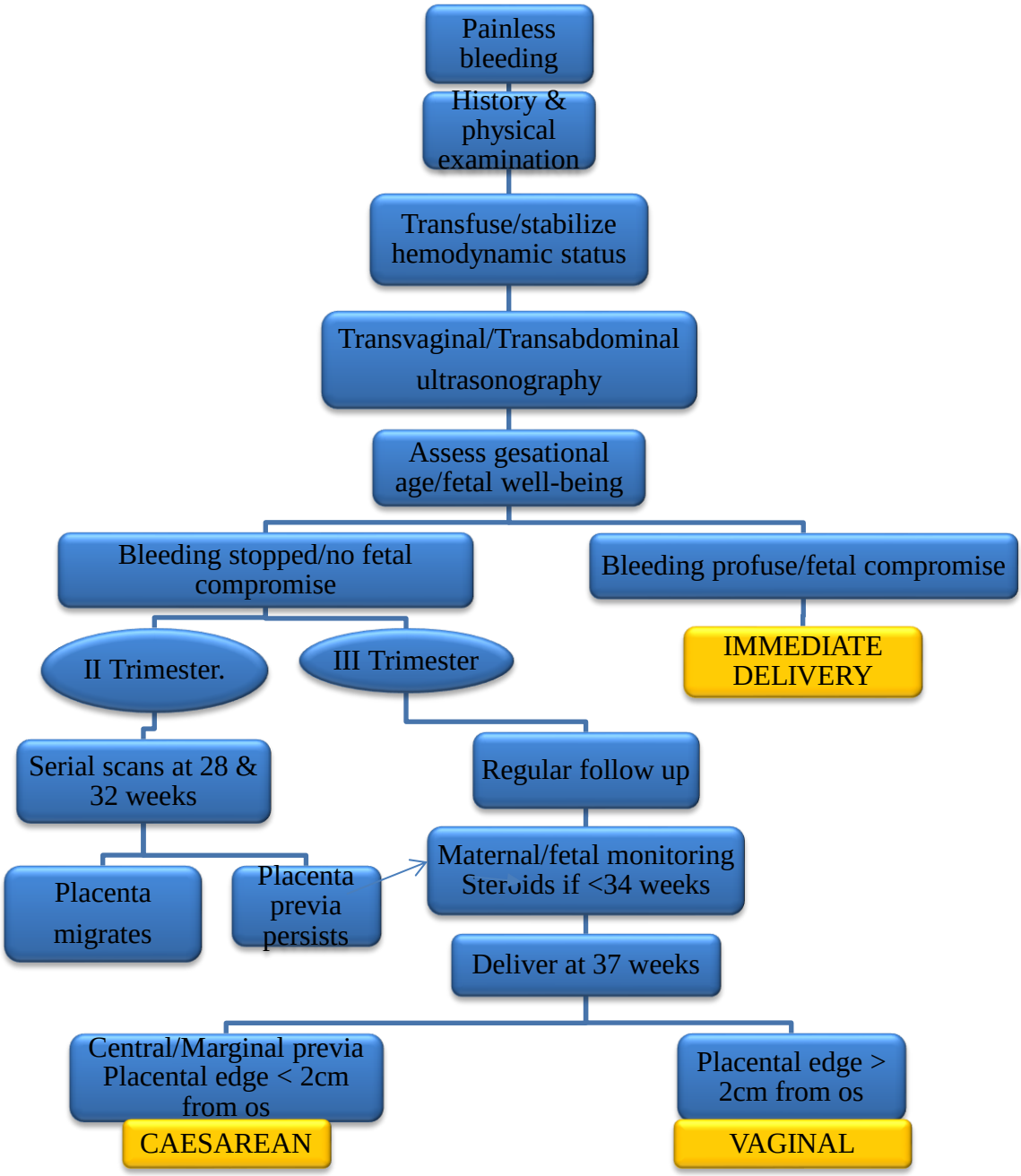


Figure 3.14: *Management Of Placenta Previa*

CHAPTER 4

AIM OF THE STUDY

- To study the incidence of placenta previa in general obstetric population.
- To evaluate and to find out the occurrence of placenta previa under the influence of the following factors like maternal age, gravidity, parity, previous history of abortion, previous history of uterine scars.
- To study the course of pregnancy and labor in placenta previa.
- To study the localization of placenta and its penetration into the myometrium and adjacent structures using Color Doppler Ultrasound and MRI.

CHAPTER 5

MATERIALS AND METHODS

5.1. MATERIALS

All the cases of placenta previa admitted and delivered at the Government R.S.R.M. Lying – in Hospital,Chennai -600013 during the period of Sept 2015 to Sept 2016 were studied in detail.

5.2. METHODOLOGY

A detailed history is elicited from all the cases of antenatal women from 28 to 40 weeks with ultrasound report of varying degrees of placenta previa and they are subjected to

- ✓ General Examination
- ✓ Obstetric Examination
- ✓ Imaging with Colour Doppler Ultrasound and MRI to analyze placental localization, degrees of penetration into the myometrium and surrounding structures.
- ✓ The course of the pregnancy and mode of delivery, complications if any are all noted.
- ✓ Post-operative outcome for both mother and baby are noted.

5.2.1.Inclusion Criteria

- All pregnancies with Ultrasound report of low lying placenta with distance between the lower end of placenta and internal os being 2.5 cm or less.
- Gestational age: 28 to 40 weeks.

5.2.2.Exclusion Criteria

- Patients in active labour.
- Placenta previa with active bleeding.
- Abruptio placenta.
- Vasa previa.
- Gestational age less than 28 weeks.

5.2.3.Sample Size

25 cases of placenta previa.

5.2.4.Data Collection

Preformatted proforma enclosed along with.

5.2.5.Procedure and Investigation Details

- Colour Doppler Ultrasound.
- M.R.I.

5.2.6.Analysis plan

Statistical analysis

CHAPTER 6

OBSERVATION

A prospective study of cases of placenta previa delivered at Govt. RSRM lying in hospital Chennai from September 2015 to September 2016. The total number of deliveries during this period was 12,462 out of these 63 cases of placenta previa were noticed 25 cases were selected for this study as they satisfied the inclusion exclusion criteria of the present study.

6.1.Incidence of placenta previa

The incidence of placenta previa among total deliveries during this period in our hospital is 0.50%. The incidence of placenta previa in total live births during the study period is 5.0 per thousand.

6.2.Age- wise distribution

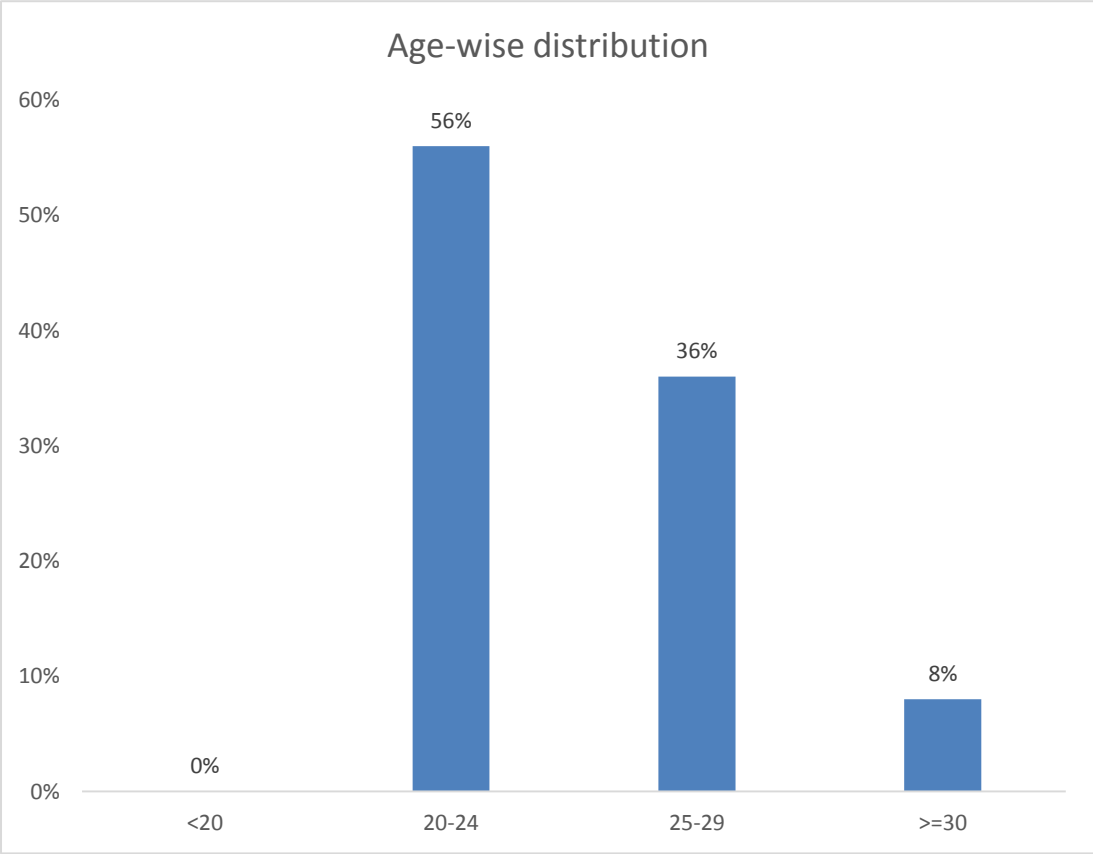
Age	No.of cases	Percentage
<20	0	0%
20-24	14	56%
25-29	9	36%
>=30	2	8%

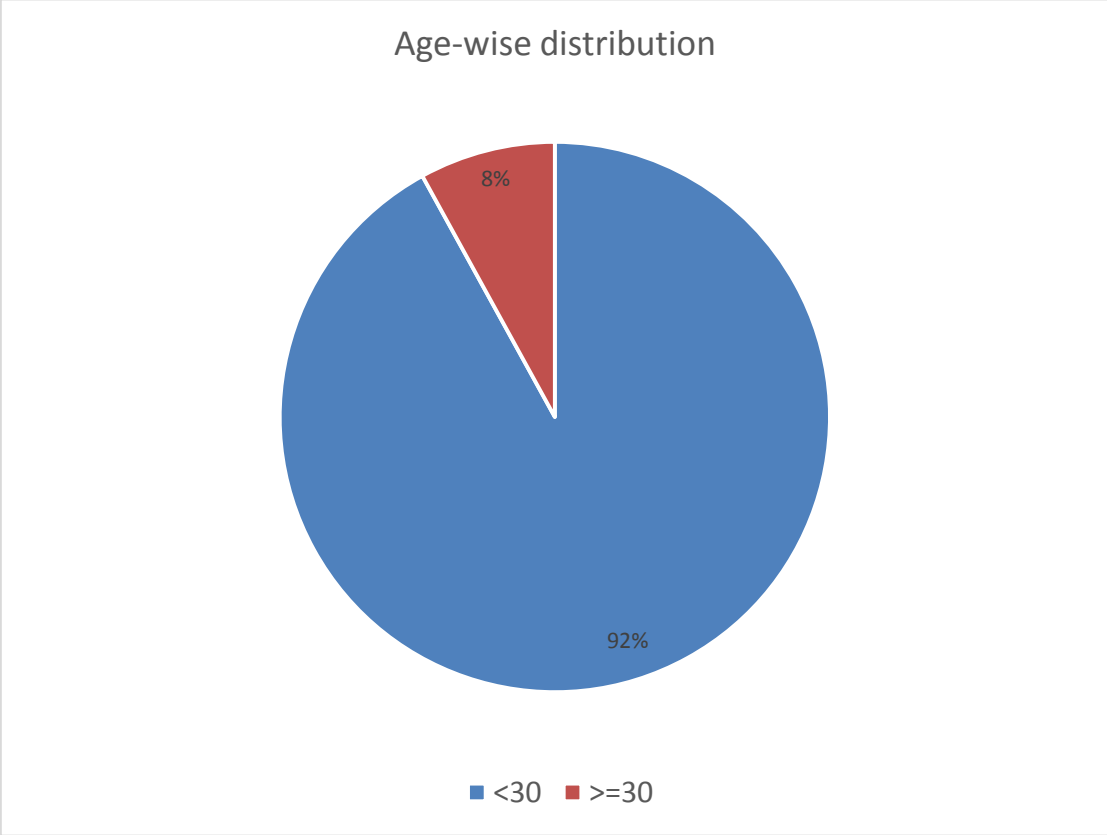
Table 1*:Age-wise distribution*

From table 1 & 2,more than 50% of the cases fall in the age group 20-24.The average age group in our study population is 25.24.This result is statistically significant at 95% CI with a X^2 value of 19.96 and P-value 0.0001.

