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PLACENTA PREVIA FREQUENCY AND ITS OUTCOME IN BAGHDAD TEACHING HOSPITAL

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ABSTRACT

Background: Placenta praevia is the implantation of the placenta partially or wholly in the lower segment of the uterus. It is graded in two ways, as either grade 1- 4 or minor/major. It is a major cause of obstetrical hemorrhage which leads to increase in maternal morbidity and perinatal mortality, its incidence is still rising worldwide. **Objectives:** To determine the frequency and outcome of placenta previa at Baghdad teaching hospital. **Patients and methods:** A prospective observational study was carried out during the period between 1st October 2013 and 31 January 2014 in Baghdad Teaching Hospital, medical city complex. During the study period, total no of deliveries was 4128 of them 2322 were cesarean section and 1806 were vaginal deliveries. Of all those, 92 pregnant ladies who had placenta previa diagnosed ultrasonographically and confirmed during cesarean delivery had placenta previa and were included. Pregnant ladies with normally situated placenta were excluded from the study. Data were collected through Detailed history taking, and clinical examinations of patients. Preparations and interventional procedures included cross matching of at least 6 pints of blood and preparation of fresh frozen plasma and cryoprecipitate, Single course of antenatal corticosteroids was given. All cases in this study where delivered by ceserean section. All mothers were monitored for signs of complication like disseminated intravascular coagulation DIC during and after surgery and for post-partum hemorrhage. Official agreements and verbal consent of all women were obtained prior to participation. Statistical analysis performed by using the statistical package for social sciences and appropriate statistical tests were used with the aid of expert statician. **Results:** There were 92 women who had placenta previa out of 4128, and the proportion of placenta previa was 2.2%, The mean age of the studied group was 32.2 ± 5.9 (range:20 – 44) years. More than half (56.3%) of the studied group were gravida 5 or more. Nulliparous were only 3 patients (3.3%). History of miscarriage was found in 23 patients (25%). One or more previous cesarean sections were found in 78 (84.8%) patients. At time of delivery 72 (78.3%) patients were at < 37 weeks of gestation and 20 patients (21.7%) were at ≥ 37 weeks. Cesarean sections were performed in 61 patients (66.3%). Caeserian hysterectomy was conducted in 31 patients (33.7%), internal artery ligation was performed in 7 patients (7.6%), uterine artery ligation in 5 patients (5.4%). Morbidly adherent placenta was the more frequent cause of hysterectomy in 18 patients represented (58.1%) and bleeding in 13 patients (41.9%). **Conclusion:** In the present study the incidence of placenta previa was increased with the advancing age, particularly > 35 years, the incidence of placenta previa was highest in the multiparous group than nulliparous and directly associated with parity and gravidity. Previous caesarean section was an important and significant risk factor and none of the cases died.

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INTRODUCTION

The word placenta comes from the Latin word for cake, from Greek plakóenta/plakoúnta, [1] The placenta functions as a fetomaternal organ with two components: the fetal placenta, or (Chorionfrondosum), which develops from the same blastocyst that form the fetus, and the maternal placenta, or (Decidua basalis), which develops from the maternal uterine tissue. [2] In humans, the placenta averages 22 cm (9 inch) in diameter 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 (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.[3] The umbilical cord inserts into the chorionic plate 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 [4]. 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 supply. Nutrient transfer to the fetus occurs via both active and passive transport. Active transport systems allow significantly different plasma concentrations of various large molecules to be maintained on the maternal and fetal sides of the placental barrier.[5]Adverse pregnancy situations, such as those involving maternal diabetes or obesity, can increase or decrease levels of nutrient transporters in the placenta resulting in overgrowth or restricted growth of the fetus.[6]

Waste products excreted from the fetus such as urea, uric acid, and creatinine are transferred to the maternal blood by diffusion across the placenta. IgG antibodies can pass through the human placenta, thereby providing protection to the fetus.[7] This transfer of antibodies begin as early as the 20th week of gestational age, and certainly by the 24th week.[8] 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 protect 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-fetus transmission of infectious diseases. The placenta secretes, from the syncytial layer of chorionic villi, hormones that are important during pregnancy. The first placental hormone produced is hCG, which can be found in maternal blood and urine as early as the first missed menstrual period (shortly after implantation has occurred) through the 100th day of pregnancy. This is the hormone analyzed by pregnancy test; a false-negative result from a pregnancy test may be obtained before or after this period.[9] hCG also ensures that the corpus luteum continues to secrete progesterone and estrogen. Progesterone is very important during pregnancy because, when its secretion decreases, the endometrial lining will slough off and pregnancy will be lost. hCG suppresses the maternal immunologic response so that placenta is not rejected. This hormone is lactogenic and has growth-promoting properties. It promotes mammary gland growth in preparation for lactation in the mother. It also regulates maternal glucose, protein, and fat levels so that these are always available to the fetus. It contributes to the woman's mammary gland development in preparation for lactation and stimulates uterine growth to accommodate growing fetus. Necessary to maintain endometrial lining of the uterus during pregnancy. This hormone prevents preterm labor by reducing myometrial contraction.[10] Placenta usually implants at fundus because blood supply is bette than in the lower uterine segment.

Numerous pathologies can affect the placenta

1. Abnormally situated placenta when the placement of the placenta is too close to or blocks the cervix like placenta praevia.
2. Morbidly adherent placenta like; Placenta accreta, when the placenta implants too deeply, into actual muscle of uterine wall.
3. Placental abruption/abruptio placentae is the separation of the placenta from the uterine lining. This condition usually occurs in the third trimester but can occur any time after the 20th week of pregnancy. Only about 1% of all pregnant women will experience placental abruption, and most can be successfully treated depending on what type of separation occurs.[10]
4. Infections involving the placenta: Placentitis, such as the TORCH infections.[11,12]

Placenta previa (pp) Is defined as a placenta partially or wholly situated in the lower uterine segment. It is graded in two ways, as either grade 1- 4 or minor/major.[13]

Grade 1: The placental edge is in the lower segment, but does not reach the internal os.
Grade 2: The placental edge reaches but does not cover the internal os.

These grades represent a minor degree of placenta previa.

Grade 3: The placenta covers the internal os and is asymmetrically situated.
Grade 4: The placenta covers the internal os and is centrally situated.

