

# Study of Efficacy of Various Surgical Techniques in Use for Controlling Bleeding From Placental Bed in Cases of Placenta Previa

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Date of Submission: 27-06-2019

Date of acceptance: 13-07-2019

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## I. Introduction

Placenta previa is an obstetric condition in which the placenta is implanted somewhere in the lower segment of the uterus either near or over the internal cervical os, presenting ahead of the leading pole of the foetus. It should be suspected in any woman beyond 20 weeks of GA who presents with painless vaginal bleeding. It usually occurs in the second or third trimesters and rarely in the later part of the first trimester and is a major cause of antepartum haemorrhage. It is seen in approximately 0.4-0.5% of all labours.

The incidence of placenta previa is on the rise following wide spread increase in the caesarean section rate. A meta-analysis showed that the rate of placenta previa increases with the increasing number of caesarean deliveries, with a rate of 1% after 1 caesarean delivery, 2.8% after 3 caesarean deliveries and as high as 3.7% after 5 caesarean deliveries<sup>1</sup>.

Abnormal placentation (placenta previa and adherent placenta) is overtaking atonic PPH as an indication for peripartum hysterectomy. The morbidity rate of hysterectomy is high and can lead to adverse effects such as loss of fertility, secondary amenorrhoea, physical and psychological trauma. So uterine sparing surgery is often required in primigravidas and others who desire fertility. Hence the need for surgical techniques like Stepwise uterine devascularisation, Bilateral hypogastric artery ligation, compression sutures like Cho square, transverse B-Lynch etc.. to control postpartum haemorrhage. They are reported to be successful with less operative time and fewer complications.

Keeping this point in mind, the present study was designed to know the efficacy of conservative surgical techniques like Cho Square compression sutures and Stepwise uterine devascularisation in controlling the placental bed bleeding in cases of placenta previa. The present study was conducted on 100 pregnant mothers who were diagnosed to have placenta previa admitted to Gandhi Hospital, a tertiary care centre over a period of two years.

The primary outcomes measured were preoperative haemoglobin, operative time, intraoperative blood loss, number of blood transfusions required, postoperative morbidity and foetal outcome in terms of maturity, birth weight and perinatal morbidity and mortality.

## II. Aim

- To study the efficacy of conservative surgical techniques like Cho square compression sutures and Stepwise uterine devascularisation in controlling the bleeding from placental bed in cases of placenta previa.

## III. Objectives

1. To prenatally detect the type and any abnormal invasion of placenta in placenta previa using various imaging techniques.
2. To assess preoperative haemoglobin, intraoperative blood loss, need for blood and blood component transfusion, intraoperative surgical interventions done (Cho Square compression sutures and Stepwise Uterine Devascularisation) and postoperative complications.
3. To study the maternal and foetal outcomes in placenta previa after conservative surgeries.

#### IV. Review of Literature

Placenta previa is a potentially severe life threatening obstetric complication where the placenta lies within the lower segment of the uterus, presenting an obstruction to the cervix and thus to delivery. There has been a considerable decrease in maternal morbidity and mortality in recent years in placenta previa worldwide owing to early diagnosis, avoiding internal examination or examining the patient under double set up, availability of blood transfusion facilities, wider use of caesarean section with expert multidisciplinary team including skilful obstetricians and anaesthesiologists. All these factors contributed in bringing down the maternal mortality from placenta previa to <1% or even to zero in some centres.

#### CLASSIFICATION:

Placenta Previa is divided into four grades traditionally depending on the relationship and distance to the internal cervical os:

1. **Grade I:** low lying placenta: placenta lies in the lower uterine segment but its lower edge does not reach the internal cervical os.
2. **Grade II:** marginal previa: placental tissue reaches the margin of the internal cervical os, but does not cover it.
3. **Grade III:** partial previa: placenta partially covers the internal cervical os
4. **Grade IV:** complete previa: placenta completely covers the internal cervical os.

**Figure 1:** Classification of Placenta Previa



#### CLINICAL PRESENTATION:

The classic presentation of placenta previa is **painless vaginal bleeding**, which may be an isolated or recurrent event.

Bleeding episodes that often cease within 1 or 2 hours, an absence of abdominal discomfort and a normal foetal heart tracing on electronic monitoring usually characterise placenta previa.

With placenta previa, the presenting part is unengaged and malpresentation is common, seen in up to 50% of cases.

Most cases of placenta accreta are not discovered until the third stage of labour, when the patient is noted to have an abnormally adherent placenta that requires manual removal or has postpartum haemorrhage secondary to partial placental separation.

Transvaginal sonography, if available, may be used to investigate placental location at any time in pregnancy when the placenta is thought to be low-lying. It is significantly more accurate than transabdominal sonography, and its safety is well established. [SOGC recommendation-2007]. TAS is associated with a false positive rate for the diagnosis of placenta previa of up to 25%. Accuracy rates for TVS are high (sensitivity 87.5%, specificity 98.8%, positive predictive value 93.3%, negative predictive value 97.6%), establishing TVS as the gold standard for the diagnosis of placenta previa<sup>2</sup>. TVS can be performed safely in patients with previa since the optimal position of the vaginal probe for visualisation of the internal os is 2 to 3 cm away from the cervix .

#### COLOUR DOPPLER

Increased vascularity is seen even in milder forms of PA. This may be due to different levels of expression of vascular endothelial growth factors and their receptors in the placentas of patients with PA. Invasion can also create an irregular bladder wall with extensive associated vascularity.

## **MRI**

Magnetic resonance imaging is considered an adjunctive modality and done when there are ambiguous ultrasound findings or a suspicion of a posterior placenta accreta, with or without placenta previa. It is most useful for diagnosis of complicated placenta previa, such as accreta, increta and percreta. (15) It is more expensive than ultrasonography and requires both experience and expertise in the evaluation of abnormal placental invasion.

## **MODE OF DELIVERY:**

In general, mode of delivery is directed by the proximity of the leading edge of the placenta in relation to the internal os of the cervix.

When the placental edge lies between 20 mm away from the internal os and 20 mm overlap after 26 weeks of gestation, ultrasound should be repeated at regular intervals depending on the gestational age, distance from the internal os, and clinical features such as bleeding, because continued change in placental location is likely. Overlap of 20 mm or more at any time in the third trimester is highly predictive of the need for CS. [SOGC Recommendation- 2007]. The os-placental edge distance on TVS after 35 weeks gestation is 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 labour 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. [SOGC recommendations-2007] In general, any degree of overlap (> 0 mm) after 35 weeks is an indication for Caesarean section as the route of delivery<sup>3</sup>.

In a retrospective study of 121 pregnancies complicated by placenta previa, 90% of with edge to cervical os distance of 1-2 cm resulted in caesarean deliveries.

## **Invasive placentations :**

If the patient is at increased risk for invasive placentation (accreta, increta, or percreta), then the patient and surgical team must be prepared prior to delivery. These invasive placentations carry a high mortality rate (7% with placenta accreta) as well as a high morbidity rate (blood transfusion, infection, adjacent organ damage).

## **Surgical Approach:**

The recommended management of suspected placenta accreta is planned preterm Caesarean hysterectomy with the placenta left in situ because removal of the placenta is associated with significant hemorrhagic morbidity.

The surgical management of placenta accreta may be individualized depending on the desire to preserve future fertility. The use of a midline vertical incision may be considered as it provides adequate exposure if hysterectomy becomes necessary. A classic uterine incision, often transfundal, may be necessary to avoid the placenta and allow delivery of the infant. Normally spontaneous detachment of the placenta occurs in 90% of patients within 15 minutes, 95% within 30 minutes, any further delay in its delivery should be considered either due to retention or morbid adherence. If hysterectomy becomes necessary, the standard approach is to leave the placenta in situ, quickly use a “**whip stitch**” to close the hysterotomy incision, and proceed with hysterectomy. The dissection of the bladder flap may be performed relatively late, after vascular control of the uterine arteries is achieved, in cases of anterior accreta. Occasionally, a subtotal hysterectomy can be safely performed, but persistent bleeding from the cervix may preclude this approach and make total hysterectomy necessary.

However, the morbidity rate of hysterectomy is high and can lead to adverse effects such as loss of fertility, secondary amenorrhoea, physical and psychological trauma.

Conservative management of adherent placenta had changed greatly from the conventional leaving placenta in situ which had lot of complications like sepsis, peritonitis, pyelonephritis, endometritis, vesicouterine fistula, infection and uterine necrosis to uterine sparing techniques that have less operating time and lesser complications<sup>4</sup>.

These complicated pregnancies must have delivery plans that include patient-matched blood and informed consent for possible caesarean hysterectomy.

## **UTERINE SPARING SURGICAL TECHNIQUES IN MANAGENEMT OF PLACENTA PREVIA AND PLACENTA ACCRETA ARE:**

### **INTERVENTIONAL RADIOLOGICAL PROCEDURES :**

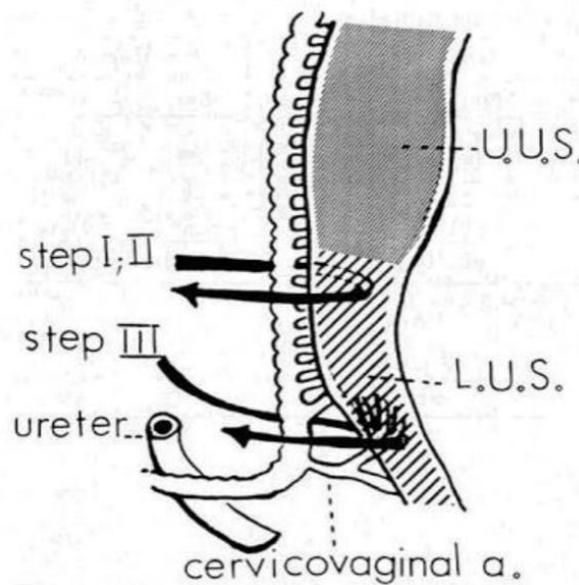
Predelivery placement of balloon catheters for angiographic embolization of pelvic vessels is a technique described in reducing blood loss associated with caesarean hysterectomy and provides the opportunity to manage potential postoperative bleeding with embolization rather than operative re-exploration<sup>5</sup>.