Age	No. of cases	Percentage
<30	23	92%
>=30	2	8%

***Table 2**:Age-wise distribution*





6.3.Distribution based on gravidity

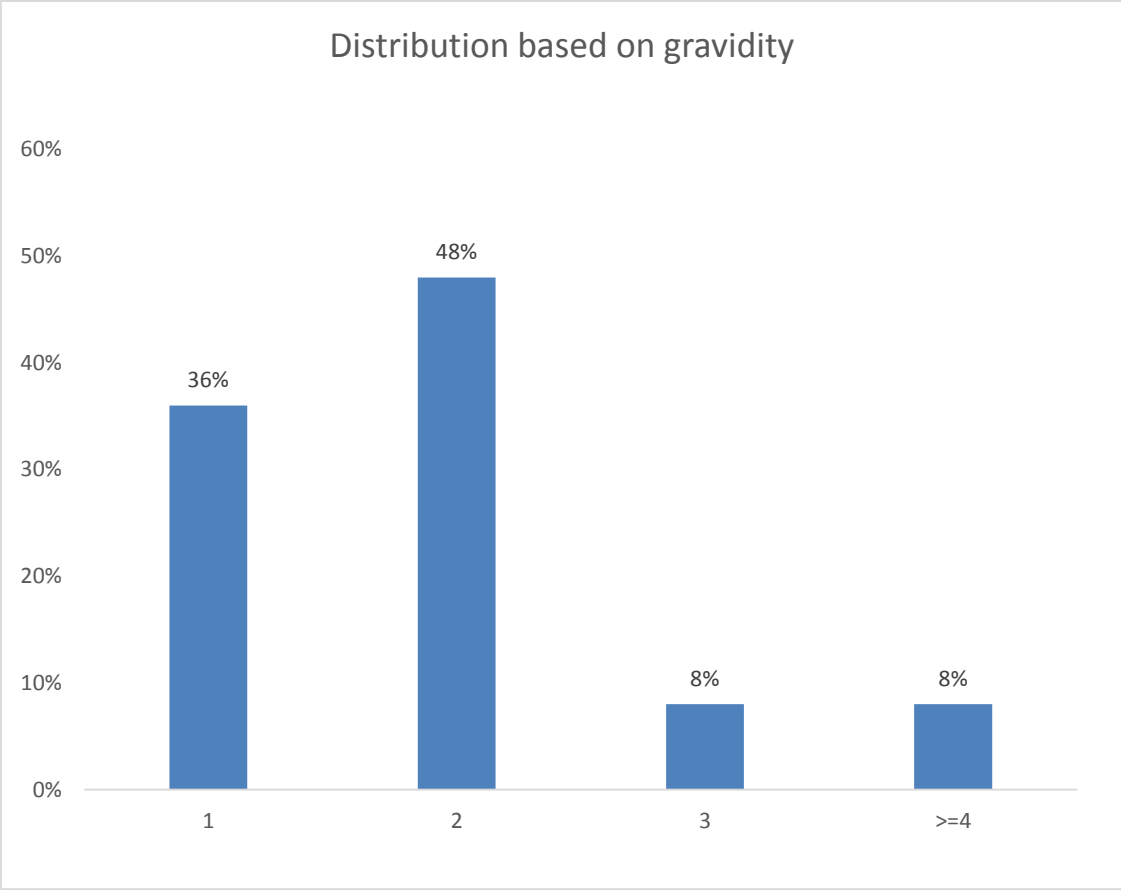
Gravidity	No.of cases	Percentage
1	9	36%
2	12	48%
3	2	8%
>=4	2	8%

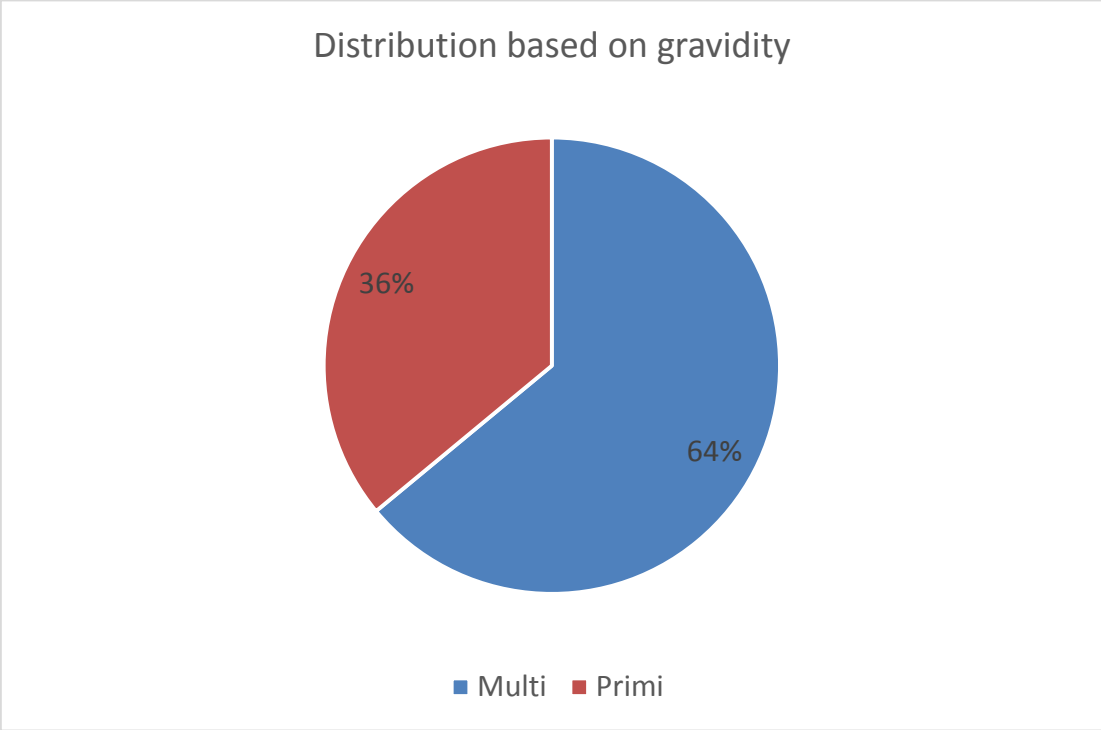
***Table 3**:Gravidity-wise distribution*

Gravidity	No.of cases	Percentage
Multi	16	64%
Primi	9	36%

Table 4*:Gravidity wise distribution*

Based on table 3 & table 4,maximum cases (64%) of placenta previa were observed in multigravida.This result is statistically significant at 95% CI with a X^2 value of 12.28 and P-value 0.0064.





6.4.Distribution based on parity

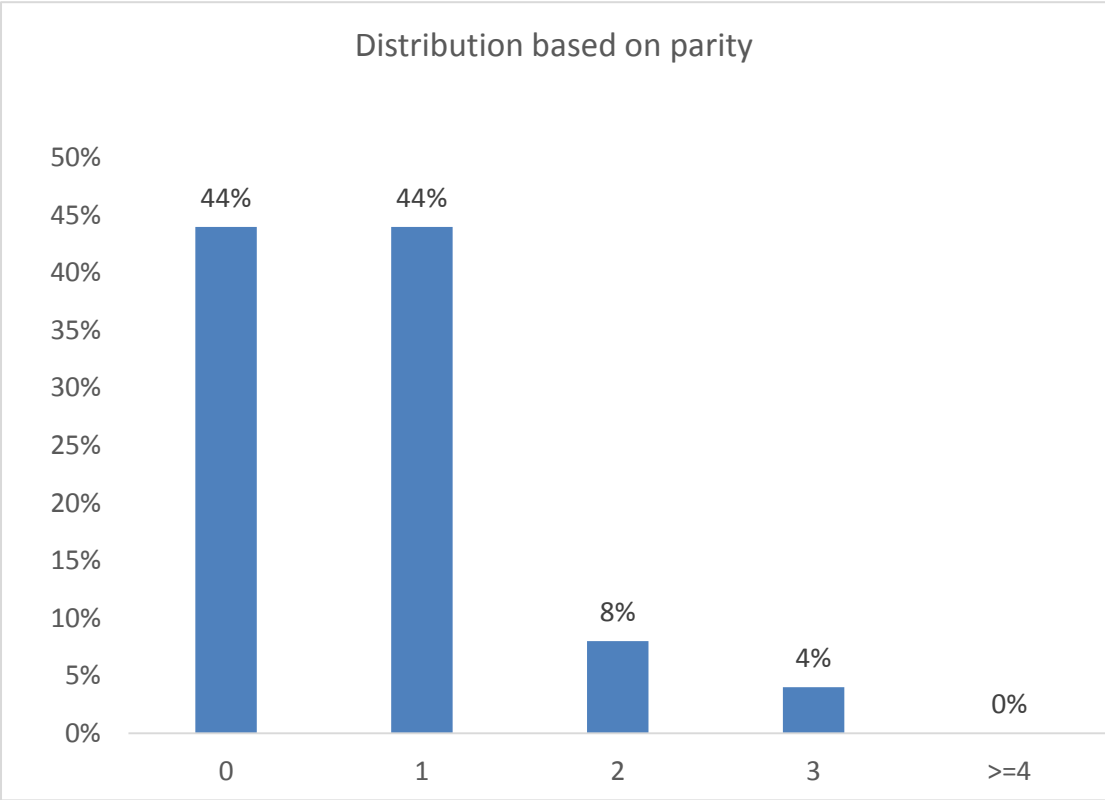
Parity	No. of cases	Percentage
0	11	44%
1	11	44%
2	2	8%
3	1	4%
>=4	0	0%