These grades represent a major placenta previa.[13]

Although this classification/grading system is the most common, others reflect the ultrasound definition of the placental site. An alternative anatomical grading is provided below:

(1) Total placenta previa: where the internal cervical os is completely covered by placenta;
(2) Partial placenta previa: where the internal os is partially covered by placenta;
(3) Marginal previa: where the edge of the placenta is at the margin of the internal os but does not cover it.
(4) Low-lying placenta: where the placental edge does not reach but is in close proximity to the internal os.[14]

PP complicates approximately 3-5 per 1000 pregnancies worldwide and is still rising.(15).The incidence is significantly higher at 20 weeks approximately 5% and continues to diminish until it approaches 0.5% at 36 weeks and above.(16)This is because as pregnancy advances the lower uterine segment is formed, the upper segment enlarges and moves with the placenta. [17] It is unclear why some placentae implant in the lower uterine segment rather than in the fundus [18]. It does appear that uterine scarring may predispose to placenta implantation in the lower segment. With the progression of pregnancy, more than 90% of these low-lying placentas identified early in pregnancy will appear to move away from the cervix and out of the lower uterine segment. [18] Although the term placenta migration has been used, most authorities do not believe the placenta moves.[18] Rather, it is felt that the placenta grows preferentially toward a better vascularized fundus (trophotropism), whereas the placenta overlying the less vascularized cervix may undergo atrophy In some cases, this atrophy leaves vessels running through the membranes, unsupported by placental tissue or cord (vasa

previa).[18] In cases where the atrophy is incomplete, a succenturiate lobe may developed. The apparent movement of the placenta may also be due to the development of the lower uterine segment. [18] In case of placenta previa- accreta it is thought to be due to an absence or deficiency of Nitabuchs layer or the spongiosus layer of the decidua.[19] This becomes a problem at delivery when the placenta does not separate and massive bleeding ensues. [19]

Risk Factor of placenta previa

1. **Advanced maternal age**: Increases the risk of placenta previa, It is 1 in 1500 for women 19years or younger, 1 in 100 for women older than 35 years. [20]
2. **Multiparity**: It is more common in women who had previous pregnancies, develop one for every twenty women who have had 6 or more pregnancies[21] the reason is not clear but it may be associated with the ageing of vasculature of the uterus This causes placental hypertrophy and enlargement which increases the likelihood of the placenta encroaching on lower uterine segment. [17,22]
3. **previous cesarean section birth, surgical disruption of the uterine cavity:** Is a potential risk factor for pp. [15,23] It is known to cause lasting damage to the myometrium and endometrium. The first observation that reported an association between prior C\S& increased risk for pp dates back to the early 1950.[24]
4. **Multiple gestation**: This occur either because of larger surface of the placenta or due to risk factors for the development of multiple gestation as: older mother, family history which increase the incidence of pp. [25,26,27]
5. **History of abortion:** It has been suggested that surgical abortion, such as those by Vacuum aspiration (VA) or dilation and sharp curettage (D&C) may Cause scarring and adhesions to the uterus, which then impede proper placentation in subsequent pregnancies.[28]
6. **Uterine Surgery:** Previous myomectomy or deficient endometrium due to presence of history of uterine scar, endometritis, manual removal of placenta, curettage.[29]
7. **Prior placenta previa**: Mothers with history of pp have a tenfold risk of recurrence in a subsequent pregnancy. This is thought to be linked to defective decidual vascularisation.[22,30]
8. **Pregnancy with Male Fetus:** The pathophysiologic mechanism explaining the association between Placenta previa and male sex at birth is unknown. MacGillivray et al.[31] proposed that early and late insemination during the menstrual cycle may cause an increase in male conception and also lead to change in the site of implantation. Differences in tranceplacental hormone and immunological status between those pregnant carrying male fetuses vs. those carrying female fetuses. Other possible explanations include the preferential demise of female fetuses that implant in the lower segment of the uterus. [32,33]
9. **Smoking& cocaine use:** Cigarette smoking (dose response and number of years) [34,35] would increase incidence of placenta previa between 3-6 folds, while use of cocaine increase risk of placenta previa by factor of 2.4. [36]
10. **Non-white ethnicity:** Asian women have excess risk of pp compared with white women. Major variation exists in pp risk among Asian women, with the lowest risk in Japanese and Vietnamese women and the highest risk in Filipino women. [37]
11. **IVF/ICSI:** The risk of pp may be increased in pregnancies conceived by (ART), It is unclear weather the increased risk is due to factors related to the (ART) or associated with maternal factors. [38]
12. **Living at high attitude:** Also increase the risk, the common factor is that lower level of oxygen get to the placenta which might lead to increase its surface area to try to compensate, as the placenta spreads there is greater risk that it will cover the cervix. [39]
13. **Birth spacing:** Is associated with a risk of pp. There is emerging risks of utero-placental bleeding disorder (placental abruption, PP) in long interval possibly longer than5 years. [40] In a study carried out in Norwegian women, it was found that birth spacing of more than 4 years was associated with pp; this could be due to scarring or poor vasculature of the uterus or may be associated with increasing maternal age. [22]
14. **Single umbilical artery (SUA).[41]** Single umbilical artery has also been associated with placenta previa. A possible explanation is that absence of one umbilical artery causes an increased resistance to the umbilical blood flow, possibly resulting in fetal hypoxia. [41]
15. **Other association** Low Socioeconomic status [42], Erythroblastosisfetalis[43], uterine fibroid[44],

Clinical presentation: Antepartum hemorrhage complicates 2-5% of pregnancies, with approximately one-third is due to placenta previa.[45]The most characteristic event in PP is painless hemorrhage, which usually does not appear until near the end of the second trimester or after,[46]generally first episode of bleeding occurs after 36th week 60%, 32-36th Weeks 30%, before 32 weeks 10%.[47] It is not uncommon for the bleeding episodes to be recurrent in most cases, with the severity of subsequent episodes usually being greater than the previous one. The absence of abdominal pain is regarded as a significant differentiating feature between placenta previa and abruption, although 10% of women with placenta previa will have a co-existing abruption.[48] Fortunately, the initial bleeding is rarely so profuse as to prove fatal. Usually it ceases spontaneously, only to recur in some women, particularly those with a placenta implanted near but not over the cervical os, also can be provoke by digital examination or intercourse.[49] Bleeding may not appear until the onset of labour, when it may vary from slight to profuse hemorrhage and clinically may mimic placental abruption or vasa previa which can be differentiated by U/S. [50] When the placenta is located over the internal os, the formation of the lower uterine segment and the dilatation of the internal os result inevitably in tearing of placental attachments. The bleeding are augmented by the inherent inability of the myometrial fibers of the lower uterine segment to contract and thereby constrict the torn vessels. [51] Hemorrhage from the placental implantation site in the lower uterine segment may continue after delivery of the placenta, because the lower uterine segment contracts poorly compared with the uterine body. Bleeding may also result from laceration in the friable cervix and lower uterine segment, especially following manual\ removal of a somewhat adherent placenta.[52] PP may be associated with placenta accreta or one of its more advanced forms, placenta inccreta or perccreta, such abnormally firm attachment of the placenta might be anticipated because of poorly developed decidua in the lower uterine segment.[53]

Examination:

Other findings on abdominal examination include:

