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A Comparative Study of Transabdominal and Transvaginal Sonography for Localization of Placenta in Antepartum Haemorrhage

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Summary

The aim of the present study was to evaluate the accuracy and safety of transvaginal sonography (TVS) in diagnosing placenta previa. A random study was carried out in 50 patients presenting with complaints of antepartum haemorrhage (APH). All the patients were evaluated by both transabdominal (TAS) and transvaginal sonography. The final diagnosis was established at delivery and placenta previa was found in 30 (60%) out of 50 patients of APH. The sensitivity, specificity and positive predictive value of TAS was 96%, 80% and 88% respectively with false positive results of 20% and false negative results of 3.34%. The TVS was found to be superior to TAS with sensitivity, specificity and positive predictive value of 100%, 95% and 97% respectively with low false positive rates of 5% and no false negative result. Transvaginal sonography was therefore found to be safe and highly accurate in diagnosing placenta previa especially Type I and Type II in the present study with no complications.

Introduction

Antepartum haemorrhage (APH) is defined as bleeding from the genital tract after the 28th week of pregnancy but before the delivery of the baby. Antepartum haemorrhage continues to be one of the most ominous complications of pregnancy. Its incidence is about 3% amongst hospital deliveries (Neilson, 1995). The seriousness and frequency of obstetric haemorrhage makes it one of the three leading causes of maternal death and also a major cause of perinatal mortality and morbidity. Therefore the timely and accurate diagnosis as well as management of obstetrical haemorrhage occupies a pioneer position in modern obstetrics (Neilson, 1995; Pritchard, 1989).

Placenta previa constitutes about one third of the patients presenting with APH and is one of the most common diagnosable causes of late pregnancy bleeding or APH. Placenta previa refers to a placenta that is wholly or partially situated in the lower uterine segment at or after 28 weeks of gestation. The various means of diagnosing placenta previa are i) history and perabdominal examination, ii) sonography, iii) internal examination, iv) examination of placenta following vaginal delivery and v) direct visualization during caesarean section.

Ultrasonography is the imaging modality of choice for placental localization. Gottesfeld et al (1966) were the first to report the usefulness of transabdominal sonography for localization of placenta. Though transabdominal sonography (TAS) is the simplest, most precise and safest method of placental localization it has many drawbacks including poor visualization with a posterior placenta, patient's obesity or an over distended bladder. The false positive and false negative rates of TAS reported are 2-6% and 2% respectively (Gottesfeld et al, 1966). A false positive diagnosis may lead to a prolonged hospitalization and unnecessary

caesarean delivery. A false negative diagnosis may lead to vaginal examination that could result in a massive haemorrhage.

Farine et al in 1988 first introduced the use of transvaginal sonography (TVS) for the diagnosis of placenta previa. They were able to visualize the internal os in all cases using TVS in contrast to 70% using TAS. The advantages of TVS are that precise anatomical relationships can be defined without the pressure distortion of a distended bladder and precise measurement of the distance between the internal os and the placental edge.

However, the basic fear of obstetricians in utilizing TVS for placental localization is the fear of provoking vaginal haemorrhage. The present study was therefore undertaken to compare the accuracy of TAS and TVS in diagnosing placenta previa in patients of APH and to evaluate the safety of TVS in these patients.

Material and Methods

The present study was carried out in 50 patients of antepartum haemorrhage admitted to the labour/ maternity wards of Pt. B.D. Sharma. PGIMS, Rohtak over a period of one year beginning from May 1998 to April 1999. Only haemodynamically stable patients were included in the study and those with profuse bleeding necessitating an immediate caesarean section were excluded. A detailed obstetric history and physical examination were carried out in these patients. Important investigations i.e. haemoglobin estimation, blood grouping, bleeding time, clotting time, clot retraction time and urine examination for albumin and sugar were carried out in all the patients. A gentle per speculum examination was performed after 24 hours of complete cessation of vaginal bleeding to rule out any local lesions which could be responsible for vaginal bleeding.

First, transabdominal sonography was performed in all the patients with full bladder using a 3.5 MHz convex transducer in supine position. Diagnosis of placenta previa was made if placental edge was located within 5cm of the internal os.