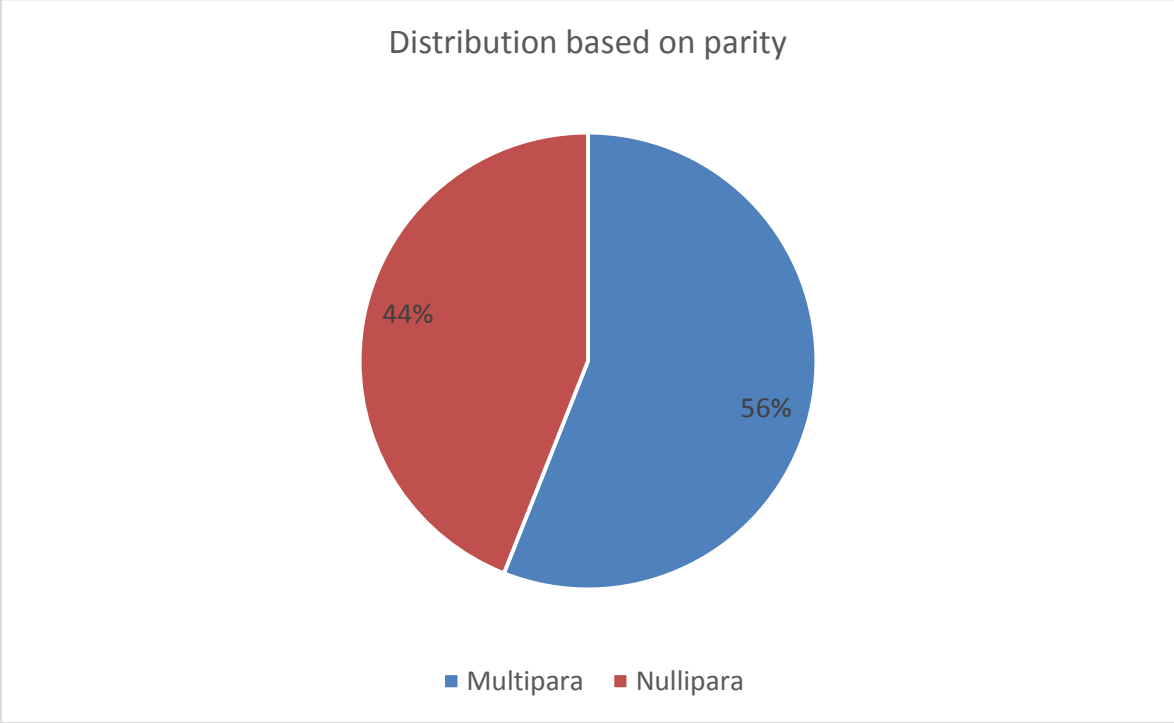
***Table 5**:Parity wise distribution*

Parity	No. of cases	Percentage
Multipara	14	56%
Primipara	11	44%

***Table 6**:Parity wise distribution*

From table 5 & 6,about 56% of the cases are patients giving birth for the second time or more. This result is statistically significant at 95% CI with a X^2 value of 24.40 and P-value 0.00006.It is also seen from the above 2 tables that even primiparas account for 44% for the study population.



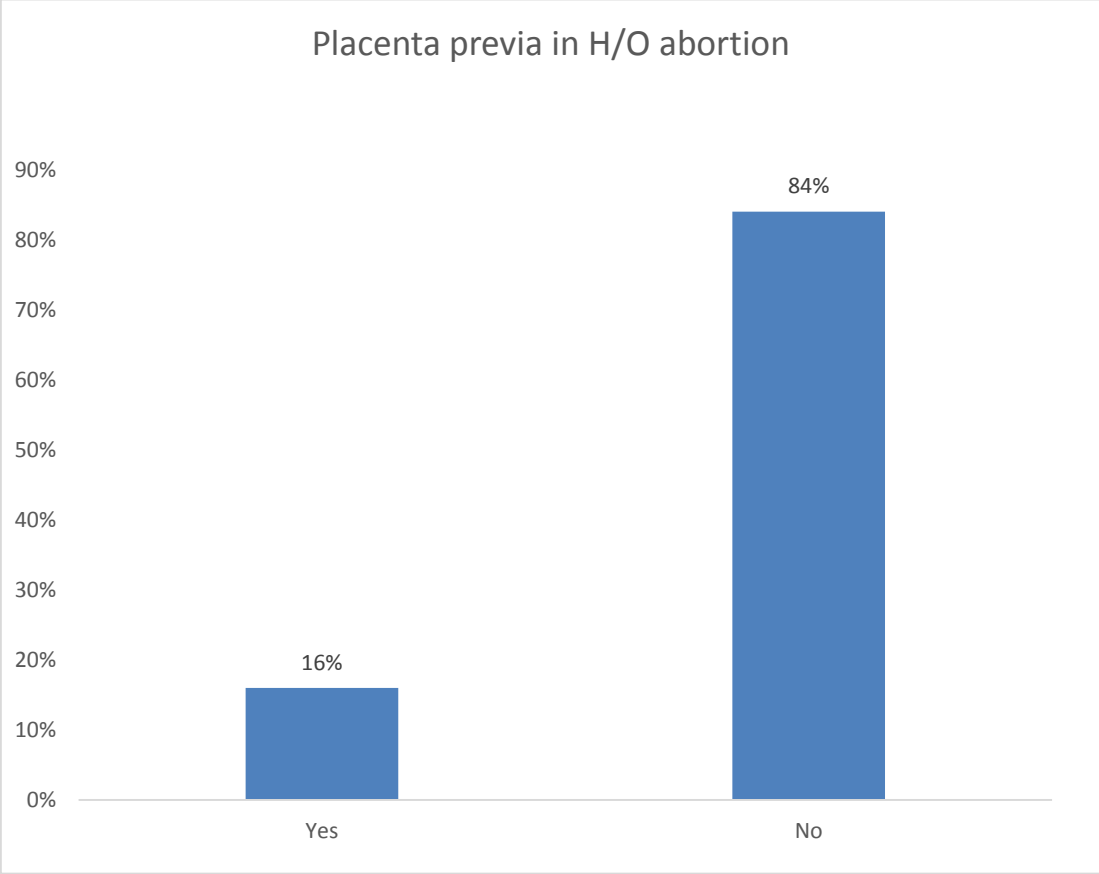


6.5.Placenta previa in history of abortions

Abortion	No.of cases	Percentage
Yes	4	16%
No	21	84%

***Table 7**:Placenta previa and previous abortions*

According to table 7,only 16% of cases have a history of abortion. This result is statistically significant at 95% CI with a X^2 value of 11.56 and P-value 0.0006.

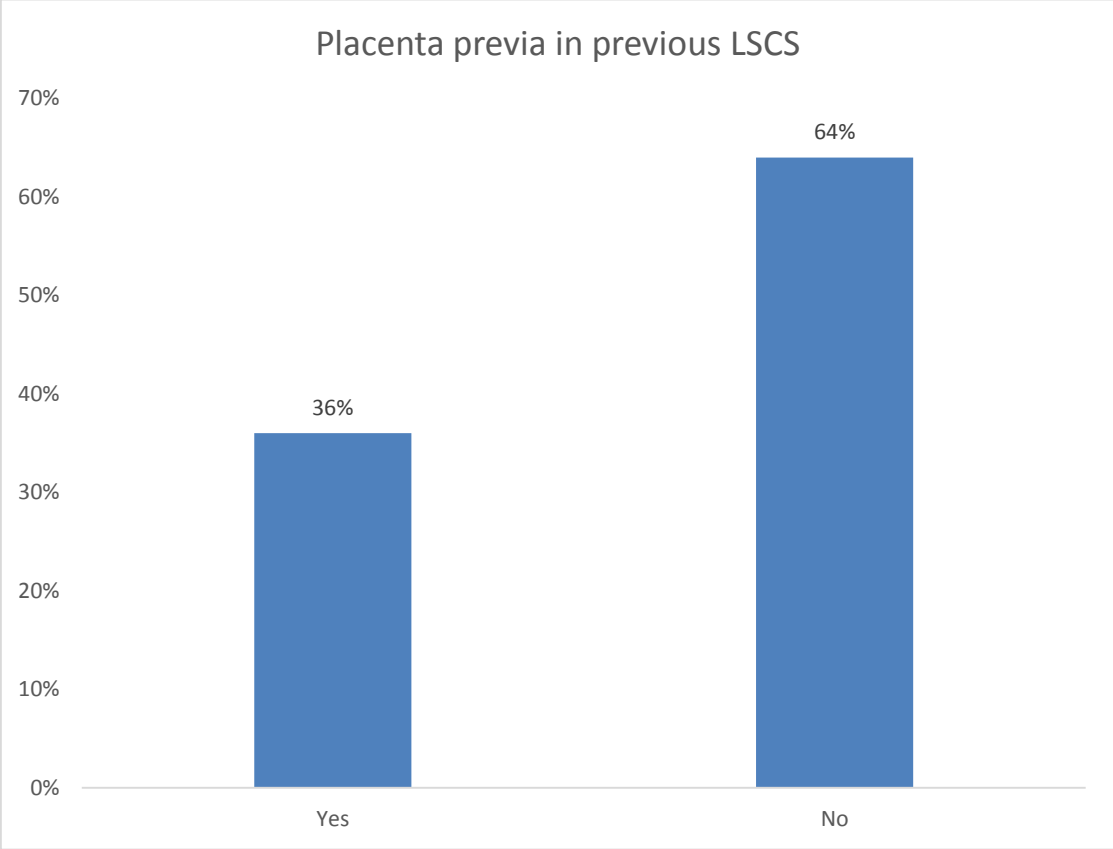


6.6.Placenta previa in previous LSCS

Previous LSCS	No. of cases	Percentage
YES	9	36%
NO	16	64%

***Table 8**:Placenta previa in Prev. LSCS.*

From table8,about 64% of observed cases did not have a history of prior LSCS.This result is not statistically significant at 95% CI with a X^2 value of 1.96 and P-value 0.1615.

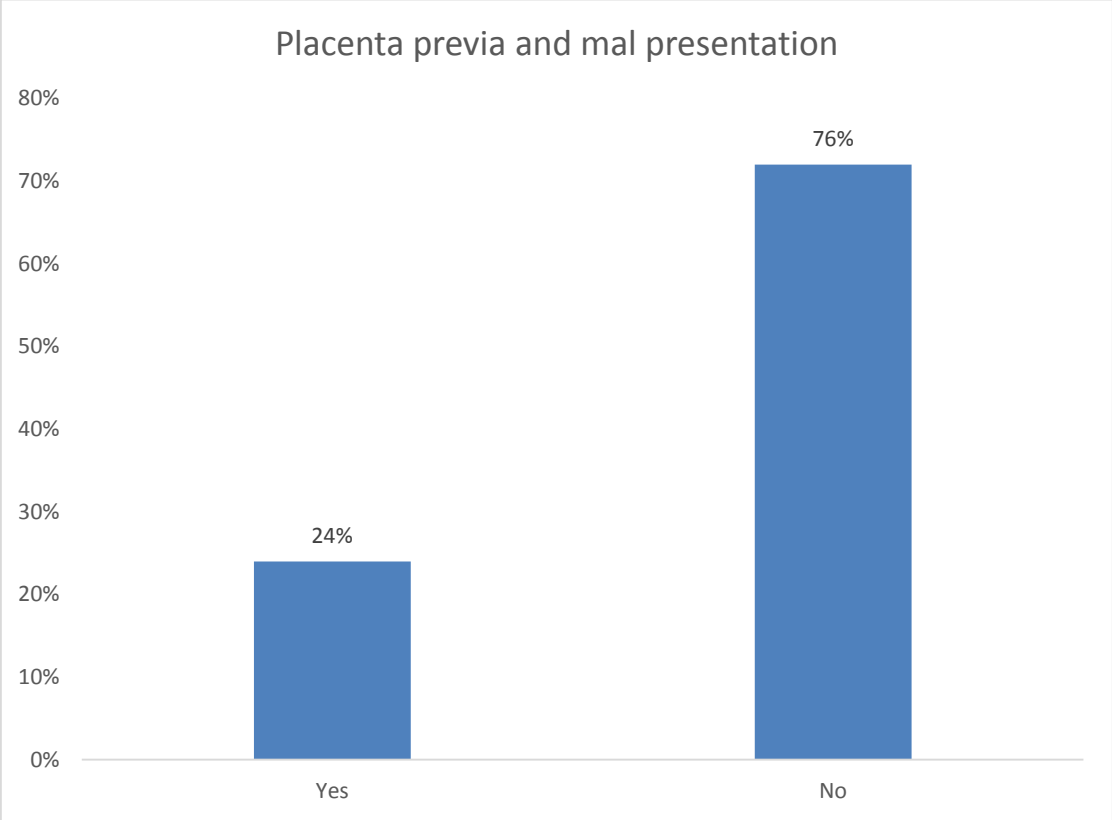


6.7.Placenta previa and mal presentation:

Mal presentation	No. of cases	Percentage
Yes	6	24%
No	19	76%

***Table 9**:Placenta previa and Malpresentation*

Based on table9,fetal positions of 24% of cases had malpresentations.This result is statistically significant at 95% CI with a X^2 value of 6.76 and P-value 0.0093.