1. Malpresentation of fetus which is either breech or transverse, which occur in about 35%of cases.[54]
2. Slight but consistent deviation of the presenting part from midline.
3. Difficulty with palpating the presenting part.[55]

Diagnosis: PP should always be suspected in women with uterine bleeding during the latter half of pregnancy. The possibility of PP should not be dismissed until sonographic evaluation has clearly proved its absence.[52]

1-Transabdominal and Transvaginal ultrasound. (TVU) if available and well established, is preferred to transabdominal sonography for the diagnosis of placenta previa. There are a good number of potential theoretical advantages to the use of transvaginal ultrasound in this situation; imaging is better and the woman does not need a full bladder, thus avoiding both maternal discomfort and also distortion of the anatomy of the lower uterine segment and cervix. The major problem with this technique is represented by the insertion of the probe into the vagina of a woman with possible placenta previa that may provoke bleeding. Advocates of transvaginal ultrasound argue that the probe should be inserted no more than three centimeters into the vagina and should not therefore come into contact with the cervix or lower segment, and that improved images outweigh the theoretical disadvantages of Provoking bleeding.[56]

If a placenta overlapped the internal os by at least 25 mm at 18–23 weeks, the positive predictive value for previa at delivery was 40% with a sensitivity of 80%.[54]

2-Transperineal and translabial sonography: Has been used by some investigators. It allows easy visualization of the internal os and carried a positive predictive value of 90% and a negative predictive value of 100% for placenta previa.[57]

3-Magnetic resonance imaging (MRI): MRI will also accurately image the placenta and is superior to trans-abdominal sonography (TAS).It is unlikely that is confers any benefits over(TVS) for placental localization, but this has not been properly evaluated. Furthermore, MRI is not readily available in most units.[58]

Ultrasound feature suggesting diagnosis of placenta accreta include:

1-The loss of the normal hypo-echoic retroplacental myometrium zone.
2- Thinning or disruption of the hyper echoic uterine serosa- bladder interface.
3- The presence of focal exophytic masses.
4- Lacunar flow within the placenta. [19]

Doppler ultrasound increases the accuracy in diagnosing placenta accrete because it highlights areas of increased vascularity with dilated blood vessels that cross the placenta and the uterine wall. This demonstrates a transition between the retroplacental hypo-echoic zone with normal Doppler signal and the myometrial zone.[59] In cases where ultrasound is equivocal, magnetic resonance imaging (MRI) is a useful adjunct. MRI provides better delineation of tissue planes, including the placenta, myometrium, and vasculature.[60]

Clinical Implications: Placenta previa can lead to varying degrees of maternal hemorrhge at different gestations, with a significant impact on materno-fetal wellbeing.[33]

1) **Maternal Mortality.** Primarily due to antepartum hemorrhge, has reduced from 5%to less than 0.1% since the use of conservative management. [55]
2) **Post partum \Hemorrhage.** This occurs due to inadequate occlusion of the sinuses in the lower uterine segment at the site of placental bed. [48]. Massive obstetric hemorrhage is a major cause of maternal death and morbidity. While maternal deaths are rare events in developed countries, serious morbidities may arise from major blood loss, including hypovolaemic shock, disseminated intravascular coagulopathy, renal failure, liver failure and adult respiratory distress. [54]
3) **Placenta Accreta and associated morbidity.**
4) **Air Embolism**. This is possible if the sinuses in the placental bed are torn.[48]
5) **Postpartum sepsis**: Often secondary to ascending infection[48]
6) **Recurrence**: after one previous placenta praevia the recurrence rate isapproximately 4–8%.[48]

Management Options for Pregnancies Complicated with Placenta Previa

- Immediate Delivery
- Expectant Management

Both of which are influenced by severity of hemorrhage, fetal wellbeing and gestational age. [48]

Immediate Delivery: When there is severe life threatening hemorrhages irrespective of the gestational age, ceserean sections is the only delivery option. With mild to moderate bleeding occurring after 34 weeks gestation, delivery should be planned after stabilizing the maternal condition. [48] Women with pp who have had a previous c/s at high risk of having a morbidly adherent placenta& should have been imaged antenatally. When placenta accrete is felt to be likely, consultant anesthetist and obstetrician input are vital in planning and conducting the delivery. [61]

Expectant Management: The perinatal mortality rate in placenta previa is directly related to gestational age at delivery. [54] When the placental edge reaches or overlaps the internal os on transvaginal sonogram (TVS) between 18 and 24 weeks' gestation (incidence 2-4%) [62], a follow-up examination for placental location in the third trimester is recommended[62]. Overlap of 20 mm or more at any time in the third trimester is highly predictive of the need for Caesarean section (CS). [62] The os-placental edge distance on TVS after 35 weeks' gestationis valuable in planning route of delivery. When the placental edge lies > 20 mm away from the internal cervical os, women can be offered a trial of labor with a high expectation of success. A distance of 20 to 0 mm away from the os is associated with a higher CS rate, although vaginal delivery is still possible depending on the clinical circumstances.[62] In general, any degree of overlap after 35 weeks is an indication for caesarean section as the route of delivery.[62] Outpatient management of placenta previa may be appropriate for stable women with home support, close proximity to a hospital, and readily available transportation and telephone communication.[62]

