

Case Report

## Detection of Placenta Percreta with Urinary Bladder Wall Invasion by Two-Stage Imaging Protocol - A Case Report

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### ABSTRACT

Invasive placenta is a placental adhesive disorder characterized by a defect of decidua in which chorionic villi (fetal trophoblast) extend into the myometrium. Based on the extent of myometrial invasion, invasive placenta is of three types -placenta accreta, placenta increta and placenta percreta. The incidence of invasive placenta increases with placenta previa and previous history of caesarean section. A two-stage imaging protocol for detection of invasive placenta is suggested which includes an initial evaluation with ultrasound and color Doppler (which usually detects invasive placenta) followed by pelvic MRI for placenta which confirms the diagnosis of invasive placenta with extra-uterine extension. We report a case of placenta percreta invading urinary bladder wall detected initially by ultrasound, color and power Doppler and later confirmed on MRI. These findings were confirmed during emergency caesarean section.

**Key words:** adherent placenta, placenta percreta, placental lacunae, invasive placenta, placental and myometrial interface, placental adhesive disorder.

### INTRODUCTION

Placenta means “flat cake”. The term originates from the Greek word plakuos. It is responsible for the respiratory and excretory function and nutrition of fetus thus acting like cake for the fetus. The invasive placenta is a placental adhesive disorder characterized by a defect of decidua in which chorionic villi (fetal trophoblast) extend into the myometrium. Based on extent of myometrial invasion, invasive placenta are of three types: a) placenta accreta- least invasive type, where the villi attach to the myometrium and may superficially invade it; b) placenta increta -

where the villi partially invade the myometrium, c) placenta percreta- where the villi completely penetrate the myometrium reaching upto the uterine serosa and may or may not invade the surrounding extra-uterine tissues. <sup>[1]</sup>

Major risk factors associated with invasive placenta are a previous caesarean section, placenta previa. Minor risk factors are previous history of uterine surgeries (abortions, curettage, and myomectomy), uterine fibroids and Asherman’s syndrome. <sup>[2]</sup>

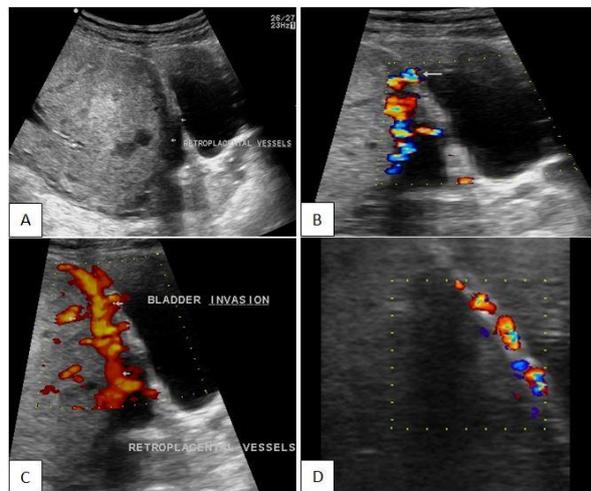
Incidence of invasive placenta is 0.4% of the general population, 5% in

presence of placenta previa, 24% with a history of single LSCS and 67% when placenta previa is associated with multiple (>3) LSCS. [1]