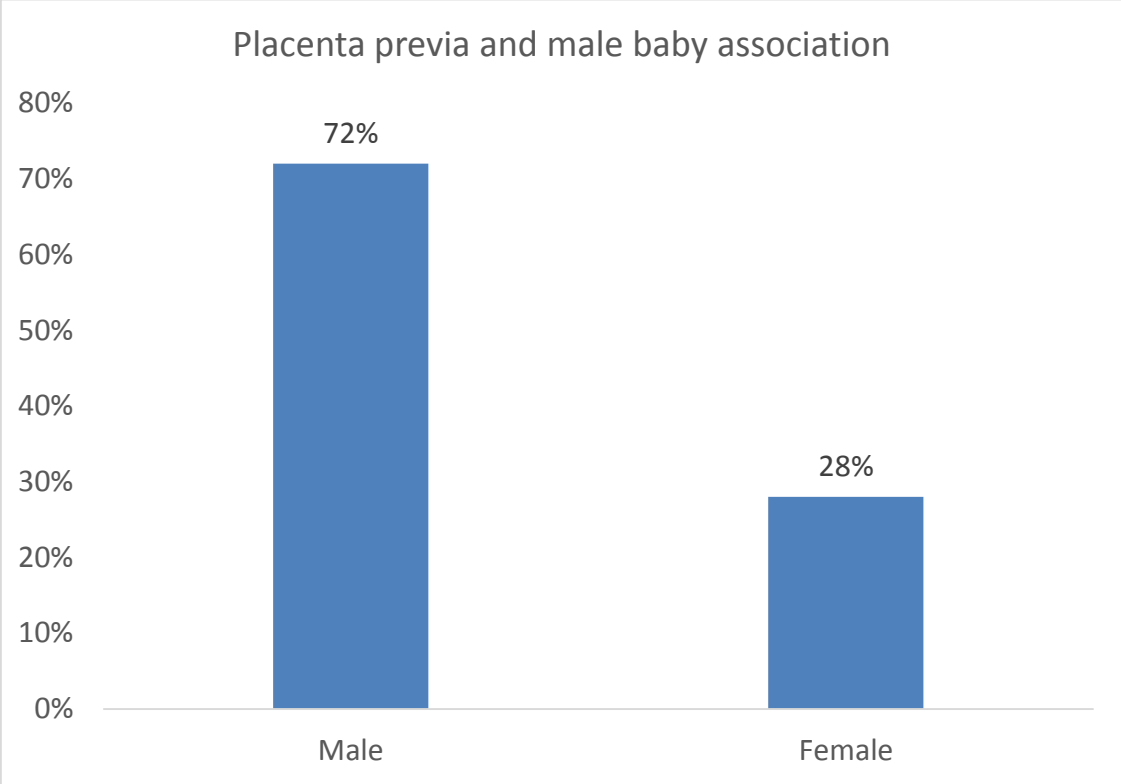


6.8.Placenta previa and male baby association

Sex	No. of cases	Percentage
Male	18	72%
Female	7	28%

***Table 10**:Placenta previa and Male baby association*

According to table 10,72% of cases gave birth to a male baby.This result is statistically significant at 95% CI with a X^2 value of 4.85 and P-value 0.02.

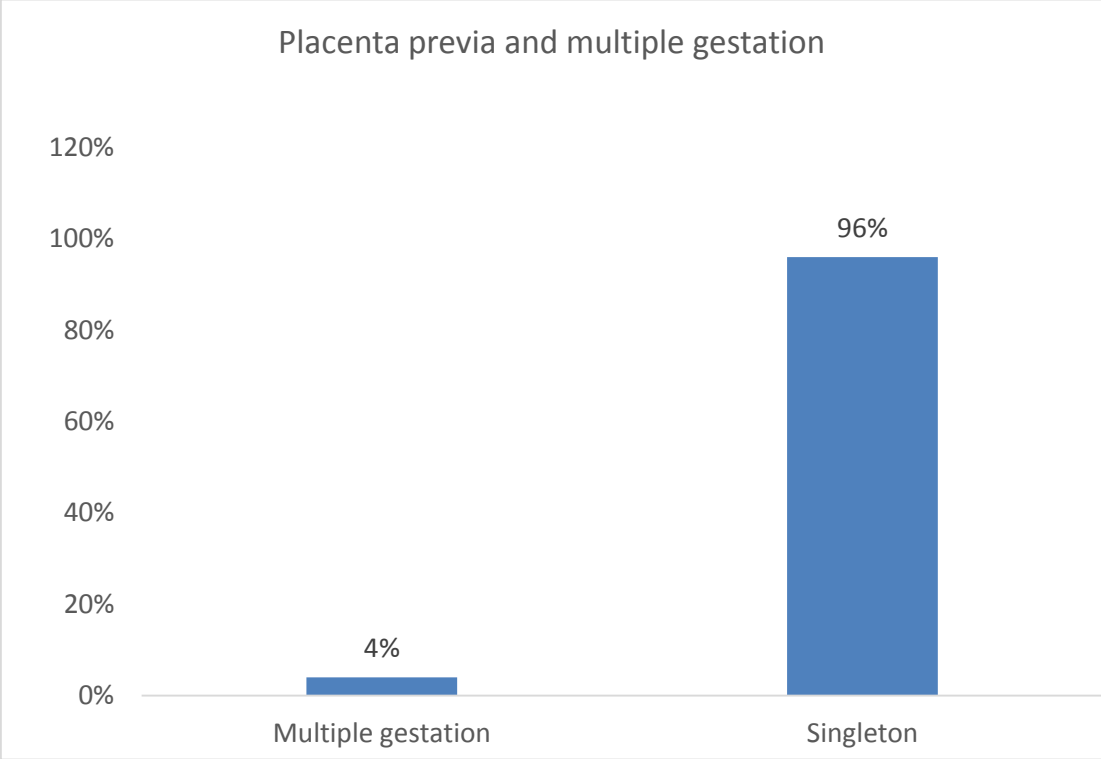


6.9.Placenta previa and multiple gestation

Type of gestation	No.of cases	Percentage
Multiple gestation	1	4%
Singleton	24	96%

Table 11*:Placenta previa and multiple gestation*

From table 11,96% of observed cases were singleton.This result is statistically significant at 95% CI with a X^2 value of 21.16 and P-value 0.00001.

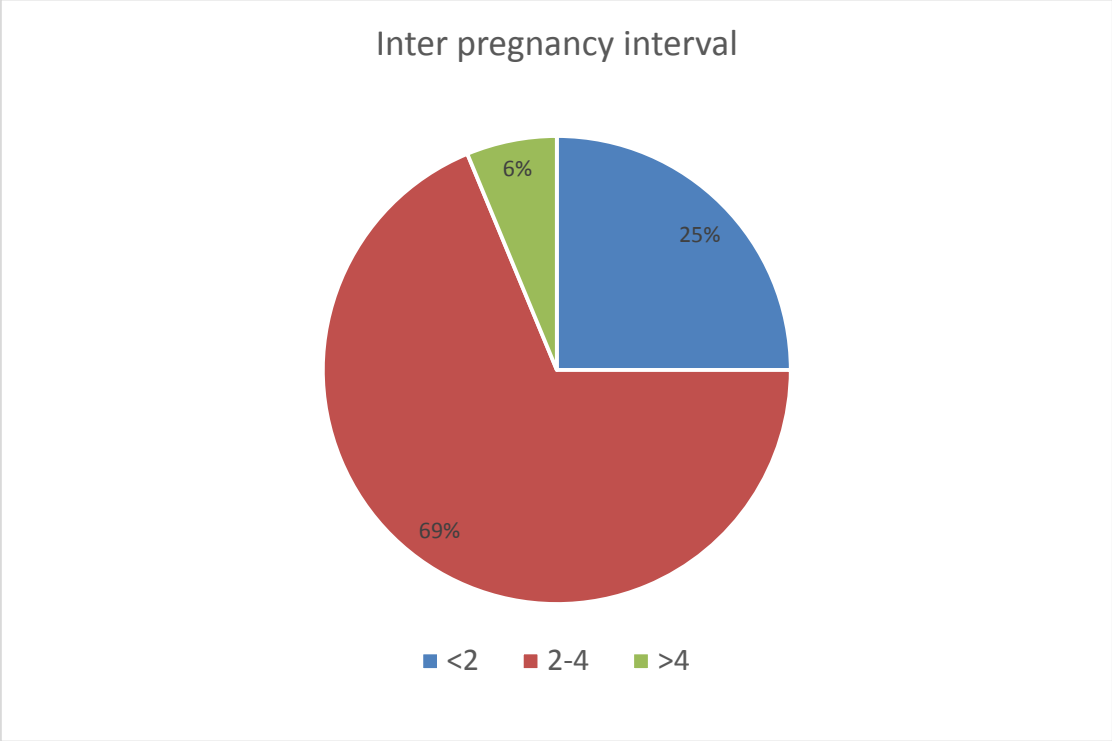


6.10.Inter pregnancy interval

Years	No. of cases	Percentage
<2	4	25%
2-4	11	69%
>4	1	6%

***Table 12**:Inter pregnancy interval*

Based on table12, nearly 70% of cases had an inter pregnancy interval of 2-4 years. This result is statistically significant at 95% CI with a X^2 value of 9.82 and P-value 0.0073.