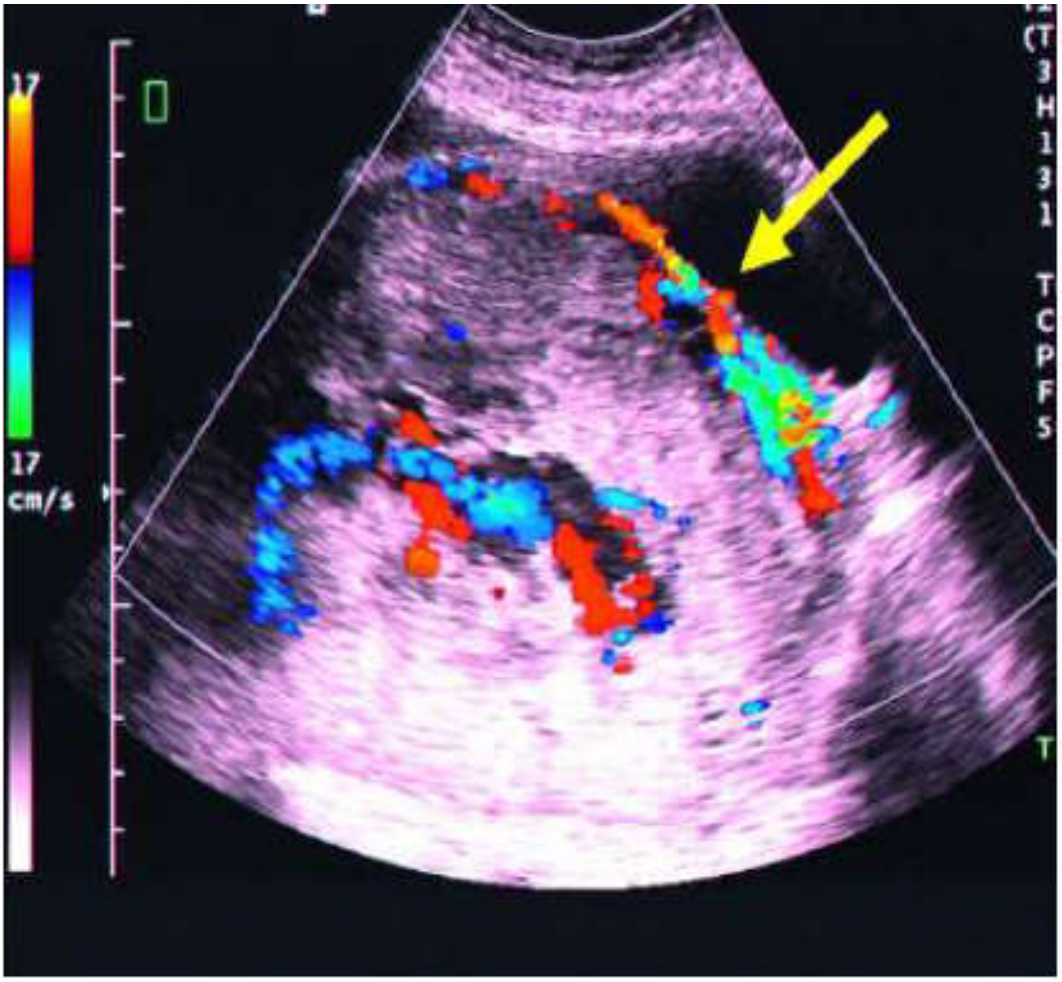

Figure 1.2.Transvaginal ultrasound at 33 weeks of gestational age: placenta previa complete.[56]

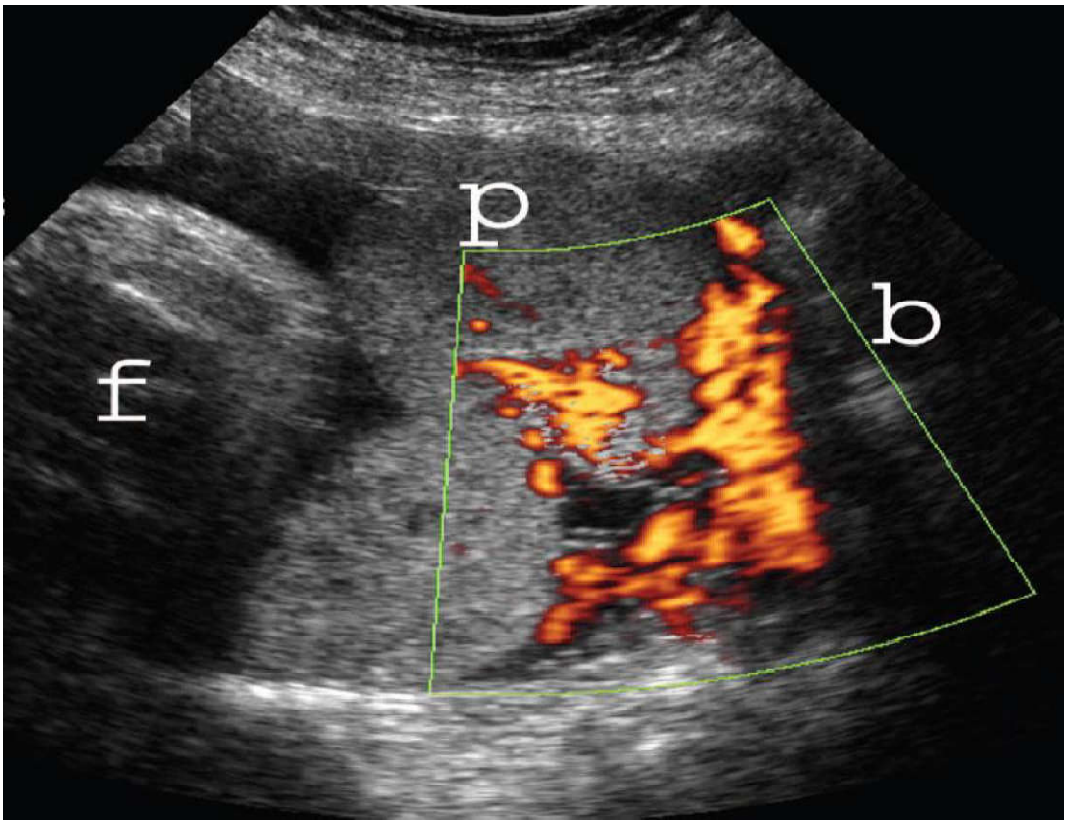

Figure 1.3. Color Doppler of placenta percreta. Note the vascularity of the bladder wall (b). At surgery, the bladder wall was involved. p, placenta; f, fetus.[14]

The R.C.O.G in the U.K has recommended that: [Women with placenta previa in the third trimester should be counseled about the risks of preterm delivery, obstetric hemorrhage, and their care should be tailored to their individual needs] [63]. If the woman is admitted for observation the following is also recommended:

- Bed rest until active bleeding has stopped for 2 – 3 days.
- Assess and treat anemia
- Consider steroid (betamethasone) administration when needed
- Daily fetal movement counts and non-stress testing.
- Delivery at 37-38 weeks, unless indicated earlier for maternal or fetal reasons. [64]

With prolonged inpatient care, immobility thrombo-prophylaxis should be encouraged and delivery planned around 38 weeks' gestation. [48] A previous lower segment scar increases the risk of placeta accreta. Even without placenta accreta, the poor contractile ability of the lower uterine segment can contribute to major Perinatal hemorrhage for which the operator must be prepared and the patient consented to necessary interventions.[52]

Method of Delivery: In general, the diagnoses of placenta previa means ceserean delivery with rare exceptions (previable fetus, Fetal demise, marginal previa, individualize low-lying placenta). In the case of a marginal placenta previa, a vaginal delivery can be accomplished if the fetal head rather than the placenta is presenting at the os.[63] The theory is that the fetal head is able to compress the placenta and lower uterine segment enough to prevent hemorrhage during labour when the degree of placenta previa is minor (grade 1 or 2 anterior) and the fetal head is engaged, pregnancy may be allowed to continue beyond 37 to 38 weeks and vaginal delivery anticipated. In those with placenta previa, emergency or elective cesarean delivery is commonly used. When a decision is made to proceed with cesarean delivery, the set-up for a cesarean hysterectomy must be immediately available given the 5% to 10% chance of a placenta accreta. The chance of placenta accreta is even higher in women who have had prior cesarean deliveries. [54]

