ASSOCIATION OF MATERNAL SERUM ALPHA-FETOPROTEIN WITH PERSISTENT PLACENTA PREVIA

DISSERTATION SUBMITTED FOR

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THE TAMIL NADU Dr. M. G. R. MEDICAL UNIVERSITY,

CHENNAI, TAMIL NADU.

BONAFIDE CERTIFICATE

This is to certify that the dissertation entitled **"ASSOCIATION OF MATERNAL SERUM ALPHA FETOPROTEIN WITH PERSISTENT PLACENTA PREVIA"** is a bonafide record work done by Dr.N.T.Malarvizhi under my direct supervision and guidance, submitted to the Tamilnadu Dr. M.G.R. Medical University in partial fulfillment of University regulation for M.S., degree (Branch II) - Obstetrics & Gynaecology.

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DECLARATION

I Dr.N.T.Malarvizhi solemnly declare that the dissertation titled **"ASSOCIATION OF MATERNAL SERUM ALPHA FETOPROTEIN WITH PERSISTENT PLACENTA PREVIA"** has been prepared by me. I also declare that this bonafide work or a part of this work was not submitted by or any other for any award, degree, diploma to any other university board either in India or abroad.

This is submitted to the Tamilnadu Dr. M.G.R .Medical University, Chennai in partial fulfillment of the rules and regulation for the award of M.S degree Branch II-Obstetrics &Gynaecology to be held in march 2015.

Place: Chennai DR.N.T.Malarvizhi

Date:

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MASTER CHART

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PROFORMA

1. **NAME:**
2. **AGE:**
3. **IPNO:**
4. **RESIDENCE:**
5. **URBAN/RURAL:**
6. **BMI:**
7. **NUTRITIONAL STATUS:**
8. **OBSTETRIC FORMULA :**

i. **Gravida**

ii. **Parity**

iii. **No. Of living Children**

iv. **Abortions.**

9. **WHERE BOOKING AND IMMUNISATION DONE:**
10. **DATE AND TIME OF FIRST VISIT:**
11. **MATERNAL ALPHA FETOPROTEIN:**
12. **ULTRASOUND FINDINGS IN SECOND TRIMESTER**
13. **ULTRASOUND FINDINGS IN THIRD TRIMESTER**

14. PERIOD OF ADMISSION

- **AN after 24 weeks**
- **AN after 28 weeks**
- **Intrapartum.**
- **Postpartum/Postnatal upto 24hrs**

15. REASONS FOR ADMISSION

A).Safe confinement

B).APH

C).PPH

D).Shock

E).Bowel obstruction

F).Wound dehiscence

G).Infection

H).Abcess

I).Bladder problems

J).Others

16. CONDITION ON ADMISSION :

Stable/Semiconsious /Unconscious

17. WAS SHE REFERRED FROM ANOTHER CENTRE?

Yes/No/Don't know

If yes type facility from which referred.

- **PHC**

- **24*7 PHS**
- **RURAL HOSPITAL**
- **DISTRICT HOSPITAL**
- **Private Hospital**
- **Private Clinic**
- **SDH/CHC**
- **Others**

18. ANTECEDENT RISK FACTORS:

- **ANEMIA**
- **PIH**
- **PREV.LSCS**
- **D.M**
- **CHRONIC ILLNESS**
- **BLEEDING DISORDER**
- **JAUNDICE**
- **MALNOURISHED**

RISK FACTORS:1). Prior Caesarean Delivery, 2). Multipartly, 3). Complete Previa

19. HISTORY OF BLEEDING /DRANING PV:

20. DATE,TIME OF DELIVERY

21. MODE OF DELIVERY: LSCS/SVD/INSTRUMENTAL

22. PLACE OF DELIVERY

23. PERSON WHO CONDUCTED THE DELIVERY

24. H/O INSTRUMENTAL DELIVERY.

25 WAS IT PROLONGED LABOUR

26. H/O MANUAL REMOVAL OF PLACENTA

27. BABY DETAILS:

A).WEIGHT

B).APGAR

C).NEONATAL ADMISSION

28. LSCS

a. ELECTIVE

b. EMERGENCY

29. INDICATION FOR LSCS

30. COMPLICATION DURING LSCS/VAGINAL DELIVERY

DENSE ADHESIONS

ANTERIOR AND LOW LYING PLACENTA

POSTERIOR AND LOW LYING

CENTRAL PLACENTA PREVIA

ATONIC PPH

PLACENTA ACCRETA INCRETA PERCRETA

URINARY BLADDER INVOLVEMENT

BOWEL INVOLVEMENT-PROCEEDED TO SUB – TOTAL HYSTERECTOMY

PROCEEDED TO TOTAL HYSTERECTOMY

31. CONSERVATIVE MANAGEMENT /NASG APPLIED:

32. POST PARTUM

A).FEVER

B).FOUL SMELLING VAGINAL DISCHARGE

C).CHRONIC COUGH/CONSTIPATION

D).EXCESSIVE BLEEDING

E).ABDOMINAL DISTENSION

33. NUMBER OF BLOOD TRANSFUSION:

34. COMPLICATION IF ANY:

35. PERIOD OF HOSPITAL STAY:

36. POST OPERATIVE OUTCOME:

37. MATERNAL MORTALITY/ NEAR MISS MORTALITY:

MASTER CHART

S.NO	IP NO	AGE	PARITY	MSAFP	MOM	PREV.LSCS	PREV.ABOR	PREV.V.D	MATERNAL OUTCOME	LSCS GA	CESA. HYS	HPE FINDINGS
1	3041	22	1	85	0.8	0	0	0	1	38	0	0
2	3243	24	2	89	0.8	0	1	1	2	36	0	0
3	3377	21	2	121	1.1	1	0	0	2	34	0	0
4	3585	25	2	262	2.5	0	0	1	1	39	0	0
5	3461	26	2	209	2	2	1	0	2	37	0	0
6	3624	24	2	241	2.3	1	1	0	2	36	0	0
7	3554	25	2	26	0.2	1	0	0	2	37	0	0
8	2943	35	2	226	2.2	2	0	0	2	35	1	2
9	108078	22	2	119	1.1	0	1	2	1	36	0	0
10	118486	30	2	279	2.7	0	0	1	1	40	0	0
11	5395	23	1	215	2.3	0	0	0	2	39	0	0
12	5660	22	1	136	1.7	0	0	0	2	34	0	0
13	5656	28	1	106	1.1	0	0	0	2	36	0	0
14	6778	33	2	63	0.6	0	0	1	2	37	0	0
15	10559	29	2	92	1.01	0	0	1	1	34	0	0
16	13959	34	2	181	1.7	1	0	0	2	33	0	0
17	3124	30	2	271	2.9	1	1	0	2	34	1	2
18	14225	32	2	183	1.8	1	3	0	2	35	1	2
19	6310	26	2	150	1.4	0	0	2	2	32	0	0
20	14102	32	2	201	1.9	0	1	0	2	27	1	4
21	6731	34	2	198	1.9	2	0	0	2	36	1	3
22	16361	24	2	189	1.87	1	0	0	2	36	0	0

23	16603	34	2	177	1.9	0	0	1	2	37	1	2
24	771	24	2	221	2.1	1	0	0	2	36	1	2
25	15955	26	2	126	1.2	1	0	0	2	36	0	0
26	16880	21	2	200	2.2	0	1	0	2	38	0	0
27	1702	20	2	246	2.4	0	1	0	1	35	0	0
28	17421	28	2	185	1.8	0	1	0	1	37	0	0
29	17378	27	2	142	1.3	0	1	2	1	39	0	0
30	17503	26	1	76	0.7	0	0	0	2	38	0	0
31	16957	27	1	107	1.05	0	0	0	2	37	0	0
32	18046	25	2	204	2.01	1	0	0	2	34	0	0
33	19597	28	1	107	1.05	0	0	0	1	37	0	0
34	19746	20	1	83	0.8	0	0	0	1	37	0	0
35	19029	24	2	23	0.22	0	1	0	1	38	0	0
36	20448	20	1	84	0.82	0	0	0	1	39	0	0
37	20491	23	1	52	0.4	0	0	0	1	32	0	0
38	20346	26	2	44	0.43	0	0	1	1	41	0	0
39	20539	20	1	23	0.21	0	0	0	1	40	0	0
40	20582	23	2	112	1.1	0	0	1	1	40	0	0
41	19812	18	1	73	0.6	0	0	0	1	39	0	0
42	1027	28	2	223	2.2	2	1	0	2	36	1	3
43	20604	27	2	89	0.8	0	1	2	1	39	0	0
44	2943	35	2	202	2	2	0	0	2	34	1	1
45	19750	34	2	23	0.2	0	1	2	1	37	0	0
46	20464	34	2	97	0.9	0	1	1	1	38	0	0
47	20431	18	1	99	0.9	0	0	0	1	40	0	0
48	20390	26	2	73	0.72	0	0	1	1	35	0	0
49	20621	26	1	60	0.56	0	0	0	1	39	0	0
50	20612	21	1	91	0.9	0	0	0	1	39	0	0
51	20717	22	2	88	0.7	0	0	2	1	40	0	0

52	3860	20	2	180	0.8	1	0	0	2	36	0	0
53	4156	28	2	174	1.72	1	1	0	2	36	1	1
54	19951	25	2	63	0.6	0	0	1	1	38	0	0
55	20739	25	2	43	0.41	0	0	1	1	39	0	0
56	20782	21	1	99	0.98	0	0	0	1	39	0	0
57	20808	22	1	53	0.52	0	0	0	1	41	0	0
58	4152	25	2	213	2.1	1	2	0	2	37	1	2
59	20639	22	2	254	2.5	0	0	1	1	38	0	0
60	20804	23	1	176	1.4	0	0	0	1	38	0	0
61	6646	23	1	212	2.09	2	2	0	2	34	1	1
62	7390	20	2	101	1	1	0	0	2	35	1	1
63	17033	24	1	108	1.06	0	0	0	1	39	0	0
64	17138	31	2	124	1.09	0	1	2	1	39	0	0
65	16799	33	2	98	0.7	0	3	2	1	39	0	0
66	17763	29	1	134	1.07	0	0	0	1	34	0	0
67	17771	23	1	74	0.7	0	0	0	1	37	0	0
68	8332	24	2	133	1.27	0	0	2	2	33	1	1
69	17905	21	2	94	0.92	0	0	2	1	39	0	0
70	18842	25	1	174	1.3	0	0	0	1	39	0	0
71	18726	24	2	113	0.9	0	0	0	1	39	0	0
72	19064	31	1	81	0.6	0	0	0	1	38	0	0
73	9304	22	2	25	0.2	0	2	0	2	37	1	1
74	14102	28	2	250	2.6	1	1	0	2	35	1	1
75	18376	25	2	131	1.04	1	0	1	2	36	0	0
76	19521	30	1	144	1.4	0	0	0	2	30	0	0
77	18058	29	2	101	1.1	0	1	0	1	39	0	0
78	17503	26	1	143	1.4	0	0	0	2	36	0	0
79	18726	31	2	93	0.9	1	0	0	1	38	0	0
80	17103	21	1	130	1.2	0	0	0	2	37	0	0

81	19391	26	1	33	0.3	0	0	0	1	39	0	0
82	16957	23	1	139	1.37	0	0	0	2	37	0	0
83	21230	30	2	152	1.49	0	1	0	2	38	0	0
84	19691	24	1	76	0.75	0	0	0	1	39	0	0
85	18221	22	2	56	0.5	0	1	0	1	39	0	0
86	20205	24	1	23	0.2	0	0	0	1	33	0	0
87	20030	25	2	231	2.28	1	0	0	2	35	1	1
88	20491	23	1	49	0.4	0	0	0	1	38	0	0
89	20604	27	2	61	0.6	0	1	2	1	38	0	0
90	19750	34	2	71	0.5	0	1	1	1	36	0	0
91	20520	22	1	80	0.64	0	0	0	1	37	0	0
92	20818	27	2	201	2	1	0	0	2	35	0	0
93	20531	32	2	68	0.6	0	0	1	1	39	0	0
94	21033	23	1	41	0.4	0	0	0	1	39	0	0
95	21137	28	2	251	2.5	1	0	0	2	38	0	0
96	21040	19	1	13	0.1	0	0	0	1	39	0	0
97	21066	30	2	211	2	3	1	0	2	34	1	4
98	20702	24	2	39	0.3	0	1	1	1	39	0	0
99	20936	27	2	23	0.2	0	0	3	1	38	0	0
100	21230	30	2	212	2.2	0	0	1	2	39	0	0

INTRODUCTION

The term placenta previa is used to describe a placenta that is implanted over or very near the internal os.

With any degree of placenta previa in later weeks of gestation, a certain degree of spontaneous placental separation is inevitable, which leads to unpredicted antepartum hemorrhage. It is one of obstetrical emergencies posing a threat to the maternal and fetal life The incidence of placenta previa is found to be 5% during second trimester; however it is only 0.5% at the time of delivery due to differential growth of uterus.

Nowadays the incidence of placenta previa and placental invasion are increasing due to rapidly increasing deliveries by caesarean section. This study is done to know the association of maternal serum alpha fetoprotein taken at 16-20 weeks in sonographically diagnosed placenta previa patients for persistence of placenta previa and its invasiveness at term as well as predictor for the same in our institution.

Diagnosis of placenta previa and its invasiveness by tissue diagnosis is 100% accurate, however high resolution sonography and MRI can detect the placenta previa persistence and its invasion only in

later weeks of pregnancy. Thus the estimation of maternal serum alpha fetoprotein in 16-20 weeks in these patients can predict the persistence and invasion of placenta previa at term.

Thus this test results will assist the clinician to counsel women in 2nd trimester itself in regard of persistent placenta previa and its invasion and advise these high risk antenatal mothers to get prompt management in tertiary care centre like our institution and for earlier termination of pregnancy so that we can reduce the perinatal and maternal morbidity and mortality to certain extent in our developing country.

AIM OF THE STUDY

1. To evaluate the relationship between maternal serum Alpha fetoprotein and the risk of persistent placenta previa
2. To evaluate and know about correlation of different values of MSAFP and the degree of invasion of placenta previa.
3. To decide on early termination of pregnancy and to save life of both mother and the baby.

MATERIALS AND METHODS

STUDY:

A prospective analytical study

PLACE:

Institute of Obstetrics and Gynaecology

PERIOD:

April 2014 - September 2014

SAMPLE SIZE:

100 cases

INCLUSION CRITERIA:

Pregnant women with sonographic evidence of placenta previa at 15-20 weeks of gestation

EXCLUSION CRITERIA:

Delivery before 24 weeks of gestation

Anomalous foetus

Multiple pregnancy

IUFD

Placental abnormalities

STUDY MATERIAL:

3 ml of venous blood was collected from antenatal mothers with sonographic evidence of placenta previa at 15-20 weeks of gestation who attended in ANOP at IOG.

Estimation of MSAFP was done by chemiluminescence assay from the serum which was collected. Multiples of median (MOM) values had been derived for our population, adjusted for gestational age.

PRIMARY OUTCOME:

The pregnancies in which caesarean delivery was performed for persistent placenta previa is our primary outcome.

Additional outcomes are indicated caesarean hysterectomy and pathological evidence of placental invasion.

REVIEW OF LITERATURE

GENERAL ASPECTS:

Third trimester bleeding is one of the most ominous complication in pregnancy and it complicates 3% of all pregnancies. Third trimester obstetric hemorrhage seems to be the third leading cause of both maternal and perinatal morbidity and mortality. The obstetric cause of bleeding in third trimester being hazardous has to be differentiated from the non obstetric causes.

CAUSES OF THIRD TRIMESTER BLEEDING:

OBSTETRIC	NON OBSTETRIC
1. Bloody show	1. Cervicitis
2. Placenta previa	2. Cervical polyp
3. Abruptio placenta	3. Cervical erosion
4. Vasa previa	4. Vaginitis
5. Disseminated intravascular coagulation	5. Genital tract disease
6. Uterine rupture	6. Vulval, vaginal varicosities
7. Marginal sinus bleeding	7. Cervical cancer

DEVELOPMENT OF THE PLACENTA:

The placenta is a remarkable organ performing many diverse functions including transport of gases and metabolites, immunological protection and production of steroids and protein hormones. The zygote after repeated metabolic divisions gets converted into a blastocyst. The outer layer of the blastocyst is called trophoblast and the inner cell mass is called embryoblast. The trophoblast rapidly proliferates and differentiates into outer syncitiotrophoblast and an inner cytotrophoblast. The primary, secondary, tertiary villi are formed by the syncitiotrophoblast and the intervillous space is formed by cytotrophoblast. Until the end of 16^{th} week the placenta grows in thickness and circumference due to the growth of the chorionic villi and expansion of the intervillous space. The implanted placenta by nature separates during the third stage of labour by a multiphasic process.

PLACENTAL MIGRATION

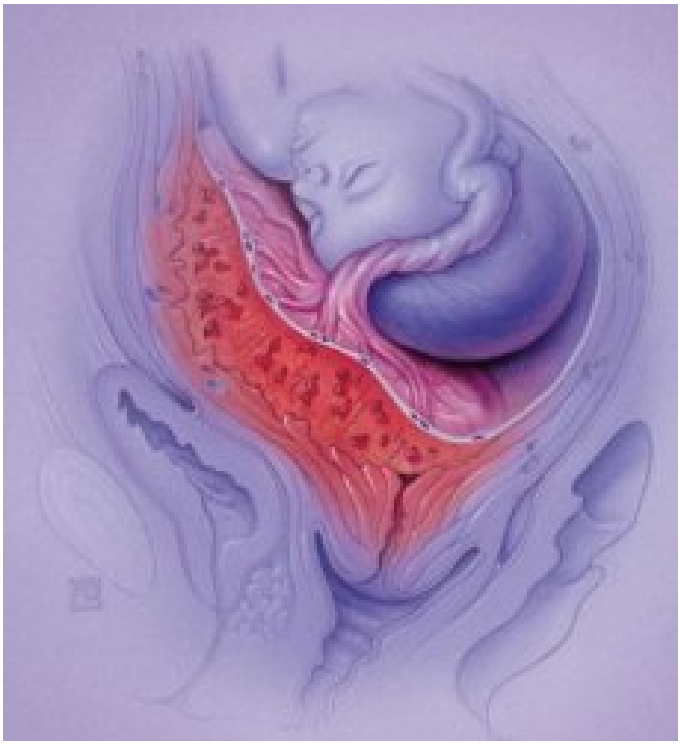
The apparent peripatetic nature of the placenta has been well established by King 1973.[1] Sanderson and Milton in 1991 reported that the placenta lies close to the internal os but not over it during the late second 2^{nd} trimester or early 3^{rd} trimester are unlikely to persist at term[2]. Chama

2004[3], Dashe 2002, Laughon 2005 shown that the persistence of placenta previa being diagnosed sonographically before 28 weeks is greater in women who have had a prior caesarean delivery.

PLACENTA PREVIA

DEFINITION:

When the placenta is implanted partially or completely over the lower uterine segment (over and or adjacent to the internal os) is called placenta previa.The term previa (in Latin, in front of) denotes the position of the placenta in relation to the presenting part.



APH complicates 2-5% of the pregnancies. Placenta previa and abruptio placenta remains the important causes of APH.

CLASSIFICATION:

1.Digital assessment:

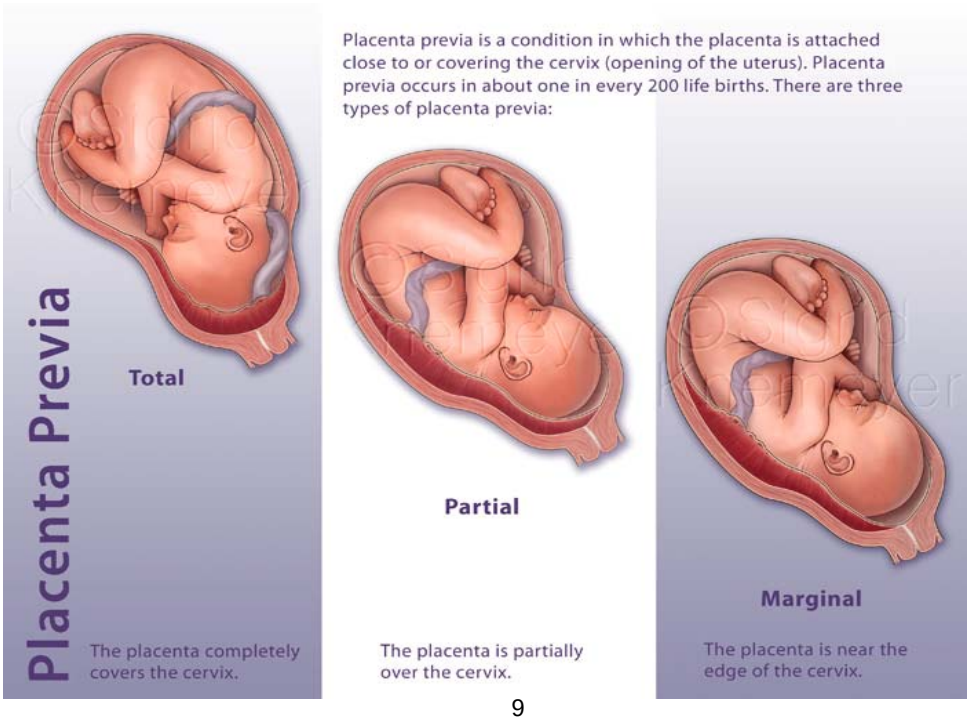
Total placenta previa: The internal os is completely covered by placenta.

Marginal placenta previa: The edge of the placenta is at the margin of the internal os.