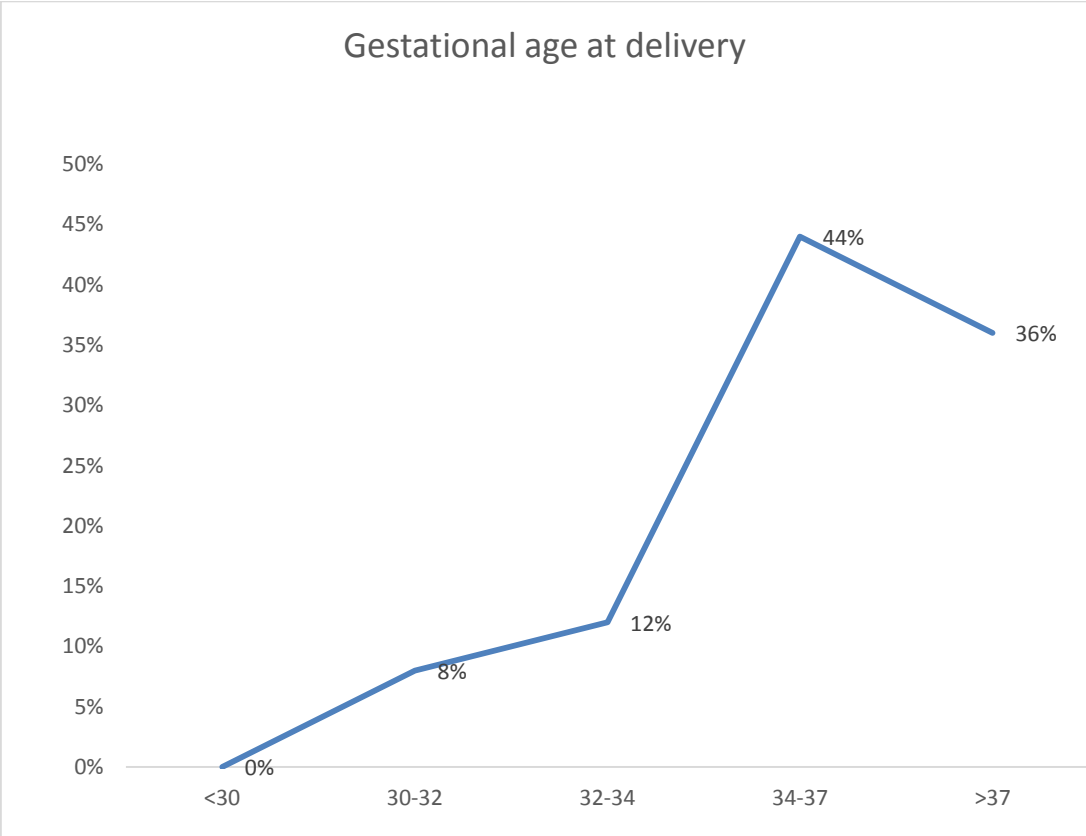


6.11.Gestational age at delivery

Weeks	No. of cases	Percentage
<30	0	0%
30-32	2	8%
32-34	3	12%
34-37	11	44%
>37	9	36%

***Table 13**:Gestational age at delivery*

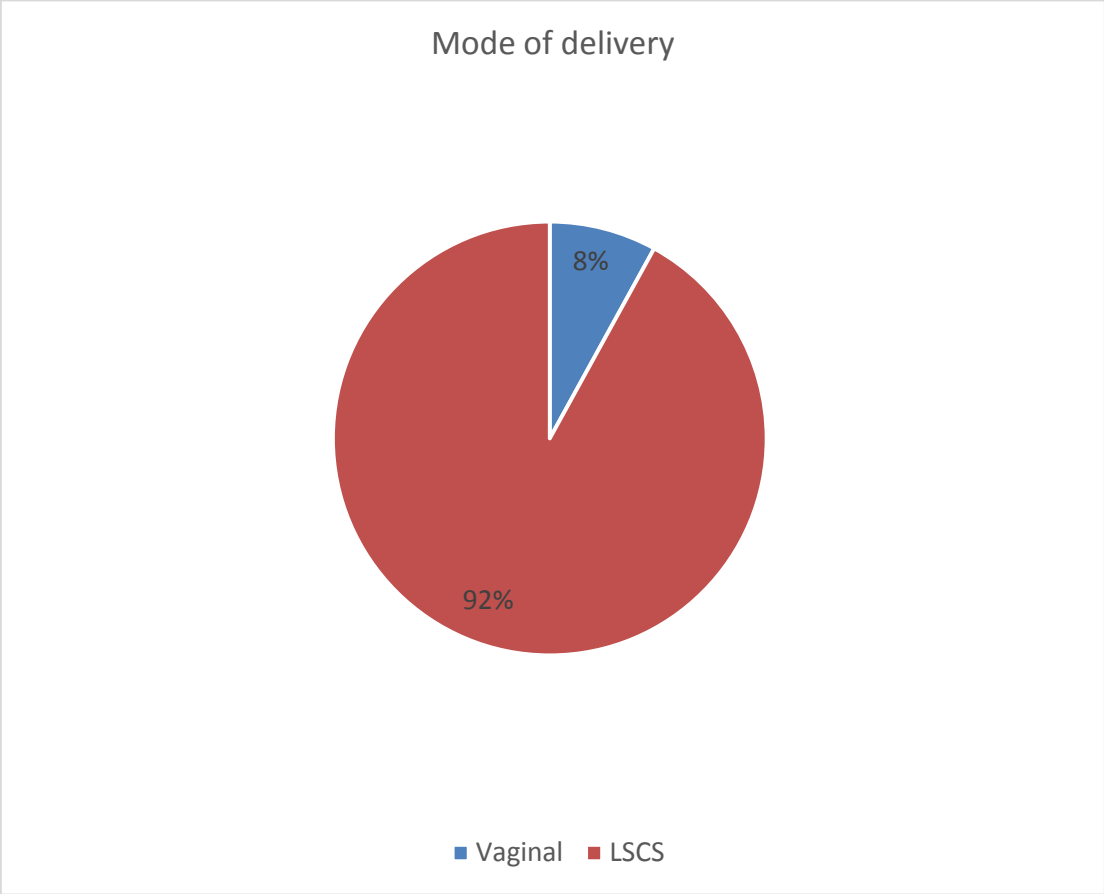
Based on,table 13,maximum cases (44%) had 34-37 weeks of gestational age at delivery. The average gestational age at gelivery was 37.1 weeks.This result is statistically significant at 95% CI with a X^2 value of 18.00 and P-value 0.0012.



6.12.Mode of delivery

Mode of delivery	Percentage
Vaginal	8%
LSCS	92%

***Table 14**:Mode of delivery*



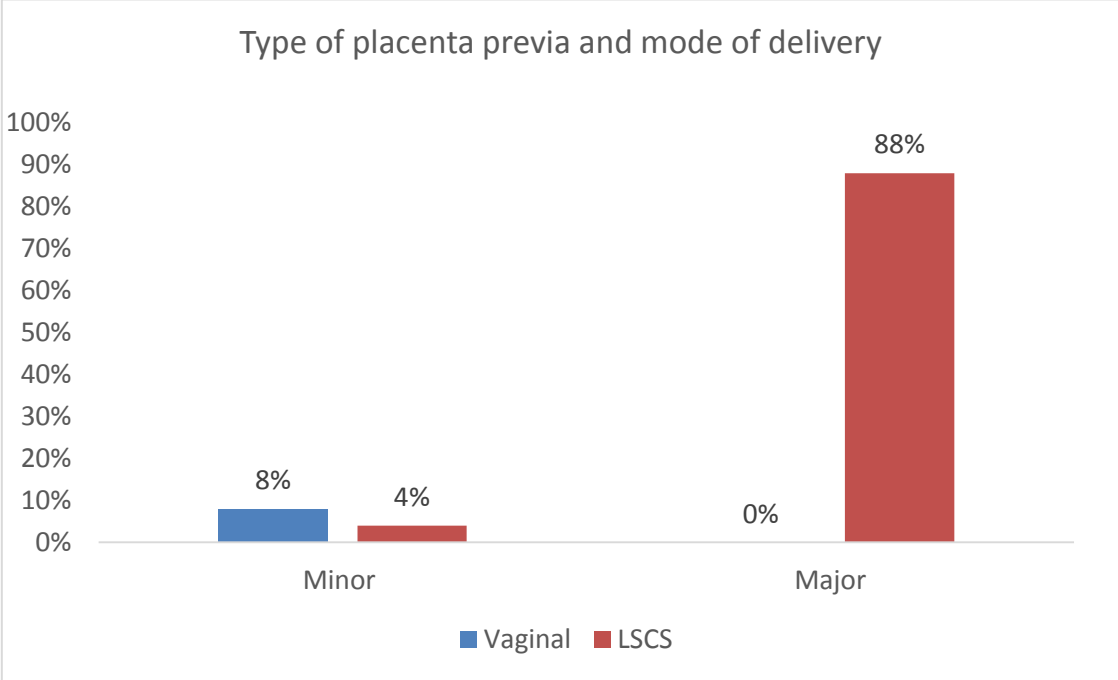
From table 14 and 15,about 92% of the cases were delivered by caesarean section.This result is statistically significant at 95% confidence interval with a X^2 value of 17.80 and p value 0.0226.Out of the 25 cases,3 cases were proceeded to caesarean hysterectomy,2 cases because of placenta accreta and the other case because of intra operative PPH.

Mode of delivery	No. of cases	Percentage
Vaginal	2	8%
Elective LSCS	6	24%
Emergency LSCS	7	28%
Elective LSCS with b/L ut.art ligation	1	4%
Emergency LSCS with b./l ut.art ligation	5	20%
Emergency LSCS with b/l ut.and int.iliac art ligation	1	4%
Emergency LSCS proceeded to subtotal hysterectomy	1	4%
Emergency LSCS proc.to subtotal hysterectomy with b/lint.iliac art ligation	1	4%
Elective LSCS proc. To total hysterectomy with b/l int.iliac art ligation with bladder rent repair	1	4%

***Table 15**: Mode of delivery*

Mode of delivery	Minor degree		Major degree	
	No. of cases	%	No. of cases	%
Vaginal	2	8%	0	0%
LSCS	1	4%	22	88%

***Table 16**: Type of placenta previa and mode of delivery*



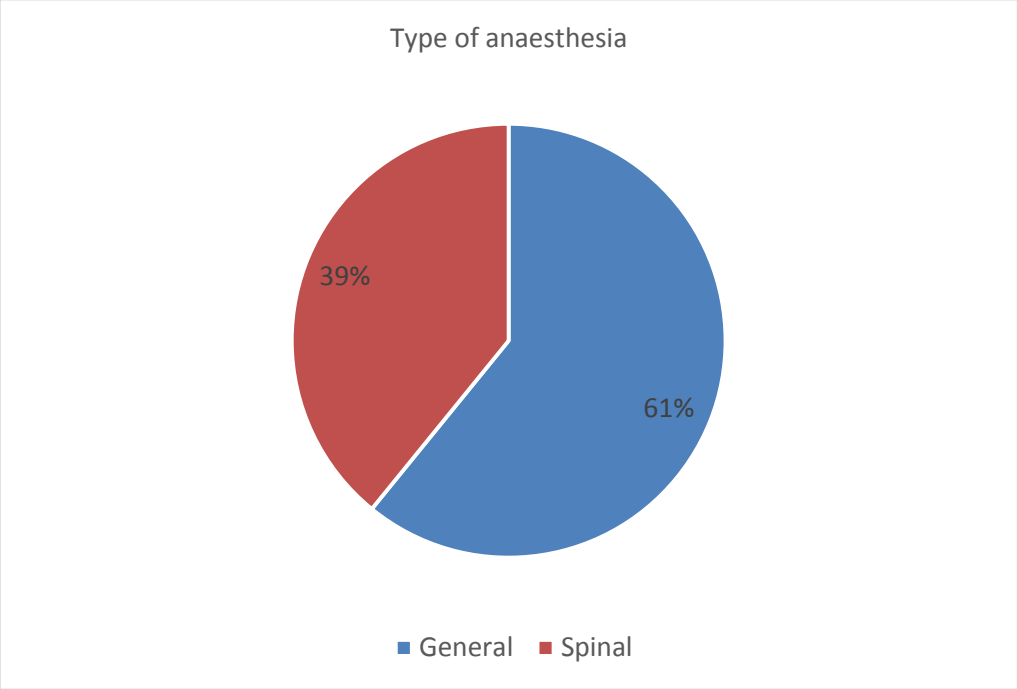
Based on table 16,about 33% of cases of minor placenta previa and 100% of casesof major placenta previa were delivered by Caesarean section. .