Planning the Cesarean Section: The degree of technical difficulty of cesarean section for placentaprevia will be related to:

- Gestation.
- Degree of previa.
- Whether the previa is anterior.
- Presence of other risk factors making a morbidly adherent placenta more likely.
- The sonographic or MRI appearances of the placenta.
- Multiple previous abdominal procedures, which make the access to uterus more difficult.
- Morbid obesity. [13]

In some cases, placental incision is unavoidable. In this scenario, delivery should occur in an expedited manner, and the umbilical cord should be milked and then clamped to maximize fetal reserve of blood supply. The placenta should be allowed to deliver spontaneously given the highrisk of placenta accreta. Even if a placenta accreta is not present, there is ahigher risk of hemorrhage due to lower uterine segment atony. A planned cesarean must enlist the help of all those thought to be necessary. This will include at the very least:

1. Senior obstetrician.
2. Senior anesthetist.
3. Experienced midwives, anesthetic assistants and theatre staff.[13]

Type of Anesthesia: The type of anesthesia is the ultimate responsibility of the anesthetist [13]. Although general anesthesia was preferred to regional anesthesia in the past, there is an increasing tendency to use the latter; Fedriksen and colleagues [20] showed its safety and a reduction in an intra-partum blood loss compared with general anesthesia.

The Procedure of the Cesarean Section with p.p: The placental location can be determined preoperatively or intra-operatively with an ultrasound that has a sterile probe cover. Transverse incisions are preferred, but a vertical incision may be indicated to avoid an anterior placenta. If the placenta is in an anterolateral position, a vertical incision on the opposite side could avoid placenta damage. If the placenta wraps around anterior to posterior, a transverse or vertical incision can be made above the level of placental attachment. [55] A transverse incision of the lower segment of the uterus is commonly used, provided there is a lower segment. When the lower segment is nonexistent or is very vascular, some obstetricians advocate a classical or Delees incision. Scott believes that such incision is rarely justified because of their consequences and long term disadvantages. [55] When difficulties occur with transverse incisions of the lower segment, the incision may be converted to an inverted T, J or U shaped incision. If the incision in the uterus is transverse and the placenta is anterior, two approaches are available:

- Going through the placenta or
- Defining its edge and going through the membranes above or below the placenta.

The former approach requires speed and may cause significant fetal blood loss. [54] Myerscough advices against cutting or tearing through the placenta because of the inevitable fetal blood loss that occurs as fetal vessels are torn. [55] Because the lower segment is less muscular, contraction and retraction cause inadequate occlusion of the sinuses of the placental bed intra operative hemorrhge is not uncommon. [55] When homeostasis is difficult, bleeding sinuses can be over sewn with an atraumatic sutures. If this is unsuccessful, packing the uterus is possible[65]. Where uterotonics are not effective, figure of eight haemostatic sutures can be applied to the placental bed other modalities shown to be effective include:

1) Intra myometrial prostaglandins injection.
2) Intra uterine hydrostatic balloon.
3) Uterine brace suture. [66]

In un controlled bleeding, an early decision may be required for uterine or internal iliac artery ligation or even hysterectomy. Embolization of the uterine arteries has shown to be extremely useful in selected cases.

Practical Aspects of Preparation and Care in Operating Theater When Placenta Accreta is suspected: The average blood loss in cases of placenta accreta is 3-5 L [67] so proper prior liaison with the hematologist to ensure an appropriate

supply of cross matched blood is essential. One needs to ensure adequate numbers of experienced and well trained supporting staff in the operating theatre, plus appropriate equipment. Instrument for bowel and bladder resection should be available if needed, as should a vascular surgery set.[66] Packing of the vagina with multiple gauze bandages to elevate the lower uterine segment can make surgery easier if there is a lot of bleeding and pelvic surgery becomes necessary, as this elevates the pelvic floor and facilitates identification of the cervix. The most appropriate abdominal incision is a midline, which gives the best access in case of heavy bleeding. Oxytocin is given and waiting to see if the placenta separates, if does, and there is good uterine retraction with minimal bleeding,then once the placenta is extruded by uterine contraction the uterus can be closed.[66]

Therapeutic Approach (Placenta PreviaAccreta): It is generally accepted that placenta accreta is ideally treated by total abdominal hysterectomy. In addition, there is almost universal consensus that the placenta should be left in place; attempts to detach the placenta frequently result in massive hemorrhage. It is better to perform surgery for placenta accreta under elective controlled conditions rather than as an emergency without adequate preparation. [66] When prenatal imaging has identified involvement of the lowersegment by the placenta accreta, some have suggested that peri operative ureteric stent placement can facilitate palpation of the ureters intra operatively to allow early identification of uretral trauma. The role of preoperative uretric stent placement when placenta accrete is suspected remains to be determined.[66]

Placenta percreta with bladder invasion at cesarean delivery: There should be no attempt to detach the placenta from the uterine wall. The edges of the uterine incision should be over sewn for homeostasis, after which a total abdominal hysterectomy should be performed. Although some have advocated supra cervical hysterectomy, in the majority of cases the lower uterine segment is involved in the morbid adhesion of placenta and therefore need to be removed. It is important to minimize blood loss and ensure that the blood lost is replaced promptly and adequately. The patient requiring hysterectomy for placenta accreta is at risk for Postoperative complications related to intraoperative hypotension, [66] persistent coagulopathy, anemia, and prolonged surgery. Renal, cardiac, and other organ dysfunctions common and should be considered. [66]

Balloon Catheter Occlusion and Embolization: Balloon catheter occlusion or Embolization of the pelvic vessels decreases blood flow to the uterus and potentially leads to reduced blood loss and makes it possible to perform surgery under easier, more controlled circumstances, with less profuse hemorrhge. A study by Alvarse and colleagues [67] found that elective Embolization resulted in improved outcomes when compared with embolization done emergently.

Management without Hysterectomy of placenta accrete: (Conservative management)**:-** Hysterectomy removes any prospect of future fertility and is associated with considerable morbidity and potential mortality, including that of surgical injury, given the distorted tissue planes and the need to operate in what is sometimes a blood -filled field. To minimize these complications& preserve fertility, recently there has been some interest in attempt to conserve the uterus& avoid hysterectomy. [68] Generally, in these cases, the placenta is left in situ, with no attempt at removal.

Adjunctive procedure includes:

1. Embolization of the internal iliac vessels.
2. Treatment with methotrexate.
3. Resection of the affected segment of the uterus.
4. Use of uterine compression sutures.
5. Over sewing of the placental bed. [68]

Women offered conservative management should be counseled extensively that the outcomes are unpredictable and that there is a significant risk of serious complication. It is possible that, in the future, conservative management will assume a more important role in the management of placenta accreta.

