Research Article

Clinical and Ultrasound Parameters for Prediction of Peripartum Complications in placenta previa patients

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Abstract
Objective: This study aims to design clinical and ultra sonographpic model for preoperative prediction of Peripartum complications in placenta Previa patients. **Methods:** Prospective observational cross-sectional study was conducted on 80 placenta Previa patients at obstetrics and gynecology department at Suez Canal University. In each patient clinical items were assessed including age, parity and number of previous cesarean sections in combination with ultrasound parameters (lacunar count, uteroplacental vascularity and position of placenta). In each patient, peripartum complications were assessed including intraoperative assessment of blood loss, cesarean hysterectomy and identification of urinary tract injury. **Results:** There was significant correlation between the score and peripartum complications. All cases with score > 8 had massive blood loss. All cases needed cesarean hystrectomy had score > 8.There is also significant correlation between the score and intraoperative bladder injury at cutoff point 9. **Conclusion:** Combined clinical and ultrasonographic scoring system could be applied to all cases of placenta Previa to predict peripartum complications
Key words: placenta Previa, accreta, cesarean hysterectomy

Introduction
Placenta previa complicates approximately 1 in 200 pregnancies. It is frequently reported to occur in 0.3-0.5% of all United states pregnancies.(1) Many risk factors are correlated with placenta previa. Some of them are still controversial as maternal smoking, alcohol use during pregnancy and race. Established risk factors of placenta previa include advanced maternal age, multiparty and prior cesarean sections or any uterine surgery.(2)

Advanced maternal age is associated with increased risk of placenta previa and its complications even after adjustment of multiparty. Women more than 34 years old have two to three fold higher risk of having placenta previa than younger age. It is also associated with higher risk of accretion. Explanation of that is still unclear.(3)

The association of previous cesarean section with placenta previa is confirmed may be due to defective placentation. Placenta previa complicated 2.54% of cases with a previous caesarean section compared with 0.44% of cases with no scar; a 5-fold increase. After one caesarean section, placenta previa was complicated by accrete in 10% of cases and after two or more this was 59%.(4) The risk of hysterectomy with placenta previa and uterine scar was 10% but with placenta previa accrete it was 22%.(5)

It is also demonstrated that the possibility of placenta previa increases with greater parity independent of the number of prior cesarean deliveries. Those who have the combination of multiparty and prior cesarean deliveries have the greatest risk of placenta previa and its complications.(6)

Transvaginal ultrasound is superior for diagnosis of previa. Reported false-positive and false-negative rates are 1% and 2%, respectively - a striking improvement over transabdominal ultrasound - which has rates of 2% to 6% and 7%, respectively.

Transvaginal sonography has several advantages over transabdominal imaging in localization of the placenta. The shorter distance from the vaginal probe transducer to the cervix and lower uterine segment allows the use of higher-frequency ultrasound waves, with improved resolution; therefore, the relationship between the placental edge and the

internal os can be determined more accurately[15,16].

The presence of lacunar vascular spaces in the placenta is a common ultrasonographic finding. Although the cause of placental lacunae is unknown, many authors have found them to be predictive of placenta accrete. Visualization of lacunae had the highest sensitivity (79%) in the 15-20-week range and a sensitivity of 93% in the 15-40-week gestational age time frame[17]

The lacunae have a moth-eaten appearance to the placenta, usually, but not always, have turbulent flow within them, irregular, often more linear rather than rounded and smooth bordered, do not have the highly echogenic border that standard venous sinuses have, Tornado-shaped flow of venous, arterial or mixed blood is typical. These sinuses have been seen as early as 9 weeks' gestation.

In the event of major adhesive placenta, the uterine serosa–bladder wall interface has an extensive hypervascular appearance with densely confluent anarchic vessels that occasionally seemed to protrude into the bladder lumen. On the other hand, in the case of placenta previa without accreta, the serosa–bladder wall interface was not affected by vascularization[17].

Patients and methods

All patients included in the study were informed about the hazards of placenta previa including the risk of massive blood transfusion and possibility of hysterectomy and benefits of preoperative prediction of these complications

Detailed history taking and detailed general and local examination Combined trans-abdominal ultrasonography to assess gestational age and amniotic fluid index with transvaginal ultrasonography to estimate placental site, placental type. Uteroplacental vascularity and lacunar count.

Location of placenta was determined as following:

- Partialis (the lower edge touches the internal os or withen2 cm).
- Totalis (placenta cover the internal os either completely or not).