### **LOCAL RESECTION OF PLACENTAL IMPLANTATION SITE:**

Adherent placenta can be safely and successfully treated, in some well selected cases by resection of the placental implantation site and repair of uterine defect. This method provides immediate therapy, reduces blood loss and preserves fertility. Local resection seems to be associated with fewer complications within 24 hours postoperatively compared with hysterectomy or leaving the placenta *in situ*<sup>6</sup>. The Triple-P procedure involves perioperative placental localization and delivery of the fetus via transverse uterine incision above the upper border of the placenta; pelvic devascularization; and placental non-separation with myometrial excision and reconstruction of the uterine wall. It is considered a safe and effective alternative to conservative management or peripartum hysterectomy<sup>7</sup>.

### **STEPWISE UTERINE DEVASULARISATION:**

The technique was described by AbdRabbo in 1994 in patients with uncontrolled haemorrhage<sup>8</sup>. It proposed that the vascularity to the uterus may be reduced in a stepwise manner tying the feeding vessels one by one till the bleeding stopped. The five steps were as follows:



**Figure 3: Stepwise Uterine Devascularisation**

1. Unilateral uterine vessel ligation
2. Bilateral uterine vessel ligation.
3. Low uterine vessel ligation
4. Unilateral ovarian vessel ligation
5. Bilateral ovarian vessel ligation

In steps 1 and 2, the ascending branch of the uterine artery is ligated. The uterus is exteriorized and the broad ligament is grasped between thumb anteriorly with the fingers lifting the base. A no 0 vicryl suture is then passed from anterior to posterior through an avascular window in the broad ligament and then through the myometrium from posterior to anterior emerging about 2cm medial to the uterine artery, and tied. This suture is taken above the level.

of bladder reflection, in the upper part of lower uterine segment. Therefore, the bladder does not need to be mobilised. If this is not sufficient to control the haemorrhage, or in case of bleeding after caesarean section, the uterine vessels have to be tied at a lower level (step 3). Here, the bladder needs to be mobilised and the suture is taken in the lower segment 3-5cm below the sutures taken in step 1. Uterine artery ligation is effective in 90% of cases<sup>9</sup>. If required, ovarian vessels can be ligated, either after high or low uterine artery ligation, at the infundibulopelvic ligament.

Bilateral UAL affords good control of postpartum haemorrhage. Performed with or without utero-ovarian ligament ligation, UAL does not appear to affect future fertility or obstetric outcomes<sup>8,10</sup>. Vascular occlusion is only temporary, as recanalization soon ensures normal uterine circulation.

### **INTERNAL ILIAC ARTERY LIGATION:**

Joshi et al.<sup>11</sup> told about 88 therapeutic IIAL for postpartum haemorrhage and 33 of 84 women failed to arrest haemorrhage. They concluded that bilateral ligation of the internal iliac arteries does not result in complete blockage of blood supply to the female pelvic organs but contributes to significant decrease in blood

loss. They concluded also that IAL is useful in the treatment and prevention of postpartum haemorrhage from any cause. Early resort to IAL effectively prevents hysterectomy in women with atonic PPH. Many authors advocate its routine ligation in placenta accreta. Others reported no value for its ligation<sup>12</sup>.

### **COMPRESSION SUTURES:**

The main differences between different types of sutures, being the figure at which the suture is applied, the numbers of longitudinal and/or transverse sutures used, and whether or not the uterine cavity is penetrated. The success rate for uterine compression sutures ranging from 68% to 100% with an overall success rate of 92%<sup>13</sup>.

**Cho suture** which is a haemostatic multiple square suture to approximate the anterior and posterior uterine walls<sup>14</sup> until no space is left in the uterine cavity. Thus, bleeding of the endometrium because of uterine atony or placentation site can be controlled by compression. An arbitrary point in the heavily bleeding area is selected and the entire uterine wall from the serosa of the anterior wall to the serosa of the posterior wall, through the uterine cavity, is sutured using a number 7 or number 8 surgical straight needle with number 1 atraumatic chromic catgut suture. Another arbitrary point 2 to 3 cm lateral above or below the first suture point is selected, and the entire uterine wall from the posterior to the anterior is sutured again. From another point in the heavily bleeding area, 2 to 3 cm lateral above or below the second suture point, we penetrate the uterine cavity walls again, this time from the anterior to posterior. Then, from the third suture point we set another point so the points form a square and penetrate the uterine walls from the posterior to the anterior. Finally, a knot is tied as tightly as possible (Figures 4 and 5). Selected areas of heavy bleeding are square sutured because we believe that if the procedure included the entire cavity, blood drainage might be compromised and compression diminished.

If bleeding is caused by uterine atony, four to five square sutures are placed evenly throughout the uterus from fundus to lower segment. If bleeding was due to placenta accreta, with bleeding in the placental separation site, the sutures are focused in two to three areas of heavy bleeding. By suturing a few areas with this method, the bleeding is controlled by attaching and compressing the anterior and posterior uterine walls. If there is bleeding in the lower segment of the transverse incision site of the uterus because of placenta previa, the haemostatic multiple square sutures can be accomplished by pushing down the bladder.

With haemostatic multiple square suturing, the compression is greater because several areas are sutured. It is easier and can be applied to the uterine atony as well as the placenta previa and accreta. Instead of using a large 70-mm round needle, a straight needle is used to make the operation easier for surgeons and should be applied in more cases.

### **Transverse B-lynch sutures**

Transverse B-Lynch sutures are also effective in controlling bleeding from placenta accreta cases. The new modification of B Lynch by making horizontal sutures passed in a vascular area in the broad ligament make more tension around and pressure in the lower segment so the technique easily applied to placenta previa and accrete<sup>15</sup>.

### **Vertical sutures**

Hwu et al<sup>16</sup> conducted a study on fourteen women with placenta praevia (including one who also had placenta accreta) undergoing caesarean section had massive bleeding after removal of the placenta. In order to preserve the uterus, two parallel vertical compression sutures were placed in the lower

segment to compress the anterior and posterior walls of the lower uterine segment. The haemorrhage from the lower segment stopped immediately after the knots were tightened. All women later resumed normal menstrual flow with no apparent complications. This parallel vertical compression suturing technique is simple, easy and effective for controlling bleeding in women with placenta praevia or accreta. The authors suggest that this technique should be tried first before other more complex procedures are undertaken.

Makino et al<sup>17</sup> also tried compression sutures as 'double vertical compression sutures' because it has dual actions: haemostatic compression of the bleeding surface and reduced uterine blood flow.

### **Other sutures**

i. **Hayman suture** which involved two vertical apposition sutures together with two transverse horizontal cervico-isthmic sutures<sup>18</sup>. Pereira suture was reported in 2005, which consisted of longitudinal and transverse sutures applied with superficial intramyometrial bites only<sup>19</sup>.

ii. **Bhal suture** which entailed two sutures instead of one, with the knots tied in the anterior-inferior margin of the lower uterine segment, without any difference in the compression effects compared to the original B-Lynch suture<sup>20</sup>.

iii. **El Shazly suture** consists of continuous 8 compression suture with anterior and posterior bites. They resorted to this suture after failure of uterine artery ligation to stop bleeding in placenta accreta cases<sup>21</sup>.

iv. **Modified suture:** An observational study was conducted in China, among patients with placenta previa centralis (with or without placenta accreta). During surgery, a Foley catheter balloon containing 60-120 mL of water was used to compress the hemorrhage site and an absorbable suture was placed around the lower uterus segment to provide extra pressure on the balloon<sup>22</sup>.

### **Consultations**

Women with placental previa are considered to have high-risk pregnancies, and a multidisciplinary team is involved in their management, including specialists in the following areas:

Obstetrics

Obstetric anaesthesiology

Interventional radiology

Surgical oncology or general surgery, if extensive surgical dissection is anticipated

Gynaecologic oncology

Urology, if significant involvement of the bladder is anticipated

### **COMPLICATIONS:**

The most common complication is massive haemorrhage at the time of placenta separation often amounting to 3-5 litres in placenta accrete syndromes. Other major complications are disseminated intravascular coagulopathy, acute respiratory distress syndrome, renal failure and death. Hudon et al<sup>23</sup>, found that in a study to estimate blood loss associated with cases of placenta previa accreta, 90% of patients have lost more than three liters of blood.

Hysterectomy is often required, leading to serious comorbidities such as cystotomy (15.4% of cases), ureteral injury (2.1%), and pulmonary embolus (2.1%), with 26.6% of patients admitted to the intensive care unit. Placenta percreta can also lead to the destruction of adjacent organs, most often the bladder, or surgical injury of pelvic structures due to loss of tissue planes. Prematurity, birth asphyxia, respiratory distress syndrome and congenital anomalies, intrauterine fetal demise contribute to the perinatal morbidity and mortality.