6. However, at the present time, this option cannot be recommended as a mainstay of therapy. Further studies are required to identify women who may be ideal candidates for conservative management and to define the risks associated with this approach. [68]

Methotrexate Therapy for placenta accrete: Conservative management of placenta accreta through adjuvant methotrexate, selective arterial embolization, or intravascular balloon catheter can be effective and allow fertility preservation. Methotrexate has been proposed to speed up the postpartum involution of the placenta and therefore improve the success rate of conservative treatment. In the recent years, reports of selected patients undergoing medical management for placenta accreta have begun to appear. Although the number of these patients has been small, with some women ultimately requiring surgical intervention, the vast majority have done well. Even so, methotrexate therapy should be considered only when the patient wishes to preserve her fertility and when no active uterine bleeding is present. Adequate discussion of the potential risks and benefits also is crucial. [68,69]

5. Over sewing of the placental bed. [68]
6. However, at the present time, this option cannot be recommended as a mainstay of therapy. Further studies are required to identify women who may be ideal candidates for conservative management and to define the risks associated with this approach. [68]

Methotrexate acts primarly against rapidly dividing cells and therefore is effective against proliferating trophoblast. Recently, Methotrexate (MTX) is the cornerstone of medical management, although case reports also have described the use of antibiotics, uterotonics, surveillance with ultrasound, and the monitoring of human chorionic gonadotropin (hCG) levels. There is no agreed-upon regimen for the use of MTX or adjunctive therapies such as antibiotics and oxytocin. However, studies and literatures suggested some general guidelines. At the time of delivery, the cord and membranes should be ligated as high as possible. Broad-spectrum antibiotics, for prophylaxis, and oxytocin should be administered during the initial 72 hours. In addition, ultrasound should be performed daily to monitor involution and placental vascularity, which should decrease over time. [70] If hCG levels plateau, placental vascularity persists, or placental involution stalls after this initial 72-hour period, MTX should be administered (1 mg/kg) on alternate days for a

total of 4 to 6 doses. Medical management should be stopped if liver function tests are 2 or more times the normal value or there is evidence of thrombocytopenia (platelet levels below 100,000), neutropenia (white blood cell below 2,000), or renal dysfunction (creatinine levels greater than 1.5 mg/dL). If the patient becomes clinically unstable or placental tissue fails to resolve following MTX therapy, hysterectomy should be considered. It is possible that the use of methotrexate hastens the resolution of the placenta. [(70)]

Bladder Involvement: The bladder is the most frequently involved extra uterine organ when there is a placenta percreta. Bladder involvement is associated with significant morbidity. [(70)] Management of the patient with bladder involvement requires careful Perioperative planning and should involve an urogynecologist, an urologist and / or a gynecological oncologist. Preoperative cystoscopy and placement of ureteric stents may aid in identification of the ureters, leading to a reduced risk of damage or injury to these structures. Involvement of the bladder may require resection of the bladder and, occasionally, of the ureters. cystotomy may be helpful in identifying the extent of involvement and location of the ureter.[(70)]

Patients and Methods: A prospective observational study was carried out during the period between 1st October 2013 and 31 January 2014 in Baghdad Teaching Hospital, medical city complex. This hospital provides a tertiary care and equipped with surgical theaters, a blood bank and an obstetrical and neonatal intensive care unit, and facility to contact urosurgical, cardiovascular and general surgical units when their opinion or intervention is required. During the study period, total no of deliveries was 4128 of them 2322 were cesarean section and 1806 were vaginal deliveries of all those 92 women had placenta previa and were included in the study sample. Twenty four patient s were admitted to hospital for observation The aim in our hospital is to do conservative management till at least 36 weeks, unless there is severe bleeding mandating emergency ceaserean section to save the mother's life.

Inclusion criteria: The study group included 92 Pregnant ladies who had placenta previa diagnosed ultrasonographically & confirmed during cesarean delivery. Gestational age was estimated based on the first day of the mother's last menstrual period or ultrasonographically if the date was unknown or uncertain.

Exclusion Criteria: Pregnant ladies with normally situated placenta were excluded from the study.

Data collection: Data were collected by using a pre-constructed data collection sheet (questionnaire) and the data collected through:

- Detailed history taking from all pregnant women, these data included the following (Name, Age, Gestational age, Blood Group and Rhesus group, L.M.P. (last menstrual period), Gravidity, Parity, Number of vaginal deliveries, Number of Previous C/S, history of previous placenta previa).
- General examinations were done to assess the general wellbeing of the mothers and asses the severity of the bleeding then an obstetric abdominal examination was done to each patient.

Preparations and interventional procedures

- Cross matching of at least 6 pints of blood and preparation of fresh frozen plasma and cryoprecipitate was done.
- At the time of admission, all women with placenta previa were informed about the risks of preterm delivery and obstetric hemorrhage, in addition to the possible intra-operative and postoperative complications and their care was tailored according to the haemodynamic status and gestational age.
- Single course of antenatal corticosteroids was given to all mothers between 28+0 and 34 weeks of gestation at risk of preterm birth).
- Prior to delivery, all women with placenta previa and their families were informed about the risks and complications and indications for blood transfusion and hysterectomy.
- Multidisciplinary involvement in pre-operative planning.
- All cases in this study where delivered by ceserean section. C/S (emergency or elective).
- Confirmation of placenta previa done at operating theater during cesarean section with exclusion of false positive cases. Hysterectomy specimens send for histopathology in all cases to assess of placenta accrete and any pathology associated.
- All mothers were monitored for signs of disseminated intravascular coagulation DIC during and after surgery and for post partum hemorrhage.

Ethical consideration:

- The study protocol was approved by the department of gynecology and obstetrics, medical college, Baghdad university.
- Agreement of the hospital administration office was obtained.
- Verbal consent of all women were obtained prior to participation

Statistical Analysis: By using the statistical package for social sciences (SPSS) software for windows, version 20, IBM, USA, data of the 92 pregnant women with placenta previa were entered and analyzed. Descriptive statistics were presented as mean ± standard deviation (SD) and range (minimum-maximum) values for continuous variables; maternal age and gestational age) which were also categorized and transformed into categorical variables, other variables presented as frequencies (numbers of women) and proportions (%). Non-parametric single variable Chi square test was used to assess the significance of differences in frequencies of each category in categorical variables, the analysis and statistical procedures were performed with the aid of professional medical statistician.