6.13.Type of anaesthesia

Type of anaesthesia	No. of cases	Percentage
General	14	61%
Spinal	9	39%

Table 17*:Type of anaesthesia*

Based on table 17,only 39% of cases were delivered by LSCS had spinal anaesthesia. This result is not statistically significant at 95% CI with a X^2 value of 1.08 and P-value 0.29.

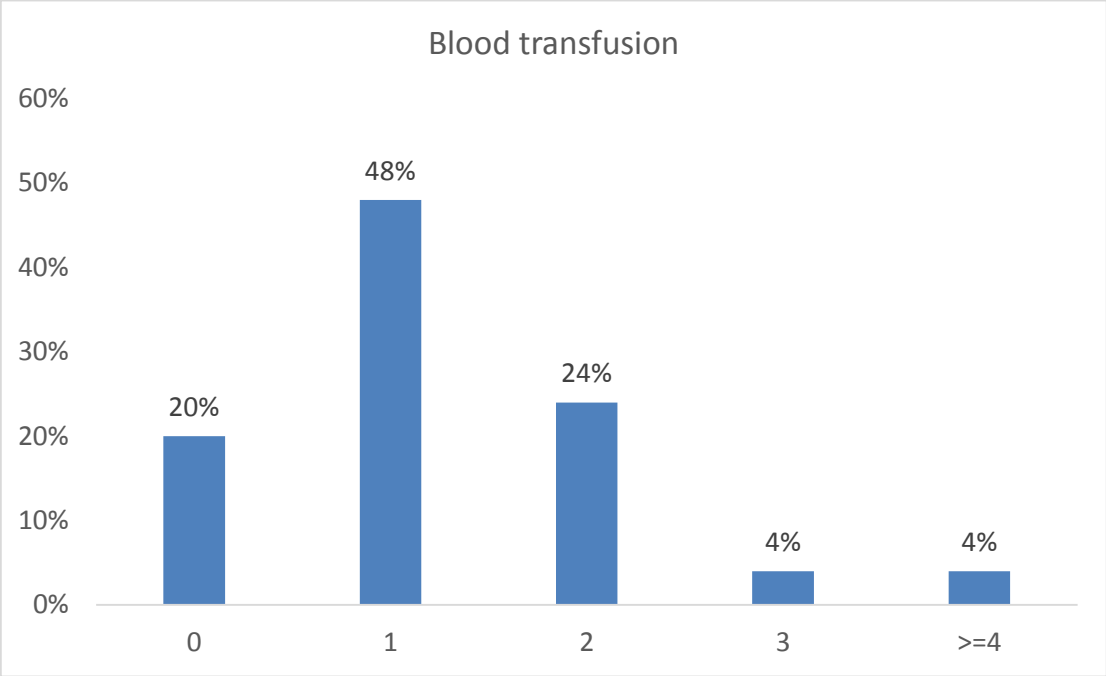


6.14.Blood transfusion

No. of units	No. of cases	Percentage
0	5	20%
1	12	48%
2	6	24%
3	1	4%
>=4	1	4%

***Table 18**:Blood transfusions*

From table 18,almost 80% of cases needed blood transfusion.This result is statistically significant at 95% CI with a X^2 value of 16.4 and P-value 0.0025.

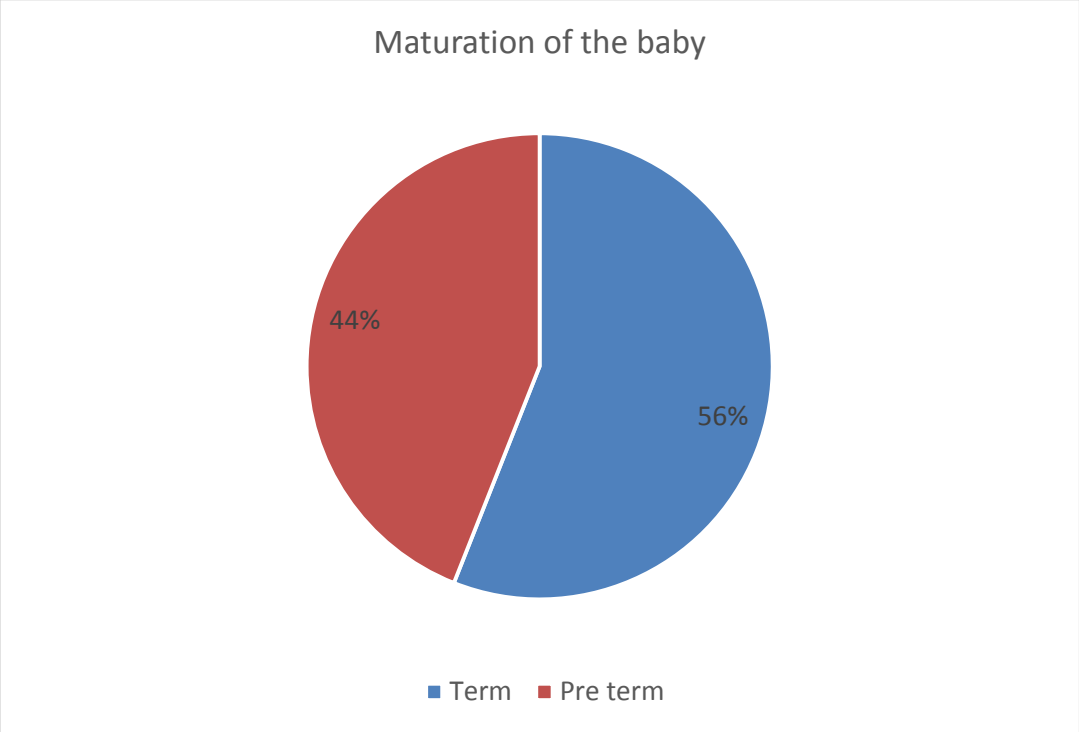


6.15.Maturation of the baby

Maturation	No. of cases	Percentage
Term	14	56%
Pre term	11	44%

***Table 19**:Maturation of the baby*

Based on table 19,about 44% of cases were delivered as preterm.This result is not statistically significant at 95% CI with a X^2 value of 0.36 and P-value 0.54.

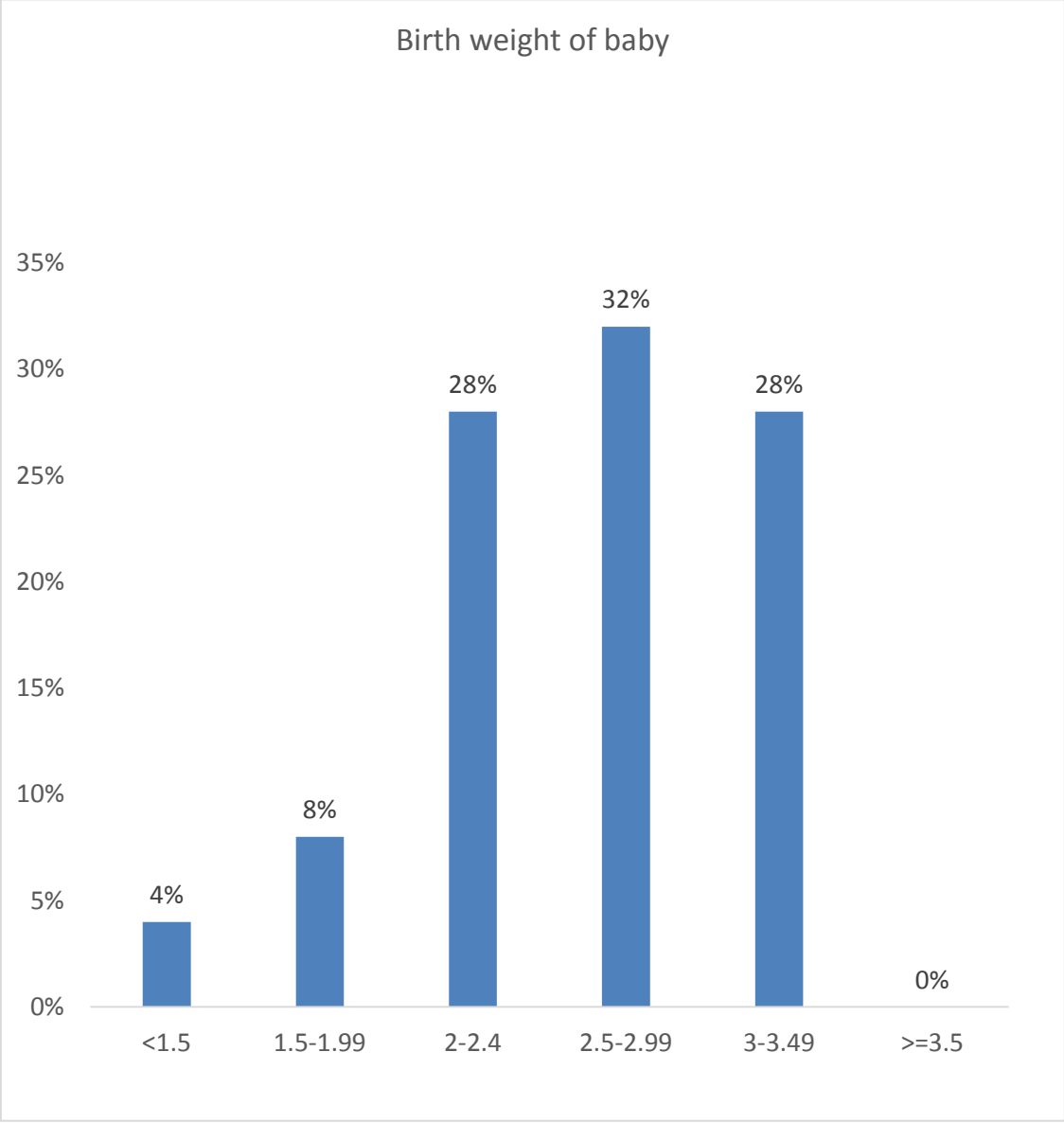


6.16.Birth weight of baby

Birth weight (kgs)	No. of cases	Percentage
<1.5	1	4%
1.5-1.99	2	8%
2-2.4	7	28%
2.5-2.99	8	32%
3-3.49	7	28%
>=3.5	0	0%

Table 20:*Birth weight of babies*

According to table 20,in maximum cases (60%), the birth weight of the baby was more than 2.5 kgs.This result is statistically significant at 95% CI with a X^2 value of 15.06 and P-value 0.0101.