Thereafter patients were made to empty the bladder and placed again is supine position with legs flexed. Transvaginal sonography was performed using a high resolution multifrequency transvaginal probe (5 MHz and 6 MHz) or broad band transvaginal probe. The vaginal probe covered with a condom was gently introduced into the vagina under direct sonographic visualization. The probe was introduced 3-4cm beyond the introitus in order to visualize the internal os and lower placental edge without coming into actual contact with the cervix. A diagnosis of placenta previa was made if placental edge was located within 5 cm of the internal os.

All the patients selected for the study underwent pelvic examination in operation theatre at 37 completed weeks and placenta was localized. In cases of caesarean delivery, the relation of placenta with the internal os was determined. Patients with Type I and Type II anterior were allowed to deliver vaginally and if the edge of the placenta was within 5 cm of the site of membrane rupture, the patient was considered as of placenta previa. Findings at delivery were used as standard to calculate the sensitivity, specificity and positive and negative predictive values of TAS and TVS in placental localization. Findings at delivery were related only to the last sonographic results.

Results

Thirty out of 50 patients were finally diagnosed as having placenta previa. During one year, there were a total of 5590 deliveries in the institution of which there were 210 APH patients (3.75%) out of which 102 patients were with placenta previa (1.82%), 70 patients with abruptio placentae (1.25%) and 38 were of indeterminate origin.

The mean age of the patients with placenta previa was 26.4±4.22 years and it was observed that the incidence of placenta previa increased with advancing age and increasing parity. The patients of APH presenting at 28-32 weeks had higher incidence of placenta previa as compared to those presenting after 32 weeks. Majority of patients (66%) reported within 6 hours of bleeding. Nineteen (63%) patients with placenta previa had high risk factors (Table I) commonest being previous caesarean section followed by previous abortions or curettage. There was high incidence of malpresentation in APH (34%) and placenta previa (43%).

Transabdominal sonography diagnosed placenta previa in 33 patients out of which TVS made the same diagnosis in 30 patients ruling out placenta previa in 3 patients (Table II). All these three patients negated by TVS were diagnosed as Type I placenta previa on TAS. In 17 patients, TAS ruled out placenta previa out of wich one case of Type I placenta previa was picked up by TVS (Table II).

Table III shows the comparison of results of TAS and delivery diagnosis. Four out of 33 patients diagnosed on TAS were ruled out at delivery giving a false positive result of 20%. The false negative rate was

Table I
Distribution of cases according to High Risk Factors

Previous history	No. of patients with APH (n=50)	No. of patients with placenta previa (n=30)
Previous LSCS	7	6
Previous abortions/D & Cs	14	10
PIH	7	2
History of abdominal trauma	4	1
No risk factor	18	11
Total	50	30

N=number of patients

Table II
Comparison of the results of Transabdominal and Transvaginal Sonography

Diagnosis by TAS	No. of patients (n=50)	Diagnosis by TVS	No. of patients (n=50)
Placenta previa	33	Placenta previa	30
		No placenta previa	3
No Placenta previa	17	No placenta previa	16
		Placenta previa	1
Total	50		50

Table III
Comparison of results of Transabdominal Sonography and Delivery diagnosis (n=50)

Diagnosis by TAS	No. of patients (TAS)	Placenta previa at delivery	No placenta previa at delivery
Placenta previa	33	29	4
No placenta previa	17	1	16
Total	50	30	20

Table IV
Comparison of results of Transvaginal Sonography and Delivery diagnosis (n=50)

Diagnosis by TVS	No. of patients (TVS)	Placenta previa at delivery	No placenta previa at delivery
Placenta previa	31	30	1
No placenta previa	19	0	19
Total	50	30	20

Table V
Comparison of results of Transabdominal and Transvaginal Sonography with Delivery diagnosis for diagnosing Types of placenta previa (n=50)

Transabdominal Sonography	No. of patients	Transvaginal sonography	No. of patients	Delivery diagnosis	No. of patients
Type I placenta	15	Type I placenta previa	12	Type I placenta	11
Previa		No placenta previa	3	No placenta previa	4
No placenta previa	17	Type I placenta previa	1	Type I placenta previa	1
		No placenta previa	16	No placenta previa	16
Type II placenta previa	8	Type II placenta previa	6	Type II placenta previa	6
		Type I placenta previa	2	Type I placenta previa	2
Type III placenta previa	7	Type III placenta previa	7	Type III placenta previa	7
Type IV placenta previa	3	Type IV placenta previa	3	Type IV placenta previa	3

3.34%. The comparison between TVS and delivery diagnosis is depicted in table IV, TVS giving a false positive rate of 5% and false negative rate of 0%. The diagnostic error with TAS occurred in patients with Type I and Type II placenta previa as shown in Table V. The statistical analysis of the findings on TAS and TVS for placenta previa are depicted in Table VI.