## **V. Methodology**

### **PATIENTS AND METHODS:**

This is an observational study carried out at Gandhi Hospital over a period of 2 year. It is a tertiary care hospital and a major referral centre for high risk obstetrics in Telangana State. 100 pregnant women who were diagnosed to have placenta previa were taken into the study.

**SOURCES OF DATA :** Gandhi Hospital

**SAMPLE SIZE :** 100 Patients

**STUDY DESIGN :** Prospective Observational study

**STUDY DURATION :** September 2015 – September 2017

Written informed consent was taken from all women recruited into the study after explaining the nature of study. Details were entered in a pre-designed proforma regarding the detailed history of period of gestation, high risk factors like previous uterine manipulations and surgeries, complaints like bleeding per vaginum, past history, complications during present and past pregnancy. Investigations like Haemoglobin%, Total white blood cell count, Platelet count, Renal function tests, Blood Grouping and Typing, HIV and HbsAg status, Ultrasonography were done in all women. Additional investigations like Placental Colour Doppler was done for all major degree PP and MRI was done in selected cases where disparity was noted between USG and placental Doppler.

Maternal outcome regarding GA at delivery, mode of delivery, type of anaesthesia used, complications occurring during delivery, intraoperative surgical interventions like Cho Square compression sutures and Stepwise uterine devascularisation done to control placental bed bleed and postoperative complications were observed. Estimated blood loss was assessed roughly by weighing of laparotomy pads before and after soiling and amount in suction apparatus. In all cases, foetal outcome was observed in form of maturity, birth weight and perinatal morbidity and mortality

### **INCLUSION CRITERIA:**

Pregnant women with:

Placenta previad diagnosed on USG undergoing abdominal delivery and who had placental bed bleed during surgery, irrespective of their gestational age and parity.

**EXCLUSION CRITERIA:**

Abruptio placenta  
Medical co-morbidities like pre-eclampsia, coagulation disorders

**STATISTICAL ANALYSIS:**

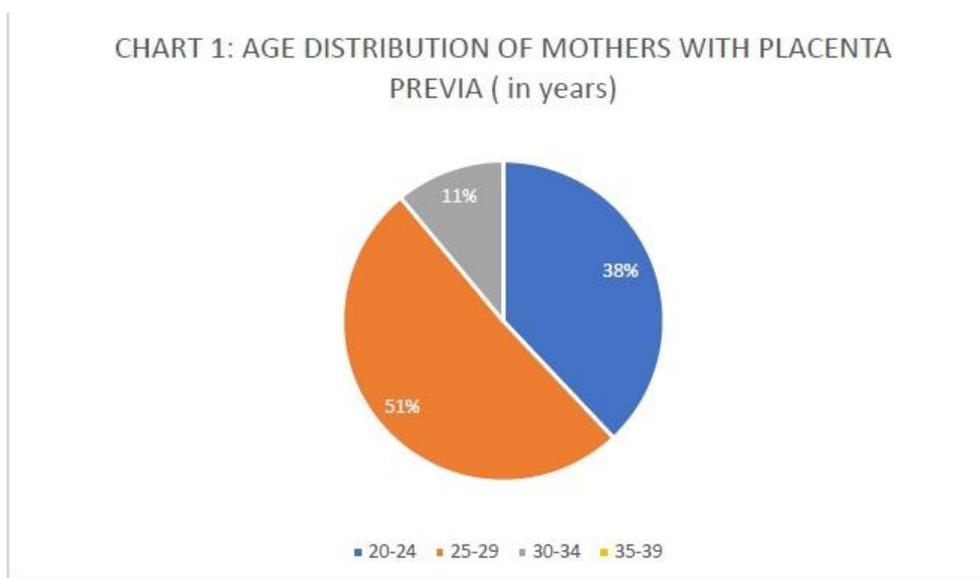
The values of epidemiological factors are presented as mean ± standard deviation. The statistical tool applied was by using the Open Epi, Version 3. Qualitative and quantitative data was analysed by chi-square and ANOVA respectively. The results were considered statistically significant when the probability of the null hypothesis was less than at least 5% (p<0.05).

**VI. Observations And Results**

**TABLE 1: AGE DISTRIBUTION OF MOTHERS WITH PLACENTA PREVIA**

Age in years	No of mothers	Percentage
20-24	38	38 %
25-29	51	51 %
30-34	11	11 %
35-39	0	0 %
Total	100	100 %

The mean age of women with PP in the present study is 26±2.7 years. The highest incidence of placenta previa is in the age group of 25-29 years i.e. 51 cases (51%) while the least incidence was in the age group of 35-39 years i.e. 0 cases. Incidences in the age groups 20-24 years and 30-34 years are 38 cases (38%) and 11 cases (11%) respectively.



**TABLE 2: BOOKED AND UNBOOKED CASES**

	No. of cases	Percentage
Booked	24	24%
Unbooked	76	76%
Total	100	100%

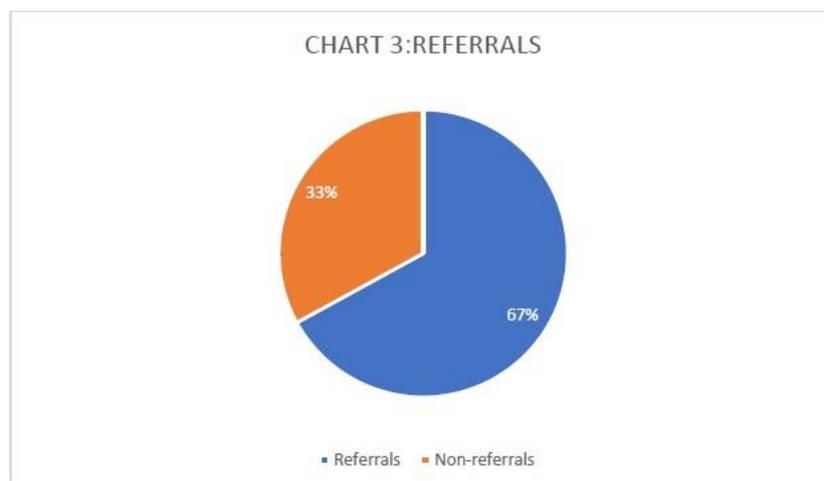
Out of 100 cases studied,unbooked cases accounted for almost three quarter of the cases. With 76% of unbooked cases,the booked cases remain at 24%.



**TABLE 3: REFERRALS**

	No. of cases	Percentage
Referral	67	67%
Non Referral	33	33%
Total	100	100%

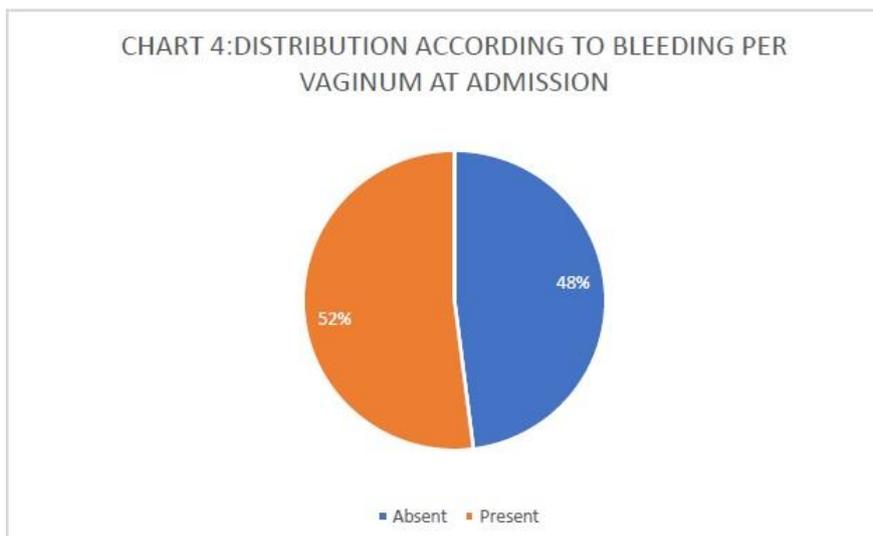
Out of the 50 cases studied, 67 cases (67%) were referred from other hospitals and 33 cases (33%) were non-referrals.



**TABLE 4: DISTRIBUTION ACCORDING TO BLEEDING PER VAGINUM AT ADMISSION**

Bleeding per vaginum	No. of women	Percentage
Present	52	52%
Absent	48	48%
Total	100	100%

The most common presentation of women with placenta previa is antepartum haemorrhage. 52 women (52%) presented with bleeding per vaginum at the time of admission and 48(48%) presented with no complaints of bleeding per vaginum.

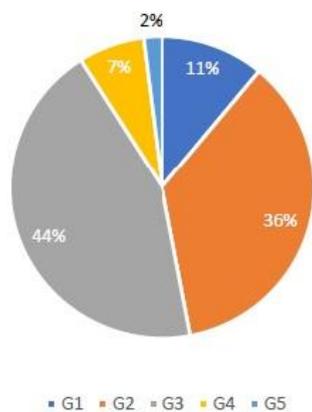


**TABLE 5: DISTRIBUTION ACCORDING TO NUMBER OF PREGNANCIES**

Gravida	No. of women	Percentage
G1	11	11%
G2	36	36%
G3	44	44%
G4	7	7%
G5	2	2%
Total	100	100%

Though placenta previa is more commonly seen in multi-gravidas, it is not so uncommon in primigravidas, with 11% of primigravidas in the study having placenta previa. The incidence of placenta previa was highest in women with third pregnancy accounting to 44 cases(44%), followed by second pregnancy (36 cases). Among 44 cases with third pregnancy, 20 cases (46 %) had 1prior LSCS and 14 cases(32 %)had 2 prior LSCS.