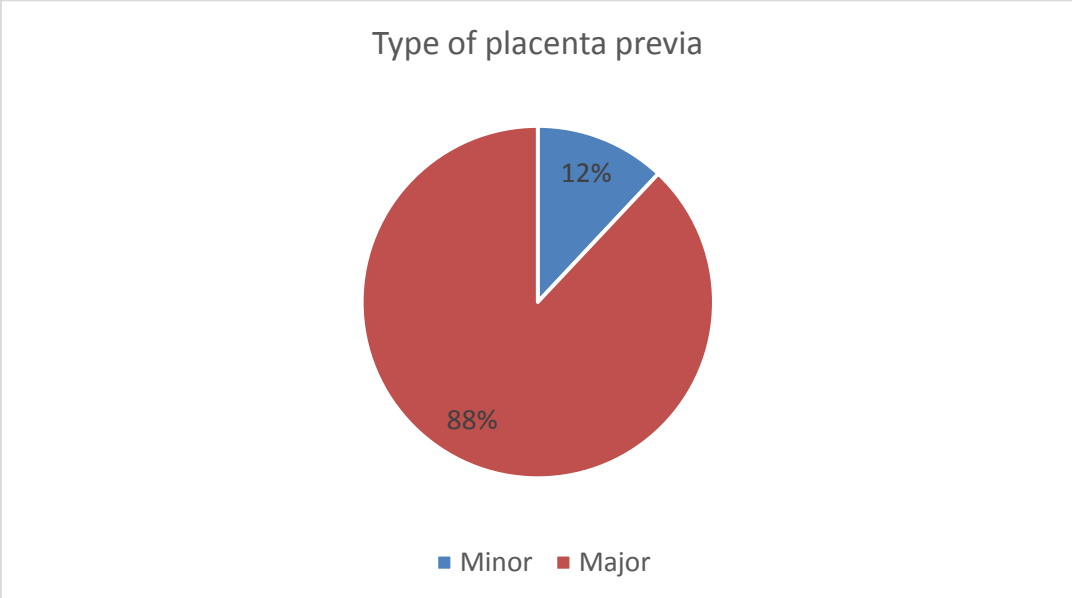


6.17.Type of placenta previa

Type of placenta previa	No. of cases	Percentage
1A	2	8%
1B	1	4%
2A	0	0%
2B	6	24%
3A	6	24%
3B	3	12%
4	7	28%

***Table 21**:Type of Placenta previa*

From table 21,almost 88% of cases observed had a major degree of placenta previa.This result is statistically significant at 95% CI with a X^2 value of 12.80 and P-value 0.04.

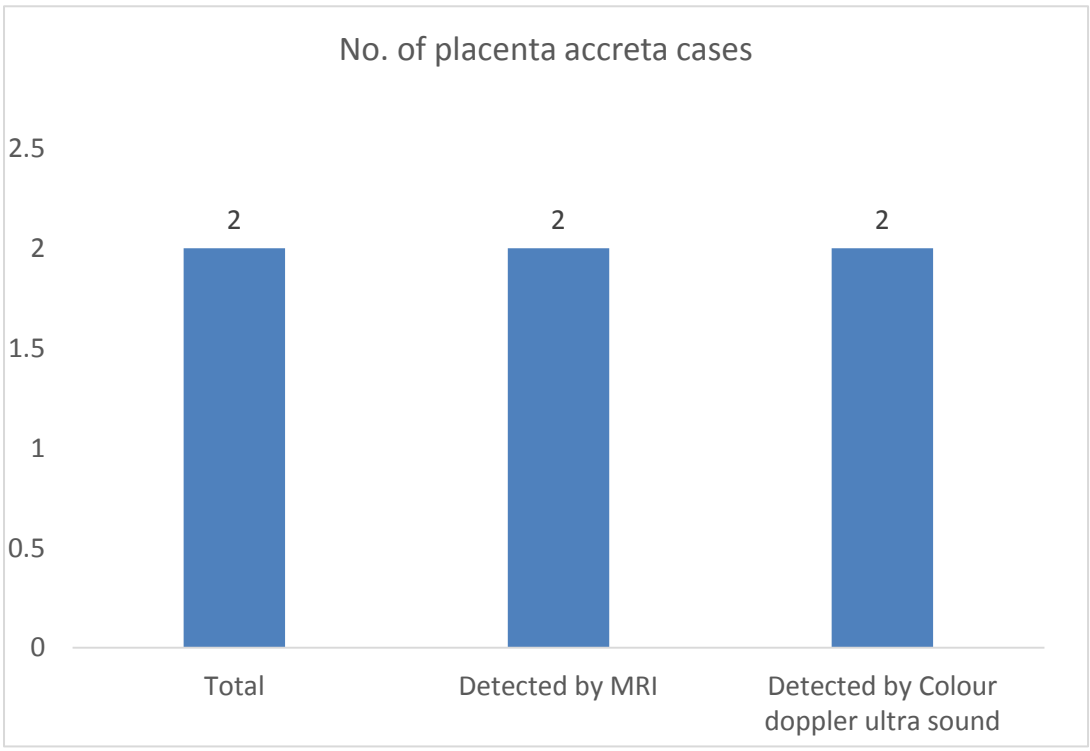


6.18.Placenta accreta cases detected

Placenta accreta	No. of cases
Total	2
Detected by MRI	2
Detected by Color Doppler ultrasound	2

***Table 22**:Placenta accrete cases detected*

From table 22,it is inferred that out of the 25 cases of study population,2 cases of placenta accrete were diagnosed and both were detected by both Colour Doppler ultrasound and MRI.This result does not have any statistical significance.



CHAPTER - 7

DISCUSSION

The incidence of placenta previa among the total deliveries in Govt. R. S. R. M. lying in Hospital, Chennai from Sept 2015 to Sept 2016 is 0.50%. The incidence of placenta previa in total live birth during the study period is 5.0 per 1000. Cresswell JA et al(2013) reported 0.5% incidence,Ahmed SR et al(2015) reported an incidence of 0.8% which were quiet similar to our current study.

7.1 Age

Abu Heija 1999 reports, that the incidence of placenta previa cases increases with advancing maternal age. Zhang 1993 reports the risks of occurrence placenta previa is 2.3 times more than in 35 years than 20 years. Ananth CV 1999 states that the risk increases 9 fold over 40 years. At Parkland Hospital from 1988 – 1999 the incidence is 1 in 1500 for women 19 or less and for women over 35 it is 1 in 100.In our present study,the maximum incidence was in the age group 20 – 24 years.The average age in our study is 25.24 and correlates with the Barnet *et al*. 1981.

7.2 Gravidity

Abu 1993, observed that the risk increased in >4 gravida with the p < 0.002. In our study also, the percentage of case increases with higher gravida, with statistically significant p value of 0.0064.It was observed from our study that with increasing gravidity the risk of placenta previa increased dramatically. Zhang 1999, also observed the same results.

7.3 Parity

Studies show that risk of placenta previa increases with increasing parity. Abu heija 1999 observed that the risk increases with parity more than 3. (p < 0.01). Our present study also shows that the risk of occurrence of placenta previa is higher in multipara than nullipara with a statistically significant p value of 0.00006 and it correlates with the above study.

7.4 Abortion

Various authors point out that, the risk of placenta previa increases with previous history of abortions. Parazzini 1999 reports a relative risk of 1.8 and Ananth CV 1997 reports relative risk of 1.6 (spontaneous abortion) and 1.7 for induced abortion. Though it has been proven that the incidence of placenta previa increases with previous history of abortion, in our current study only 16% of the study population had a history of abortion.

7.5 Previous LSCS

The risk of placenta previa occurring in the pregnancy following a caesarian delivery is 1-4% (Gabee) relative risk of 1.2 for 1 previous caesarian section and 2.1 for 2 previous caesarian section is showed by Parazzini 1994. Ananth 1994 mentioned that the relative risk is 3.8 in case control study and 2.4% in Cohort study. Taylor 1994 shows 1.48 as relative risk between scarred and unscarred uterus is 1.64. Abu Heila 1993 study showed a statistically significant p value of < 0.02. Zhang *et al*. 1993 states that those with previous uterine scar had a 1.8 times higher risk of placenta previa in subsequent pregnancy than those without. In our study, only 36% of patients had previous history of LSCS. Discordance in the above two results(previous history of abortions and LSCS) can be attributed to the fact that 44% of patients in our study group belong to primipara who did not have previous obstetric history.

7.6 Mal presentation

It is observed from different studies that malpresentations occur in 30-35% of placenta previa cases. Cotton and Crenshaw quoted that malpresentation occur in 1/3 of cases. Stall worth 1951 reports 20% but

in our study the incidence is 24% which accounts for about 1/4th of the total cases of placenta previa which is statistically significant.

7.7 Multiple Gestation

Strong and bar reported that an increased incidence of placenta previa in multiple gestation (0.55%) Parazzini 1994 reported that there is no risk between multiple gestation and occurrence of placenta previa between singleton and multiple gestation.In our study,there was statistical significance between multiple gestation and placenta previa.

7.8 Inter pregnancy interval

Nearly 70% of the study population has an interpregnancy interval of 2 – 4 years.According to studies it is proved that the incidence of placenta previa increases with decreasing inter pregnancy interval.

7.9 Gestational age at delivery

Various authors reported that the mean gestational age at delivery is 35.3 ± 3.4 weeks. In our current study,about 80% of the cases had their gestational age at delivery to be >34 weeks and the average gestational age at delivery is 37.1weeks which is similar to observation of Frederiksen MC 1999.

7.10 Type of placenta previa

Sipson et al(1962 – 74) reported the incidence of minor and major previa to be 73% and 27% respectively whereas our study reports 80% incidence of major previa. This may be explained based on the fact that our hospital being a tertiary care institute, many of the minor degrees of placenta previa cases get delivered without any complication.

7.11 Mode of delivery

In our study 92% of placenta previa were delivered by caesarian section. Mahesh Kumar 2002, presents that 57% of minor degree and 86% of major degree required caesarian section. In our series 33% of minor degree and 100% of major degree were delivered by caesarean section, which is similar to the rate observed by the above study.

7.12 Type of anaesthesia

McShane 1985 reported the use of general anaesthesia in 75% of cases, our current study has similar results with 61% cases with general anaesthesia.

7.13 Blood Transfusion

In Mahesh kumar at Timkur 2000 observed that 60% of cases required blood transfusion. But in our study almost 80% of cases received blood transfusion.

7.14 Preterm

Brenner(1978),Crane(1999) reported that incidence of preterm births in placenta previa were 40% and 46.65% respectively.In our current study the incidence is 44% which is similar to the above studies.

7.15 Low birth weight

In our study only 40% of babies were less than 2.4 kg which is similar to Zhanghna(1992) which was 47%.

7.16 MRI and Color Doppler ultrasound in detection of placenta accreta

Out of 25 cases of placenta previa in our study, 2 cases of placenta accreta were detected which were confirmed pathologically post-delivery. Both these cases were antinatally diagnosed by both MRI and Color Doppler ultrasound. One of them was placenta percreta involving the bladder serosa which was initially diagnosed by Color Doppler

ultrasound and then confirmed by MRI. The second case was placenta increta which was also initially diagnosed by Color Doppler ultrasound. Based on the observations, Color Doppler ultrasound proves to be a valuable initial screening tool with 100% accuracy, cost-effectiveness and easy availability. MRI being an expensive tool which needs expertise should be reserved primarily for equivocal ultrasound findings of abnormal placentation or posterior placenta with risk factors. There are no statistically proven significance noted between accuracies for diagnosis of placenta accreta by Color Doppler ultrasound and MRI.