Partial placenta previa: The internal os is partially covered by internal os

Low lying placenta: The placenta is implanted in the lower uterine segment but the placental edge does not reach the internal os but it is within 2 cm of internal cervical os.

Vasa previa: The fetal vessels come through membrane and present at the cervical os.



With both partial and complete placenta previa, certain degree of spontaneous placental separation is an inevitable consequence of lower uterine segment formation and cervical dilatation but separation is usually associated with hemorrhage (APH).

Grades of placenta previa:

Grade 1: The placenta is in the lower segment, but the lower edges does not reach the internal os.

Grade 2: The lower edge of the low-lying placenta reaches, but does not cover, the internal os.

Grade 3: The placenta covers the internal os asymmetrically.

Grade 4 : The placenta covers the internal os symmetrically.

Grade 1, 2 are minor degree of placenta previa.

Grade 3, 4 are major degree of placenta previa.

2.Ultrasound classification:

Total previa:

When placenta completely covers the internal cervical os and extends over both lips of the cervix.

Partial previa:

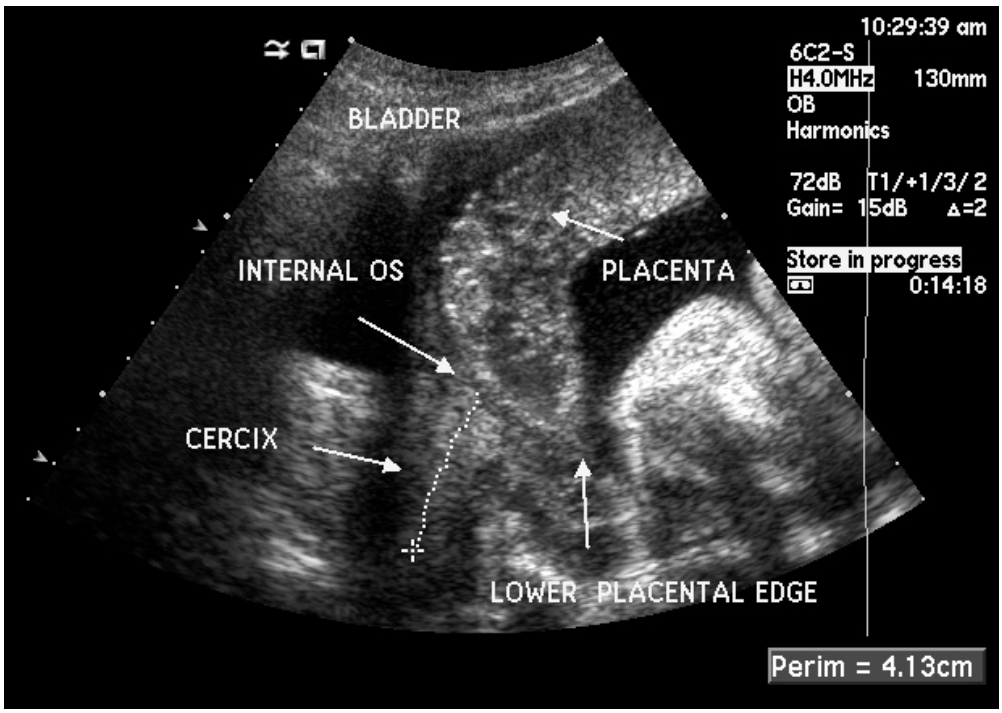
When the placenta does not cover the internal os but its lower border is

within 2 cms of the internal os

Low lying placenta:

When the placental border is more than 2 cms from the internal os

Bhide et al., 2003 have shown that caesarean section rate is 90% when the placental edge - internal os distance less than 2 cm and 37% when it is more than 2 cms[4].



HISTORICAL ASPECTS:

Columbus first coined the term placenta which meant a circular cake in Latin. In 1775, Edward of Norwich made the first clinical presentation between abruptio placenta and placenta previa.

EPIDEMIOLOGY:

The prevalence of clinically evident Placenta previa at term is estimated to be approximately 5 per 1000[5]. Placenta previa occurs in 0.3-0.5% of pregnancies. Placenta previa occurs in one of every 250 births. One third of all APH occurs due to placenta previa. Perinatal mortality rate of placenta previa is 3-4 times higher than normal pregnancies.

The risk increases 1.5 to 5 fold with history of caesarean delivery. The frequency of complete placenta previa ranges from 20-45%, partial placenta previa accounts for approximately 30% and marginal placenta previa accounts for the remaining 25-50%.Martin and co-workers 2005 reported that incidence of placenta previa s 1 in 300 deliveries[6].

Placenta previa occurs in 2.8 of 1000 singleton pregnancies and 3.9 of 1000 twin pregnancies.The incidence of caesarean hysterectomies due to intractable postpartum hemorrhage is 5.3%with a 3-4 fold increase in perinatal mortality compared with normal pregnancies.

ETIOLOGY:

The exact cause of the implantation of the placenta in the lower segment is not known. The following theories are postulated:

1. Dropping down theory: The fertilised ovum drops down and implants in the lower segment. Poor decidual reaction in the upper segment may be the cause.

2. Failure of zona pellucida to disappear in time can be a hypothetical possibility that explains the formation of central placenta previa.

3. Persistence of chorionic cavity in the decidua capsularis and its subsequent development into capsular placenta which comes in contact with decidua vera of the lower uterine segment can explain the formation of lower degrees of placenta previa.

4.Defective deciduas results in spreading of chorionic villi over a wide area in the uterine wall to get nourishment. During this process, not only the placenta becomes membranous but encroaches into lower segment.

5.Big surface area of the placenta as in twins may encroach into lower uterine segment

RISK FACTORS:

1.Advancing maternal age:

Advancing maternal age increases the risk of placenta previa.In the FASTER[7] trial, first and second trimester evaluation of risk, those older than 35 years had a 1.1% of placenta previa compared with that of 0.5% for women lesser than 35. Frederickson and colleagues in 1999 reported that increasing maternal age increases the overall incidence of placenta previa, thus increasing maternal age has increased the overall incidence of previa from 0.3% in 1976 to 0.7% in 1997[8].

2. Multiparity:

Multiparity is associated with an increased risk for placenta previa.Babinski and colleagues, 1999 reported that 2.2% increased incidenceof placenta previa in women with para 5 and above[9].

3.Multifetal Gestation:

Ananth and associates 2003 reported that the rate of placenta previa to be 40% higher in multifetal gestation compared with singleton[10].

4.Prior caesarean delivery:

Prior caesarean delivery increases the risk for placenta previa. Silver and associates 2006 noted that the risk of previa increases inwomen who had prior caesarean delivery[11].Incidence is over 1.3% for one prior caesarean delivery and 3.4% who had 6 or more caesarean delivery. Miller and associates 1996 cited a 3 fold increase in previa in women with a prior caesarean delivery[12]. Gesteland and co-workers 2004 and William and colleagues reported that likelihood of previa was increased more than 8 fold in female with parity greater than 4 and more than 4 prior caesarean delivery[13].

5.Smoking:

William and colleagues reported that the relative risk of placenta previa is increased 2 fold in female who smoked cigarettes[14]. These findings were confirmed by Ananth 2003, Handler 1994, Usta 2005.It was theorised that carbon dioxide, hypoxemia caused compensatory placental hypertrophy, defective decidual vascularisation.

6.Prior curettage:

7.Abruptio placenta: In 10% of women with abruptio may have coexistent placenta previa[17] (Konje and Taylor 2001)

8.Endometritis: According to Faiz & Ananth, 2003 placenta previa occurs in patients with endometritis[16]

9.Uterine scar.

10.Recurrent placenta previa.

PREDICTORS

1. ULTRASONOGRAPHY

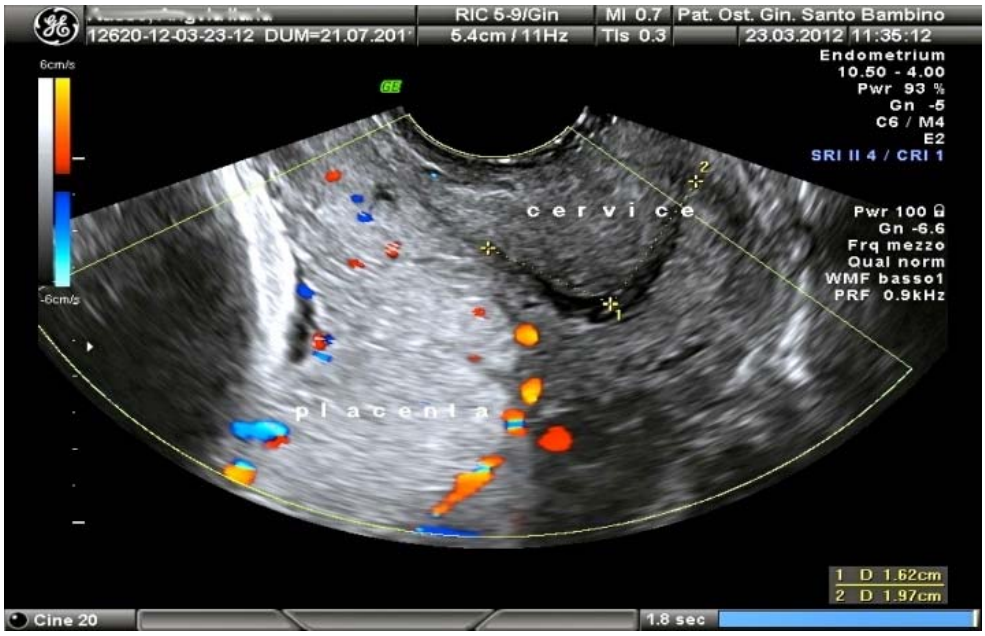
2. BIOCHEMICAL MARKERS.

ULTRASONOGRAPHY :

TRANSVAGINAL SONOGRAPHY:

RCOG and National institute for health and clinical excellence support placental localization in routine ultrasound scanning at around 20 weeks of gestation.TVS is safe and should be used to improve the accuracy of the diagnosis of low lying placenta at 20 weeks of gestation. Various studies like Taipale et al 1988, Becker et al 2001, Fung et al 2011 did

ultrasound at 18-23 weeks of gestation, concluded that significant migration of low lying placenta is unlikely if the placenta overlaps the internal os by 25mm at 20-23 weeks of gestation[15].



In asymptomatic patients follow up scan is a must until 36 weeks, but in case of placenta accreta do scan in 32 weeks for early decision. Women with both anterior or central placenta previa and two or more previous caesarean delivery have a 40% risk of placenta accreta. The presence of vascularisation of lacunae had the highest sensitivity of 79% with positive predictive value of 93%.

The persistence of placenta previa at term is best predicted by ultrasound when the placenta overlaps the internal os by 1.4 cm at 10 to16 weeks or 2 cm at 20 to23 weeks of gestation. Mustafa et al. reported that if placenta overlaps by 2.3 cm at 11 to 14 weeks the probability of persistent placenta previa at term is 8% with sensitivity of 83% and specificity of 86%.

Ghourah et al., reported that if the leading edge of the placenta is less than 1 cm thickness and or the angle of placental edge is less than 45 degree is called thin low lying placenta and any other type of placenta more than this measures is thick low lying placenta. The presence of thick low lying placenta can predict the delivery complications[18].

Cervical length as an outcome predictor in placenta previa was reported by M. Busquest and co workers. As mean cervical length less than 29 mms before 34 weeks in placenta previa patients is associated with caesarean section complications.

Hasegawa and associates stated that ultrasonographic findings can predict a massive hemorrhage in placenta previa[45]. Saitoh et al., demonstrated that the risk of massive antenatal hemorrhage is higher (83.3%) in cases with an echo free space in the placental edge overlying

the internal os compared to other locations[47]. This echo free space was either a placental sinus or varices that developed in the decidual tissue.

Ghi et al reported a possible association between the cervical length and the risk of preterm hemorrhage in complete placenta previa[46]. Stafford et al., demonstrated that a third trimester cervical length of 3cm or less was associated with an increased of hemorrhage and that Tocodynamometer evidence of regular uterine contractions was more common in patient with short cervix.

Oyelese and Smulian reported that contractions and cervicaleffacement, dilatation during third trimester can cause separation of the placenta leads to minimal bleeding[19]. This bleeding may stimulate further placental separation and unavoidable bleeding.

HEMORRHAGE DURING CAESAREAN SECTION:

Risk factors are

Advanced maternal age

H/O previous caesarean section

Anterior placenta

Placenta located on the previous uterine scar

The presence of lacunae in the placenta

Sponge like finding in the cervix

Lack of a clear zone

Adherence of the placenta

DOPPLER VELOCIMETRY:

D.W.Kwak et al., reported that uterine artery doppler RI is reduced in placenta accreta compared with placenta previa. Low uterine artery Doppler RI is independent risk factor of placenta accreta in a placenta previa patient.

BIOCHEMICAL MARKERS:

1.MATERNAL SERUM ALPHA FETOPROTEIN:

Also known as alpha-1-fetoprotein, alpha-fetoglobulin or alpha feto protein. It is encoded by the AFP gene. The AFP gene is located on the q arm of chromosome 4. AFP is a major plasma protein produced by the yolk sac and the liver during fetal development. It is thought to be the

fetal form of serum albumin. AFP binds to copper, nickel, fatty acid and bilirubin and found in monomeric, dimeric and trimeric forms.

Structure:

AFP is a glycoprotein of 591 amino acids and a carbohydrate moiety.

Function:

AFP is the most abundant plasma protein found in the human foetus. Plasma levels decreases rapidly after birth but start decreasing prenatally at the end of the first trimester. Normal adult level is achieved by the age of 8 – 12 months. The function of AFP in adult humans is unknown.

Maternal serum levels:

In pregnant women, fetal AFP levels can be monitored in fetal urine. AFP is cleared strongly from the kidneys allowing urinary AFP tend to mirror fetal serum level. MSAFP level are much lower but continue to rise until about 32 weeks.

MSAFP is elevated in spontaneous abortion, gestational Hypertension, pre-elampsia, chronic Hypertension, preterm delivery, IUGR and PPROM. Katz et al., reviewed that unexplained MSAFP

elevation is associated with poor maternal and/or fetal outcome, probably as a consequence of placental injury[48].

Simpson confirmed the association between second trimesterelevation of MSAFP levels and the adverse outcome[49]. Ramusconcluded that women with elevated MSAFP level have associatedhyperechogenic placenta and maternal and fetal complications[50].

Koster EL et al, concluded that there is an association between increasing MSAFP and greater likelihood of persistent placenta previa. An MSAFP value less than 1 MOM is associated with a reduction in the risk of persistence of previa to delivery[20].

EL Butler et al, concluded that women with placenta previa and high MSAFP more than 2 MOM are at increased risk of bleeding in early third trimester and preterm birth[21].

2.CELL FREE FETAL DNA

Lo et al., discovered the presence of increased cell free DNA in plasma measured by real time quantitative PCR assay. In addition they analyzed the Y chromosome specific SRY sequence to quantify the

number of genome equivalent/ml of plasma in women carrying male foetus and they concluded that foetal cell free DNA in plasma and genome equivalent per ml as significantly elevated in placenta previa patients with placental invasion. It has been suggested that invasion of trophoblast into the uterine muscles of these patients produces increased placental concentration of cell free foetal DNA because of the destruction of trophoblast by immune system[42].

Jimbo and Sekizawa et al, reported that the concentration of free DNA in the plasma might be a useful marker to follow patients with retained placental tissue after delivery[43].

CREATINE KINASE

It is used as a biochemical marker of placenta increta and percreta. Ophir E et al reported that in placenta previa patients with ultrasonographic findings of adherent placenta, unexplained elevation of creatine kinase in serum should alert the clinician regarding the possibility of placenta increta and percreta.[44]

CLINICAL PRESENTATION

The most characteristic event in placenta previa is sudden onset of painless apparently cause less and recurrent hemorrhage. Fortunately initial bleeding is rarely profuse. Most women with placental previa do not bleed until the onset of labour especially central placenta previa.

Asymptomatic cases may be detected by sonography.

Vaginal bleeding is mostly of maternal origin. However the fetal component could be significant if some disruption of the villi occur.

Crenshaw et al., in 1973 reported that one third of patient with placenta previa have their first bleeding episode before 30 weeks, other third at 30-35 weeks and another third after 36 weeks[22]. The mean gestational age at the first bleeding episode is 29.6 weeks.

Fetal blood loss may be detected by fetal heart rate monitoring. A simple test by Loendershoot in 1979, take 2 test tubes with 5 ml of tap water in each and add 10 ml of KOH. In one tube add 3 drops of vaginal blood and in another tube add 3 drops of maternal blood and wait for 2 minutes. If vaginal blood contains fetal blood cells the solution will be

pink in color. The other tube with maternal blood will have green yellowish brown color.

Foetal malpresentation like breech or transverse or compoundpresentation accounts to 30%. In case if it is vertex presentationthey are in persistent occipitoposterior or transverse position(15%).

Generally the patient is anaemic.

According to M C Shan et al., 1985 the incidence of pretermdelivery, number of bleeding episodes, severity of the bleeding, units of blood transfusion needed are higher for patient who had bleeding episodes before 28 weeks of gestation.

CLINICAL EXAMINATION

Generally the size of the uterus is corresponding to the period of gestation.Uterus feels soft and relaxed without tenderness.The head is floating in contrast to the period of gestation.Persistent displacement of foetal head is suggestive of placenta previa.The head cannot be pushed down into pelvis.Fetal heart sound is usually present unless there is a major separation ofplacenta with patient in exsanguinated state.

Slowing of fetal heart rate while pressing the fetal head down into the pelvis, which recovers promptly as the pressure is released -suggestive of low lying placenta posterior type. It is known as stallworth sign.

VULVAL INSPECTION

Only inspection is to be done to assess whether the bleeding is stilloccurring or not, character of the bleeding and amount of bleeding. Inplacenta previa the bleeding is bright red since the bleeding occurs fromthe separated retro placental sinuses close to the cervical os.

DIGITAL EXAMINATION

No justification for digital vaginal examination in patients withpainless vaginal bleeding. 1 in every 16 examinations produces amajor hemorrhage and 1 out of every 25 examination result inhypovolumic shock. Accuracy of digital pelvic examination in the diagnosis of placenta previa is only 69%.

DIAGNOSIS

1.RADIOLOGICAL DIAGNOSIS

Placentography - localisation of placenta.

Trans abdominal sonography

It is the simplest,safest and accurate method of placental localization.Routine placental localization is done as a part of the anomaly scanat 20-22 weeks of gestation. According to Laing 1996, the accuracy oftrans abdominal sonography is 96%[23].

False negative results are due to bladder distension and myometrialcontraction. Poor imaging could be due to maternal obesity andposteriorly placed placenta.

The reason for poor imaging in a posteriorly placed placenta are dueto acoustic shadows from the fetal presenting parts which obscuresthe placental view and there is no anatomical landmark posteriorly.

A positive case should be subjected to repeated scan at 34 weeks or earlier for detection of placental migration. A low lying placenta is more common in early pregnancy because the lower segment does not exist.

The apparent placental migration is due to enlargement of the uppersegment and formation of the lower uterine segment.

Comeau and associates and Ruparelia and Chapman reported that themore advanced the pregnancy, the more accurate the diagnosis of theplacenta previa based on sonography[24]. False positive rate in transabdominal ultrasound is of 7% and false negative rate is 8%. Inultrasound the length of lower uterine segment is less than 1 cm at 20weeks and is more than 5 cm at term due to progressive enlargement ofthe uterus.

Transvaginal sonography

The use of transvaginal sonography has improved the diagnosticaccuracy of placenta previa.

Timor-Tritch and Yunis 1993 shown that transvaginal sonogram tobe safe[25]. Farine and associates 1988 were able to visualise the internalcervical os in all cases using the transvaginal technique in contrast only by 70% in transabdominal method[26].

Smith in 1997 and Taipale 1998 compared both imaging and found that transvaginal technique is superior and safe[27]. The accuracy is

higher in transvaginal ultrasound in evaluation of vaginal bleeding during pregnancy than transabdominal scan[26] (farine et al., 1988).

Endovaginal ultrasound has a positive predictive value of 93.3% and negative predictive value of 97.6% for the diagnosis of placenta previa. A placental edge exactly reaching the os is described as 0 mm. When the placental edge reaches or overlaps the internal os on

TVS between 18 – 24 weeks of gestation, a follow-up scan for placental localization in the third trimester is recommended. Overlap of more than 15 mm is associated with an increased likelihood of placenta previa at term. Overlap of more than 20 mm at any time is highly predictive of the need of caesarean section.

Dashe and co-workers concluded that in 34% of cases, placenta previa that was diagnosed at 20-23 weeks persisted at delivery, whereas 73% of those, present at 32 – 35 weeks persisted at delivery[28].

Trans perineal sonography

Trans perineal or trans labial ultrasound using a trans abdominalprobe can improve the diagnostic accuracy of transabdominal ultrasoundand can be used as an alternative for TVS if TVS not available.