Placenta was examined carefully by transvaginal ultrasound for homogenecity. Lacunae were defined as irregular area of low echogenicity larger than 1 × 1 cm in the placental parenchyma. The number of lacunae was recorded Color Doppler study was applied for serosal bladder interface for assessment of crossing vessels and calculation of resistance index of these vessels if present it was graded as following:

- Normal: no crossing vessels
- Moderate: crossing vessels with resistance index< 0.24
- Severe: crossing vessels with resistance index $\geq$ 0.24

Scoring was done using combined clinical and ultrasonographic parameters

Item	0	1	2	3
Multiparty	No	Yes		
Maternal age	<35	>35		
History of cesarean sections	No	Once	Two or more	
Lacunar count	No	1-3	4-6	Whole placenta
Type of previa	Partialis		Totalis	
Uteroplacental vascularity	Normal	Moderate	Severe	

In each group, peripartum complications were assessed:

1. Intraoperative Assessment of blood loss:

Estimated blood loss (cEBL) was obtained by multiplying the calculated maternal blood volume by the percent of blood volume lost.

- cEBL = maternal blood volume × percent of blood volume lost.
- Calculated maternal blood volume = 0.75 × {[maternal height in inches × 50] + [maternal weight before delivery in pounds × 25]}.

- Percent of blood volume lost = {predelivery haematocrit (HCT) – post delivery (HCT) within 24 h.}/ predelivery HCT.

1 kg = 2.20462 lb.
1 m = 39.37008 inches.
The units of blood product transfused to the patients during or after operation were documented.

Ideally, the use of a single unit of packed RBCs should increase the hematocrit by approximately 3–4%. However, the expected increase in hematocrit may be slightly less due to expanded blood volume during pregnancy.
So if the patient received blood products during operation we can calculate post-delivery HCT by {haematocrit after blood transfusion−(number of the units of blood product transfused × 3)}.
Severe bleeding was considered if blood loss is more than 1500 ml blood.
We used a cutoff for severe bleeding of >1500 ml representing 25% of blood volume since blood loss of such amount would lead to hemodynamic decom-position.

2. Cesarean hysterectomy:
was performed when the vital status of patient was unstable (blood pressure ≤ 90/60 mm hg, pulse ≥120 beat per minute) with massive blood transfusion (≥3 packed RBCs units) (74) and hemostatic measures (trimming of uterine segment involved in accretion, hemostatic sutures at placental bed, bilateral ligation of uterine artery and IV administration of tranexamic acid) .

3. Identification of urinary tract injury:
Either intra-operative or during 1 week postoperative

- Lower abdominal pain
- Blood in the urine
- Bloody discharge
- Difficulty beginning to urinate or inability to empty the bladder
- Loss of fluids
- Painful urination
- Pelvic pain
- Severe bleeding
- Small, weak urine stream.

Results

Table 1: relation between clinical and ultrasonographic parameters and peripartum massive blood loss among studied patients: there was statistically significant difference between patients with and without massive bleeding regarding all clinical and ultrasonographic parameters. History of previous 2 or more CS showed highest odds ratio for developing of massive bleeding with odds ratio = 5.05.

		No massive blood loss		Massive blood loss		p-value	Odds ratio
Age	**< 35 years**	24	35.29%	0	0%	0.01*	1
	≥ 35 years	44	64.71%	12	100%		1.63
Multi-parity	**No**	28	41.18%	0	0%	0.006*	1
	Yes	40	58.82%	12	100%		2.09
Previous CS	**No**	32	47.06%	0	0%	0.001*	1
	Once	24	35.29%	4	33.33%		1.29
	≥ two	12	17.65%	8	66.67%		5.05
Position of placenta	**Previa partialis**	36	52.94%	4	33.33%	0.2 (NS)	1
	Previa totalis	32	47.06%	8	66.67%		0.5
Uteroplacental vascularity	**Normal**	8	11.76%	0	0%	0.03*	1
	Moderate	40	58.82%	4	33.33%		0.2
	Severe	20	29.41%	8	66.67%		0.7
Lacunar count	**No**	20	29.41%	0	0%	0.001*	1
	1 – 3	24	35.29%	0	0%		1
	4 – 6	12	17.65%	4	33.33%		1.5
	Whole placenta	12	17.65%	8	66.67%		3.1

*Statistically significant difference

Table 2: relation between clinical and ultrasonographic parameters and peripartum cesarean hysterectomy among studied patients: there was statistically significant difference between patients with and without cesarean hysterectomy regarding all clinical and ultrasonographic parameters. History of previous 2 or more CS showed highest odds ratio for developing of cesarean hysterectomy with odds ratio = 5.05.