CHART 5: DISTRIBUTION ACCORDING TO NUMBER OF PREGNANCIES

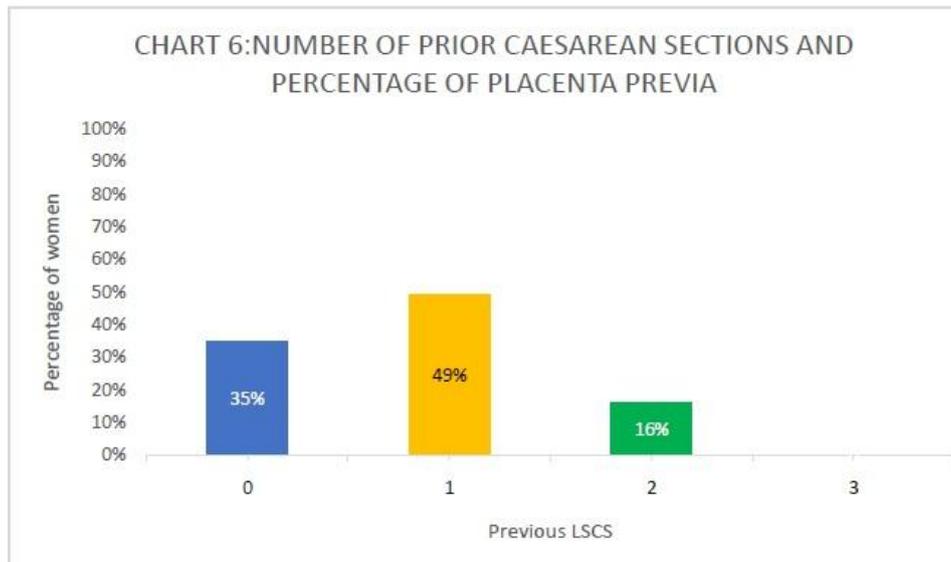


**TABLE 6: NUMBER OF PRIOR CAESAREAN SECTIONS AND PLACENTA PREVIA**

No. of caesarean sections	No. of women	Percentage
0	35	35%
1	49	49%
2	16	16%
3	0	0%
Total	100	100%

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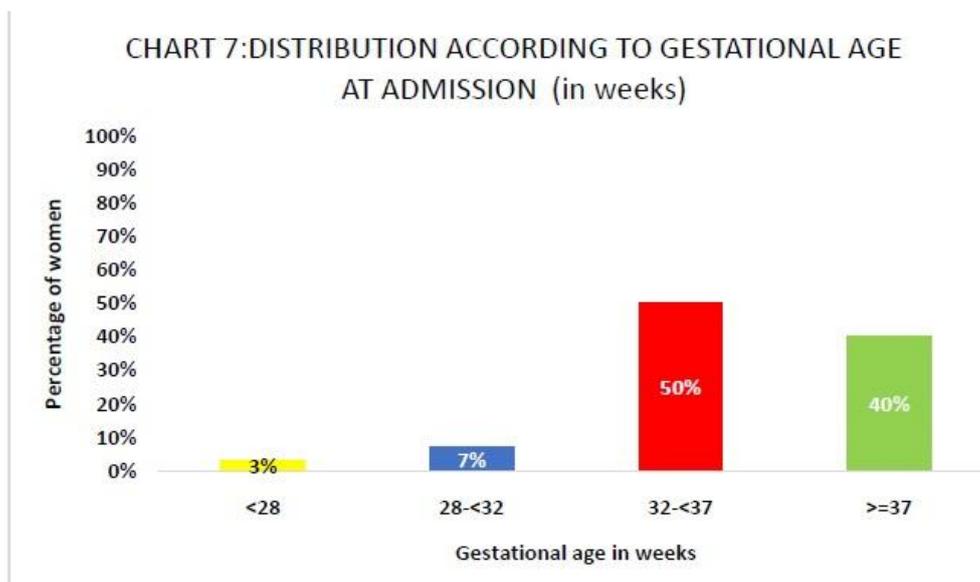
Women with one previous Caesarean section constituted the majority accounting to 49% (49 cases) and those with two and three previous Caesarean sections accounted to 16% (16 cases) and 0% (0 cases) in the study group 35%(35 cases) of the pregnant women had no prior surgeries.



**TABLE 7: DISTRIBUTION ACCORDING TO GESTATIONAL AGE AT ADMISSION**

Gestational age in weeks	No. of women	Percentage
<=28	3	3%
28-<32	7	7%
32-<37	50	50%
>=37	40	40%
Total	100	100%

Mean GA of women at admission was 35.24 ±2.9 weeks. 50 (50%) women were admitted between 32 and 37 weeks gestation, constituting the highest number and 40(40%) were admitted in term gestation group and 7% were admitted in 28 to <32 weeks gestation group. 3% were admitted in less than 28 week gestation group. Most of the patients presented in the last trimester of pregnancy with APH in 51 % of cases, whereas 49 % cases presented asymptomatic.



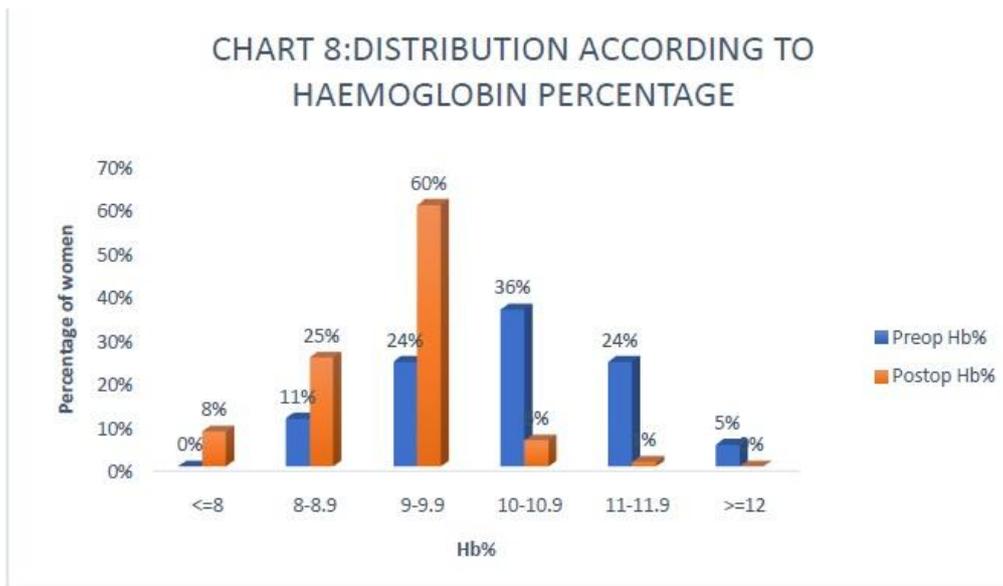
**TABLE 8: DISTRIBUTION ACCORDING TO HAEMOGLOBIN PERCENTAGE**

Hb%	No. of women(preoperative)	No. of women(Postoperative)
<=8	0 0%	8 8%
8-8.9	11 11%	25 25%
9-9.9	24 24%	60 60%
10-10.9	36 36%	6 6%
11-11.9	24 24%	1 1%
>=12	5 5%	0 0%
(n=100)	<b>Mean = 10.1±0.95</b>	<b>Mean =8.66±2.16</b>

Mean preoperative Hb of women was 10.1±0.95.

At the time of admission, 29(29%) women were not anaemic and had haemoglobin levels above 11 gm%. Women with haemoglobin levels between 10 and 11,9 and 10 and 8 and 9 were 36(36%),24(24%) and 11(11%) respectively.

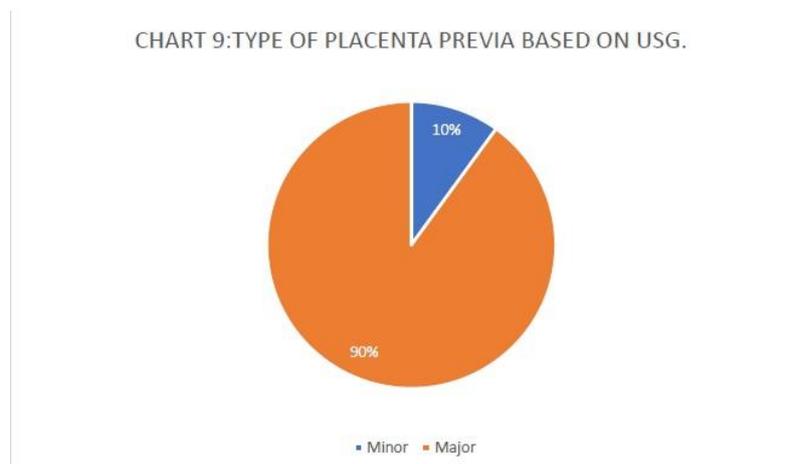
Postoperative mean Hb was 8.66 ±2.16 and 60% of women had Hb values between 9 and10.



**TABLE 9: TYPE OF PLACENTA PREVIA BASED ON USG**

Type	No. of women	Percentage
Minor	10	10%
Major	90	90%
Total	100	100%

90(90%) were diagnose to have major degree placenta previa and only 10 (10%) women had minor degree placenta previa.