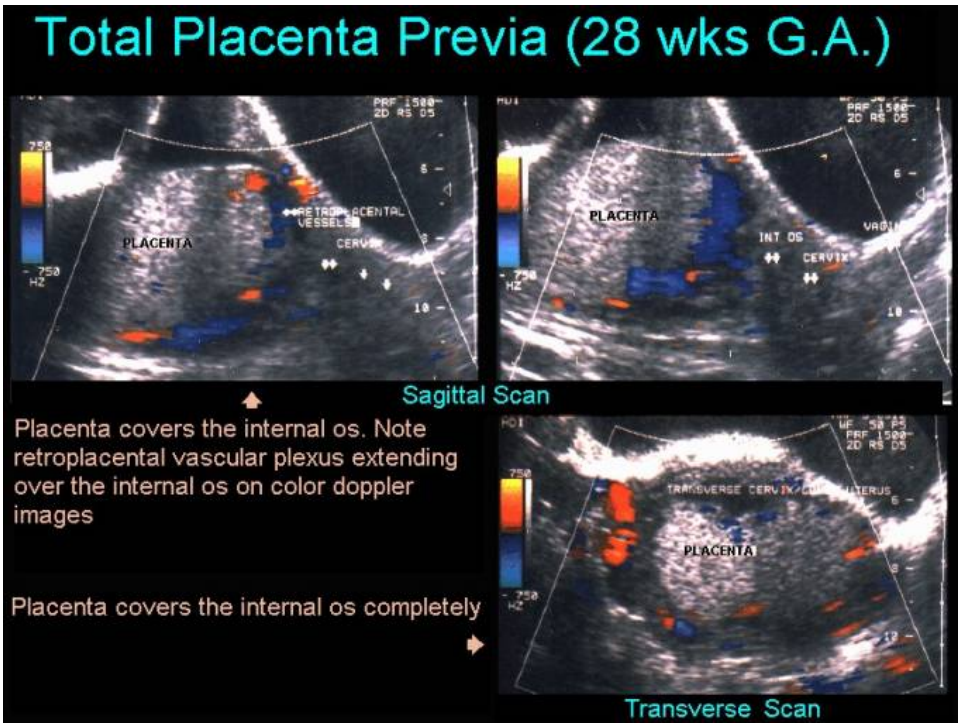
Hertzberg and colleagues in 1992 reported that trans perinealsonography was accurate to localise placenta previa[29].

Rani and associates 2007 demonstrated that trans perineal sonography had 98%of positive predictive value and 100% negative predictive value[30].

2.Color Doppler flow study

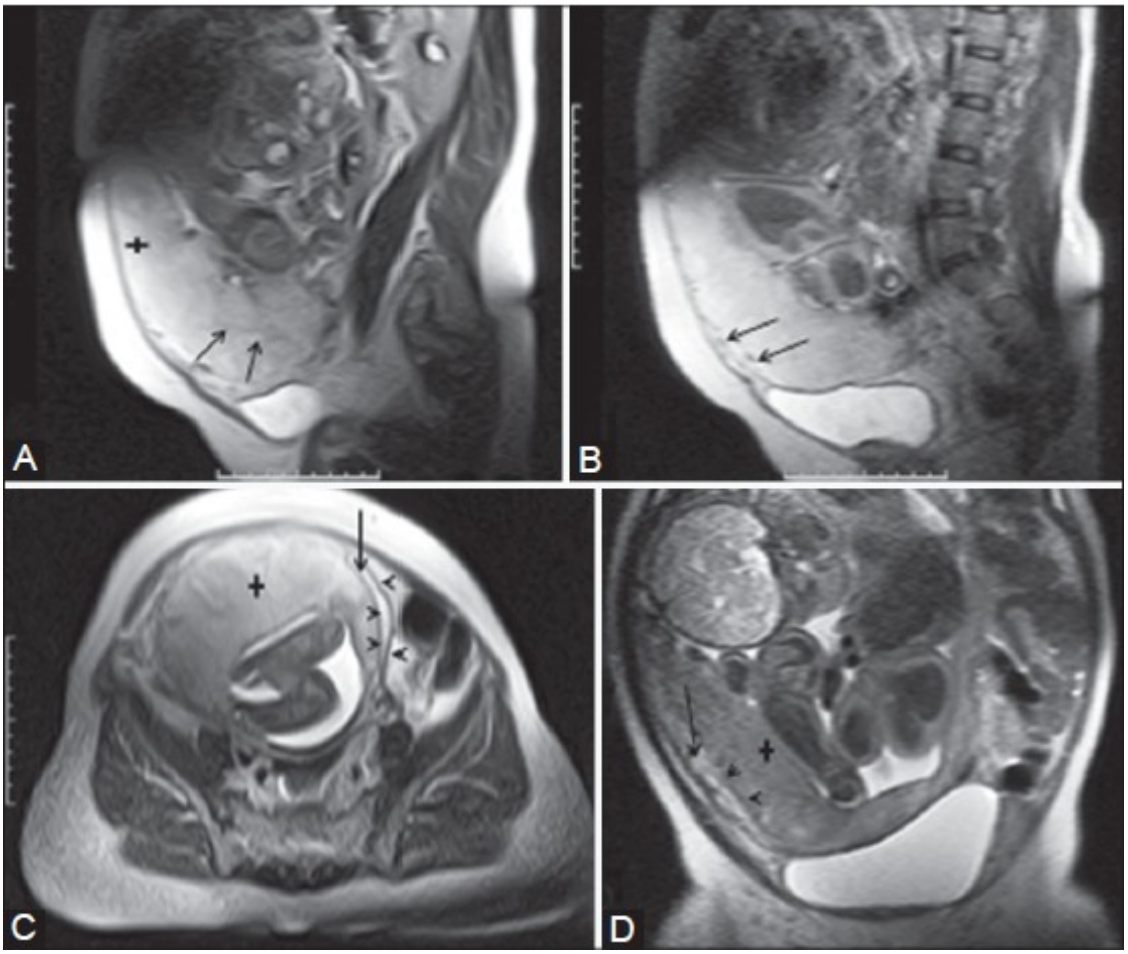
Recent guidance from RCOG recommends that patients with a previous CS and an anterior placenta previa should have color flow doppler as investigation of choice.

Prominent venous flow in the hypo echoic areas near the cervix is consistent with the diagnosis of placenta previa.



3.Magnetic resonance imaging

It is non invasive method without any use of ionizing radiation. Quality of placental imaging is excellent. But it is unlikely that MRI will replace sonographic scanning for routine evaluation in the near future. But Palacious Jaraquemada and Bruno 2005 stated that MRI more useful for diagnosis of placenta accreta than placenta previa[31].



ii. CLINICAL DIAGNOSIS

By internal examination (double setup examination)

Direct visualisation during caesarean section

Examination of placenta following vaginal delivery

DOUBLE SETUP EXAMINATION

Examination done in an operating room provides the most accurate assessment of the relationship between the lower edge of the placenta and the cervical os. This approach is contraindicated by active, profuse hemorrhage mandating immediate delivery.

Procedure:

After catheterizing the bladder two fingers are gently introduced into the vagina with care taken to avoid the cervical os. Each vaginal fornix is palpated in turn to feel whether there is placenta between the presenting part and the finger. If placental tissue is present, a sensation of "bogginess" is felt. If the four fornices are empty, then the index finger is gently introduced into the cervical os and the surroundings, felt for the placental edge.

LABORATORY INVESTIGATIONS

Complete Blood Count

Blood grouping and typing

Liver and renal function test

Coagulation profile &ECG

DIFFERENTIAL DIAGNOSIS

1. Abruptio placenta

2. Cervical polyp

3.Cervical Carcinoma

4.Circumvallate placenta

COMPLICATIONS

Maternal complications

1. During pregnancy

-antepartum hemorrhage

-malpresentation

-preterm delivery

2. During labour

-early rupture of membranes

-cord prolapse

-slow dilatation of cervix due to attachment of placenta on the lower segment

-intrapartum hemorrhage

-increased incidence of operative interference

-postpartum hemorrhage

-imperfect retraction of the lower uterine segment upon which the placenta is implanted

-large surface area of placenta with atonic uterus

-morbidly adherent placenta

-trauma to cervix and lower segment because of extreme softness and vascularity

-retained placenta

-anaesthetic and surgical complications

-air embolism

-coagulation defects

Coagulopathy is rare with placenta previa even when there is extensive separation from the implantation site. Presumably thromboplastin which incites intravascular coagulation that commonly present in abruption placenta readily escapes through the cervical canal rather than being forced into the maternal circulation. Wings and colleagues 1996 reported that there is no evidence of coagulopathy in placenta previa patients with bleeding episodes[32].

-Placental invasion

Placenta previa is associated with placenta accreta, increta and percreta is due to absence or deficiency of nitabuch layer or the spongiose layer of the deciduas and will dealt in detail later.

Feotal complications

-Low birth weight babies are common around 15% due to either spontaneous or induced preterm labour.

Fetal growth restriction is due to repeated small bouts of hemorrhage when patient is on expectant line of management which causes chronic placental insufficiency (16%).

-Birth asphyxia

-Intrauterine death

-Birth injuries

-Congenital malformation is 2-4 times more common.

There are no specific abnormalities associated with placenta previa but most commonly associated with central nervous system, cardiovascular, respiratory and gastrointestinal systems.

MATERNAL OUTCOME:

The possible reasons for maternal mortality are

-postpartum hemorrhage

-anaesthetic and surgical complications

-air embolism

-ascending infection

-placenta accreta

A rapid reduction in maternal mortality rate due to placenta previa was achieved during the second half of the 20th century. Oyelese and Sumulian in 2006 reported that MMR is increased by 3% due to placenta previa[19]. Emach reported that MMR is 3 in 2003-2005 due to hemorrhage that occur in placenta previa. Crenshaw et al., 1973 reported that the number of units of blood needed per patient in total, partial and marginal placenta previa is 4.7, 3.6 and 2.5 units respectively[22].

FETAL OUTCOME:

Cotton and colleagues reported perinatal mortality rate of 100% at less than 27 weeks, 19.7% at 27 to 32 weeks, 6.4% at 33 to 36 weeks and 2.6% after 36 weeks in 1980[33]. In recent years the overall PMR reduced due to improved neonatal care. Perinatal mortality rate is higher with earlier bleeding, greater amount of bleeding and greater extent of placenta previa.

According to the data collected by Crenshaw et al., 1973 perinatal mortality is mainly due to induced preterm delivery because of hemorrhage[22]. Salihu and associates in 2003 reported that neonatal mortality rate is increased by 3 fold in placenta previa[34]. Ananth CV and associates in 2003 reported that increased risk of neonatal death even in

term pregnancy with placenta previa[35]. Brar and colleagues in 1988 stated that the incidence of fetal growth restriction is nearly 20%[51]. Crane JMG and co workers in 1999 stated that there is no increased incidence of IUGR after controlling the gestational age[36]. Ananth and associates in 2001 reported that association between placenta previa and low birth weight was due to preterm birth and to lesser extent from growth restriction[37].

MANAGEMENT OF PRETERM PREGNANCY

Management with preterm foetus without persistent active uterine bleeding need only close monitoring. Some women needs prolonged hospitalisation. Ideal management of placenta previa patients is hospitalisation, but selective patients can have home monitoring. According to Mouer 1994, Neilson 2003, in properly selected patients no need for hospitalisation[38].

Drost and Keil reported that there are 50% reduction of hospitalisation and 40% reduction in cost expenditure in outpatient management[39]. Wing and colleagues concluded that there are no difference in maternal or foetal morbidity rates with outpatients vs inpatients observation[40].

GENERAL MANAGEMENT

Prevention

1. Adequate ante natal care:

Observational studies so far suggest that in women with elevated MSAFP at 15-20 weeks,in ultrasound if placenta encroach on the cervical os,thick placenta inferiorly, or show turbulent flow at their lower margin are mostly associated with APH, needs close monitoring.

2. If antenatal ultrasonogram at 20 weeks shows low lying placenta then do repeat ultrasound at 34 weeks to confirm the diagnosis.
3. Should not ignore the presence of "warning hemorrhage".
4. Do Color flow Doppler ultrasound to detect the placental invasion.

Management depends on

1. Mother's condition, evidenced by the degree of obstetric hemorrhage

2.Foetal condition depends on gestational age

3.The ability of neonatal unit to handle an infant of lesser gestational age

4.Management protocol depends on severity of bleeding.

CLASSIFICATION OF SEVERITY OF BLEEDING[41] (Gutierrez, Reines HD, Wult Gutierrez ME et al.,)

Class	1(MILD)	2(MODERATE)	3(SEVERE)	4(SEVERE)
Blood loss	<750 ml, <15%	750-1000ml, 15-30%	1500-2000ml, 30-40%	>2000ml. >40%
Pulse rate/min	100	100-120	120-140	140
Blood pressure	Normal	decreased	Decreased	Decreased
Respiratory rate/min	14-20	20-30	30-40	40
Urine output	30ml	20-30	5-15	Negligible
CNS symptoms	Normal	anxious	Confused	Lethargic

TREATMENT ON ADMISSION

Immediate care

1. Asses the amount of blood loss
2. Arrange Rh compactable blood for transfusion
3. A large bore IV canula is inserted and NS infusion started
4. Gentle abdominal palpation to ascertain any uterine tenderness and auscultate for fetal heart sound.
5. Local inspection of vulva for the presence of active bleeding per Vaginum.

MANAGEMENT OF PATIENTS WITH MILD BLEEDING:

Conservative line of management:

Macafee and Johnson expectant treatment [52](Silver R, Depp R, Saggagha RE et al.,) This is an attempt to improve the fetal salvage without increasing undue maternal hazards. It should be done in place where blood is available whenever required and facilities for caesarean section should be available throughout 24 hours.

Ideal cases are

1. Mother is in good healthly status (Hb >10 g%, HCT >30%).
2. Duration of pregnancy is <37 weeks.
3. Active rapid vaginal bleeding is absent.
4. Fetal well being is reassured.

CONDUCT OF EXPECTANT MANAGEMENT

1. Bed rest with limited bathroom privileges are usually allowed.
2. Intercourse, douching and vaginal suppositories are avoided.
3. Stool softeners are appropriate to avoid straining at defecation.
4. Basic investigations to be done
5. Periodic inspection of vulval pads and foetal surveillance using ultrasound in 2-3 weeks interval.

6. Blood loss is replaced with blood products.
7. Gentle cusco's speculum examination is made to exclude the
8. local cervical and vaginal lesions for bleeding
9. Use of tocolytics: Can be given for vaginal bleeding patients.

Besinger et al., 1995 reviewed that the use of tocolysis in symptomatic placenta previa women is significantly associated with prolongation of pregnancy and increased birth weight[53].

Drug of choice is Nifedipine 10-20 mg orally every 4-6 hrs. Tocolysis can be continue until delivery. Tower and associates suggested no increased mortality and morbidity ~~associated~~ with tocolytic use in a tertiary care[54].

10.Use of cervical encerclage to reduce bleeding and to prolong pregnancy is not useful (RCOG 2005).

Lovset 1959, Von Friesen (1964,1972), Sadauskas et al., 1982 demonstrated a significantly greater prolongation of pregnancy in women treated with cerclage than in women managed conservatively[55]. Thus cervical cerclage limits the development of the lower uterine segment, which occurs in advancing gestation and the effect of uterine

contractions, in turn avoids the partial detachment of the placenta from the lower uterine segment.

Arias 1988 reported that cerclage patients had significantly better outcomes as more advanced gestational age at delivery, greater birth weight, less neonatal complications. Cobo et al., 1998 concluded that there is no significant difference in maternal and fetal outcome in patients with cerclage and expectant management[56].

Neilson et al 2003 found that cervical cerclage may reduce the risk of delivery before 34 weeks and that of the birth weight less than 2 kg or having a low 5 minute APGAR score[57].

11. Rh immunoglobulin should given to all Rh negative women
12. Glucocorticoids.

Multiple studies have shown that 50% reduction in incidence of hyaline membrane disease in preterm infant born after a mother received glucocorticoids. The time necessary for this effect can be as little as 24 hrs or as much as 72 hrs.

Liggins and Howie 197 stated that the reduction of HMD was confined to preterm babies delivered within 1-7 days of maternal glucocorticoid treatment[58].

Medications used are

a) Nifedipine 10-20 mg orally every 4-6 hrs.

b) Betamethsone 12 mg im every 24 hrs for 2 doses.

c) Feso^{4} 325 mg orally three times daily.

d) Stool softeners, high residue diet.

Ideally expectant management should be given in hospital care and is carried up to 37 weeks of gestation.

Expectant management can be given at home in certain patients

-who live very close to hospital

-24 hours transportation is available

-bed rest assured

-patients and her attenders are well motivated about the risk.

-72 hrs of inpatient observation without vaginal bleeding

-reactive Non Stress Test at the time of delivery

DEFINITE MANAGEMENT (DELIVERY)

INDICATIONS:

1. Bleeding occurs at or after 37 weeks of gestation

2. Patient is in labour

3. Bleeding is continuing and of moderate degree

4. Patient is in exsanguinated state on admission.

5. Baby is dead or known to be congenitally deformed.

Vaginal delivery may be considered where placental edge is clearly 2-3 cm away from the internal os. Caesarean delivery is done for all women with sonographic evidence of placenta previa where placental edge is within 2 cms from the internal os. It is mainly indicated if it is thick more than1cm and posterior (RCOG 2005).

Elective caesarean delivery is ideal because emergency delivery has more negative impact on maternal and perinatal outcome, independent of gestational age. Cotton and colleagues found that 27.7% of infant delivered emergently had anaemia compared with 2.9% delivered electively.

Vaginal delivery is induced by low rupture of membranes using long kochers forceps in type 1 and type 2 placenta previa.

ARM followed by oxytocin drip to be started if aminotomy fails to stop bleeding or fail to initiate labour, caesarean section is performed.

Active management of 3rd stage of labour to be done along with Inj. Methergin 0.2 mg given intravenously while delivering ant shoulder..

PRECAUTIONS DURING CEASARIAN SECTION

-done by senior obstetrician

-regional blockage may be used

-if the patient is in shock stage and the bleeding continues the operation has to be performed immediately with restorative measures.

TYPE OF OPERATIONS:

- Lower uterine caesarean section is appropriate if the presenting part is easily accessible and the lower uterine segment has developed enough to allow a generous incision

-classical caesarean section provide greater flexibility in the

approach to deliver the baby and less trauma to the foetus.

Important points in lower segment approach are

Most commonly lower segment transverse incision is possible, when difficulties occur the transverse incision may be converted to an inverted T, J or U shaped incision.

To avoid foetal bleeding which may result from a transverse incision with anterior placenta or when the lower segment is nonexistent or is very vascular, a vertical incision (classic) or De Lee incision is employed. Scott did not justify with these incisions, because of long term consequences.

In transverse incision of the uterus with anterior placenta two approaches are available:

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

Myerscough recommends against cutting or tearing through the placenta because of the inevitable foetal blood loss. Ward 2003 described a surgical method in which a cleavage plane is developed following the uterine incision. The operator undermines the placenta towards the closest edge until the membranes are palpable and they are then ruptured with the foetus and delivered around the intact placenta[59].

.Due to poor contractile capacity of the lower uterine segment there may be uncontrollable hemorrhage following placental removal. If the bleeding from the placental bed is not controlled by the conservative methods other methods have to be attempted.

1. Over sewing the implantation site with 0 chromic suture.

2. Bilateral uterine artery and internal iliac artery ligation can be done. Cho and colleague 1991 reported that interrupted 0 chromic suture 1 cm apart and forming a sutured circle around the bleeding portion of the lower segment can be done.

Druzin 1989 described that uterine cavity packing with gauze pack to arrest hemorrhage and the pack was removed 12 hours later by trans vaginal route[60].

Intramyometrial injection of prostaglandin F2 alpha is useful. Knight 2007 reported that in women with placenta previa if placenta is implanted anteriorly in the site of previous uterine scar there is a increased likelihood of placenta accreta and she needs hysterectomy as a last resort[61].

MANAGEMENT OF PATIENTS WITH MODERATE BLEEDING:

Delivery by caesarean section should be performed if the pregnancy is 36 weeks or more. If the pregnancy is between32 and 36 weeks it is necessary to evaluate the fetal lung maturity as soon as the acute bleeding episode subsides and the patient's condition is stabilized.

Rapid test for assessing fetal pulmonary maturity is amniotic fluid is lecithin to sphingomyelin ratio (L/S). If the L/S ratio greater than 2, the foetus should be delivered. If lungs are immature start on steroid therapy.

If the patient is stable give her expectant management. In unstable patient alert paediatrician regarding imminent delivery as the risk of developing Respiratory distress syndrome of the new born is high.

MANAGEMENTOF PATIENT WITH SEVERE BLEEDING:

Constant observation and monitoring the vital parameters

Administration of intravenous fluids

Transfusion therapy

Assessment of renal function

Assessing the foetus

Delivery

INVESTIGATIONS

CBC

Blood grouping and typing

Serum electrolytes

Glucose

Creatinine

Blood urea nitrogen

DIC profile - Serum fibrinogen

-PT, PTT

-Platelet count

-D-dimer

-Fibrin degradation products.

Intravenous fluids

One or two large bore canulas should be inserted. One litre of crystalloid solution results in 250 ml of intravascular volume expansion.