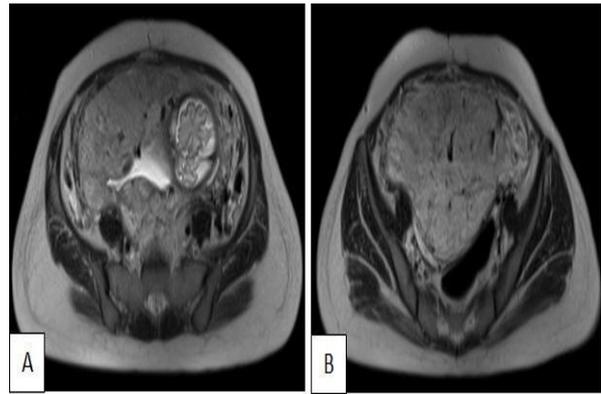
### CASE REPORT



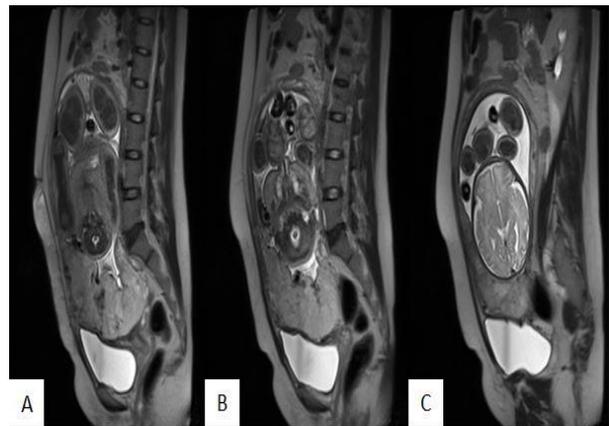
**Figure 1-** (A) USG showing complete placenta previa; (B) showing multiple lacunae in placenta; (C) showing loss of retro-placental lucency at the site of adherent placenta; (D) showing loss of echogenic interface between uterus and urinary bladder wall suggestive of bladder invasion.



**Figure 2 -** (A) USG showing sonolucent retro placental vessels; (B) Colour Doppler showing increased retro placental vascularity with vessels entering adjoining urinary bladder wall; (C) Power Doppler increased retro placental vascularity with vessels entering adjoining urinary bladder wall suggestive of bladder invasion; (D) Colour doppler on linear probe showing vascularity in urinary bladder wall suggestive of bladder invasion.



**Figure 3–**MRI Pelvis axial T2WI sequence (A,B) showing placenta previa



**Figure 4 –** MRI Pelvis sagittal T2WI sequence showing complete placenta previa with multiple linear hypointense bands (A), urinary bladder wall thinning with tenting (B) and flow voids in urinary bladder wall suggestive of bladder invasion (C).

A 27-years old female patient of 30 weeks 2 days pregnancy was referred to ultrasound department for the growth scan. She had previous history of LSCS. Ultrasound revealed single live intra-uterine fetus with longitudinal lie and cephalic presentation with normal liquor. Placenta was anterior, low lying and covering the internal os with extension into the posterior uterine wall in lower uterine segment suggestive of complete placenta previa. Anechoic placental lacunae were noted. Retro-placental lucency was lost at places with multiple retro-placental anechoic tubular vessels. The echogenic interface between anterior uterine wall and posterior bladder wall was lost at places (Figure 1). Multiple retro-placental vessels were noted with extension into urinary bladder wall on color Doppler and power Doppler (Figure 2). A diagnosis of adherent placenta – placenta percreta with urinary bladder

invasion was made. MRI pelvis for placenta was done for confirmation. Complete placenta previa was confirmed. The placenta was slightly heterogeneous in signal intensity on T2WI with few intra placental hypointense bands of variable thickness with thinning of adjoining myometrium with flow voids in urinary bladder wall suggestive of the adherent placenta with bladder invasion (Figures 3, 4). Emergency Caesarean section confirmed placenta previa with placenta percreta invading adjoining urinary bladder wall. Omentum was also adherent to the anterior uterine wall. All the adhesions were released and ligated. The defect in anterior bladder wall was closed. This was followed by hysterectomy.

## DISCUSSION

Pre-natal evaluation and identification of invasive placenta is critical for optimal management as it a life-threatening condition during delivery due to increased risk of massive intra or post partal hemorrhage. The abnormal placenta cannot be completely separated from the uterus due to myometrial invasion. Extensive blood loss (>3-5 liters) may cause disseminated intravascular coagulation (DIC), adult respiratory distress syndrome (ARDS), renal failure and death. Hence, appropriate scheduled delivery to minimize maternal and neonatal risk is essential. Usually planned caesarian section is done at 34-35 weeks maturity to reduce the risk of fetal lung immaturity. Maternal mortality due to invasive placenta is 7%.<sup>[3]</sup>

A multi-disciplinary approach with a well-trained surgical team including gynecologist, urologist, pediatrician, and anesthetist are needed. Interventional radiologists may be required for peri-operative internal iliac artery occlusion to reduce blood loss during surgery and subsequent need for blood transfusion. Blood products should be readily available for transfusion.<sup>[1]</sup>

A two-stage protocol for detection of invasive placenta is suggested which includes initial evaluation with ultrasound

and color Doppler (which usually detects invasive placenta) followed by pelvic MRI for placenta which confirms the diagnosis of invasive placenta with extra-uterine extension.<sup>[1]</sup>

