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Original Article

Marginal sinus placenta previa is a different entity in placenta previa: A retrospective study using magnetic resonance imaging

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ABSTRACT

Objective: The current definition of placenta previa does not include whether the placental edge is parenchyma or marginal sinus defined as placenta previa in which the placental marginal sinus just reached the internal os and/or in which the placental parenchyma might be located at > 2 cm from internal os.

Materials and Methods: Cases with placenta previa were identified through the review of magnetic resonance imaging (MRI) from among 210 cases at our institution between 2007 and 2016. The clinical outcomes of patients with marginal sinus placenta previa (Group A) were compared with patients with low-lying placenta and marginal placenta (Group B) and patients with partial placenta and total placenta previa (Group C), respectively. This study was a retrospective analysis.

Results: Twenty-seven (12.7%) cases were included in Group A. The patients in Group B and Group C were 72 and 108 cases, respectively. First, Group A more frequently underwent emergency cesarean section than Group B ($p = 0.02$). There was no statistical significance with other maternal history, post −or pre-operative hemorrhage, and/or additional treatment for hemorrhage between the two groups. Additionally, Group A delivered at a later gestational age ($p < 0.01$); were less frequently complicated with antenatal bleeding ($p < 0.01$); underwent emergency cesarean section ($p < 0.01$), allogenic blood transfusion ($p < 0.01$), and uterine artery embolization ($p < 0.01$) for postpartum hemorrhage less often; and had less perioperative hemorrhage ($p < 0.01$) than Group C.

Conclusions: Marginal sinus placenta previa may be a mild type of placenta previa. This new classification could be useful in the management of placenta previa.

Introduction

It is well known that placenta previa is the main cause of maternal and neonatal mortality and morbidity because of massive hemorrhage during delivery [1,2]. Placenta previa is commonly diagnosed using ultrasound sonography or magnetic resonance imaging (MRI) in the third trimester, often between 28 and 32 weeks [3,4]. Placenta previa is divided into four categories according to the distance from placental edge to internal os: low-lying placenta, marginal placenta, partial placenta, and total placenta previa [1]. This classification system is useful in tailoring the management of cases of placenta previa. For example, cases of total or partial placenta previa are associated with higher morbidity than those of marginal placenta previa or low-lying placenta [5]. In addition, patients with low-lying placenta can be considered as subjects to try the vaginal labor [6]. Thus, the accurate diagnosis of the type of placenta previa is important, as it enables physicians to decide on the best course of management of placenta previa.

The current definition of placenta previa was determined using the distance from placental edge to internal os, but it does not contain definitive rules whether the placental edge was the placenta parenchyma or marginal sinus. Recently, marginal sinus placenta previa was defined as one type of placenta previa. The definition of marginal sinus placenta previa was when the placental marginal sinus just reaches the internal os and when the placental parenchyma might be > 2 cm from the internal os [7]. However, the

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clinical significance of marginal sinus placenta previa has not been reported.

Herein, the purpose of this study was to investigate the clinical significance of marginal sinus placenta previa.

Material and methods

This retrospective study was approved by the Institutional Review Board of the National Defense Medical College, Tokorozawa, Japan.

Patients with singleton pregnancies who underwent cesarean section due to placenta previa at our institution between January 2007 and December 2016 were identified for inclusion in this study. Patients with multiple pregnancies and those who did not undergo an MRI scan during pregnancy were excluded.

Maternal history and intraoperative information were obtained from patient medical charts and operative records. In all cases, MRI for the diagnosis of placenta previa was performed after 30 weeks of gestation. At our institution, elective cesarean section was performed up until the end of 37 gestational weeks in accordance with the Guidelines for Obstetrical Practice in Japan, which recommend cesarean section be performed in cases of placenta previa up until the end of 37 gestational weeks [8]. However, if persistent antenatal bleeding with over 100 ml blood loss or uncontrollable uterine contractions occurred during labor, an emergency cesarean section was performed. Antenatal bleeding was defined as painless genital bleeding from the placenta with <100 ml blood loss. The amount of intraoperative hemorrhage was measured from the time of the skin incision to the time of scar closure, based on suction count and towel weight. Postpartum hemorrhage was defined as the amount of bleeding from the end of the cesarean section procedure to 24 h after the surgery. Total hemorrhage was defined as the amount of intraoperative hemorrhage and postoperative hemorrhage. If the amount of blood loss was increased, hemostatic procedures (e.g., intrauterine balloon tamponade, filling of vaginal gauze, suture of placenta peeling surface) were performed at the surgeon's discretion. The cases in this study that underwent allogenic blood transfusion included patients who received blood transfusion at antenatal, intraoperative, and postoperative times. Placental adhesion was diagnosed with pathological findings.