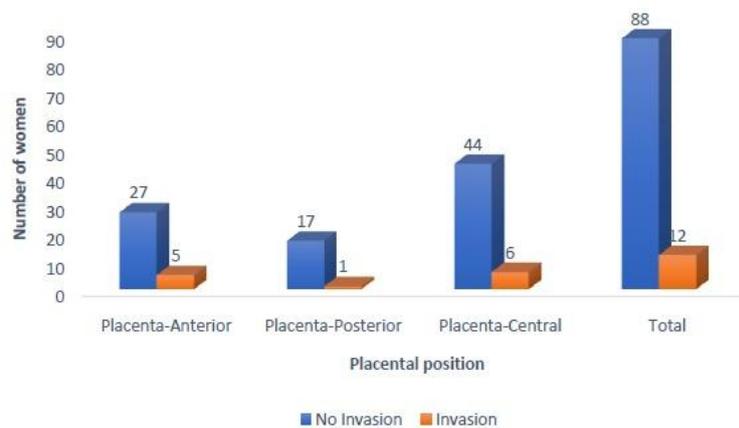


**TABLE 10: LOCATION OF PLACENTA AND INVASION BASED ON USG**

Location	No Invasion	Invasion
Placenta-Anterior (n =32)	27 84%	5 16%
Placenta-Posterior (n=18)	17 94%	1 6%
Placenta-Central (n=50)	44 88%	6 12%
Total	88	12

In this study, it was noted that 5(16%) out of 32 women with anterior placenta previa, 1(6%) out of 18 women with posterior placenta, and 6(12%) out of 50 women with central placenta had adherent placenta.

**CHART 10 :LOCATION OF PLACENTA AND INVASION BASED ON USG**

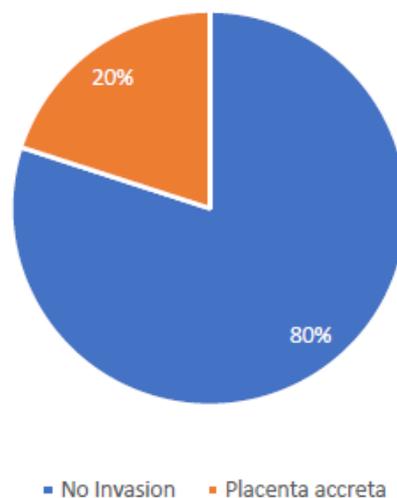


**TABLE 11: COLOUR DOPPLER FINDINGS**

Finding	No. of cases (n=90)	Percentage
No invasion	72	80%
Placenta Accreta	18	20%
Total	90	100%

Out of the 90 cases with major degree placenta previa, 20% (18 cases) had placenta accrete on colour doppler.

**CHART 11 :COLOUR DOPPLER FINDINGS**

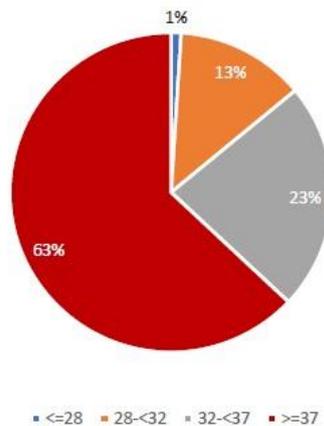


**TABLE 12. GESTATIONAL AGE OF WOMEN AT DELIVERY**

GA in weeks	No. of women	Percentage
<28	1	1%
28-<32	13	13%
32-<37	23	23%
>=37	63	63%
Total	100	100%

Mean GA of women at delivery was 36±3 weeks. Majority of women underwent delivery at term gestation (63%). There was 1 baby born extremely pre-term(<28 weeks). Very preterm (28weeks-<32 weeks) constituted 13%(13 babies). Moderately to late preterm (32-<37 weeks) constituted 23% (23 babies). And, term babies constituted 63%(63 babies).

CHART 12 :GA OF WOMEN AT DELIVERY( in weeks)

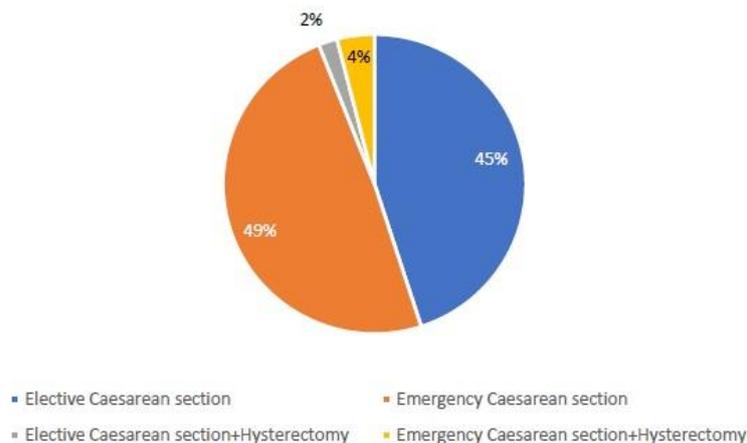


**TABLE 13: MODE OF DELIVERY IN PLACENTA PREVIA**

Mode of delivery	No. of Women	Percentage
Elective Caesarean section	45	45%
Emergency Caesarean section	49	49%
Elective Caesarean section +Hysterectomy	2	2%
Emergency section+Hysterectomy	4	4%
Total	100	100%

Out of 100 cases studied, pregnancy was terminated by Elective Caesarean section in 47 cases(47%), with 2 cases requiring hysterectomy.53 cases (53%) were terminated by Emergency Caesarean section,with 4 cases requiring hysterectomy.

CHART 13 :MODE OF DELIVERY IN PLACENTA PREVIA

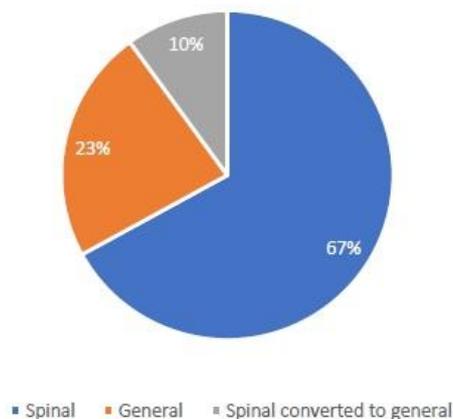


**TABLE 14: DISTRIBUTION ACCORDING TO TYPE OF ANAESTHESIA USED**

Type of Anaesthesia	No. of Patients	Percentage
Spinal	67	67%
General	23	23%
Spinal converted to General	10	10%
Total	100	100%

Out of 100 patients, Spinal anaesthesia was used in 67 cases, General anaesthesia was used in 23 cases and spinal was converted to General anaesthesia in 10cases.

**CHART 14 :TYPE OF ANAESTHESIA USED**



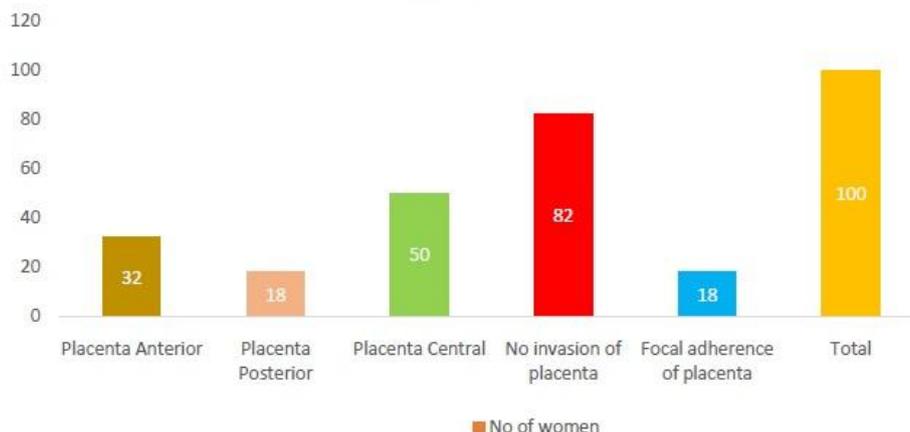
**TABLE 15: INTRAOPERATIVE FINDINGS IN PLACENTA PREVIA**

Finding	No. of women	Percentage
Placenta Anterior	32	32%
Placenta Posterior	18	18%
Placenta Central	50	50%
No invasion of placenta	82	82%
Focal adherence of placenta,removed in piecemeal	18	18%

Intraoperatively, placenta was found to be located anteriorly, posteriorly, and centrally in 32%(32cases), 18%(18 cases), and 50%(3 cases) respectively. No invasion of placenta in 82%(82 cases) of women. Focal adherence of placenta was present in 18% of the cases (18 cases).