Transfusion theory

Packed red cell transfusion is an essential component in the treatment of obstetrical hemorrhage. One important danger is transmission of infections like hepatitis C and B, HIV, CMV. Fortunately the probability of infection transmission is less (Brecher and Hay 2005) after introducing nucleic acid amplification testing for donated blood. In obstetrical hemorrhage, ideal method to select blood for potential transfusion is "type and screening" rather than "type and cross match"

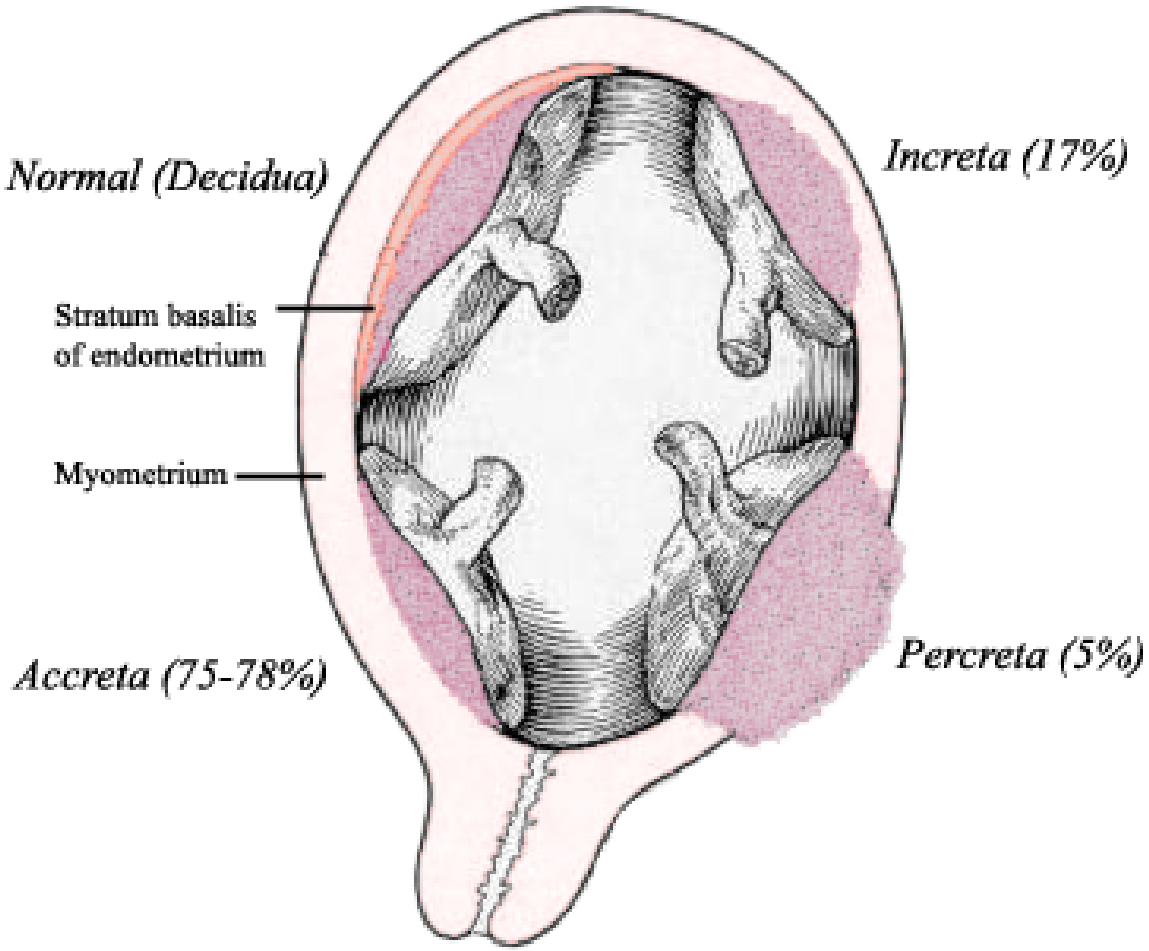
In rare circumstances type O Rh negative packed cell transfusion should be given. To overcome platelet depletion in massive blood transfusion (10 units or more within 24 hrs) the best approach is to transfuse 1 unit of platelet which obtained from a single donor. For clotting factor deficiency transfuse FFP in the ratio of 1:4 (1 FFP:4 PC) Yamada and co-workers suggested some benefit in autologous transfusion of placenta previa patients, but needs further studies.

PLACENTA ACCRETA, INCRETA, PERCRETA

DEFINITION

PLACENTA ACCRETA

The term placenta accreta is described if any implantation of placenta in which there is abnormally firm adherence to the uterine wall as the consequence of partial or total absence of the decidua basalis and imperfect development of the fibrinoid or nitabuch layer. Histology shows that the trophoblast has invaded the myometrium without any intervening decidua.



PLACENTA ACCRETA - placental villi are attached to the myometrium.

PLACENTA INCRETA - Placental villi invade into the myometrium.

PLACENTA PERCRETA - Placental villi penetrate through the myometrium.

TOTAL PLACENTA ACCRETA - Abnormal adherence of all lobules of the placenta

PARTIAL PLACENTA ACCRETA - Abnormal adherence of only a few to several lobules

FOCAL PLACENTA ACCRETA - Abnormal adherence of all or part of a single lobule may be involved

Benirschke and colleagues 2006 reported that histological diagnosis cannot be made from the placenta alone and the entire uterus or curettings with myometrium are necessary for histopathological confirmation[62].

INCIDENCE:

The incidence of placental invasion has increased over few decades, because of the increasing caesarean section rate. ACOG 2002 reported that placenta accreta complicates 1 in 2500 deliveries. Stafford and Belfort 2008 cite the incidence is 1 in 2500 in the 1980s,1 in 535 in 2002, and 1 in210 in 2006.

Zelop and colleagues 1996 reported that placenta accreta has been the leading cause of intractable postpartum hemorrhage requiring emergency peripartum hysterectomy[63].

ASSOCIATED CONDITIONS:

Previous caesarean delivery scar or after uterine curettage. Here the decidual formation is defective. Fox reported that 1/3 of cases had placenta previa, 1/4 had a prior caesarean delivery, 1/4 had previous curettage and 1/4 were gravida 6 and above[64]. Zaki and associates 1990 found that 10% of placenta previa had associated placenta accrete.

Hardardottir and colleagues 1996 observed 50% of women with a previous caesarean delivery had adherent placenta in myometrial fibres detected microscopically[65]

The risk for accreta was increased 8 fold when MSAFP level more than 2.5 MOM and it was increased 4 fold when the maternal free beta-HCG levels more than 2.5 MOM and it was increased 3 fold when maternal age more than 35 years.

CLINICAL COURSE

In the 1st trimester abnormal myometrial invasion may manifest as a caesarean scar pregnancy [66](Ash and associates 2007), Rotas and colleagues 2006 reported that this type of ectopic pregnancy is increasing in frequency[67]. If pregnancy advances placental villi at the site of a previous caesarean scar may lead to uterine rupture before labour[68]stated by Liang and co workers 2003.

Antepartum hemorrhage with placenta accreta.

PREDICTION OF PLACENTAL ADHERENCE:

ULTRASONOGRAPHIC PREDICTION:

1. Irregularly shaped placental lacunae within the placenta.

2. Thinning of myometrium overlying the placenta.

3. Loss of retro placental clear zone.

4. Protrusion of the placenta into the bladder.

5. Increased vascularity of uterine serosa and bladder interface.

Pasto et al, suggested that a lack of retro placental clear space detected using ultrasonography may be abnormal sign of placenta accreta and can be detected as early as 12 weeks.

Comstock et al., found that at 15-20 week of gestation, the presence of lacunae in the placenta was the most predictive sign of accreta.. Finberg and Williams reported the number of lacunae was associated with complications related to placental adherence.

Yang et al. classified the sonographic finding of intra placental lacunae into 4 grades. He concluded that the presence of > than grade 2 lacunae was strongly associated with placenta accreta.

Hurton et al, reported that the areas with sponge like echoes were most likely composed of clusters of richly developed blood vessels.

PERIOPERATIVE EVALUATION

Lam and colleagues 2004 found that antepartum sonography was only 33% sensitive for detecting placenta accreta.

Twickler and colleagues 2000 reported two factors are highly predictive of myometrial invasion[69] .

1. Distance <1 mm between the uterine serosa-bladder interface and the retro placental vessels.
2. Identification of large intra placental lakes .

These findings had 100% sensitivity and positive predictive value of 78% Chou and co workers 2001 concluded that successful use of 3D color Doppler imaging for diagnosis of placenta percreta.

MR imaging is used as an adjuvant to sonography in diagnosing accreta. Lax and co workers 2007 suggested that 3 MRI findings to diagnose accreta[70].

1. Uterine bulging

2. Heterogeneous signal intensity within the placenta

3. Presence of dark intra placental bands on T2-weighed imaging.

MANAGEMENT:

Thorough preoperative assessment allows better planning and transfer these patients for tertiary .care.

Pre operative arterial balloon tipped catheter placement into the internal iliac arteries decrease the blood loss during placental delivery.

Alternatively the catheters can be used to embolize the arterial sites YU and colleagues 2009 reported favourable outcome with uterine artery embolization[71].

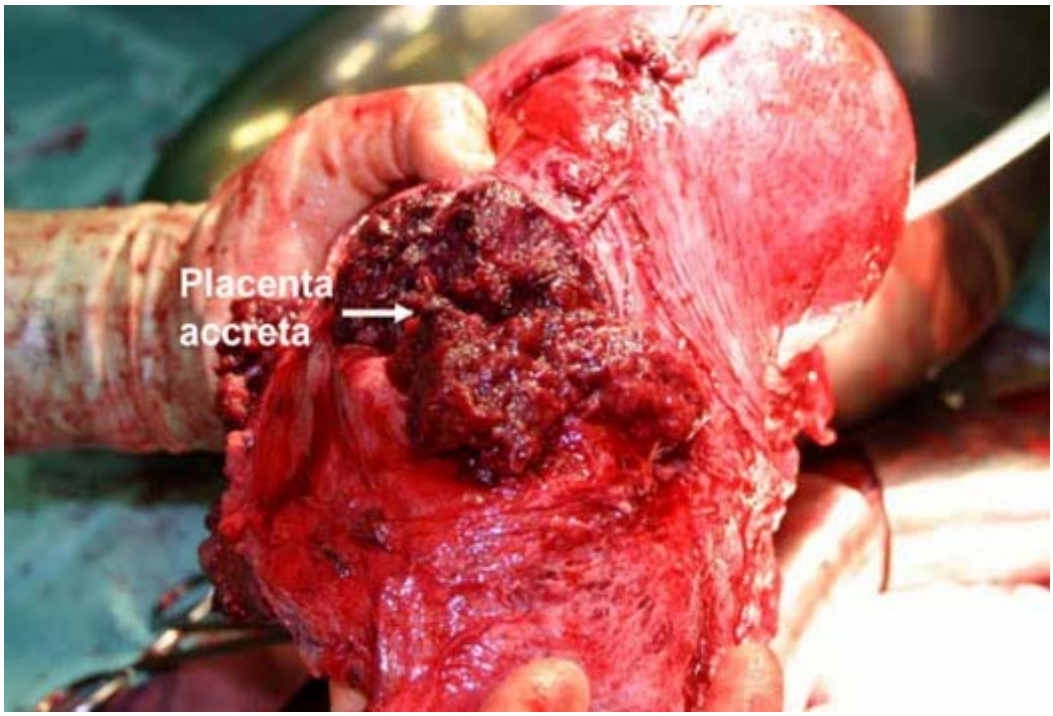
Greenburg and collegues 2007 adviced to take necessary precaution while attempting embolization in order to prevent thrombosis of common and external iliac vessels[72] .

DELIVERY OF PLACENTA

Problems associated with delivery of placenta depends on implantation sites, depth of myometrial penetration and number of lobules involved. Focal placenta accreta with implantation in upper uterine segments may be unrecognised and it may be the cause of postpartum hemorrhage. Benirschke and Kaufmann 2006 reported that

focal placental accrete may be the cause for formation of placental polyp[73].

When there is extensive invasion of placenta into the myometrium leads to the profuse hemorrhage on attempting placental delivery which can be tackled with immediate blood replacement and prompt hysterectomy. With total placenta accreta there may be little or no bleeding after the delivery of the baby and at times traction on umbilical cord causes uterine inversion.



Usual attempt of manual removal of placenta do not succeed because of absence of cleavage plane between placenta and the uterine myometrium. For this conservative management like manual removal of as much placenta as possible followed by uterine packing can be done, but mortality with these treatment is 25% [64](Fox 1972).So safest management is total hysterectomy. If not possible go for subtotal hysterectomy.

Another method during caesarean section is to leave the entire placenta insitu without attempting to extract it and to close the caesarean hysterotomy incision[74] (Worley and associates, 2008) Several scenarios have described about methotrexate injection given at the time of surgery. Kayem and colleagues 2002, Lee and co workers 2008 also performed pelvic arterial embolization[75].

Other measures are Uterine or internal iliac artery ligation and Balloon occlusion or embolization of pelvic arteries.

Karam and colleagues 2003 described the use of argon beam coagulation for haemostasis in a woman with placenta percreta and bladder invasion.

Keyam, Henrich and co workers showed in few cases there are spontaneous resorbtion of placenta.

Hay 2008, Lee 2008, Nijman 2002 concluded that hysterectomy either planned or prompted for hemorrhage or infection is performed several weeks postpartum when blood loss may be less torrential

MANAGEMENT OUTCOME

Eller and co workers 2009 reported that preoperative identification of adherent placenta with scheduled caesarean hysterectomy without placenta removal was associated with significantly reduced morbidity when compared with those of attempted placenta removal[76].

Timmerman and co workers 2007 reviewed that the conservative management of leaving the placenta insitu with either adjuvant methotrexate or uterine artery ligation as fertility conservation may prevent massive hemorrhage thus the overall success rate as infertility prevention was 80%[77].

Serial serum beta HCG measurements were not found to be predictive but many authors recommend serial imaging with sonography or MRI for follow up.

The main complication of conservative management is vaginal bleeding and thus 15% of these groups go for hysterectomy in view of controlling hemorrhage.

REVIEW OF LITERATURE FOR MSAFP:

1.Unexplained elevation of MSAFP and placenta previa.

Waller et al 1996 of north middle sex university hospital NHS trust. Obstet Gynecol 1996,88:816-22

Unexplained raised MSAFP has been associated with adverse pregnancy outcome such as intrauterine fetal growth restriction, preeclampsia, preterm birth and placental complication includes placental abruptio as well as placental invasion disorder like accreta, increta, percreta.

The incidence of placenta accreta was about 1 in 7000 pregnancies, with increasing trend due to increased caesarean birth.

Recognised risk factors are placenta previa, uterine surgery, uterine curettage, multiparity, advanced maternal age (Hung etal 1999).

Gagnon et al 2008 suggested that the combination of raised MSAFP and placenta previa should strength the clinical suspicion of invasive placental disorder.

2. Increased likelihood of placenta accreta with persistent placenta previa and raised MSAFP.

Kupferminc MJ,Tamura RK,WigtonTR, et al.

Obstet Gynecol 1993;82:266-9

Kupferminc et al 1993 in a retrospective review of all patients who underwent emergency caesarean hysterectomy reported that women with MOM>2.5 are at the higher risk of placenta accreta and also of significant blood loss with mean MOM >1.39.(Koster et al 2004).

Gagnon et al 2008 recommended that when unexplained raised MSAFP occurs in combination with 2nd or 3rd trimester placenta previa, a thorough assessment of the placental-uterine interface must be made.

Needs multi disciplinary approach for delivery and also required appropriate counselling and consent for surgery to be taken.

3.placenta accreta/percreta/increta-a cause of elevated maternal serum alpha fetoprotein

Zelop C, Nadel A, Frigoletto jr, Pauker S, Macmillan M, Benaceraf BR Obstet Gynecol b1992 ,oct 80 (4),693-4.

This study concluded that there is a significant association between elevated MSAFP and placenta accreta/percreta/increta (P=0.017). Thus the patients with an unexplained elevation of MSAFP as well as placenta previa may be at increased risk for abnormal placental adherence.

4.placenta accreta is associated with elevated MSAFP

Kupferminc MJ, Tamara RK, wigtonTR, Glassenberg R, Socol ML Obstet Gynecol 1992;82:266-9.

Patients with placenta accreta, percreta, increta had an elevated

MSAFP with p value <0.001.Maternal estimated blood loss was also significantly greater in study group with p <0.0001.

Table : I A

AGE GROUP * PP PERSISTENCE

			PP PERSISTENCE		
			0	1	Total
AGE GROUP	1	Count	7	2	9
		% within AGE GROUP	77.8%	22.2%	100.0%
<20 years		% within PP PERSISTENCE	12.7%	4.4%	9.0%
		% of Total	7.0%	2.0%	9.0%
	2	Count	40	35	75
		% within AGE GROUP	53.3%	46.7%	100.0%
21 -30 years		% within PP PERSISTENCE	72.7%	77.8%	75.0%
		% of Total	40.0%	35.0%	75.0%
	3	Count	8	8	16
		% within AGE GROUP	50.0%	50.0%	100.0%
>30 years		% within PP PERSISTENCE	14.5%	17.8%	16.0%
		% of Total	8.0%	8.0%	16.0%
	Total	Count	55	45	100
		% within AGE GROUP	55.0%	45.0%	100.0%
		% within PP PERSISTENCE	100.0%	100.0%	100.0%
		% of Total	55.0%	45.0%	100.0%

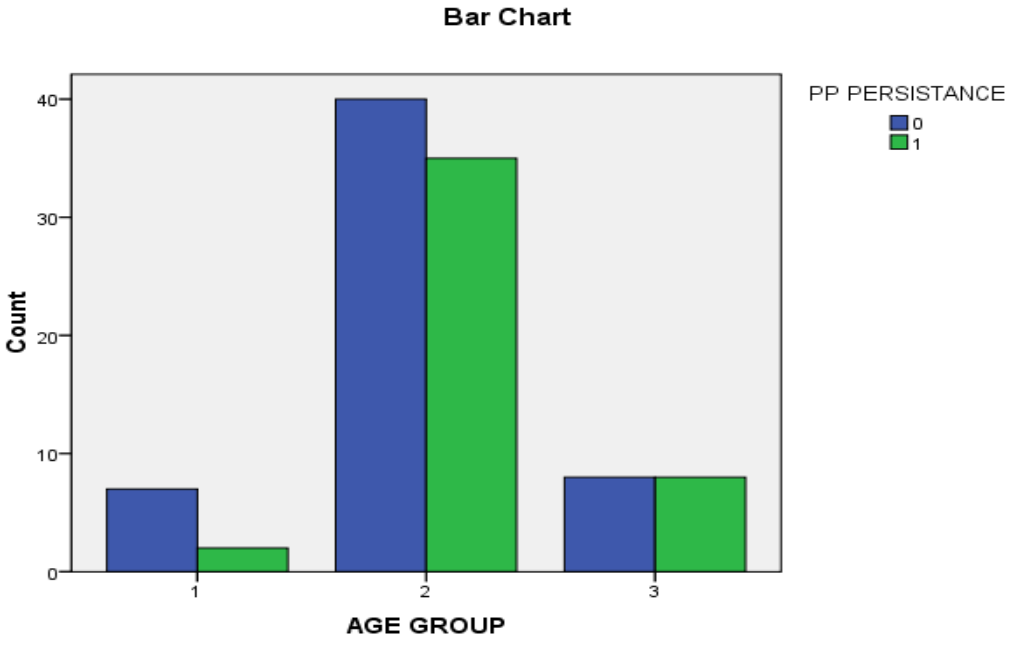
In this study antenatal mothers with age group between21-30 years was 75%. In these 75 cases 40 (53.3%%) were not having persistent placenta previa and35 (46.7%) were having persistent of placenta previa.Age group less than 20 years were 9 cases,more than 30 years were 16 cases.

Table : I B

AGE GROUP * PP PERSISTENCE

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.132[a]	2	.344
Likelihood Ratio	2.274	2	.321
Linear-by-Linear Association	1.326	1	.250
N of Valid Cases	100		



There is no statistical significance between persistent placenta previa and non persistent patients with respect to age distribution, since p value is 0.34.

Table : II A

PARITY * PP PERSISTENCE

			PP PERSISTENCE		
			0	1	Total
PARITY	1	Count	25	10	35
		% within PARITY	71.4%	28.6%	100.0%
Primigravida		% within PP PERSISTENCE	45.5%	22.2%	35.0%
		% of Total	25.0%	10.0%	35.0%
	2	Count	30	35	65
		% within PARITY	46.2%	53.8%	100.0%
Mulitigravida		% within PP PERSISTENCE	54.5%	77.8%	65.0%
		% of Total	30.0%	35.0%	65.0%
	Total	Count	55	45	100
		% within PARITY	55.0%	45.0%	100.0%
		% within PP PERSISTENCE	100.0%	100.0%	100.0%
		% of Total	55.0%	45.0%	100.0%

Among 100 antenatal women,35 were primigravida.out of these 35 women only 10 (28.6%) had persistence of placenta previa and out of 45 women with persistant placenta previa 22.2% were primigravida.

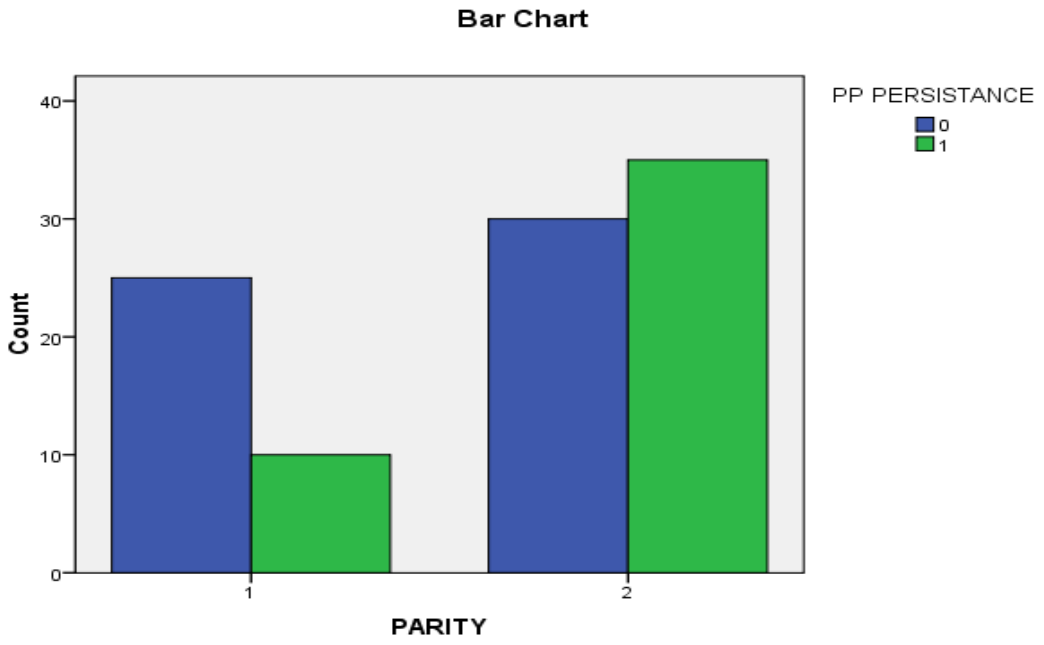
Out of 100 antenatal women with placenta previa,65 were multigravida .Among these women 35cases(53%) had persistent placenta previa and out of 45 women with persistent placenta previa 35cases (77.8%) were multigravida.