Trans-abdominal B-mode ultrasound with color Doppler and Power Doppler is the first line imaging modality in the detection of invasive placenta as it is readily available, cheaper, lacks ionizing radiation and can be safely used in pregnant patients. High index of suspicion is needed for its detection in presence of placenta previa and/or previous history of LSCS. A high-frequency transducer may be used for detailed imaging for evaluation of the lower uterine segment. A transvaginal ultrasound may be useful for evaluation of the myometrium of the lower anterior uterine segment, placental morphology and myometrial-placental interface. Sonography has limitations in case of posterior location of placenta, in presence of post-operative uterine scar with acoustic shadowing, poor image quality due to patient's body habitus and operators inexperience, and detection of extra-uterine extension.<sup>[1]</sup>

Finberg and Williams described sonographic features of invasive placenta.<sup>[4]</sup> Presence of large and irregularly dilated intra-placental vascular spaces/ placental lacunae, loss of retro-placental hypoechoic zone (venous network within stratum spongiosum of the decidua), extensive vascularity in the utero-placental interface, myometrial thinning (<1mm) or loss of visualization the myometrium are the usual signs of invasive placenta which have more than 80% specificity.<sup>[5]</sup>

Color and power Doppler criteria for detection of the invasive placenta are extreme intra-placental vascularity with turbulent flow, the presence of multiple tortuous vessels with a chaotic pattern, disruption in the normal continuous organized pattern of sub-placental blood flow paralleling the myometrium (indicates the site of myometrial invasion).<sup>[6]</sup>

Marked thinning or loss of the echogenic utero-bladder interface, focal

uterine bulge with a vascular mass extending beyond the uterus and presence of a prominent vascular network between the uterine serosa and urinary bladder are signs of extra-uterine spread of invasive placenta in adjoining urinary bladder. [1]

Placenta has fetal (chorionic plate, where the umbilical cord inserts) and maternal surfaces. The umbilical vessels divide into chorionic vessels within the placenta with vascular network of the villous trees. Though chorionic vessels are practically not visible within the placenta, few less than 5 mm thick vascular branches may be seen normally within normal non-invasive placenta. Sub-placental vascularity is seen as signal flow void on MRI at placenta-myometrial interface. Spiral arteries located at the myometrium-placental interface are perpendicular to the decidual surface and parallel to the villous tree of the chorionic arteries. Placental appearance changes during the course of pregnancy with maturity. It is seen as a uniform homogeneous soft tissue structure of low to intermediate signal on T2WI upto 23<sup>rd</sup> week. It becomes less uniform with increase in number of placental lobules and placental septae between 24-31 weeks of gestation. It becomes more inhomogeneous after 32 weeks of gestation. Placental evaluation by MRI should be performed ideally before the 30<sup>th</sup> week of gestation. Placental lobules are surrounded by clefts and septae of connective tissue {21 in cools} seen as thin linear bands low signal on T2WI. Various signs of invasive placenta on MRI are – detection of intra-placental abnormal vascularity (presence of serpentine, more than 6mm vessels/ flow voids- these correspond to abnormal dilated vascular lacunae), presence of thick linear hypointense bands within the placenta on T2WI which may be linear or nodular and may be randomly distributed (these represent pathological fibrin deposition within the placental tissue) , marked heterogeneous appearance of placenta, loss of three layer appearance of the myometrium, focal uterine bulge (with the

lower uterine segment wider than the fundus-reverse of the normal). Tenting of urinary bladder dome is seen in placenta percreta due to bladder invasion. Loss of fat plane between the placenta and the bladder wall and presence of abnormal vascular network in the utero-bladder space are other signs of bladder invasion. Normal myometrium has sandwich like 3 layer appearance with outer and inner layer appearing as hypointense thin continuous lines and middle layer appearing of moderately high signal with multiple flow voids due to myometrial vessels. The inner layer represents utero-placental interface and includes both decidua and inner myometrium while outer layer represents the uterine serosa. Focal or diffuse loss of inner T2 hypointense line, focal or diffuse myometrial thinning or indistinctness are sensitive signs of invasive placenta. [7,8] Though placenta previa covers internal os, it does not protrude into os. Detection of placental protrusion sign is highly suggestive of invasive placenta. [9]

## CONCLUSION

Detection of the invasive placenta is critical for optimal management due to increased risk of massive intra or post partum hemorrhage. A two-stage protocol for detection of the invasive placenta is an initial evaluation with ultrasound and color Doppler followed by pelvic MRI for placenta which confirms the diagnosis of the invasive placenta with extra-uterine extension.

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