**TABLE 16: CORRELATION OF RADIOLOGICAL FINDINGS WITH INTRAOPERATIVE**

**CHART 15 :INTRAOPERATIVE FINDINGS IN PLACENTA PREVIA**

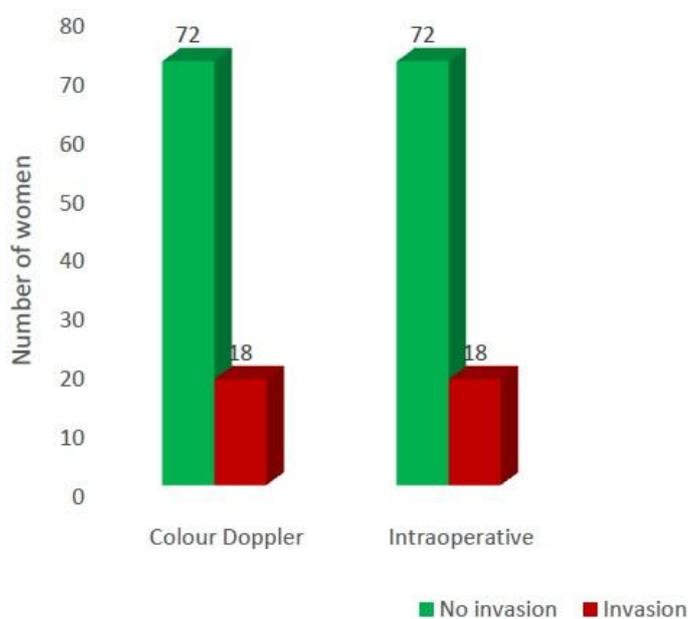
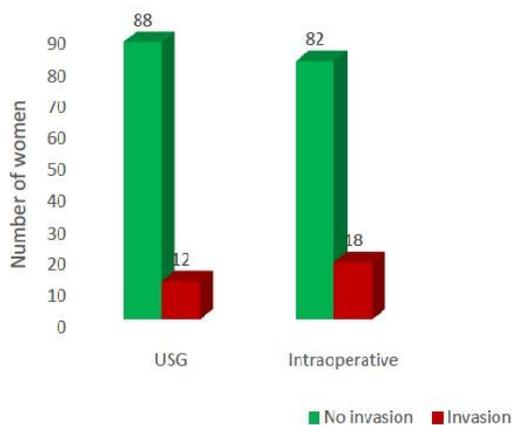


**FINDINGS**

PLACENTA	USG (n=100)	INTRAOPERATIVE
NO INVASION	88	82
INVASION	12	18
	DOPPLER (n=90)	INTRAOPERATIVE
NO INVASION	72	72
INVASION	18	18

This shows sensitivity and specificity of USG as 67% and 100% respectively in patients with adherent placenta and positive predictive value and negative predictive value using ultrasonography as 100% and 93% respectively. Colour doppler was done for all the 90 women who were diagnosed as major degree placenta previa on USG, for evidence of features of placental invasion. 18 cases (20%) had placenta accreta. All the 18 cases had adherent placenta intraoperatively. The sensitivity, specificity ,PPV and NPV of Colour Doppler were 100% each in the present study.

**CHART 16:CORRELATION OF RADIOLOGICAL FINDINGS WITH INTRAOPERATIVE FINDINGS**



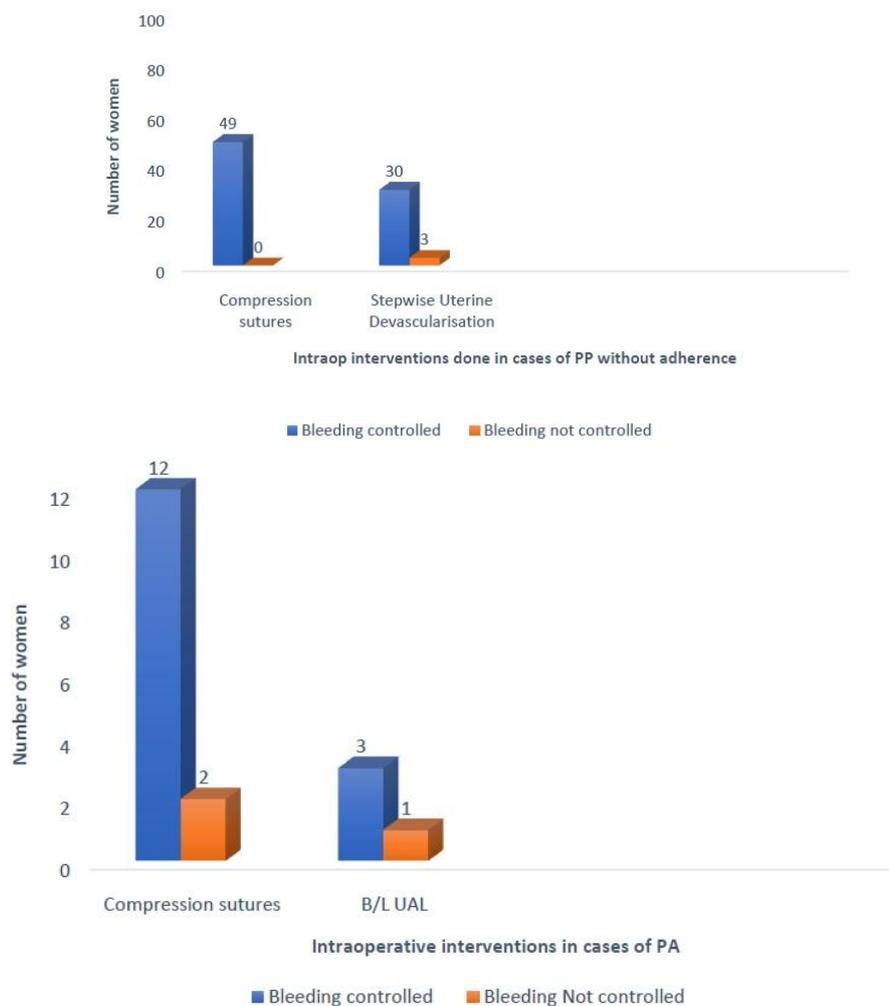
**TABLE 17: INTRAOPERATIVE INTERVENTIONS DONE TO CONTROL PLACENTAL BED BLEED**

	<b>Intra operative interventions</b>	<b>Bleeding controlled</b>	<b>Not controlled</b>	<b>Total</b>
Without placental adherence (n=82)	Cho Square compression sutures	49 100%	0 0%	49 60%
	Stepwise Uterine Devascularisation(SUD)	30 91%	3 9%	33 40%
With adherent placenta (n=18)	Cho Square compression sutures	12 86%	2 14%	14 78%
	SUD	3 75%	1 25%	4 22%
	<b>Total</b>	<b>94</b>	<b>6</b>	<b>100</b>

In cases of PP without adherence, Cho Square compression sutures effectively controlled placental bed bleed in 49 cases (100% success) whereas SUD had 91% (30 cases out of 33) success rate in controlling bed bleed, 9% underwent hysterectomy.

In cases of PA, Cho Square compression sutures effectively controlled placental bed bleed in 86% cases (12 cases out of 14) whereas SUD had 75% (3 cases out of 4) success rate in controlling bed bleed, 14% and 25% of cases underwent hysterectomy respectively.

**CHART 17: INTRAOPERATIVE INTERVENTIONS DONE TO CONTROL PLACENTAL BED BLEED**

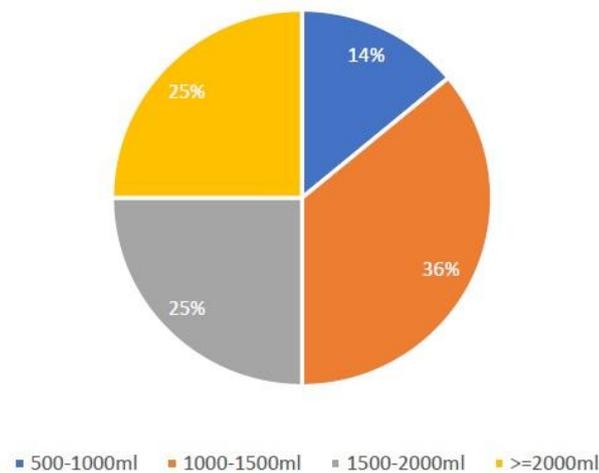


**TABLE 18: INTRAOPERATIVE BLOOD LOSS**

Blood loss(in ml)	No. of women	Percentage
500-1000	14	14%
1000-1500	36	36%
1500-2000	25	25%
>=2000	25	25%
Total	100	100%

Mean intraoperative blood loss was 1.4±0.55 litres. 14% of the cases had a blood loss between 500ml to 1000ml. In 36% of the cases, it was 1000ml to 1500ml. And, in 25% of the cases, it was 1500ml to 2000ml. Massive transfusion of blood and blood products was needed in 3% of the cases.

**CHART 18 :INTRAOPERATIVE BLOOD LOSS**



**TABLE 19: AMOUNT OF BLOOD LOSS WITH TYPE OF SURGICAL INTERVENTION**

Blood Loss in litres	Cho Square sutures	Stepwise Uterine Devascularisation(SUD)
<=1.5 (n=48)	29 60%	19 40%
>1.5 (n=46)	32 70%	14 30%
	61	33

Chi square 0.85, p value =0.17

**CHART 19 : AMOUNT OF BLOOD LOSS WITH TYPE OF SURGICAL INTERVENTION.**



Out of 48 patients who had blood loss of  $\leq 1.5$  litres, in 29 (60%) cases Cho Square Compression sutures were applied, in 19 (40%) cases SUD was done. Out of 46 patients who had blood loss of  $>1.5$  litres, in 32 (70%) cases Cho Square Compression sutures were applied, in 14 (30%) cases SUD was done. There is no statistical difference in terms of blood loss between the two surgical procedures as the p value is  $>0.05$ . The mean blood loss with Cho Square Compression sutures and SUD was about  $1.35 \pm 0.45$  and  $1.32 \pm 0.48$  litres in the present study.