Table : IIB

PARITY * PP PERSISTENCE

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.872[a]	1	.015		
Continuity Correction[b]	4.895	1	.027		
Likelihood Ratio	6.025	1	.014		
Fisher's Exact Test				.020	.013
Linear-by-Linear Association	5.813	1	.016		
N of Valid Cases	100				



There is a statistical significance with multiparity and persistence of placenta previa since p value in this study is 0.015.The bar diagram also shows the increased incidence of persistence of placenta previa at term is more with multiparous women.

Table : IIIA

PREVIOUS LSCS * PP PERSISTENCE

			PP PERSISTENCE		
			0	1	Total
PREV.LSCS	0	Count	54	19	73
		% within PREV.LSCS	74.0%	26.0%	100.0%
		% within PP PERSISTENCE	98.2%	42.2%	73.0%
		% of Total	54.0%	19.0%	73.0%
	1	Count	1	19	20
		% within PREV.LSCS	5.0%	95.0%	100.0%
		% within PP PERSISTENCE	1.8%	42.2%	20.0%
		% of Total	1.0%	19.0%	20.0%
	2	Count	0	6	6
		% within PREV.LSCS	.0%	100.0%	100.0%
		% within PP PERSISTENCE	.0%	13.3%	6.0%
		% of Total	.0%	6.0%	6.0%
	3	Count	0	1	1
		% within PREV.LSCS	.0%	100.0%	100.0%
		% within PP PERSISTENCE	.0%	2.2%	1.0%
		% of Total	.0%	1.0%	1.0%
	Total	Count	55	45	100
		% within PREV.LSCS	55.0%	45.0%	100.0%
		% within PP PERSISTENCE	100.0%	100.0%	100.0%
		% of Total	55.0%	45.0%	100.0%

Out of 100 cases of placenta previa 27 cases were prior caesarean delivery cases and 73 cases were not having previous uterine scar. Among these 73 women of not having prior uterine scar only 19 cases (26%) were having persistent placenta previa and these accounts for 42.2% in persistence group .Among 27 cases of prior caesarean delivery 26 cases (96%) had persistent placenta previa.

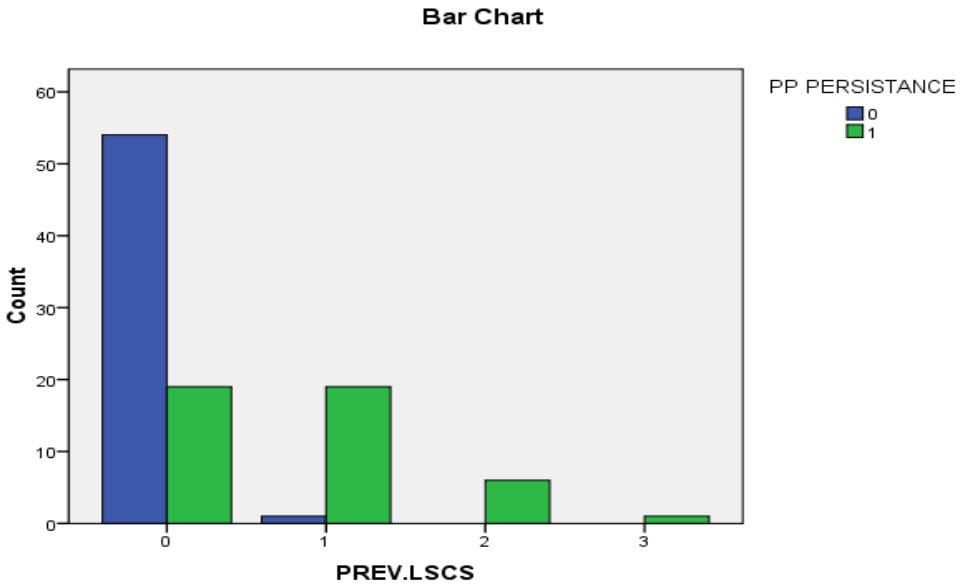
Out of 20 cases of 1 prior caesarean delivery 19 cases were having persistence of placenta previa, accounts for 95% and in persistence group it accounts for 42.2%.6 cases of previous 2 lscs and 1 case of previous 3 lscs was reported in this study.

Table : IIIB

PREVIOUS LSCS * PP PERSISTENCE

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	39.375[a]	3	.000
Likelihood Ratio	45.979	3	.000
Linear-by-Linear Association	32.693	1	.000
N of Valid Cases	100		



There is excellent statistical significance with previous lscs and persistence of placenta previa since p value is 0.000.In our Institution we get more cases of one previous lscs than 2 or more prior caesarean delivery.so the bar diagram shows 19 cases of one previous lscs have persistant placenta previa at term.

Table : IV A

PREVIOUS ABORTION * PP PERSISTENCE

			PP PERSISTENCE		
			0	1	Total
PREV.ABOR	0	Count	40	30	70
		% within PREV.ABOR	57.1%	42.9%	100.0%
		% within PP PERSISTENCE	72.7%	66.7%	70.0%
		% of Total	40.0%	30.0%	70.0%
	1	Count	14	11	25
		% within PREV.ABOR	56.0%	44.0%	100.0%
		% within PP PERSISTENCE	25.5%	24.4%	25.0%
		% of Total	14.0%	11.0%	25.0%
	2	Count	0	3	3
		% within PREV.ABOR	.0%	100.0%	100.0%
		% within PP PERSISTENCE	.0%	6.7%	3.0%
		% of Total	.0%	3.0%	3.0%
	3	Count	1	1	2
		% within PREV.ABOR	50.0%	50.0%	100.0%
		% within PP PERSISTENCE	1.8%	2.2%	2.0%
		% of Total	1.0%	1.0%	2.0%
	Total	Count	55	45	100
		% within PREV.ABOR	55.0%	45.0%	100.0%
		% within PP PERSISTENCE	100.0%	100.0%	100.0%
		% of Total	55.0%	45.0%	100.0%

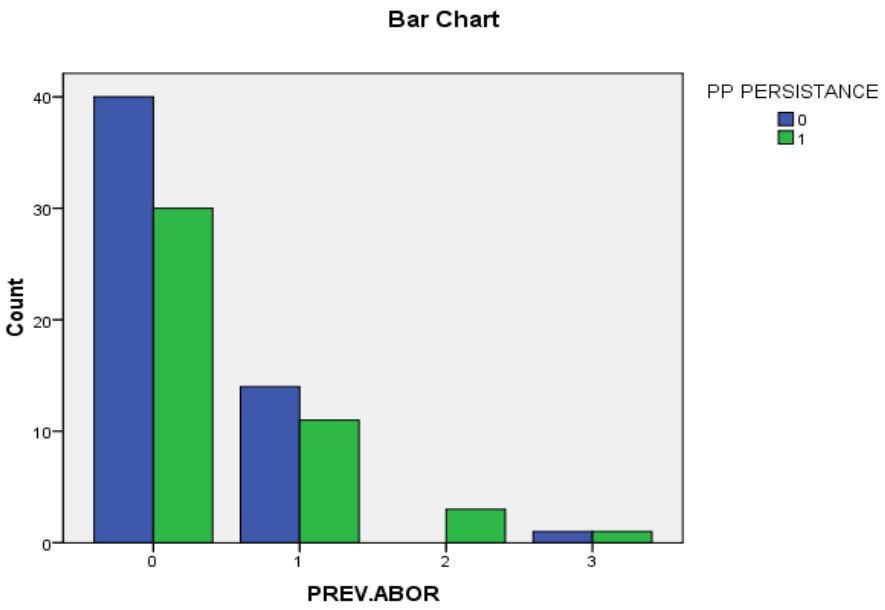
Out of 100 antenatal mother 30 cases had previous history of abortions and out of these 25 cases had previous history of 1 abortion. Out of 25,11 cases(44%) had persistence of placenta previa.3 cases had h/o 2 abortions and all 3 cases had persistence of placenta previa .In this study only 2 cases had previous h/o 3 abortions in which only one case had persistent previa.

Table : IV B

PREVIOUS ABORTION * PP PERSISTENCE

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.827[a]	3	.281
Likelihood Ratio	4.952	3	.175
Linear-by-Linear Association	1.087	1	.297
N of Valid Cases	100		



In this study there is no statistical significance in women with previous abortions and the persistence of placenta previa since the p value is 0.281 and the pictorial representation also implies the same .

Table V A

PREVIOUS VAGINAL DELIVERY * PP PERSISTENCE

			PP PERSISTENCE		
			0	1	Total
PREV.V.D	0	Count	32	38	70
		% within PREV.V.D	45.7%	54.3%	100.0%
		% within PP PERSISTENCE	58.2%	84.4%	70.0%
		% of Total	32.0%	38.0%	70.0%
	1	Count	13	5	18
		% within PREV.V.D	72.2%	27.8%	100.0%
		% within PP PERSISTENCE	23.6%	11.1%	18.0%
		% of Total	13.0%	5.0%	18.0%
	2	Count	9	2	11
		% within PREV.V.D	81.8%	18.2%	100.0%
		% within PP PERSISTENCE	16.4%	4.4%	11.0%
		% of Total	9.0%	2.0%	11.0%
	3	Count	1	0	1
		% within PREV.V.D	100.0%	.0%	100.0%
		% within PP PERSISTENCE	1.8%	.0%	1.0%
		% of Total	1.0%	.0%	1.0%
	Total	Count	55	45	100
		% within PREV.V.D	55.0%	45.0%	100.0%
		% within PP PERSISTENCE	100.0%	100.0%	100.0%
		% of Total	55.0%	45.0%	100.0%

Out of 100 antenatal mothers 30 cases had previous h/o full term vaginal deliveries. .In these 30 cases,18 cases had previous h/o 1 FTVD,11 cases had 2 FTVD and only 1 case have 3FTVD.

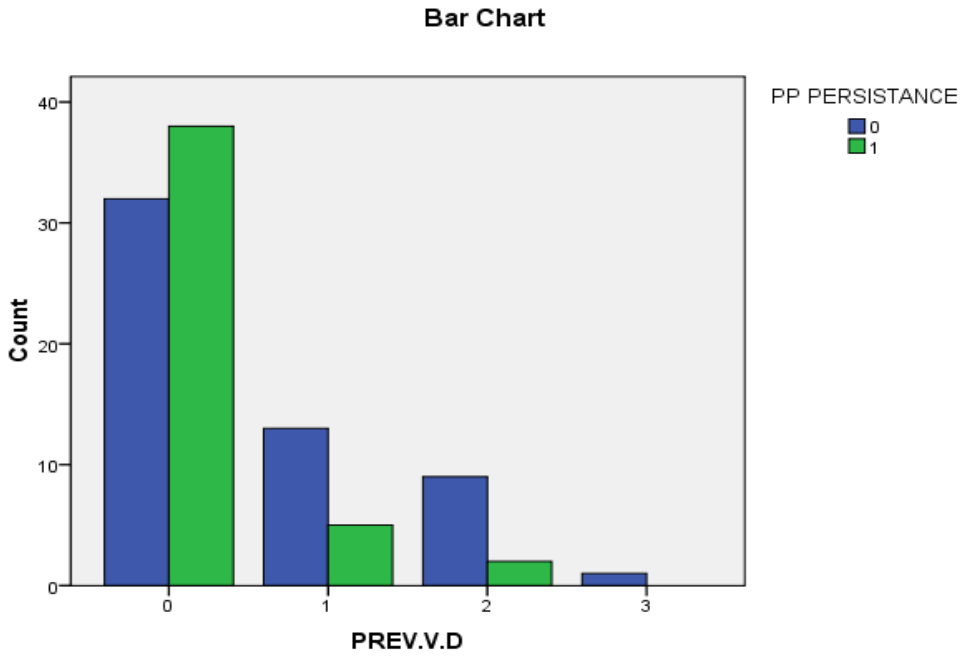
With previous 1 FTVD only 5 cases out of 18 cases(27.8%) had persistent placenta previa.2 cases of previous h/o 2 FTVD had persistence of placenta previa.

Table V B

PREVIOUS VAGINAL DELIVERY * PP PERSISTENCE

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.610[a]	3	.035
Likelihood Ratio	9.401	3	.024
Linear-by-Linear Association	8.160	1	.004
N of Valid Cases	100		



There is significant statistical correlation between the persistence of placenta previa and previous vaginal deliveries since the p value is 0.03 and it is more common in previous one vaginal delivery which has been shown in this bar diagram.(may be because our country is following "two child norm")

Table VI A

MATERNAL OUTCOME * PP PERSISTENCE

			PP PERSISTENCE		
			0	1	Total
MATERNAL OUTCOME Good	1	Count	55	0	55
		% within MATERNAL OUTCOME	100.0%	.0%	100.0%
		% within PP PERSISTENCE	100.0%	.0%	55.0%
		% of Total	55.0%	.0%	55.0%
Adverse	2	Count	0	45	45
		% within MATERNAL OUTCOME	.0%	100.0%	100.0%
		% within PP PERSISTENCE	.0%	100.0%	45.0%
		% of Total	.0%	45.0%	45.0%
	Total	Count	55	45	100
		% within MATERNAL OUTCOME	55.0%	45.0%	100.0%
		% within PP PERSISTENCE	100.0%	100.0%	100.0%
		% of Total	55.0%	45.0%	100.0%

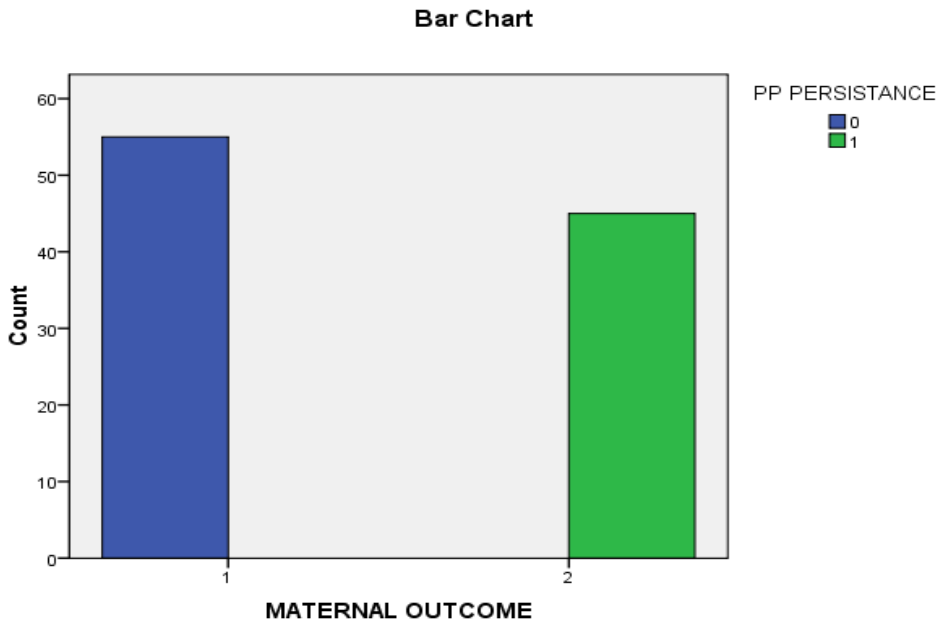
This crosstab shows 45 cases out of 100 antenatal mothers had maternal complications like antepartum hemorrhage, persistent placenta previa, complete placenta previa, preterm delivery, caesarean delivery and caesarean hysterectomy also.

Table VI B

MATERNAL OUTCOME * PP PERSISTENCE

hi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	100.000[a]	1	.000		
Continuity Correction[b]	96.000	1	.000		
Likelihood Ratio	137.628	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	99.000	1	.000		
N of Valid Cases	100				



In this study adverse maternal outcome is 100% like preterm deliveries, antepartum hemorrhage ,persistent placenta previa, complete placenta previa, caesarean delivery and caesarean hysterectomy which have been shown in bar chart as well with chisquare test since the p value is0.000.

Table VII A

TERM * PP PERSISTENCE

			PP PERSISTENCE		
			0	1	Total
Term	0	Count	48	15	63
		% within TERM	76.2%	23.8%	100.0%
		% within PP PERSISTENCE	87.3%	33.3%	63.0%
		% of Total	48.0%	15.0%	63.0%
Preterm	1	Count	7	30	37
		% within TERM	18.9%	81.1%	100.0%
		% within PP PERSISTENCE	12.7%	66.7%	37.0%
		% of Total	7.0%	30.0%	37.0%
	Total	Count	55	45	100
		% within TERM	55.0%	45.0%	100.0%
		% within PP PERSISTENCE	100.0%	100.0%	100.0%
		% of Total	55.0%	45.0%	100.0%

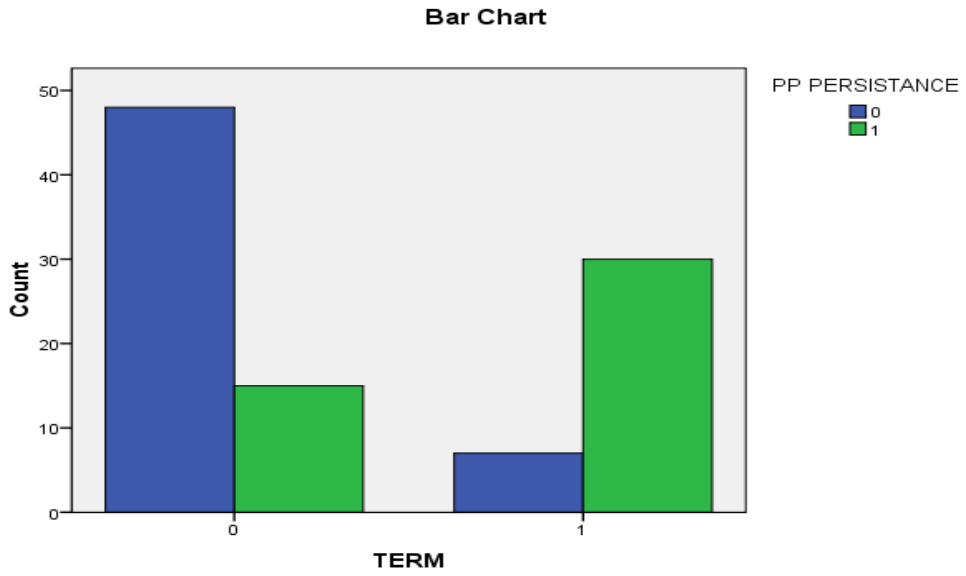
Out of 100 antenatal placenta previa women,37 of them had preterm deliveries.out of 37 cases ,30 patients (81%) had persistence of placenta previa.In persistent previa patients,66.7% had preterm delivery.

Table VII B

TERM * PP PERSISTENCE

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	30.892[a]	1	.000		
Continuity Correction[b]	28.621	1	.000		
Likelihood Ratio	32.576	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	30.583	1	.000		
N of Valid Cases	100				



The value of chi-squared test and the bar diagram shown that prematurity was more common in persistent placenta previa. Thus the prematurity was iatrogenic, which has been induced due to hemorrhage.

Table VIII A

CAESAREAN HYSTERECTOMY * PP PERSISTENCE

			PP PERSISTENCE		
			0	1	Total
CAESAREAN HYSTERECTOMY	0	Count	55	27	82
		% within CAESAREAN HYSTERECTOMY	67.1%	32.9%	100.0%
No		% within PP PERSISTENCE	100.0%	60.0%	82.0%
		% of Total	55.0%	27.0%	82.0%
	1	Count	0	18	18
		% within CAESAREAN HYSTERECTOMY	.0%	100.0%	100.0%
Yes		% within PP PERSISTENCE	.0%	40.0%	18.0%
		% of Total	.0%	18.0%	18.0%
	Total	Count	55	45	100
		% within CAESAREAN HYSTERECTOMY	55.0%	45.0%	100.0%
		% within PP PERSISTENCE	100.0%	100.0%	100.0%
		% of Total	55.0%	45.0%	100.0%

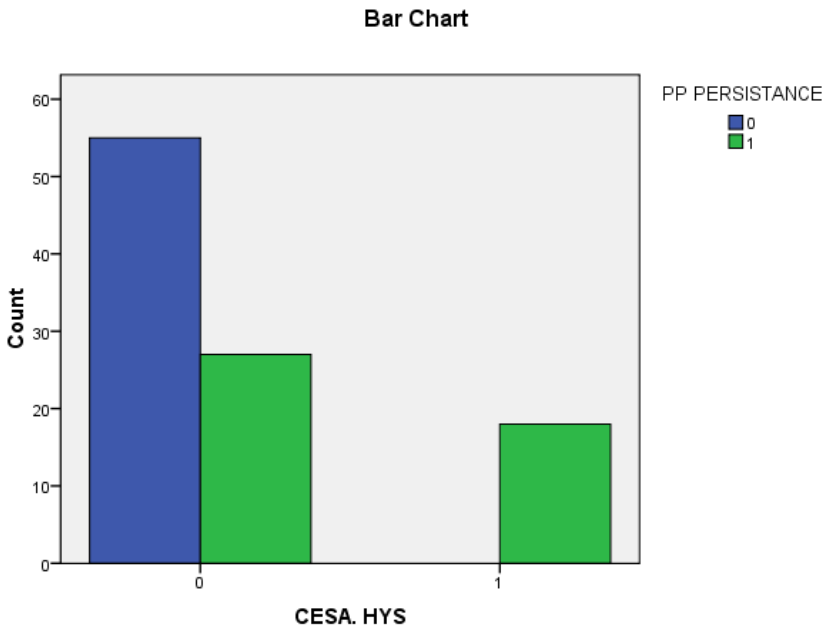
In my study 18 cases underwent caesarean hysterectomy,all 18 cases had persistent placenta previa.