Table VI
Test characteristics for Transabdominal Sonography and Transvaginal Sonography in diagnosis of Placenta Previa

	Transabdominal sonography	Transvaginal sonography
Sensitivity	96.67 %	100 %
Specificity	80 %	95 %
Positive predictive value	87.88 %	96.7 %
Negative predictive value	94.12 %	100 %
False positive rate	20 %	5 %
False negative rate	3.34 %	0 %

The patient acceptance of TVS was 100%. No patient experienced any discomfort or complication.

Discussion

All patients with placenta previa need hospitalization as this condition is one of the important causes of maternal and perinatal mortality and morbidity. These days there is pressure on hospital beds and an investigation with accurate test for fetal and maternal well being can reassure us to allow the mother to rest at home thus decreasing the hospital load.

Transvaginal sonography has been found to be more useful in cases of placenta previa of minor degrees viz. Type I and Type II which were more likely to be misdiagnosed by TAS. These are the patients in which an accurate diagnosis is of utmost importance as it can obviate the need for unnecessary examination and caesarean section (Tan et al, 1995; Kuhlmann and Warsof, 1996).

The incidence of placenta previa in the present study was found to increase with advancing age and parity which is in accordance with those reported by other authors (Pritchard et al, 1989; Mabie, 1992; Zelop et al, 1994; Neilson, 1995). Seventy percent of the patients had first bout after 32 weeks and 34% had malpresentations as also reported by other authors (Leopold and Asher 1975; Brenner et al 1978; Pritchard et al, 1989).

Various authors (Townsend et al, 1986; Miller and Langlois, 1989) observed that endometrial/ myometrial damage was a significant factor in low placental implantation. They found a significant relationship between placenta previa and previous caesarean section, dilatation and curettage, spontaneous abortion and evacuation of retained products of conception as was found in our study also (Table I).

In the present study, out of 33 patients diagnosed as placenta previa on TAS actually 29 patients had placenta previa confirmed at delivery thus giving a false positive rate of 20%. One patient of placenta previa missed on TAS was picked up by TAS giving a false negative rate of 3.34%. The sensitivity of TAS was 96% and specificity was 80%. We found TVS to be highly accurate with sensitivity of 100% and specificity of 95%. Tan et al in 1995 in a study comparing TAS and TVS reported the diagnostic accuracy of 92.8% by TVS as against 75.7% by TAS. Leerentveld (1990), however, observed the sensitivity and specificity of TVS in diagnosing placenta previa as 87.5% and 98.8% respectively.

The lower accuracy rates of transabdominal are because a full bladder is a necessity for TAS which may exert pressure on lower uterine segment thereby distorting it and possibly giving false impression of placenta previa (Bowie et al, 1978; Laing, 1981). On the other hand, an empty bladder may make identification of the internal os quite difficult by transabdominal route. It has also been observed that in vertex presentation, acoustic shadowing by the fetal head may interfere in the precise diagnosis of placenta previa by TAS (Bowie et al, 1978; farine et al 1988; Caroll and Weber 1992). Women who are falsely diagnosed as having placenta previa by TAS may have to undergo unnecessary hospitalization and several unnecessary sonographic examinations and suffer anxiety (Farine et al, 1990).

Tan et al (1995) and Kuhlmann & Warsof (1996) found TVS to be more accurate than TAS in the diagnosis of Type I and Type II placenta previa as was also observed in the present study.

Inspite of TVS being more accurate, obstetricians are still fearful of using it considering the risk of vaginal bleeding by manipulation of cervix or vagina. However this fear is unfounded because the vaginal probe is introduced slowly into the vagina under direct sonographic visualization of the cervix to avoid contact with the cervix. Further the focal zone of the vagina probe is 2-7 cms and a clear picture is obtained when the distance between the top of the probe and cervix is about 3cm (Pritchard et al, 1989).

In view of the ongoing discussion it is therefore

concluded that TVS is highly accurate in diagnosing placenta previa and is superior to transabdominal sonography. It is safe, well tolerated by the patient and associated with no complications.

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