RESULTS

There were 92 pregnant ladies who had placenta previa enrolled in this study, from a total of 4128 women attended for labor giving a proportion of 2.2%. The mean maternal age was (32.2 ± 5.9) years with a range of (20 – 44)years, further distribution of the age into four categories revealed that 10 (10.9%) of the patients aged 20-24 years, 21 (22.8%) patients aged 25 - 29 years, 26 patients (28.3%) aged 30 - 34 years and

Table 1. Distribution of Age and obstetrical characteristics of studied group

Variable	No.	%	P.value
Maternal age (years)			
20 – 24	10	10.9	< 0.001
25 – 29	21	22.8	
30 - 34	26	28.3	
≥ 35	35	38.0	
Total	92	100.0	
Mean ± SD	32.2 ± 5.9		
Range	20 - 44		
Gravidity			
1-2	6	6.5	< 0.001
3 - 4	36	39.1	
5 - 6	37	40.2	
≥ 7	13	14.1	
Total	92	100.0	
Parity			
Nulliparity	3	3.3	< 0.001
1 - 2	20	21.7	
3 - 4	48	52.2	
≥ 5	21	22.8	
Total	92	100.0	
Abortion history			
Yes			
One	15	16.3	< 0.001
Two	6	6.5	
Three	2	2.2	
Total abortion	23	25.0	
None	69	75.0	
Total	92	100.0	

Table 2. Frequency distribution of previous cesarean sections

Cesarean section	No.	%	P.value
Cesarean section			
One	12	13.0	
Two	19	20.7	
Three	25	27.2	
Four	13	14.1	
≥ 5	9	9.8	
Total	78	84.8	< 0.001
None	14	15.2	
Total	92	100.0	

Table 3. Distribution of mean gestational age at admission and at termination of pregnancy of the studied group

Gestational Age (weeks)	No.	%	
At admission			
< 37 weeks	77	83.7	< 0.001
≥ 37 weeks	15	16.3	
Mean ± SD	32.7 ± 2.6	-	
Range	22^{+3} – 38^{+1}	-	
At time of delivery			
< 37 weeks	72	78.3	< 0.001
≥ 37 weeks	20	21.7	
Mean ± SD	35.6 ± 1.7		
Range	27^{+6} – 38^{+1}		

35 women (38%) aged ≥ 35, these findings indicated that the occurence of placenta previa increase directly (positive correlation) with the increasing maternal age, (P<0.001) table 1. Regarding the gravidity, 6 patients (6.5%) were gravida 1 and 2, gravida 3 and 4 in 36 patients (39.1%), gravida 5-6 in 37 patients (40.2%) and 13 patients (14.1%) were gravida 7 or more.

Nulliparity were found in only 3 patients represented (3.3%) of the cases, 1-2 parity reported in 20 (21.7%) patients, 3-4 parity in 48 (52.2%) patients and the parity of 5 or more was found in 21 patients (22.8%). History of miscarriage was found in 23 patients; 15 (16.3%) patients gave a history of one abortion, 6 patients (6.5%) had 2 miscarriage and 2 patients (2.2%) had a history of three abortions, the remaining 69 patients (75%) had no history of miscarriage or curettage.

Table 4. Distribution of mode of delivery and other needed intervention

Intervention	No.	%
Cesarean section	48	52.2
Cesarean & Over sewing	13	14.1
Hysterectomy	31	33.7
Internal artery ligation	7	7.6
Uterine artery ligation	5	5.4

Table 5. Causes of Hysterectomy of 31 pregnancies terminated with hysterectomy

Causes	No.	% from all causes	% from total cases
Morbidly adherent placenta	18	58.1	19.6
Bleeding	13	41.9	14.1
Total	31	100.0	33.7

All these findings are demonstrated in (Table 1). Previous cesarean sections were found in 78 (84.8%) patients; history of one previous cesarean section was found in 12 (13%) patients, 2 CSs in 19 (20.7%) patients, 3 CSs in 25 (27.2%) patients, 4 CSs in 13 (14.1%) and 5 CSs or more were found in 9 (15.2%) patients. Only 14 (15.2%) patients had no history of previous CS, Table 2. The mean gestational age at admission was (32.7 ± 2.6) weeks with a range of (22^{+3} – 38^{+1}), furthermore, 77 (83.7%) of the patients were at < 37 weeks of gestation at admission and 15 (16.3%) patients were at ≥ 37 weeks of gestation. At time of delivery, the mean gestational age was (35.6 ± 1.7) weeks with a range of (27^{+6} – 38^{+1}). Additionally, 72 (78.3%) patients were at < 37 weeks of gestation and 20 (21.7%) patients were at ≥ 37 weeks of gestation (Table 3). In 61 patients (66.3%), delivery was by CS, of them 48 (52.2%) were cesarean section alone and 13 (14.1%) were cesarean with over sewing. Hysterectomy was conducted in 31 (33.7%) of the patients, on the other hand, internal artery ligation was performed in 7 patients (7.6%), uterine artery ligation in 5 patients (5.4%) (Table 4). Among the 31 hysterectomy cases, morbidly adherent placenta was the more frequent cause of hysterectomy; it was reported in 18 patients represented (58.1%) of all causes of hysterectomy, followed by bleeding in 13 patients (41.9%), furthermore, these causes represented (19.6%) and (14.1%) of the total number of cases, respectively, (Table 5).

DISCUSSION

Placental abnormalities may be associated with maternal and fetal complications, if left undiagnosed during pregnancy. Placenta previa is one of the major causes of ante partum hemorrhage and responsible for maternal and neonatal morbidity and mortality. There has been substantial reduction in maternal death in placenta previa throughout globe because of early diagnosis even prior to the bleeding, omission of internal examination outside the hospital, availability of blood transfusion facilities. All these factors reduced maternal death from placenta praevia. But in developing countries because of wide gap of the extension of medical facilities maternal mortality from placenta praevia in hospital statistics ranges from less than 1% to as high as 5%. Although the etiology of placenta previa remains speculative, several risk factors associated with this condition have been established. However, it is very important to recognize placenta previa early, thereby decreasing the maternal and fetal morbidity and mortality. [71,72] The current prospective study included 92 pregnant ladies who had placenta previa diagnosed ultrasonographically and confirmed during cesarean delivery.