Table VIII B

CAESAREAN HYSTERECTOMY * PP PERSISTENCE

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	26.829[a]	1	.000		
Continuity Correction[b]	24.188	1	.000		
Likelihood Ratio	33.708	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	26.561	1	.000		
N of Valid Cases	100				



This bar diagram shows that there were 18 cases in whom caesarean hysterectomy done for placenta previa and its related complications. There is 100% correlation in caesarean hysterectomy done in our hospital and placenta previa complications.

Table IX A

HISTOPATHOLOGICAL EXAMINATION FINDINGS * PP PERSISTENCE

			PP PERSISTENCE		
			0	1	Total
HISTOPATHOLOGICAL EXAMINATION FINDINGS	0	Count	55	27	82
		% within HISTOPATHOLOGICAL EXAMINATION FINDINGS	67.1%	32.9%	100.0%
		% within PP PERSISTENCE	100.0%	60.0%	82.0%
		% of Total	55.0%	27.0%	82.0%
Placenta previa	1	Count	0	5	5
		% within HISTOPATHOLOGICAL EXAMINATION FINDINGS	.0%	100.0%	100.0%
		% within PP PERSISTENCE	.0%	11.1%	5.0%
		% of Total	.0%	5.0%	5.0%
Placenta accreta	2	Count	0	6	6
		% within HISTOPATHOLOGICAL EXAMINATION FINDINGS	.0%	100.0%	100.0%
		% within PP PERSISTENCE	.0%	13.3%	6.0%
		% of Total	.0%	6.0%	6.0%
Placenta increta	3	Count	0	2	2
		% within HISTOPATHOLOGICAL EXAMINATION FINDINGS	.0%	100.0%	100.0%
		% within PP PERSISTENCE	.0%	4.4%	2.0%
		% of Total	.0%	2.0%	2.0%
Placenta percreta	4	Count	0	5	5
		% within HISTOPATHOLOGICAL EXAMINATION FINDINGS	.0%	100.0%	100.0%
		% within PP PERSISTENCE	.0%	11.1%	5.0%
		% of Total	.0%	5.0%	5.0%
	Total	Count	55	45	100
		% within HISTOPATHOLOGICAL EXAMINATION FINDINGS	55.0%	45.0%	100.0%
		% within PP PERSISTENCE	100.0%	100.0%	100.0%
		% of Total	55.0%	45.0%	100.0%

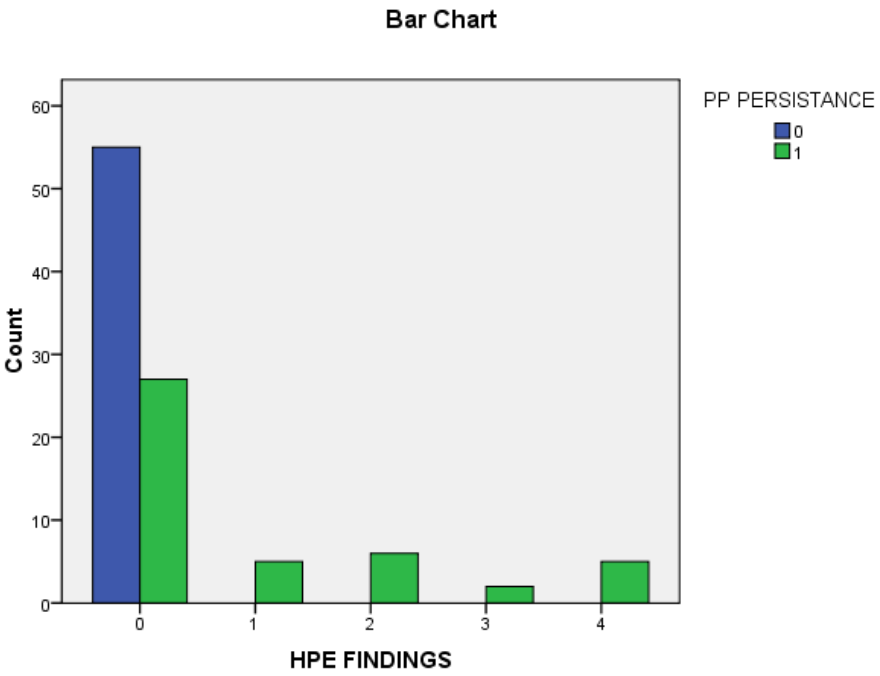
Out of 45 cases of persistent placenta previa,27 cases had underwent lower segment caesarean section and 18 cases had caesarean hysterectomy.

Table IX B

HISTOPATHOLOGICAL EXAMINATION FINDINGS * PP PERSISTENCE

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26.829[a]	4	.000
Likelihood Ratio	33.708	4	.000
Linear-by-Linear Association	20.618	1	.000
N of Valid Cases	100		



Out of 18 cases of hysterectomy in the histopathological examination there are 5 cases with placenta previa , 6 cases of placenta accreta, 2 cases of placenta increta and 5 cases of placenta percreta.

Table X A

TERM * CESARIAN HYSTERECTOMY

			CAESAREAN HYSTERECTOMY		
			0	1	Total
Term	0	Count	60	3	63
		% within TERM	95.2%	4.8%	100.0%
		% within CAESAREAN HYSTERECTOMY	73.2%	16.7%	63.0%
		% of Total	60.0%	3.0%	63.0%
Pre term	1	Count	22	15	37
		% within TERM	59.5%	40.5%	100.0%
		% within CAESAREAN HYSTERECTOMY	26.8%	83.3%	37.0%
		% of Total	22.0%	15.0%	37.0%
	Total	Count	82	18	100
		% within TERM	82.0%	18.0%	100.0%
		% within CAESAREAN HYSTERECTOMY	100.0%	100.0%	100.0%
		% of Total	82.0%	18.0%	100.0%

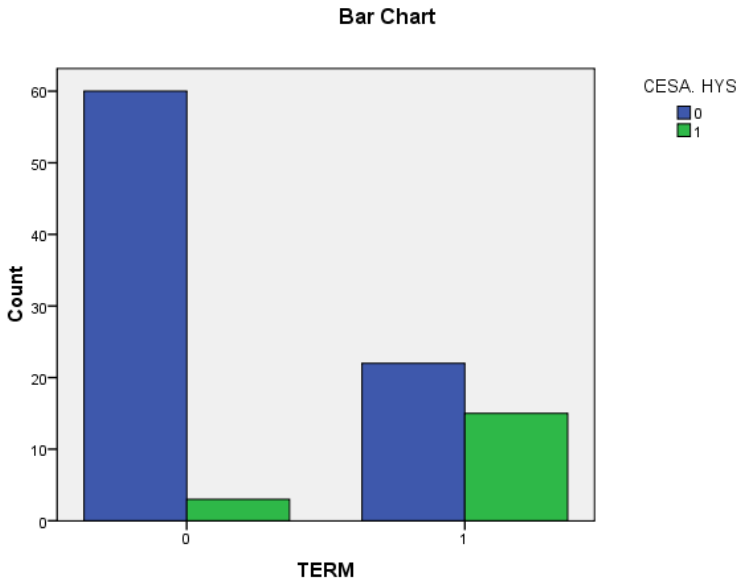
Out of 37 preterm cases,15 cases(40.5%) had persistent placenta previa

Table X B

TERM * CESARIAN HYSTERECTOMY

Chi-square test

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20.216[a]	1	.000		
Continuity Correction[b]	17.865	1	.000		
Likelihood Ratio	20.196	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	20.014	1	.000		
N of Valid Cases	100				



Out of 82 cases who underwent vaginal delivery 60(73%) were term and 22(27%) were preterm and 18 cases who underwent caesarean hysterectomy 3(17%) were term and 15(83%) were preterm.

Table XI A

AGE GROUP * CAESAREAN HYSTERECTOMY

			CAESAREAN HYSTERECTOMY		
			0	1	Total
AGE GROUP	1	Count	8	1	9
		% within AGE GROUP	88.9%	11.1%	100.0%
<20 years		% within CAESAREAN HYSTERECTOMY	9.8%	5.6%	9.0%
		% of Total	8.0%	1.0%	9.0%
	2	Count	64	11	75
		% within AGE GROUP	85.3%	14.7%	100.0%
21 -30 years		% within CAESAREAN HYSTERECTOMY	78.0%	61.1%	75.0%
		% of Total	64.0%	11.0%	75.0%
	3	Count	10	6	16
		% within AGE GROUP	62.5%	37.5%	100.0%
>30 years		% within CAESAREAN HYSTERECTOMY	12.2%	33.3%	16.0%
		% of Total	10.0%	6.0%	16.0%
	Total	Count	82	18	100
		% within AGE GROUP	82.0%	18.0%	100.0%
		% within CAESAREAN HYSTERECTOMY	100.0%	100.0%	100.0%
		% of Total	82.0%	18.0%	100.0%

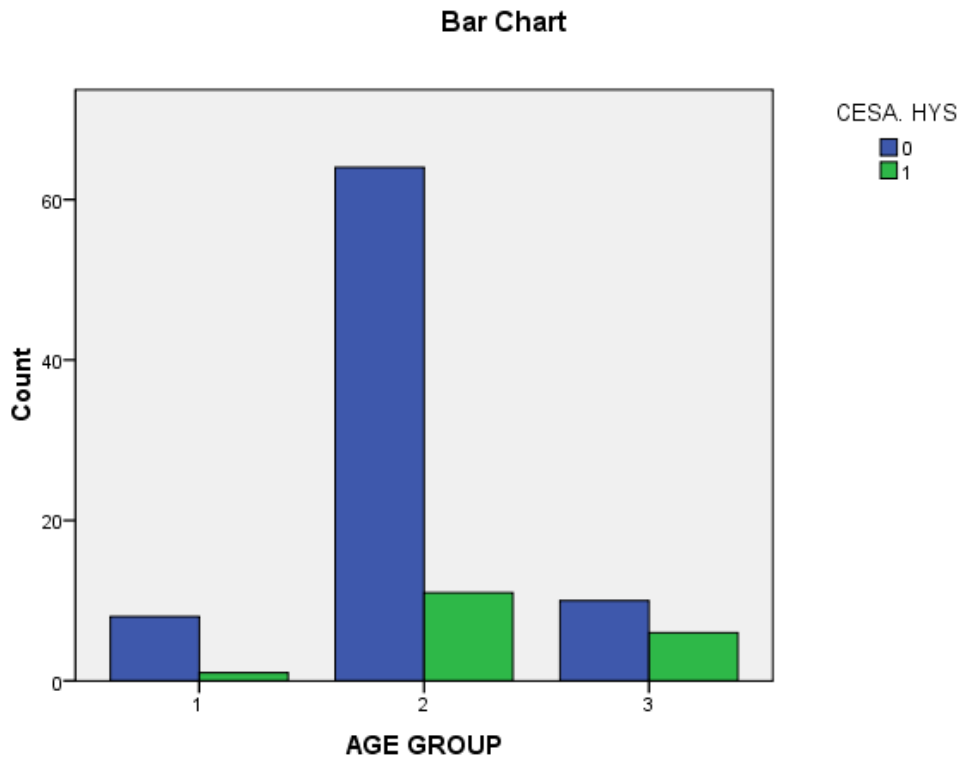
Out of 100 women 75 were between the age of 21 – 30 years, 9 were less than 20 years and 16 were more than 30 years.

Table XI B

AGE GROUP * CAESAREAN HYSTERECTOMY

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.976[a]	2	.083
Likelihood Ratio	4.297	2	.117
Linear-by-Linear Association	3.828	1	.050
N of Valid Cases	100		



There is no statistical significance between the age distribution and PP complications as the p value is .08.

Table XII A

PARITY * CAESAREAN HYSTERECTOMY

			CAESAREAN HYSTERECTOMY		
			0	1	Total
PARITY	1	Count	34	1	35
		% within PARITY	97.1%	2.9%	100.0%
Primigravida		% within CAESAREAN HYSTERECTOMY	41.5%	5.6%	35.0%
		% of Total	34.0%	1.0%	35.0%
	2	Count	48	17	65
		% within PARITY	73.8%	26.2%	100.0%
Mulitigravida		% within CAESAREAN HYSTERECTOMY	58.5%	94.4%	65.0%
		% of Total	48.0%	17.0%	65.0%
	Total	Count	82	18	100
		% within PARITY	82.0%	18.0%	100.0%
		% within CAESAREAN HYSTERECTOMY	100.0%	100.0%	100.0%
		% of Total	82.0%	18.0%	100.0%

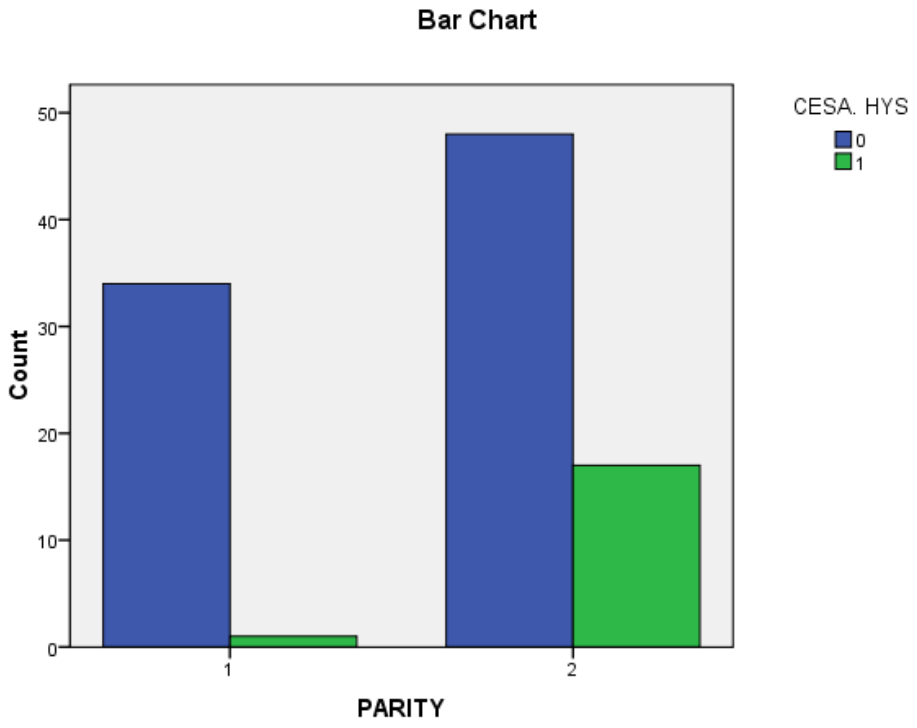
Out of 100 women 65 were multiparous women and in these 17 (26.2%) underwent caesarean hysterectomy. In the remaining 35 primigravida only one (2.9%) had caesarean hysterectomy.

Table XII B

PARITY * CAESAREAN HYSTERECTOMY

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.365[a]	1	.004		
Continuity Correction[b]	6.861	1	.009		
Likelihood Ratio	10.491	1	.001		
Fisher's Exact Test				.003	.002
Linear-by-Linear Association	8.282	1	.004		
N of Valid Cases	100				



The chi-Square tests and the bar diagram shows that the multiparous women had increased chances of caesarean hysterectomy due to placenta previa complications.

Table XIII A

PREVIOUS LSCS * CAESAREAN HYSTERECTOMY

			CAESAREAN HYSTERECTOMY		
			0	1	Total
PREV.LSCS	0	Count	69	4	73
		% within PREV.LSCS	94.5%	5.5%	100.0%
		% within CAESAREAN HYSTERECTOMY	84.1%	22.2%	73.0%
		% of Total	69.0%	4.0%	73.0%
	1	Count	12	8	20
		% within PREV.LSCS	60.0%	40.0%	100.0%
		% within CAESAREAN HYSTERECTOMY	14.6%	44.4%	20.0%
		% of Total	12.0%	8.0%	20.0%
	2	Count	1	5	6
		% within PREV.LSCS	16.7%	83.3%	100.0%
		% within CAESAREAN HYSTERECTOMY	1.2%	27.8%	6.0%
		% of Total	1.0%	5.0%	6.0%
	3	Count	0	1	1
		% within PREV.LSCS	.0%	100.0%	100.0%
		% within CAESAREAN HYSTERECTOMY	.0%	5.6%	1.0%
		% of Total	.0%	1.0%	1.0%
	Total	Count	82	18	100
		% within PREV.LSCS	82.0%	18.0%	100.0%
		% within CAESAREAN HYSTERECTOMY	100.0%	100.0%	100.0%
		% of Total	82.0%	18.0%	100.0%

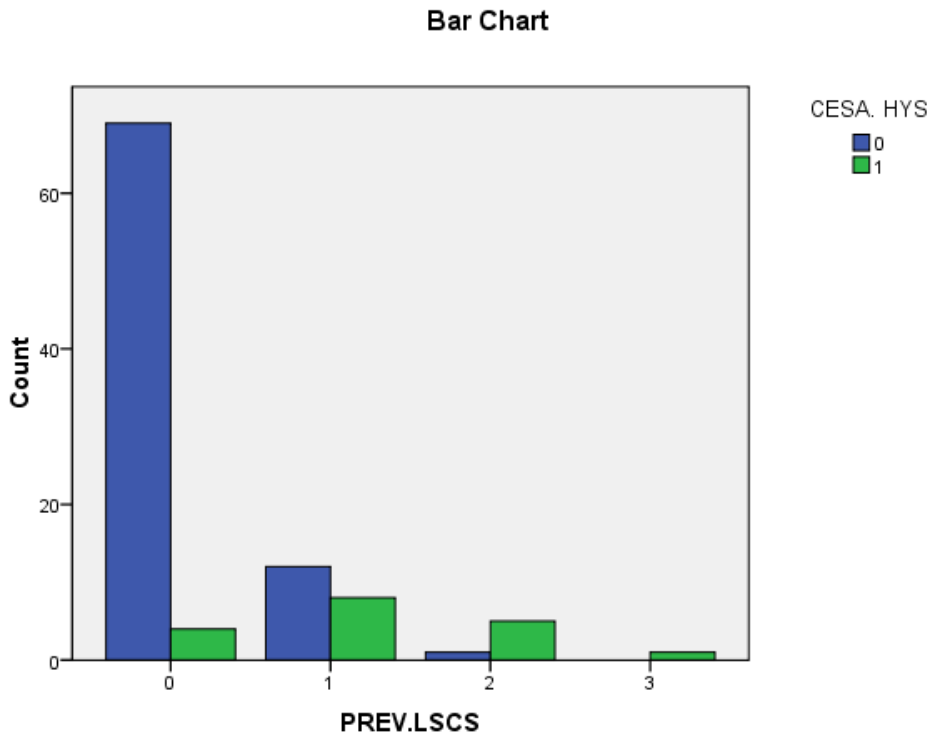
Out of 100 women 27 had previous caesarean delivery. In women with previous caesarean delivery 20 had 1prior caesarean delivery , 6 had 2prior caesarean deliveries and 1 had prior 3 caesarean deliveries. In women with 1 previous caesarean delivery 8 (40%) underwent caesarean hysterectomy. In the group of women with 2 prior caesarean deliveries 5 (83.3%) underwent caesarean hysterectomy. The single woman with past h/o 3 caesarean deliveries also underwent caesarean hysterectomy. This shows the higher the number of previous caesarean deliveries the greater is the chance for woman to undergo caesarean hysterectomy.