**TABLE 20: DISTRIBUTION OF WOMEN ACCORDING TO DURATION OF SURGERY**

Duration in minutes	Cho Square sutures		SUD	
$\leq 90$ (n=87)	55	63%	32	37%
$>90$ (n=7)	6	86%	1	14%
Total	61		33	

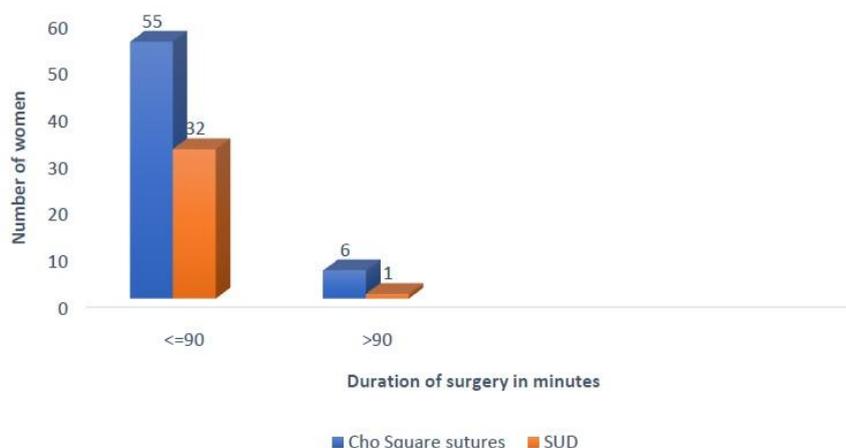
**Chi square 1.4, p value=0.1**

Out of 61 cases to whom Cho Square compression sutures were applied, duration of surgery was  $\leq 90$  minutes in 55 (90%) cases and, it was  $> 90$  minutes in 6 (10%) cases.

Out of 33 cases in whom SUD was done, duration of surgery was  $\leq 90$  minutes in 32 (97%) cases and it was  $>90$  minutes in 1 (3%) case. As the p value is  $>0.05$ , there is no statistical difference between the two surgical procedures.

The mean duration of surgery with Cho Square Compression sutures and SUD was  $1.2 \pm 0.29$  and  $1.16 \pm 0.27$  hours respectively in the present study.

**CHART 20: DISTRIBUTION OF WOMEN ACCORDING TO DURATION OF SURGERY**

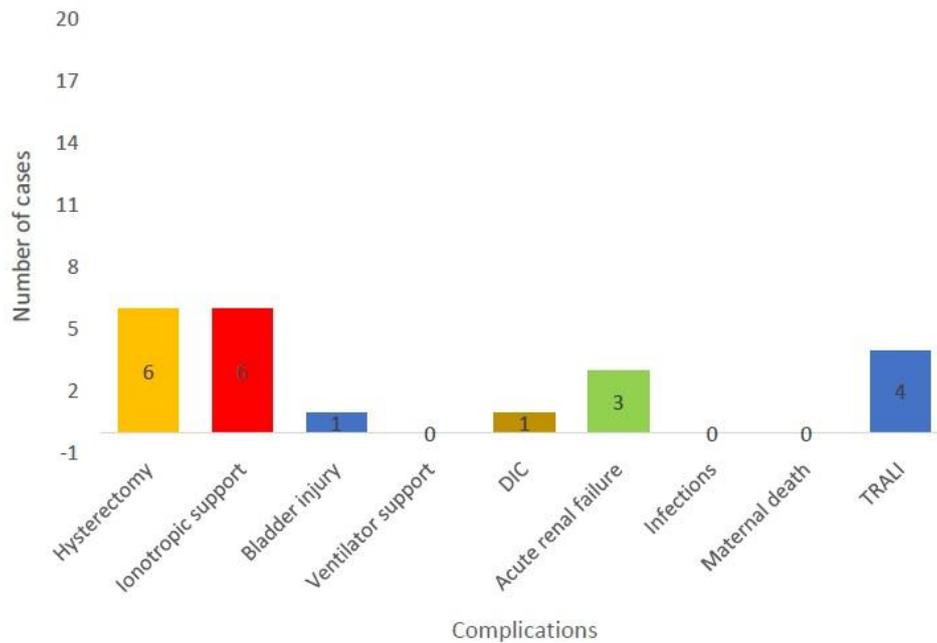


**TABLE 21: COMPLICATIONS**

Complications	No. of women	Percentage
Hysterectomy	6	6%
Ionotropic support	6	6%
Bladder injury	1	1%
Ventilator support	0	0%
TRALI	4	4%
DIC	1	1%
Acute Kidney Injury	3	3%
Infections	0	0%
Maternal death	0	0%
Total	17	

It was observed that Hysterectomy was done in 6 cases (6%). 6 cases (6%) needed postoperative ionotropic support, bladder was injured in 1 case (1%), DIC was noted in 1 case (1%), TRALI was noted in 4 cases (4%) and there were 3 cases (3%) with acute renal failure. No cases needed ventilator support and there were no maternal deaths.

**CHART 21:COMPLICATIONS**

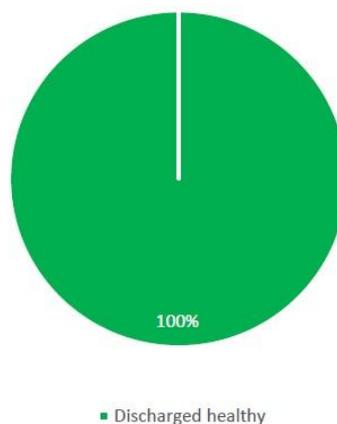


**TABLE 22: MATERNAL OUTCOME**

Outcome	No. of women	Percentage
Discharged healthy	100	100%
Mortality	0	0%
Total	100	100%

The maternal mortality in the present study was 0%(0 cases) and 100% of the women were discharged healthy (100 cases).

**CHART 22:MATERNAL OUTCOME**



**TABLE 23: DISTRIBUTION ACCORDING TO BABY WEIGHT AT BIRTH**

Weight in Kg	No. of women	Percentage
<=1	4	4%
1-1.49	8	8%
1.5-2.49	22	22%
>=2.5	66	66%

In the present study, babies with extremely low birth weight(<1kg) constituted 4% (6 babies) and those with very low birth weight(1-1.5kg) constituted 8% (8 babies). Low birth weight babies (1.5 - 2.5kg) were highest in number accounting to 22% (22 babies). and those with normal birth weight constituted 66% (61 babies).

CHART 23: DISTRIBUTION ACCORDING TO BABY WEIGHT AT BIRTH (in Kgs.)

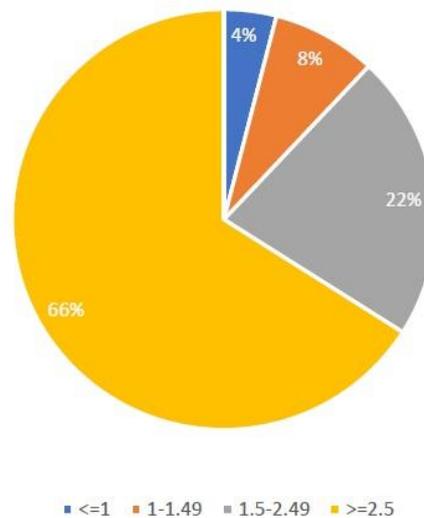
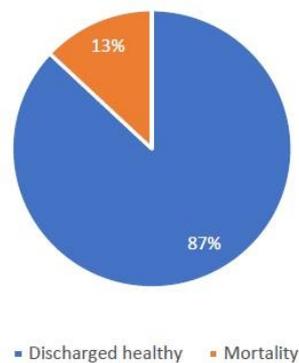


TABLE 24: BABY OUTCOME

Baby outcome	No. of babies	Percentage
Discharged healthy	87	87%
Mortality	13	13%
Total	100	100%

Out of 100 babies born to mothers with PP the present study,87 babies (87%) were discharged healthy and 13 babies (13%)were dead.

CHART 24: BABY OUTCOME



## VII. Discussion

Placenta previa is one of the leading causes of obstetric haemorrhage leading to increased maternal morbidity and mortality. The present study with 100 women was undertaken at Gandhi Hospital in order to study the efficacy of surgical techniques like Cho Square compression sutures and Stepwise Uterine Devascularisation in controlling the placental bed bleed. This study was a prospective observational study.

**MATERNAL AGE:**

Majority of women with placenta previa were in the age group of 25-29 years i.e.(51%) 51 cases.

**BOOKED/UNBOOKED STATUS:**

Unbooked cases accounted for almost three-quarters of the study group (76% - 76 cases) and booked cases were 24%.

**PARITY:**

Multiparity appeared to increase the occurrence of Placenta Previa. Though placenta previa is more commonly seen in multi-gravidas, it is not so uncommon in primi-gravidas. In the present study, it was noted that multigravidae constituted 89% of the cases and primigravida constituted a share of 11%(11 cases). The incidence of placenta previa was highest in women with third pregnancy accounting to 44%, followed by those with second pregnancy (36%). Among the 44 cases with third pregnancy, 20 cases had 1 prior LSCS and 14 cases had 2 prior LSCS.

**CLINICAL PRESENTATION:**

Antepartum haemorrhage was the most common presentation, seen in 52% of the cases while 48% of the cases presented with no complaints and were admitted for safe institutional delivery.

Out of the 52 cases with APH in the present study, 96% (50 cases) presented in the last trimester with mean GA of 37±1 weeks. With the increase of GA, the risk of APH will increase in pregnant women with PP<sup>24</sup>.