The mean maternal age in the present study was 32.9 (ranged 20 – 44) years, on the other hand, the current study found that the occurrence of placenta previa increased with the advanced age; where 10 (10.9%) of the patients aged 20-24 years, 21 (22.8%) patients aged 25 - 29 years, 26 patients (28.3%) aged 30 - 34 years and 35 women (38%) aged ≥ 35, these findings agreed that concluded by Cieminski A et al in 2005[73] who concluded that advancing maternal age increases the occurrence of placenta previa and they found the occurrence of placenta previa increased with maternal age and was the highest in women aged 35 or older and the lowest in women aged <25 years. Also the findings of our study was close to that reported by Cleary-Goldman J et al in 2005, [74] who concluded that increasing maternal age is independently associated with specific adverse pregnancy outcomes, and that older age women were about 1.8 – 2.8 folds more likely to have PP. Regarding the gravidity and parity in the present study, the incidence of placenta previa was highest in multiparous and there was a significant and direct correlation between the incidence of placenta previa and parity and gravidity; incidence increased with the increase parity and gravidity, (6.5%) were gravida 1and 2, (39.1%) gravida 3 and 4, (40.2%) gravida 5-6 and (14.1%) were gravida 7 or more. Only 3.3% were nulliparous and the majority (96.7%) of ladies were multiparous. Previuos studies and literatures had reported that incidence of placenta previa increased with parity and gravidity; Surraya Halimi (Pakistan, 2011)[75] found the highest proportion in multiparous; Out of 226 patients with placenta previa, 89 were multipara, and 99 were grand multipara and rest were primigrvidas, and concluded that there is an association between incidence of placenta previa with the increase in parity.

Another study by Sharma M *et al.* (2014) [76] found a good association between increasing incidence of placenta previa with the increase in parity ($p<0.001$) These studies showed that as the parity increases the risk of placenta previa independent of other risk factors. As it has been noted in the other studies, the incidence of placenta previa is higher in women of high parity. The current study found that 16.3 % of the women had history of miscarriage and D&C, this consistent with that reported in previous study was carried out by Johnson LG et al (2003) [77] and it has been suggested that surgical abortion, such as those by dilation and sharp curettage (D&C) may cause scarring and adhesions to the uterus, which then impede proper placentation in subsequent pregnancies. The risk of PP in women with one or more prior abortions is reportedly 1.3–2.7 times that of women reporting no prior abortion. [77]

History of previous Cesarean sections (CSs): In the present study previous cesarean sections were reported in 78 (84.8%) women and there was a highly significant association between the previous cesarean sections and the incidence of placenta previa, furthermore, the incidence increased significantly with higher number of cesarean sections, compared to those who didn't have previous cesarean sections, these findings agreed that previously reported; In a study done by Ananth CV et al (2003) [72] who found the incidence of placenta previa increase with history of caesarean sections with relative risks 4.5 after 1 C/S, 7.4 after 2, 6.5 after 3 and 44.9 after 4 or more prior cesearean sections. In a retrospective analysis of 292 cases of placenta previa. Another study was conducted by Getahun *et al.* (2006) [78], found the pregnancy after a cesarean delivery was associated with increased risk of previa compared with a vaginal delivery (relative risk: 1.5). and the cesarean delivery in the first and second births conferred a two-fold increased risk of previa in the third pregnancy (RR 2.0) compared with first two vaginal deliveries. In the current study, the mean gestational age at admission was (32.7 ± 2.6) weeks with a range of (22^{+3} – 38^{+1}), furthermore, 83.7% of the women were at < 37 weeks of gestation. Räisänen *et al.* (2014) [79] concluded among multiparous women, placenta previa was associated with a twofold increased risk of small for gestational age (SGA) controlling for maternal age, parity, prior preterm birth. This might explained by clustering of risk factors associated with placenta previa. [79] Ananth (2001) suggested that the association between low birth weight and placenta previa is chiefly due to preterm delivery and to a lesser extent with fetal growth restriction.[80] Zlatnik MG (2007)[81] found among the 38 540 women, 230 women had previas (0.6%). Compared to controls, pregnancies with previa were significantly associated with preterm delivery prior to 28 weeks (3.5% vs. 1.3%; p = 0.003), 32 weeks (11.7% vs. 2.5%; p < 0.001), and 34 weeks (16.1% vs. 3.0%; p < 0.001) of gestation., In the current study 61 women (66.3%) delivered by CS, of them 13 (14.1%) with over sewing. Hysterectomy was conducted in 31 (33.7%) of the patients, the causes of Hysterectomy, including placenta accrete which was the more frequent cause of hysterectomy (58.1%), and bleeding in (41.9%) of all causes. On the other hand, internal artery ligation was performed in 7 patients (7.6%), uterine artery ligation in 5 patients (5.4%). In a study done by Machado LSM *et al.* (2011) [82] the predominant indication for emergency hysterectomy was abnormal placentation (placenta previa/accreta) which was noted in 45 to 73.3%, uterine atony in 20.6 to 43% and uterine rupture in 11.4 to 45.5 %. The risk factors included previous cesarean section, scarred uterus, multiparity, older age group and the decision of performing total or subtotal hysterectomy was influenced by the patient's condition. Studies and literatures referred that conservative measures to arrest bleeding are initially tried before considering hysterctomy. The measures include uterotonic drugs, uterine or hypogastric artery embolisation, hemostatic sutures, uterine or internal iliac artery ligation. Conservative management is of particular importance in patients who are young, have low parity and who are haemodynamically stable. However while there are reports of 96% success rate following uterine artery ligation there are others who have achieved success in only 39.4% of these cases. The choice between conservative management and hysterectomy should be individualized. In situations where conservative treatment is likely to fail or has failed, there should be no further delay in performing hysterecomy as delay leads to increase in blood loss, transfusion requirement, operative time, DIC, and increased possibility of admission to ICU.[82]

Conclusion

1-In the present study the incidence of placenta previa was increased with the advancing age, particularly > 35 years.
2-The incidence of placenta previa was highest in the multiparous group than nulliparous and directly associated with parity and gravidity. Previous caesarean section was an important and significant risk factor

1. Early diagnosis of placenta previa and proper management to reduce the maternal morbidity and mortality.
2. Education of women to visit and register in ANC units.
3. Mothers at high risk should be sent to the tertiary hospital with advanced diagnostic and managements tools.
4. As cesarean section was a major risk factor, women with previous cesarean section should be followed carefully during the ANC visit as early as possible and educated about the family planning and hospital delivery.
5. Decreasing the cesarean section rates is an important factor to reduce the incidence of placenta previa, this can be reached by giving a trial of labour after 1st cesarean section, offer external cephalic version for patients with breech presentation. Further studies with larger sample size are suggested for further studying and analysis of risk factors.

Abbreviation

Abbreviation	Text
C\S	Cesarean section
D and C	Dilation and sharp curettage
et al	et alibi, (Latin) and others
hCG	Human Chorionic Gonadotropin
hPL	Human Placental Lactogen
ICSI	Intra-cytoplasmic sperm injection
IgG	Immunoglobulin G
IgM	Immunoglobulin M
IVF	In vitro fertilization
MRI	Magnetic resonance imaging
MTX	Methotrexate
P.vlue	Level of significance (probability of error)
pp	Placenta previa
SD	Standard deviation
SPSS	Statistical package for social sciences
SUA	Single umbilical artery
TAS	Trans abdominal sonography
TVS	Transvaginal sonography
TVU	Transvaginal ultrasound
U/S	Ultra sound
VA	Vacuum aspiration

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