Table XIII B

PREVIOUS LSCS * CAESAREAN HYSTERECTOMY

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	36.218[a]	3	.000
Likelihood Ratio	30.941	3	.000
Linear-by-Linear Association	35.568	1	.000
N of Valid Cases	100		



There is a statistically significant association between previous LSCS and caesarean hysterectomy for placenta previa complications as the p valu--*e is .000 (which is <0.005)

Table XIV A

PREVIOUS ABORTION * CAESAREAN HYSTERECTOMY

			CAESAREAN HYSTERECTOMY		
			0	1	Total
PREV.ABOR	0	Count	62	8	70
		% within PREV.ABOR	88.6%	11.4%	100.0%
		% within CAESAREAN HYSTERECTOMY	75.6%	44.4%	70.0%
		% of Total	62.0%	8.0%	70.0%
	1	Count	19	6	25
		% within PREV.ABOR	76.0%	24.0%	100.0%
		% within CAESAREAN HYSTERECTOMY	23.2%	33.3%	25.0%
		% of Total	19.0%	6.0%	25.0%
	2	Count	0	3	3
		% within PREV.ABOR	.0%	100.0%	100.0%
		% within CAESAREAN HYSTERECTOMY	.0%	16.7%	3.0%
		% of Total	.0%	3.0%	3.0%
	3	Count	1	1	2
		% within PREV.ABOR	50.0%	50.0%	100.0%
		% within CAESAREAN HYSTERECTOMY	1.2%	5.6%	2.0%
		% of Total	1.0%	1.0%	2.0%
	Total	Count	82	18	100
		% within PREV.ABOR	82.0%	18.0%	100.0%
		% within CAESAREAN HYSTERECTOMY	100.0%	100.0%	100.0%
		% of Total	82.0%	18.0%	100.0%

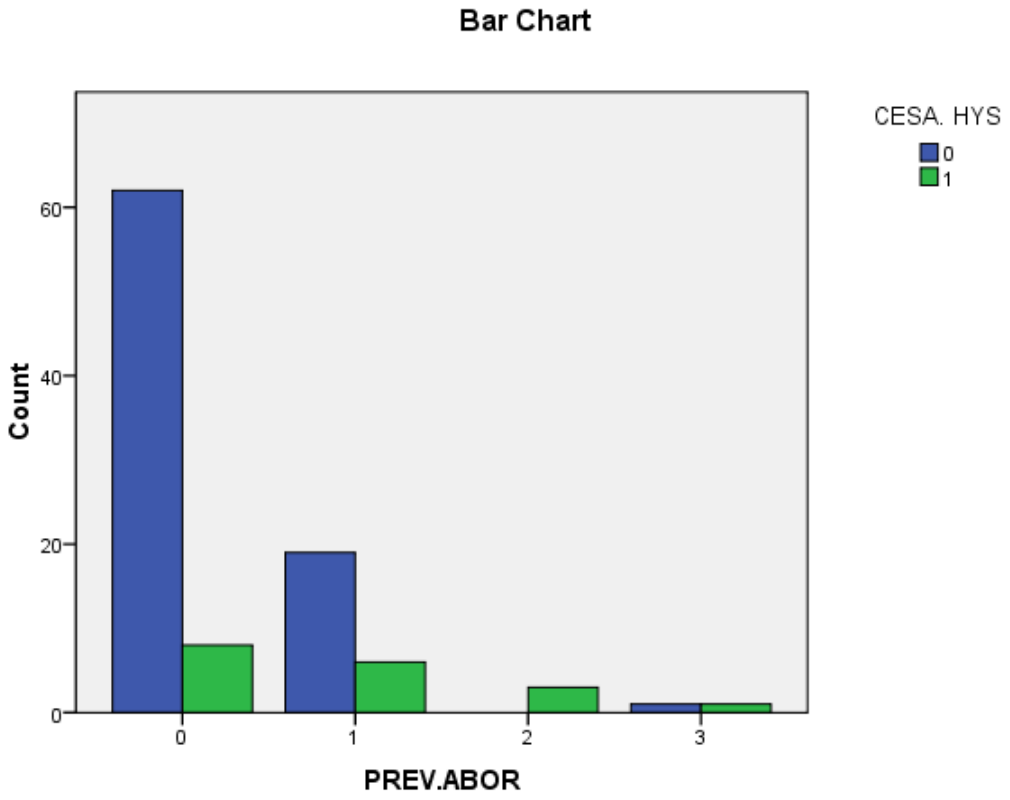
Out of 100 women with placenta previa 30 cases had h/o previous abortion, out of which 25 women had h/o one abortion and in these, 6 women (25%) underwent caesarean hysterectomy. 3 women had h/o 2 abortions, 2 had h/o 3 recurrent abortions.

Table XIV B

PREVIOUS ABORTION * CAESAREAN HYSTERECTOMY

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.712[a]	3	.001
Likelihood Ratio	14.199	3	.003
Linear-by-Linear Association	11.293	1	.001
N of Valid Cases	100		



The association of previous abortion and PP complications is statistically significant as the p value is less than .001.

Table XV A

PREVIOUS VAGINAL DELIVERY * CAESAREAN HYSTERECTOMY

			CAESAREAN HYSTERECTOMY		
			0	1	Total
PREV.V.D	0	Count	54	16	70
		% within PREV.V.D	77.1%	22.9%	100.0%
		% within CAES HYS	65.9%	88.9%	70.0%
		% of Total	54.0%	16.0%	70.0%
	1	Count	17	1	18
		% within PREV.V.D	94.4%	5.6%	100.0%
		% within CAES HYS	20.7%	5.6%	18.0%
		% of Total	17.0%	1.0%	18.0%
	2	Count	10	1	11
		% within PREV.V.D	90.9%	9.1%	100.0%
		% within CAES HYS	12.2%	5.6%	11.0%
		% of Total	10.0%	1.0%	11.0%
	3	Count	1	0	1
		% within PREV.V.D	100.0%	.0%	100.0%
		% within CAES HYS	1.2%	.0%	1.0%
		% of Total	1.0%	.0%	1.0%
	Total	Count	82	18	100
		% within PREV.V.D	82.0%	18.0%	100.0%
		% within CAES HYS	100.0%	100.0%	100.0%
		% of Total	82.0%	18.0%	100.0%

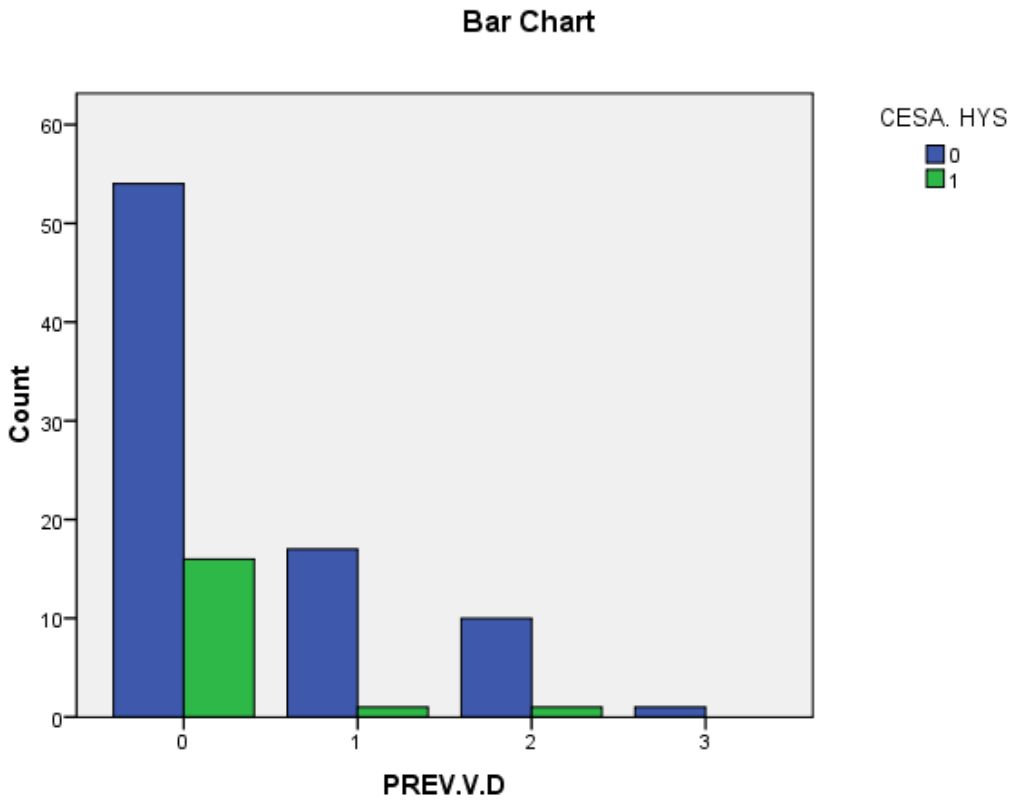
Out of 30 cases with previous vaginal delivery only 2 underwent caesarean hysterectomy due to placenta previa complications.

Table XV B

PREVIOUS VAGINAL DELIVERY * CAESAREAN HYSTERECTOMY

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.818[a]	3	.282
Likelihood Ratio	4.596	3	.204
Linear-by-Linear Association	2.870	1	.090
N of Valid Cases	100		



There is no statistical significance with placenta previa complications and previous vaginal delivery since the p value is .2

Table XVI A

MATERNAL OUTCOME * CAESAREAN HYSTERECTOMY

			CAESAREAN HYSTERECTOMY		
			0	1	Total
MATERNAL OUTCOME	1	Count	55	0	55
		% within MATERNAL OUTCOME	100.0%	.0%	100.0%
Good		% within CAESAREAN HYSTERECTOMY	67.1%	.0%	55.0%
		% of Total	55.0%	.0%	55.0%
	2	Count	27	18	45
		% within MATERNAL OUTCOME	60.0%	40.0%	100.0%
Adverse		% within CAESAREAN HYSTERECTOMY	32.9%	100.0%	45.0%
		% of Total	27.0%	18.0%	45.0%
	Total	Count	82	18	100
		% within MATERNAL OUTCOME	82.0%	18.0%	100.0%
		% within CAESAREAN HYSTERECTOMY	100.0%	100.0%	100.0%
		% of Total	82.0%	18.0%	100.0%

Out of 100 cases of placenta previa, 45 had persistent placenta previa at term, out of which 18 underwent caesarean hysterectomy for complications. All 45 cases were delivered by caesarean section which is indicative of adverse maternal outcome in persistent placenta previa.

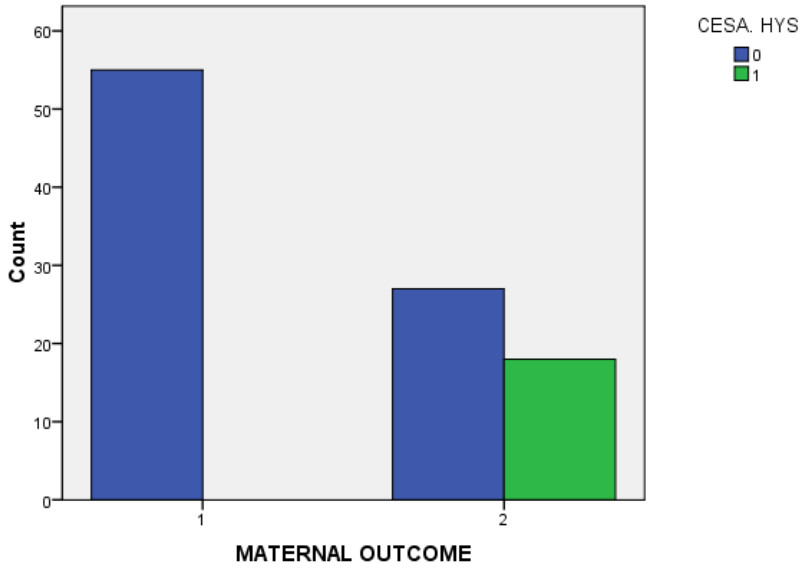
Table XVI B

MATERNAL OUTCOME * CAESAREAN HYSTERECTOMY

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	26.829[a]	1	.000		
Continuity Correction[b]	24.188	1	.000		
Likelihood Ratio	33.708	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	26.561	1	.000		
N of Valid Cases	100				

Bar Chart



This bar chart shows Significant adverse maternal outcome with placenta previa persistence and its invasion.

Table XVII A

TERM * CAESAREAN HYSTERECTOMY

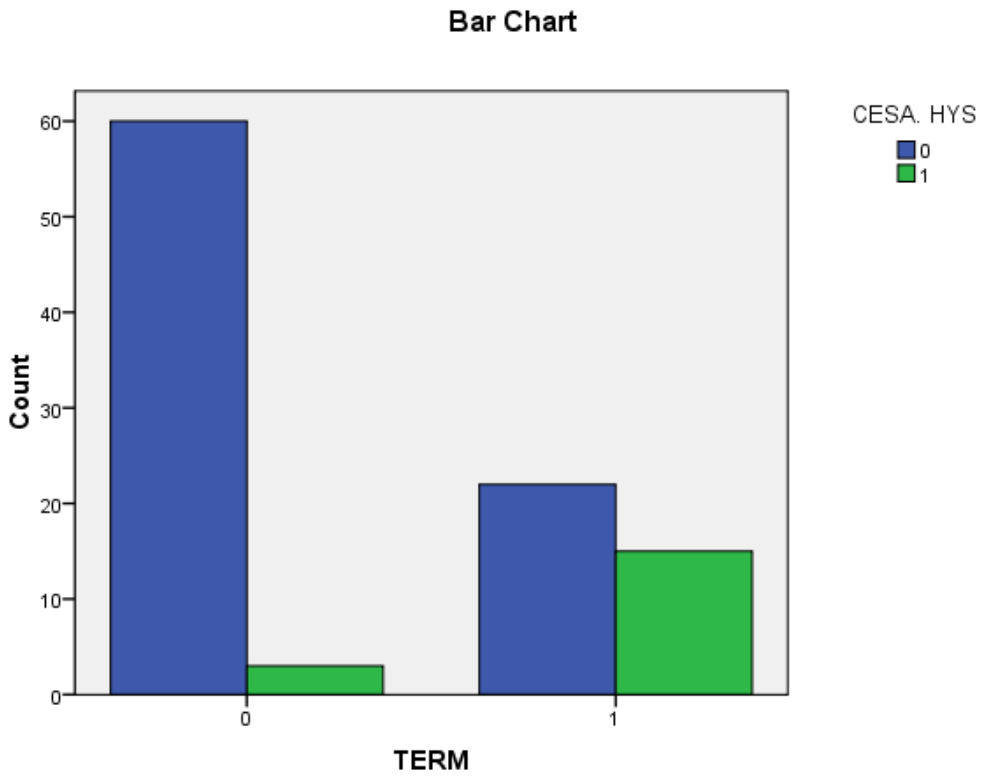
			CAESAREAN HYSTERECTOMY		
			0	1	Total
Term	0	Count	60	3	63
		% within TERM	95.2%	4.8%	100.0%
		% within CAESAREAN HYSTERECTOMY	73.2%	16.7%	63.0%
		% of Total	60.0%	3.0%	63.0%
Pre term	1	Count	22	15	37
		% within TERM	59.5%	40.5%	100.0%
		% within CAESAREAN HYSTERECTOMY	26.8%	83.3%	37.0%
		% of Total	22.0%	15.0%	37.0%
	Total	Count	82	18	100
		% within TERM	82.0%	18.0%	100.0%
		% within CAESAREAN HYSTERECTOMY	100.0%	100.0%	100.0%
		% of Total	82.0%	18.0%	100.0%

Out of 37 preterm deliveries due to placenta previa, 15 cases underwent caesarean hysterectomy, which constitute 40.5%. Out of 18 cases of caesarean hysterectomy 15 cases had preterm deliveries, which constitute 83.3%.

Table XVII B

TERM * CAESAREAN HYSTERECTOMY

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20.216[a]	1	.000		
Continuity Correction[b]	17.865	1	.000		
Likelihood Ratio	20.196	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	20.014	1	.000		
N of Valid Cases	100				



There is good statistical significance between preterm delivery and caesarean hysterectomy since p value is 0.000

Table XVIII A

HISTOPATHOLOGICAL EXAMINATION FINDINGS * CAESAREAN HYSTERECTOMY

			CAESAREAN HYSTERECTOMY		
			0	1	Total
HISTOPATHOLOGICAL EXAMINATION FINDINGS	0	Count	82	0	82
		% within HPE Findings	100.0%	.0%	100.0%
		% within Ceas Hys	100.0%	.0%	82.0%
		% of Total	82.0%	.0%	82.0%
Placenta previa	1	Count	0	5	5
		% within HPE Findings	.0%	100.0%	100.0%
		% within Ceas Hys	.0%	27.8%	5.0%
		% of Total	.0%	5.0%	5.0%
Placenta accreta	2	Count	0	6	6
		% within HPE Findings	.0%	100.0%	100.0%
		% within Ceas Hys	.0%	33.3%	6.0%
		% of Total	.0%	6.0%	6.0%
Placenta increta	3	Count	0	2	2
		% within HPE Findings	.0%	100.0%	100.0%
		% within Ceas Hys	.0%	11.1%	2.0%
		% of Total	.0%	2.0%	2.0%
Placenta percreta	4	Count	0	5	5
		% within HPE Findings	.0%	100.0%	100.0%
		% within Ceas Hys	.0%	27.8%	5.0%
		% of Total	.0%	5.0%	5.0%
	Total	Count	82	18	100
		% within HPE Findings	82.0%	18.0%	100.0%
		% within Ceas Hys	100.0%	100.0%	100.0%
		% of Total	82.0%	18.0%	100.0%

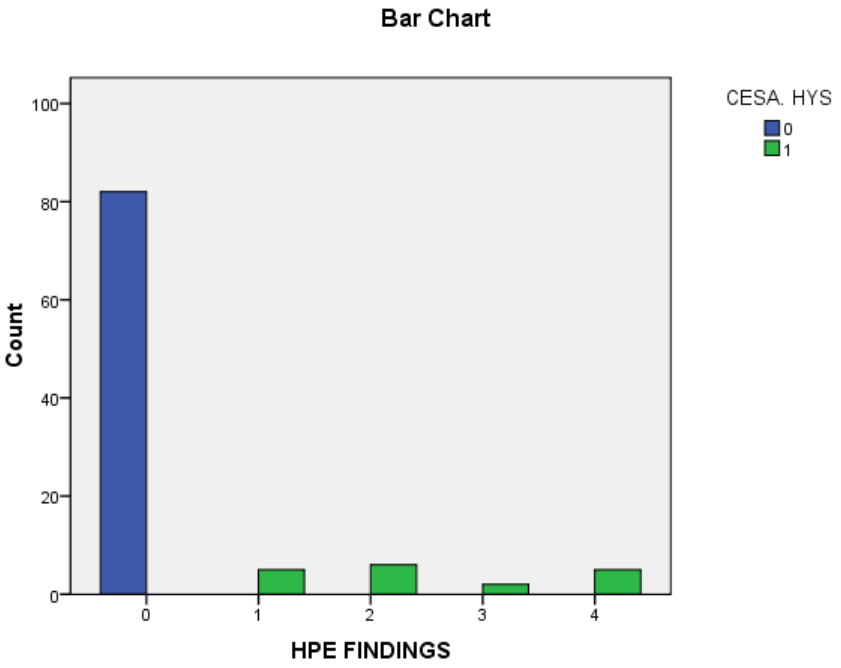
Out of 18 caesarean hysterectomy patients, 5 had only placenta previa, 6 had placenta accreta, 2 had placenta increta and 8 had placenta percreta, which is 27.8, 33.3, 11.1 1nd 27.8% respectively.

Table XVIII B

HISTOPATHOLOGICAL EXAMINATION FINDINGS * CAESAREAN HYSTERECTOMY

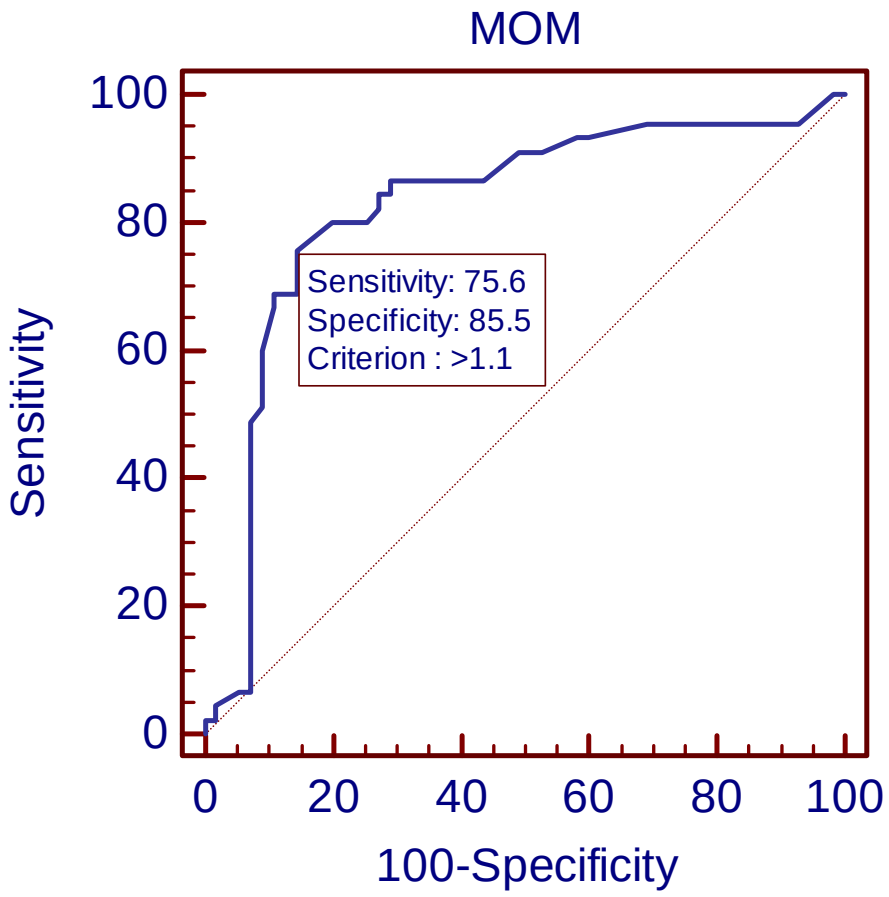
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	100.000[a]	4	.000
Likelihood Ratio	94.279	4	.000
Linear-by-Linear Association	76.850	1	.000
N of Valid Cases	100		



The distribution of cases with placental invasion who underwent caesarean hysterectomy is shown in the bar diagram.

ROC curve for MOM value & persistent placenta previa



The sensitivity and specificity of MSAFP with MOM value of >1.1 for persistence of placenta previa at term are 75.6 and 85.5 respectively.