GA at the time of admission, 40% were admitted at the term gestation and 60% were admitted before 37 weeks of gestation. Those admitted before 28 weeks were 3%, between 28 weeks and 32 weeks were 7% and those between 32 weeks and 37 weeks were 50%. Majority of the cases (97%) were admitted in the last trimester.

Placenta previa in primigravida was not uncommon accounting to 35%. The risk of placenta accreta in the presence of placenta previa increases dramatically with the number of previous CS, with a 25% risk for one prior CS, and more than 40% for two prior CS in studies by Clark et al and Oppenheimer.

Placental invasion is associated with previous surgeries on the uterus like caesarean sections, myomectomies, etc. This study has shown that 35% of women with no prior CS had placenta previa while those who had previous one and two CS had 49% and 16%. However, the association of previous two and three CS with placental invasion remains inconclusive due to small sample size.

About 28 (28%) women in the sample had previous miscarriages for which curettage was done to remove the retained products of conception. A significant number of cases who had curettage i.e., 6 out of 28 cases had placental invasion, coming to about 21.4%. The total number of women who underwent CS in previous pregnancies were 65, of which 14 cases had placental invasion in the present pregnancy.

**RADIOLOGICAL FINDINGS IN PP:**

Placenta previa is classified into 2 types - Major and Minor. 10% of the women had minor degree placenta previa and 90% had major degree placenta previa in the sample studied.

USG alone could detect 12 cases of placental invasion out of 18 cases in the study. This shows the Sensitivity and Specificity of USG as 67% and 100% and Positive predictive value and Negative predictive value as 100% and 93% respectively in patients with adherent placenta in present study.

The Sensitivity, Specificity, Positive and Negative predictive values of Colour Doppler in detecting placental invasion were 100% each in the present study.

MRI is used as an adjunct when there is suspicion of invasion which couldn't be detected by USG or colour doppler. In the present study MRI was done for 6 women where USG showed no invasion.

Colour doppler and MRI gave similar results in prenatal diagnosis of abnormal invasion of placenta in the present study.

**MODE OF DELIVERY:**

Caesarean section was the preferred mode of delivery in all the cases in the study. 94% of the women underwent CS without caesarean hysterectomy with 45% (45 cases) elective planned CS and 49% (49 cases) emergency CS. The most common aetiology of Caesarean Hysterectomy is haemorrhage.

**LOCATION OF PLACENTA:**

Placenta was found extending onto the anterior wall, posterior wall and centrally covering the internal os in 32%, 18% and 50% respectively. There was no adherence of placenta in 82%. Focal adherence of placenta was noted in 18% and the placenta was removed in piecemeal.

**INTRA OPERATIVE INTERVENTIONS DONE TO CONTROL PLACENTAL BED BLEED:**

CASES WITH NO PLACENTAL ADHERENCE (n=82) :Intraoperative interventions like Cho Square compression sutures were applied in 49 cases of which placental bed bleed was controlled in all cases (100%).

SUD was done in 33 cases of which placental bed bleed was controlled in 30 (91%), rest 3 cases underwent hysterectomy. Among 33 cases, 29 cases responded to step 2 (B/L UA Ligation) and 4 cases required step 3, low bilateral uterine vessel ligation. Among the latter 4, hysterectomy was required in 3 cases (9%). Among them one was elective procedure and two were emergency procedures.

As the p value is  $<0.05$ , there is significant statistical difference between the two procedures. Cho Square compression sutures effectively controlled placental bed bleed in 49 cases (100% success).

**CASES WITH ADHERENT PLACENTA (n=18) :** Cho Square compression sutures were applied in 14 cases of which placental bed bleed was controlled in 12 cases (86%) and 2 cases needed hysterectomy.

SUD was done in 4 cases of which placental bed bleed was controlled in 3 (75%) rest 1 case underwent hysterectomy. Among those 4 cases, 2 cases responded to step 2 (B/L UA Ligation) and 2 cases required step 3, low bilateral uterine vessel ligation. Among the latter 2, 1 case required hysterectomy.

The relation between the two techniques is not statistically significant as the p value is  $>0.05$ .

#### **BLOOD LOSS:**

Placenta previa and accrete syndromes constitute a huge part of obstetric haemorrhage. About 14% had a blood loss between 500ml to 1000ml. The blood loss was between 1000ml to 1500ml and 1500- 2000ml in 36% and 25% of the cases respectively. Massive haemorrhage requiring multiple transfusions of blood and blood products occurred in 3% of the cases. Massive transfusion protocol was implemented and blood and blood products were transfused in 1:1 ratio. The mean blood loss in present study was  $1.4 \pm 0.55$  litres.

Out of 61 patients where placental bed bleed was controlled by Cho Square compression sutures, 29 patients had blood loss of  $\leq 1.5$  litres and 32 patients had blood loss of  $>1.5$  litres.

#### **DURATION OF SURGERY:**

Conservative surgeries are effective with fewer complications and less operative time. Duration of surgery in majority of women was  $<90$  minutes.

The mean duration of surgery with compression sutures and SUD was  $1.2 \pm 0.29$  and  $1.16 \pm 0.27$  hours respectively in the present study, p value here is  $>0.05$ , so the relation is statistically not significant.

#### **COMPLICATIONS:**

Haemorrhage was the most common complication in the study necessitating interventions like compression sutures, arterial ligation and hysterectomy. Uterine artery catheterization to minimize the intraoperative blood loss was not done in any of the cases. Hysterectomy was done in 6 (6%) cases. Other complications include bladder injury in 1 case (1%), hypovolaemic shock with inotropic support in 6 cases (6%), acute renal failure (3%), DIC was noted in 1 case, no cases with ventilator assistance or death.

Hysterectomy was done because of uncontrollable PPH in 3% and 11% of women when Cho Square suturing and SUD were done respectively in the present study. In a study by Salah A, Abd Rabbo, et al and Jin Ho Cho et al 100% success rate was seen with conservative surgical procedures in PP.

#### **MATERNAL MORTALITY:**

Maternal mortality in the present study where conservative surgical interventions are done was 0% which is comparable with other studies, stating that conservative surgeries can be done for PPH due to PP with lesser morbidity and mortality.

#### **PERINATAL OUTCOME:**

Placenta previa is known to be associated with prematurity (77) The overall perinatal mortality rate ranges between 4 –8%. The important causes are asphyxia, prematurity. The onset of bleeding before 20 weeks carries a poor foetal prognosis. Most of the neonatal mortality is attributed to prematurity with its associated risk, particularly respiratory distress syndrome and intracranial haemorrhage. 37% of the babies were born preterm and 63% were born after 37 weeks of gestation.

Perinatal mortality in the present study is 15%, which is relatively high owing to prematurity and associated complications like respiratory distress. This rate is comparable to that of the studies by Yifru Berhan, Ananth-Smulian JCVintzileos and Anand D Bhatt-Aarti Meena-Malini R Desai which are 44.7%, 10.7% and 24.17% respectively.

#### **SUMMARY**

The study entitled —Study of Efficacy of various surgical techniques in use for controlling bleeding from placental bed in cases of placenta previal was conducted in the Department of Obstetrics and Gynaecology, Gandhi Medical College, Musheerabad from September 2015 to September 2017.

A total number of 100 patients who were diagnosed to have Placenta Previa on USG were included in the study irrespective of their GA and parity.

In this study, the mean age of women with placenta previa was 26±2.7 years. The incidence of PP was highest in women with third pregnancy, 46% had 1 prior LSCS and 32% had 2 prior LSCS.

Grayscale ultrasonography is 67% sensitive and 100% specific for the diagnosis of placental invasion. Colour doppler and MRI may be done to detect the vascularity and depth of invasion for appropriate management and are found to be 100% sensitive and 100% specific in the present study.

18% of the cases had adherent placenta.

96% of cases with APH presented in the last trimester with mean GA of 37±1 weeks.

Haemorrhage from the placental bed was the most common complication seen in all cases during surgery in the present study, with a mean blood loss of 1.4±0.55 ml.

In cases of Placenta Previa without adherence Cho Square compression sutures were 100% effective and Stepwise Uterine Devascularisation was

91% effective in controlling placental bed bleed, 9% (3 cases) underwent hysterectomy. Here p value is <0.05 (p=0.01) indicating a significant statistical difference between the two surgical procedures, with 100% success rate of Cho Square compression sutures.

In cases of adherent placenta Cho Square compression sutures were 86% effective and Stepwise Uterine Devascularisation was 75% effective in controlling placental bed bleed, 14% (2 cases) and 25% (1 case) underwent hysterectomy respectively. Here p value is >0.05 (p=0.3) indicating no significant statistical difference between the two surgical procedures. No statistical difference was noted between the two conservative surgical procedures in relation to blood loss and duration of surgery.

The maternal mortality in this study was 0%. All mothers were discharged healthy as a result of good management by multidisciplinary team.

Perinatal mortality in the present study was 15%. Prematurity, low birth weight, birth asphyxia and respiratory distress syndrome are the important factors leading to increased perinatal morbidity and mortality.

## VIII. Conclusion

In order to decrease the morbidity rate and to prevent the adverse effects of hysterectomy, conservative surgical techniques like Cho Square compression sutures and Stepwise Uterine Devascularisation are effective in controlling placental bed bleed in 97% and 89% of cases and can be considered as first step measures to control postpartum haemorrhage in cases of Placenta Previa.

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*Study of Efficacy of Various Surgical Techniques in Use for Controlling Bleeding From Placental Bed*

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