CHAPTER - 8

SUMMARY

- The total number of deliveries from September 2015 to September 2016 is 12,426 out of which 63 cases were reported as placenta previa,with the incidence of placenta previa being 0.50%,that is 5 per 1000 live births.

- The risk of placenta previa is increased with advancing maternal age,gravidity,parity and previous history of invasive uterine procedures or uterine surgeries.

- The risk of malpresentations increases with major degree of placenta previa.

- In our study,it was observed that there was association between male babies and placenta previa.

- It was also observed that the risk of placenta previa decreases as the inter pregnancy interval increases(>4yrs).

- Maximum cases(80%) of placenta previa had their gestational age at delivery to be more than 34 weeks.(34 to 37 weeks – 44%; >37 weeks – 36%).

- About 92% cases of placenta previa were delivered by Caesarean section(minor – 33%; major – 100%).

- Out of the Caesarean deliveries,61% were given general anaesthesia.

- Almost 80% of the cases needed blood transfusion either intra operatively or post operatively which was statistically significant.
- 56% of the babies were of term maturation and 60% of the babies were born with birth weight >2.5 kg which were statistically proven to be significant.

- 80% of the observed placenta previa belonged to major subtype.

- Out of the 63 cases of placenta previa,only 2 cases of placenta accreta are reported,the incidence of placenta accreta being 3.1% of total placenta previae and 0.016% of total deliveries in the study period.
- Colour Doppler Ultrasound and Magnetic Resonance Imaging are both effective in detecting the myometrial invasion in suspected cases of placenta accreta with Colour Doppler USG being used as an initial screening tool which is both sensitive,specific and cost

effective whereas MRI being an expensive,time consuming and expertise requiring tool be used as an adjunct to Colour Doppler when there is equivocal results with USG or when the placental position is posterior.

CHAPTER - 9

CONCLUSION

Placenta previa whether found fortuitously by Ultrasound or with the clinical emergency of maternal hemorrhages,caries significant maternal and fetal risks.Accurate diagnosis,judicious expectant management with transfusions as and when required and prompt delivery at the time of fetal maturation can lead to the most favourable outcome.

With the emerging era of caesarean sections,anticipation of clinical life threatening complications like placenta accreta requiring a multidisciplinary approach to management are on the increasing trend.The prompt diagnosis of placenta accreta before delivery will allow us to plan in a multi disciplinary approach to reduce both the maternal and perinatal morbidity and mortality

Colour Doppler Ultrasound is accurate enough in diagnosing placenta accrete and also in detecting the amount of myometrial invasion specifically whereas MRI can be used in specific cases as an adjunct in ambiguous cases and in suspected cases of placenta posterior.

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ANNEXURE – I

PROFORMA

DATE:

NAME:

AGE:

IP.NO.:

LMP:

EDD:

OBSTETRIC CODE:

D.O.A.:

D.O.D.:

ADDRESS & CONTACT NO.:

USG AT OR AFTER 28 WEEKS:

PRESENTING COMPLAINTS:

MENSTRUAL HISTORY:

MARITAL HISTORY:

OBSTETRIC HISTORY:

PAST HISTORY:

GENERAL EXAMINATION:

HT.: WT.:

TEMP.: PR: BP:

PALLOR:

PEDAL EDEMA:

SYSTEMIC EXAMINATION:

CVS:

RS:

ABDOMINAL EXAM.:

LOCAL EXAM.:

INVESTIGATIONS:

Hb: RBS: URINE ALBUMIN:

HIV: VDRL: HBsAg:

COLOUR DOPPLER ULTRASOUND:

MRI:

OUTCOME:

BABY DETAILS:

POST/INTRA OPERATIVE COMPLICATIONS:

BLOOD TRANSFUSION IF ANY:

RESULT:

ANNEXURE – II

KEY TO MASTER CHART:

A) S.NO.:Serial No.

B) Name of the patient

C) Age

D) Ip.No.

E) Gravidity:

F) Parity

G) Total no. of live births

H) No. of previous abortions: A-abortions

I) Past obstetric history:

Prev. NVD. – previous history of normal vaginal delivery

Prev. LSCS – previous history of caesarean section

J)Inter pregnancy interval

K)Colour Doppler ultrasound features

1 – placenta previa type 1A

2 – placenta previa type 1B

3 – placenta previa type 2A

4 – placenta previa type 2B

5 – placenta previa type 3A

6 – placent previa type 3B

7 – placenta previa type 4

8 – features suggestive of placenta accreta

L)MRI features

1 – placenta previa type 1A

2 – placenta previa type 1B

3 – placenta previa type 2A

4 – placenta previa type 2B

5 – placenta previa type 3A

6 – placent previa type 3B

7 – placenta previa type 4

8 – features suggestive of placenta accrete

M)Mode of delivery

N)Type of anaesthesia

SA – Spinal anaesthesia

GA – general anaesthesia

O)Complications

P)Type of placenta previa

1A,1B,2A,2B,3A,3B,4

A – anterior placenta

B – posterior placenta

Q)Blood transfusions

WB – Whole Blood

PRBC – Packed Red Blood Cells

FFP – Fresh Frozen Plasma

R)Maturation of baby

Term - >37 weeks

Preterm – 34 – 37 weeks

Late Preterm – 36 – 37 weeks

S)Birth weight of the baby

T)Sex of the baby

U)Gestational age at delivery

W – weeks

V)Presentation of fetus inutero

Vx – Vertex

Breech

Transverse

Unstable

ANNEXURE IV

ABBREVIATIONS

USG	–	Ultrasonography
MRI	–	Magnetic Resonance Imaging
TVUS	–	Trans Vaginal Ultrasonography
TAS	–	Trans Abdominal Ultrasonography
LSCS	-	Lower segment Caesarean Section
NVD	-	Normal Vaginal Delivery

S.NO	NAME	AGE	IP. NO.	GRAVIDA	PARA	LIVE BIRT	ABOR	PAST OBSTETRIC HISTO	INTER PRE	COLOUR	MRI	MODE OF DELIVERY	TYPE	COMPLI	TYPE O	BLOOD T	BABY	B.WT	SEX	GEST. AGE	PRESENTATION
1	KUMUDHA	33	10316	G2	P1	LI		PREV LSCS	2YRS	8	8	EMERG.LSCS PROCCEDED TO SUBTOTAL HYS	GA	PPH	4	2WB	TERM	2.6	GIRL	37W	VX
2	PALANISELVI	24	9753	PRIMI						7	7	ELECTIVE LSCS	SA		4	1WB	TERM	3	BOY	36W	BREECH
3	MAHADEVI	27	9972	G2	P1	L1		PREV NVD	2YRS	2	2	LABOUR NATURALE WITH EPISIOTOMY			1B		TERM	2.7	BOY	37W	VX
4	RAJESHWARI	21	5018	PRIMI						5	5	EMERG LSCS WITH B/L UT. ART LIGATION	SA		3A	1WB	LATE PI	2.38	GIRL	36W	VX
5	AMEENA	25	10550	G2	P1	L1		PREV NVD	5YRS	5	5	EMERG LSCS	GA		3A	1WB	PRETER	2.14	GIRL	35W4D	VX
6	GAYATHRI	22	2501	G2	P1	L1		PREV NVD	3YRS	1	1	LABOUR NATURALE WITH EPISIOTOMY			1A		TERM	3.13	BOY	39W3D	VX
7	DHAMAYANDHI	20	4765	G3	P1	L1	A1	PREV LSCS	3YRS	1	1	EMERG LSCS	SA		1A		TERM	3.035	BOY	38W1D	VX
8	SARALA	28	13100	G2	P1	L1		PREV LSCS	2YRS	6	6	ELECTIVE LSCS	GA		3B	1WB	TERM	2.7	BOY	37W4D	VX
9	ROHINI	23	10511	PRIMI						5	5	ELECTIVE LSCS	GA		3A	1WB	TERM	3.2	BOY	37W2D	VX
10	BHARATHI	25	11060	G2	P1	L1		PREV LSCS	4YRS	4	4	EMERG LSCS	SA		2B	2WB	PRETER	2.1	GIRL	34W	TRANSVERSE
11	SEETHA	24	11094	G2	P1	L1		PREV LSCS	2YRS	5	5	EMERG LSCS WITH B/L UT. ART LIGATION	GA		3A	1WB/4FF	PRETER	2.25	BOY	35W	VX
12	PREMAVATHI	27	7892	G4	P3	L3		PREV NVD	11/2 YRS	4	4	EMERG LSCS	GA		2B	2WB/4FF	PRETER	1.8	BOY	32W	TRANSVERSE
13	SRIGADHA	22	8680	PRIMI						4	4	EMERG LSCS	SA		2B	1WB	PRETER	2.215	BOY	36W	VX
14	MANJU	26	8666	G2	P1	L1		PREV LSCS	3YRS	7	7	EMERG LSCS	SA		4	2WB	PRETER	2	BOY	34-35W	VX
15	SHOBANA	23	18172	G2	P1	L1		PREV LSCS	21/2 YRS	4	4	EMERG LSCS	SA		2B		TERM	3	GIRL	38W2D	BREECH
16	PARVEEN	25	15171	G3	P2	L2		PREV 2 NVD	4 YRS	5	5	ELECTIVE LSCS	GA		3A	1WB	TERM	2.5	BOY	37W2D	VX
17	SHALINI	21	15220	PRIMI(TWINS)						6	6	EMERG LSCS WITH B/L UT.AND INT.ILIAC AR	GA		3B	1WB	PRETER	1.795,1.7	GIRL/GIRL	33W	VX/BREECH
18	KAVITHA	26	16493	G2			A1	H/O D &C	1 YR	5	5	EMERG LSCS WITH B/L UT. ART LIGATION	SA		3A		TERM	3	BOY	39W	VX
19	TAMANI NAIDU	24	12933	G2	P1	L1		PREV LSCS	11/2YRS	4	4	ELECTIVE LSCS	GA		2B	2WB	LATE PI	2.1	BOY	36W	VX
20	SUGANTHY	23	14602	PRIMI						6	6	EMERG LSCS PROC.TO SUBTOTAL HYSTEREC	GA	PPH	3B	4WB/4FF	TERM	2.7	BOY	36W3D	VX
21	ANU PRIYA	21	8995	G2			A1	H/OD &C	1 YR	4	4	ELECTIVE LSCS	GA		2B	2WB	TERM	2.85	BOY	37W3D	VX
22	MUTHU PRIYA	24	9202	PRIMI						7	7	ELECTIVE LSCS WITH B/L UT.ART LIGATION	GA		4	1WB	TERM	2.65	BOY	38W	VX
23	FAMIDHA BANU	21	9199	PRIMI						7	7	EMERG LSCS WITH B/L UT.ART LIGATION	GA		4	1WB	PRETER	2.55	BOY	36W	BREECH
24	KAUVERI	25	9011	PRIMI						7	7	EMERG LSCS WITH B./L UT.ART LIGATION	SA		4	1WB	PRETER	0.9(EXPI	BOY	30W	UNSTABLE
25	LATHA	30	14591	G4	P2	L1	A1	PREV 2LSCS	31/2YRS	8	8	ELECTIVE LSCS PROC. TO TOTAL HYSTERECT	GA		4	3WB/1PR	TERM	3.3	GIRL	36W	VX