ROC curve for MOM value & persistent placenta previa

ROC curve

Variable	MOM
Classification variable	PP_PERSISTENCE PP PERSISTENCE

Sample size		100
Positive group :	PP PERSISTENCE = 1	45
Negative group :	PP PERSISTENCE = 0	55

Disease prevalence (%)	unknown

Area under the ROC curve (AUC)

Area under the ROC curve (AUC)	0.823636
Standard Error[a]	0.0458
95% Confidence interval[b]	0.734623 to 0.892625
z statistic	7.064
Significance level P (Area=0.5)	<0.0001

Youden index

Youden index J	0.6101
Associated criterion	>1.1

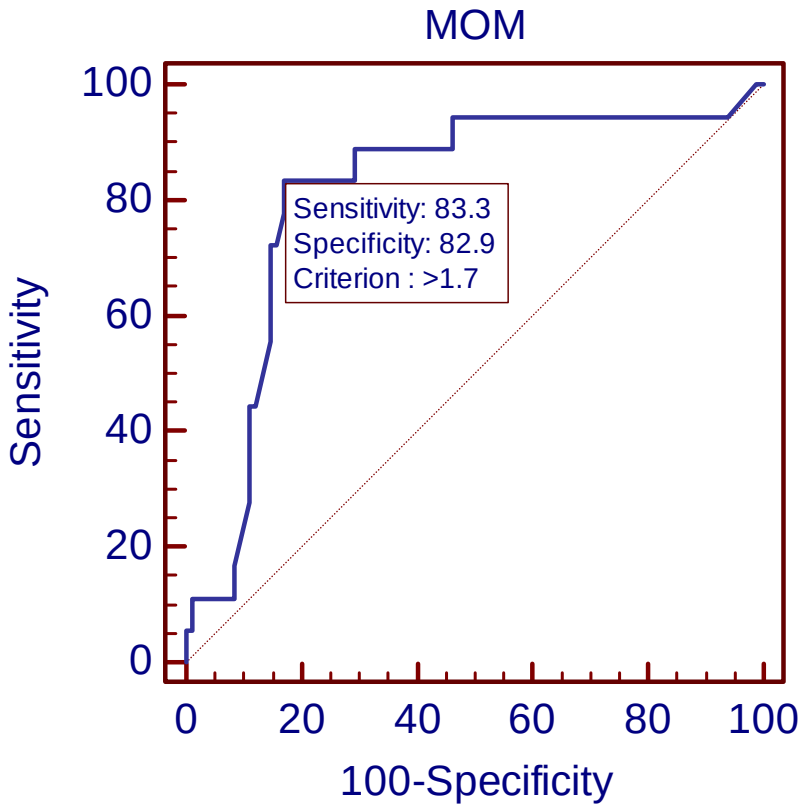
Area under ROC curve is 0.82, which is to the left and above the tangential line and is statistically significant. Youden index, J is the distance between the summit of the curve and the tangential line and statistical significance is directly proportional to the length of the J line. In this study it is 0.61, which is statistically significant. The p value is <0.0001, shows statistical significance with MSAFP in MOM value taken at 16 – 20 weeks with persistence of placenta previa at term.

ROC curve for MOM value & persistent placenta previa

Criterion values and coordinates of the ROC curve

Criterion	Sensitivity	95% CI	Specificity	95% CI	+LR	-LR
≥0.1	100.00	92.1 - 100.0	0.00	0.0 - 6.5	1.00	
>0.1	100.00	92.1 - 100.0	1.82	0.05 - 9.7	1.02	0.00
>0.2	95.56	84.9 - 99.5	7.27	2.0 - 17.6	1.03	0.61
>0.56	95.56	84.9 - 99.5	30.91	19.1 - 44.8	1.38	0.14
>0.6	93.33	81.7 - 98.6	40.00	27.0 - 54.1	1.56	0.17
>0.64	93.33	81.7 - 98.6	41.82	28.7 - 55.9	1.60	0.16
>0.7	91.11	78.8 - 97.5	47.27	33.7 - 61.2	1.73	0.19
>0.75	91.11	78.8 - 97.5	50.91	37.1 - 64.6	1.86	0.17
>0.8	86.67	73.2 - 94.9	56.36	42.3 - 69.7	1.99	0.24
>0.98	86.67	73.2 - 94.9	70.91	57.1 - 82.4	2.98	0.19
>1	84.44	70.5 - 93.5	70.91	57.1 - 82.4	2.90	0.22
>1.01	84.44	70.5 - 93.5	72.73	59.0 - 83.9	3.10	0.21
>1.04	82.22	67.9 - 92.0	72.73	59.0 - 83.9	3.01	0.24
>1.05	80.00	65.4 - 90.4	74.55	61.0 - 85.3	3.14	0.27
>1.09	80.00	65.4 - 90.4	80.00	67.0 - 89.6	4.00	0.25
>1.1	75.56	60.5 - 87.1	85.45	73.3 - 93.5	5.19	0.29
>1.27	68.89	53.4 - 81.8	85.45	73.3 - 93.5	4.74	0.36
>1.3	68.89	53.4 - 81.8	89.09	77.8 - 95.9	6.31	0.35
>1.37	66.67	51.0 - 80.0	89.09	77.8 - 95.9	6.11	0.37
>1.4	60.00	44.3 - 74.3	90.91	80.0 - 97.0	6.60	0.44
>1.72	51.11	35.8 - 66.3	90.91	80.0 - 97.0	5.62	0.54
>1.8	48.89	33.7 - 64.2	92.73	82.4 - 98.0	6.72	0.55
>2.3	6.67	1.4 - 18.3	92.73	82.4 - 98.0	0.92	1.01
>2.4	6.67	1.4 - 18.3	94.55	84.9 - 98.9	1.22	0.99
>2.5	4.44	0.5 - 15.1	98.18	90.3 - 100.0	2.44	0.97
>2.6	2.22	0.06 - 11.8	98.18	90.3 - 100.0	1.22	1.00
>2.7	2.22	0.06 - 11.8	100.00	93.5 - 100.0		0.98
>2.9	0.00	0.0 - 7.9	100.00	93.5 - 100.0		1.00

ROC curve for MOM value and Ceasarean hysterectomy



The sensitivity of MSAFP in MOM values > 1.7 in persistent placenta previa patients for Caesarean hysterectomy due to placental invasion is 83.3% and specificity is 82.9%.

ROC curve for MOM value and Ceasarean hysterectomy

ROC curve

Variable	MOM
Classification variable	CESA._HYS CAESAREAN HYSTERECTOMY

Sample size		100
Positive group :	CAESAREAN HYSTERECTOMY = 1	18
Negative group :	CAESAREAN HYSTERECTOMY = 0	82

Disease prevalence (%)	unknown

Area under the ROC curve (AUC)

Area under the ROC curve (AUC)	0.811992
Standard Error[a]	0.0589
95% Confidence interval[b]	0.721531 to 0.883183
z statistic	5.293
Significance level P (Area=0.5)	<0.0001

[a] DeLong et al., 1988

[b] Binomial exact

Youden index

Youden index J	0.6626
Associated criterion	>1.7

Area under ROC curve is 0.81, which is to the left and above the tangential line and is statistically significant. Youden index is the distance between the summit of the curve and the tangential line and statistical significance is directly proportional to the length of the J line. In this study it is 0.6, which is statistically significant. The p value is <0.0001.

ROC curve for MOM value and Ceasarean hysterectomy

Criterion values and coordinates of the ROC curve

Criterion	Sensitivity	95% CI	Specificity	95% CI	+LR	-LR
≥0.1	100.00	81.5 - 100.0	0.00	0.0 - 4.4	1.00	
>0.1	100.00	81.5 - 100.0	1.22	0.03 - 6.6	1.01	0.00
>0.2	94.44	72.7 - 99.9	6.10	2.0 - 13.7	1.01	0.91
>0.98	94.44	72.7 - 99.9	53.66	42.3 - 64.7	2.04	0.10
>1	88.89	65.3 - 98.6	53.66	42.3 - 64.7	1.92	0.21
>1.2	88.89	65.3 - 98.6	70.73	59.6 - 80.3	3.04	0.16
>1.27	83.33	58.6 - 96.4	70.73	59.6 - 80.3	2.85	0.24
>1.7	83.33	58.6 - 96.4	82.93	73.0 - 90.3	4.88	0.20
>1.72	77.78	52.4 - 93.6	82.93	73.0 - 90.3	4.56	0.27
>1.8	72.22	46.5 - 90.3	84.15	74.4 - 91.3	4.56	0.33
>1.87	72.22	46.5 - 90.3	85.37	75.8 - 92.2	4.94	0.33
>1.9	55.56	30.8 - 78.5	85.37	75.8 - 92.2	3.80	0.52
>2	44.44	21.5 - 69.2	87.80	78.7 - 94.0	3.64	0.63
>2.01	44.44	21.5 - 69.2	89.02	80.2 - 94.9	4.05	0.62
>2.1	27.78	9.7 - 53.5	89.02	80.2 - 94.9	2.53	0.81
>2.2	16.67	3.6 - 41.4	91.46	83.2 - 96.5	1.95	0.91
>2.28	11.11	1.4 - 34.7	91.46	83.2 - 96.5	1.30	0.97
>2.5	11.11	1.4 - 34.7	98.78	93.4 - 100.0	9.11	0.90
>2.6	5.56	0.1 - 27.3	98.78	93.4 - 100.0	4.56	0.96
>2.7	5.56	0.1 - 27.3	100.00	95.6 - 100.0		0.94
>2.9	0.00	0.0 - 18.5	100.00	95.6 - 100.0		1.00

Table XIX

T-Test

	CAESAREAN HYSTERECTOMY	N	Mean	Std. Deviation	Std. Error Mean
MSAFP	1	18	191.78	57.283	13.502
	0	82	113.02	65.003	7.178
MOM	1	18	1.898	.5985	.1411
	0	82	1.058	.6523	.0720

MSAFP value for 18 cases who underwent caesarean hysterectomy is 191.78 and 82 cases who didn't undergo hysterectomy the MSAFP value is 113.02 and MOM values for the same is 1.898 and 1.058 respectively. It shows that the women who underwent caesarean hysterectomy had higher values of MSAFP.

Table XX

Multiple Logistics Regression

Variables in the Equation

			Score	df	Sig.
Step 0	Variables	PARITY(1)	8.365	1	.004
		MOM	20.408	1	.000
		PREV.LSCS	35.927	1	.000
		MATERNALOUTCOME(1)	26.829	1	.000
		TERM	20.216	1	.000
		PREV.ABOR	11.408	1	.001
		Overall Statistics	47.803	6	.000

The variables like multiparity, MOM value, Prev., LSCS, Adverse Maternal outcome, preterm delivery and h/o pre., abortion have significant p value between 0.001 to 0.004. So these variables are considered risk factors for placenta previa persistence and intra caesarean hysterectomy.

With multiple logistic regression this table shows that the various characteristics of the patients like multiparity, MOM value of more than 1.9, previous caesarean delivery and previous abortions are considered as independent risk factors.With this it shows that adverse maternal outcomes like maternal hemorrhage and preterm delivery are directly related with these risk factors .Since all variables have Pvalue less than 0.005

DISCUSSION

- 100 Antenatal women had sonographic evidence of placenta previa at 15-20 weeks of gestation were subjected for maternal serum alpha fetoprotein screening.
- All 100 women were delivered either vaginally or by caesarean section of non anomalous live born infants at or after 24 weeks of gestation. Out of 100 patients, 45 (45%) had persistent placenta previa confirmed at the time of delivery.
- Of these 45 women who had placenta previa at the time of delivery, 18 cases (40%) underwent caesarean hysterectomy . out of these 18 cases of caesarean hysterectomy, 13 cases(72%) had abnormal placental invasion, which was confirmed by histopathological study .Out of these 13 cases, 6 cases were placenta accreta,2 cases were increta and 5 cases were placenta percreta. In these 18 cases most of them had preterm delivery.
- In this study 27 cases had previous caesarean delivery . , out of 27, 26 cases had persistence of placenta previa at term compared to 19 out of 54 cases with non prior caesarean delivery. So Women who had prior caesarean delivery had a higher incidence of persistence of placenta previa in this study There was good statistical significance with parity, previous

lscs, previous vaginal delivery but there was no statistical significance with maternal age, previous abortion regarding persistence of placenta previa.

- The likelihood of persistence increased significantly with increasing MSAFP in MOM value .The mean MSAFP in MOM value for persistent placenta previa was >1.1 and the mean MSAFP in MOM value for caesarean hysterectomy was >1.7.
- Mid trimester MSAFP <1.1 MOM was associated with decreased incidence of persistence of placenta previa. The 1.1 MOM cut off was then applied to subgroups of women with incomplete and complete previa and found that women with incomplete placenta previa who have <1.1MOM are not presented with persistence of placenta previa at term .Thus when MSAFP >1.1 MOM there is significant statistical correlation of persistence of placenta previa since p value is0.0001 (95% CI 60-87%).
- Using multiple logistic regression ,traditional risk factors for placenta previa persistence were compared with MSAFP MOM value. Thus MSAFP is considered as an independent risk factor and can be used as predictor for detecting persistence of placenta previa at term, in the second trimester itself.

CONCLUSION

- Antenatal women with sonographic evidence of placenta previa between 15-20 weeks of gestation have a greater likelihood of persistent placenta previa with increased values of MSAFP.
- If MSAFP values <1.1 MOM there is a decreased likelihood of persistence of placenta previa at term.
- MSAFP proved to be particularly useful in subgroup of women having incomplete placenta previa at 15-20 weeks of gestation.
- MSAFP value more than 1.1 MOM is significantly associated with the risk of persistence of previa comparable to other risk factors such as complete placenta previa, multi parity and previous caesarean delivery.
- In this study the risk factor associated with highest risk of placenta previa persistence is prior caesarean delivery.
- Also found that there is a great association between MSAFP and occurrence of placenta accreta, thus deficient decidualization is likely responsible for elevated MSAFP due to disruption of placental barrier.

In the present scenario, clinicians and patients are interested in having a suitable serum marker which represents a persistence of placenta

previa at term in early pregnancy. Thus this data confirms the above mentioned statement.

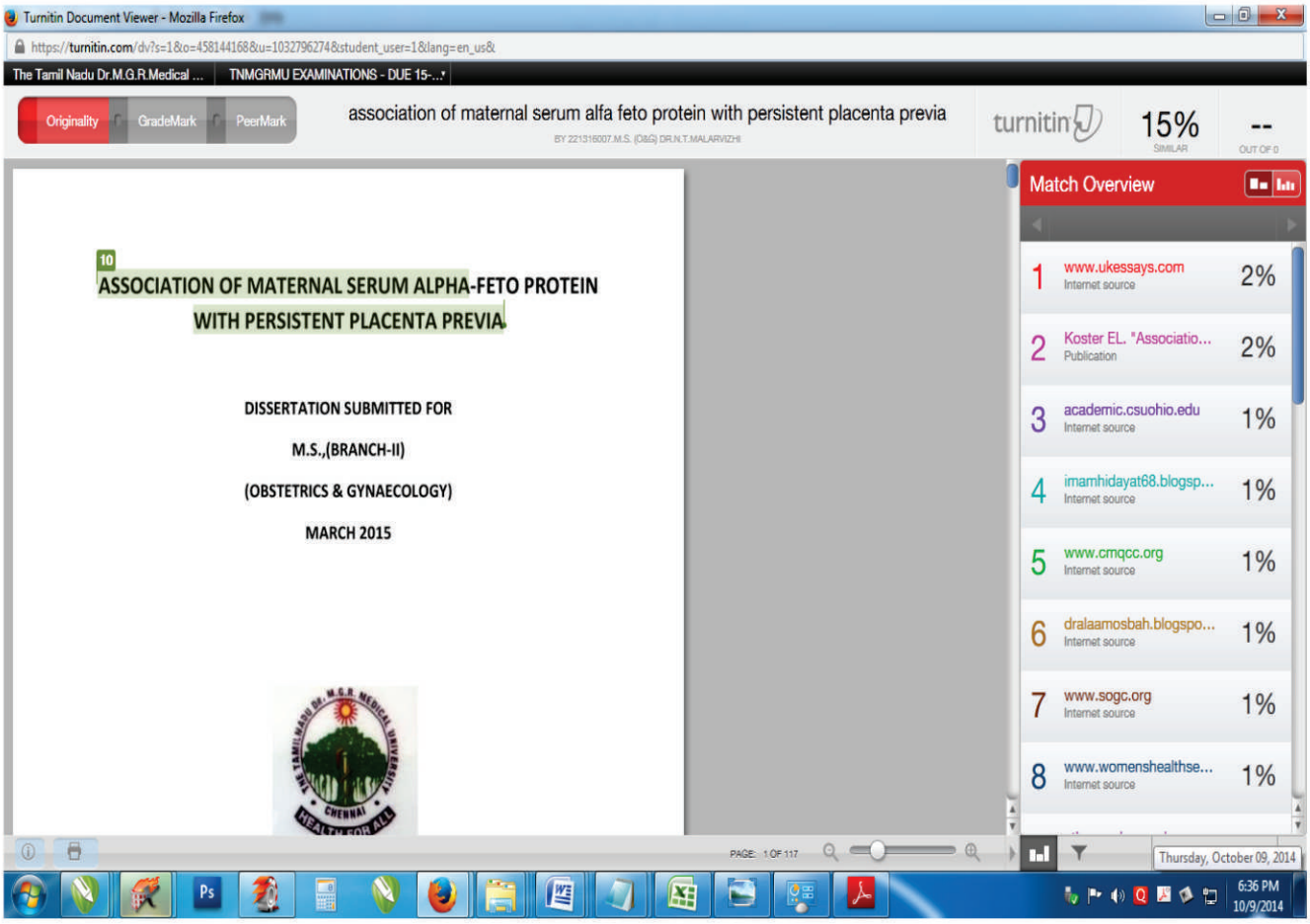
- In this study if the value of MSAFP is >1.1MOM then there is high chance of occurrence of persistent placenta previa and if the values are >1.7MOM there is higher chance of occurrence of adherent placenta.

- This study reveals elevated MSAFP is an adjuvant tool to diagnose the persistence of placenta previa in addition with Sonography. So if MSAFP level >1.7 MOM and Sonography reveals the placental invasion, patient can be counselled for increase risk of caesarean hysterectomy.

- It helps the clinician to motivate the patient to have tertiary level of care and plan for elective surgery.

- The combination of Ultrasound and MSAFP is cost effective compared with MRI in diagnosing persistent placenta previa and its invasion.

- Thus the estimation of maternal serum alpha fetoprotein in 16-20 weeks of gestation in these patients can predict the persistence and invasion of placenta previa at term.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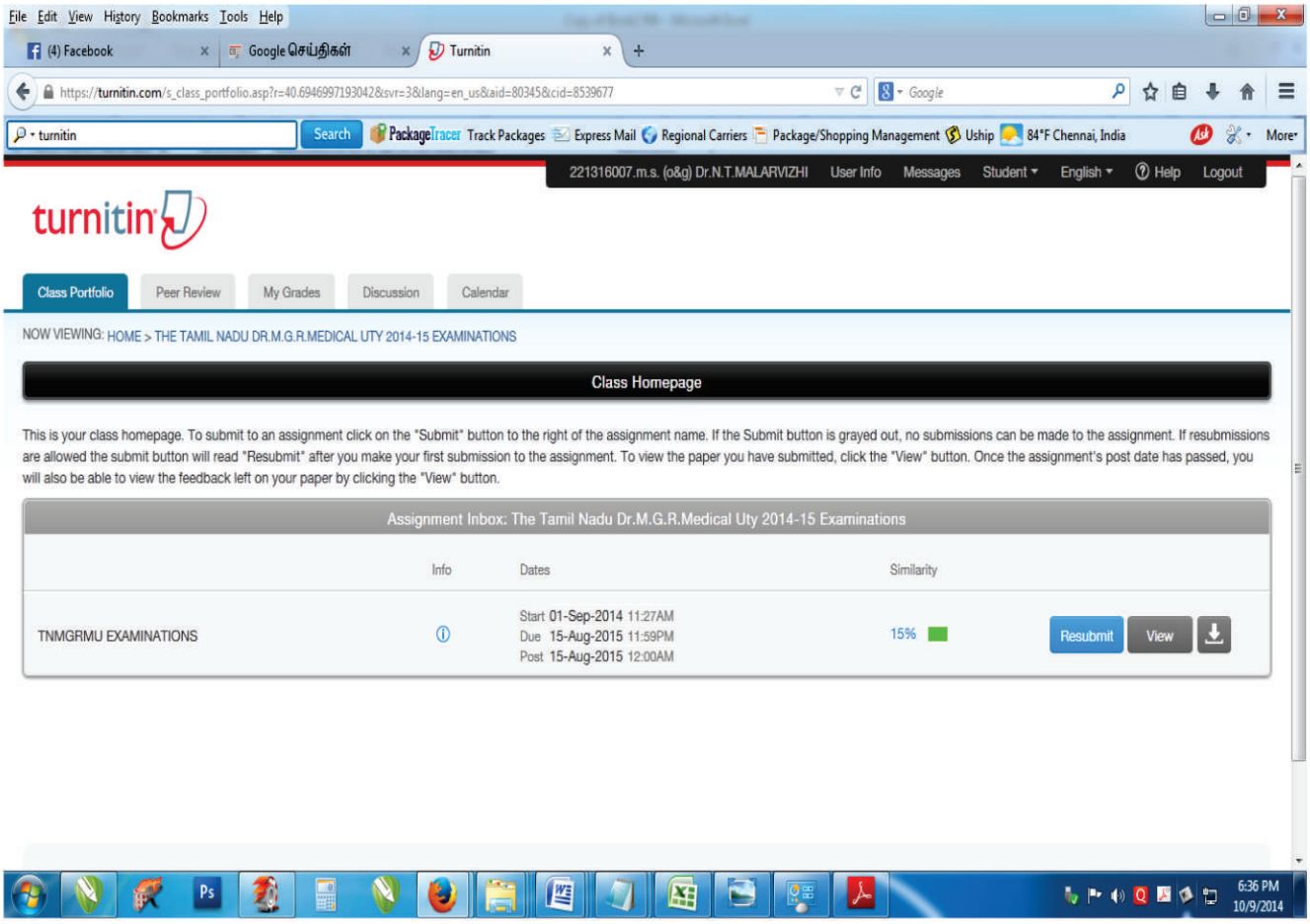
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