		No cesarean hysterectomy		Cesarean hysterectomy		p-value	Odds ratio
Age	**< 35 years**	24	35.29%	0	0%	0.01*	1
	≥ 35 years	44	64.71%	12	100%		1.63
Multi-parity	**No**	28	41.18%	0	0%	0.006*	1
	Yes	40	58.82%	12	100%		2.09
Previous CS	**No**	32	47.06%	0	0%	0.001*	1
	Once	24	35.29%	4	33.33%		1.29
	≥ two	12	17.65%	8	66.67%		5.05
Position of placenta	**Previa partialis**	36	52.94%	4	33.33%	0.2 (NS)	1
	Previa totalis	32	47.06%	8	66.67%		0.5
Uteroplacental vascularity	**Normal**	8	11.76%	0	0%	0.03*	1
	Moderate	40	58.82%	4	33.33%		0.2
	Severe	20	29.41%	8	66.67%		0.7
Lacunar count	**No**	20	29.41%	0	0%	0.001*	1
	1 – 3	24	35.29%	0	0%		1
	4 – 6	12	17.65%	4	33.33%		1.5
	Whole placenta	12	17.65%	8	66.67%		3.1

*Statistically significant difference

Table 3: relation between clinical and ultrasonographic parameters and peripartum injury of pelvic structures among studied patients: there was statistically significant difference between patients with and without injury of pelvic structures regarding all clinical and ultrasonographic parameters except age and multi-parity. History of previous 2 or more CS showed highest odds ratio for developing of massive bleeding with odds ratio = 1.9.

		No injury of pelvic structure		Injury of pelvic structure		p-value	Odds ratio
Age	**< 35 years**	24	31.58%	0	0%	0.2 (NS)	1
	≥ 35 years	52	68.42	4	100%		0.5
Multi-parity	**No**	28	36.84%	0	0%	0.1 (NS)	1
	Yes	48	63.16%	4	100%		0.6
Previous CS	**No**	32	42.11%	0	0%	0.002*	1
	Once	28	36.84%	0	0%		1
	≥ two	16	21.05%	4	100%		1.9
Position of placenta	**Previa partialis**	40	52.63%	0	0%	0.04*	1
	Previa totalis	36	47.37%	4	100%		1.1
Uteroplacental vascularity	**Normal**	8	10.53%	0	0%	0.02*	1
	Moderate	44	57.89%	0	0%		1
	Severe	24	31.58%	4	100%		0.3
Lacunar count	**No**	20	26.32%	0	0%	0.001*	1
	1 – 3	24	31.58%	0	0%		1
	4 – 6	12	15.79%	4	100%		1.5
	Whole placenta	20	26.32%	0	0%		1

*Statistically significant difference

Discussion

Present study reported that there is positive relationship between uteroplacental vascu-larity and massive intraoperative bleeding, 28.57% of cases with severe uteroplacental vascularity had massive bleeding while it was 9.5% in moderate vascularity and no cases with absent uteroplacental vascu-larity had massive intraoperative bleeding that is due to with increasing utero-placental vascularity there is higher incidence of placental accretion.

Present study showed that combined clinical and ultrasound scoring is significant for prediction intraoperative blood loss agreeing with So-Yoen-Yoon,et al., Present study showed that all cases with score > 8 had massive blood loss.

The most significant predictor was number of previous CS with odds ratio 5.05 with

history of 2 or more previous CS in agreement with So-Yoen-Yoon, et al., as it was 4.82. So-Yoen-Yoon, et al., found that 75% of cases with score ≥ 6 have massive blood loss.

The most important ultrasonographic parameter was lacunar count with odds ratio 3.1 when whole placenta is involved with lacunae.

Present study showed that significant correlation between the score and the need of casearean hysterectomy. Present study showed that all cases with score >8 needed casearean hysterectomy similar to So-Yoen-Yoon, et al.,

The most significant predictor was number of previous CS with odds ratio 5.08 with history of 2 or more CS. The most important ultrasonographic parameter was

lacunar count with odds ratio 3.1 when whole placenta is involved with lacunae.
Present study showed that there was statistically significant difference between patients with and without injury of pelvic structures regarding all clinical and ultrasonographic parameters except age and multi-parity.

Present study showed that at cutoff point 9, all cases had bladder injury. The most significant predictor was number of previous CS with odds ratio 1.9 with history of 2 or more CS.

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