The methods of re-evaluation of MRI findings were as follows: first, placenta previa was re-reviewed and classified into four categories, according to previous reports: low-lying placenta, marginal placenta, partial placenta, and total placenta previa [1.9]. Second, among all cases, marginal sinus placenta previa was identified. The definition of marginal sinus placenta previa was that placental marginal sinus just reached the internal cervical os, and that placental parenchyma might be > 2 cm from the internal cervical os (Fig. 1) [7]. Third, all cases were classified into five categories: marginal sinus placenta previa, low-lying placenta, marginal placenta, marginal sinus placenta, partial placenta and total placenta previa. Finally, all cases were categorized into three patient groups: Group A defined as those with marginal sinus placenta previa; Group B defined as those with partial and total placenta previa; and Group C defined as those with low-lying placenta and marginal placenta previa, respectively.

Two radiologists reevaluated pelvic MRI scans for all patients. Pelvic MRI was performed for all cases at 1.5 Tesla (Ingenia, Philips Healthcare, Eindhoven, the Netherlands). They were imaged in the supine position using a 32-channel phased-array coil. MRI evaluation of the placenta without the use of gadolinium was performed in all cases to diagnose the accurate placental location, type of previa, and placental adhesion. This is considered by many to be the approach most suitable for gravida cases, since the European Medicines Agency warns against the use of gadolinium in such imaging studies before the first trimester [10].

The maternal pelvis was scanned using the following protocol:

(1) Axial, sagittal, and coronal respiratory-triggered single-shot fast spin echo sequence (TR/TE = 1500/100 ms, 6 mm slice thickness with 1 mm gap, 304 × 276 (zero-filled interpolation [ZIP] 512) matrices).

(2) Sagittal T1-weighted fast-spin echo (FSE) sequence: TR/TE = 253/4.6 ms, 6 mm slice thickness with 1 mm gap, 240 × 214 (ZIP 352) matrices.

The protocol of this study was approved by the Ethics Committee of National Defense Medical College, Tokorozawa, Japan.

Statistical analysis was performed using JMP 11.0 software (SAS Institute Inc., Cary, NS, USA). The chi-squared test, Fisher's exact test, and Mann–Whitney U test were used to evaluate the clinical significance of clinical factors. Statistical significance was set at $p < 0.05$.

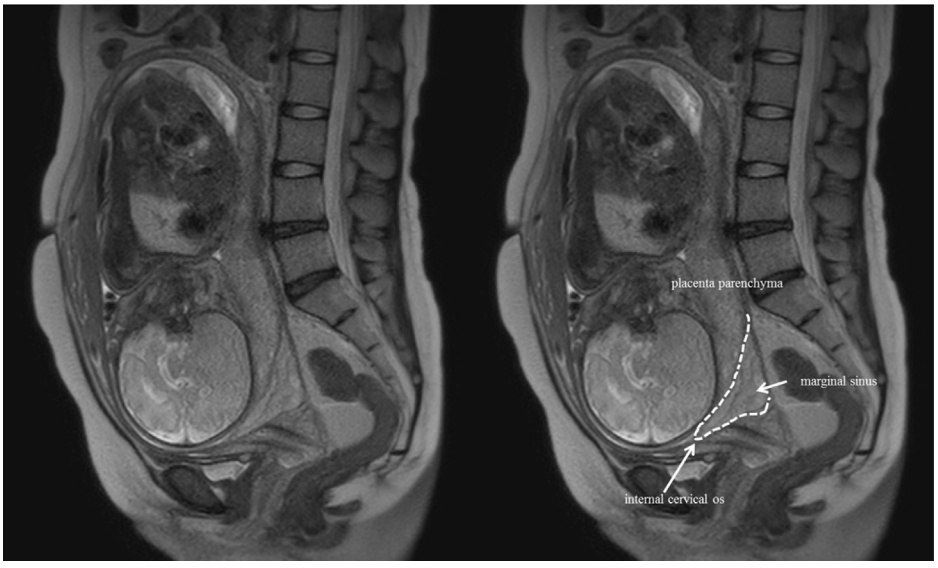

Fig. 1. Representative MRI images of marginal sinus placenta previa.