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CASE REPORT

Abdominopelvic Splenosis Resembling an Ovarian Malignancy: A Case Report

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Background: Splenosis is a benign condition that most commonly occurs following traumatic splenic rupture or splenectomy. It is characterized by ectopic autotransplantation of splenic tissue, typically within the abdominal or pelvic cavities. Due to its nonspecific clinical and imaging features, splenosis is often mistaken for malignant or metastatic disease, making accurate diagnosis a persistent clinical challenge.

Materials and Methods: The diagnosis was established using multimodal imaging techniques, including transvaginal and abdominal ultrasonography with color Doppler flow imaging (CDFI), contrast-enhanced computed tomography (CECT) of the abdomen, and evaluation of serum tumor markers.

Case Report: We report a case of a 31-year-old woman who underwent follow-up after an abortion and intrauterine device (IUD) placement. Transvaginal ultrasound revealed a hypoechoic, vascularized mass in the right adnexal region, which was attached to but poorly demarcated from the right ovary and adjacent bowel. Abdominal ultrasound failed to identify a spleen with typical features. Subsequent contrast-enhanced abdominal computed tomography (CECT) demonstrated multiple well-defined nodules with homogeneous soft tissue density throughout the right adnexal region, abdomen, and pelvis. Detailed medical history revealed prior traumatic splenic rupture with surgical repair. Based on these findings, a diagnosis of splenosis was established. As the patient remained asymptomatic, conservative management was adopted.

Conclusion: This case highlights the importance of considering splenosis in the differential diagnosis of adnexal or abdominopelvic masses, particularly in patients with a history of splenic trauma or surgery. Accurate diagnosis depends on comprehensive imaging evaluation and thorough medical history review, which are critical to preventing misdiagnosis as malignancy and avoiding unnecessary surgical intervention.

Keywords: splenosis, ultrasound, contrast-enhanced abdominal computed tomography, case report

Background

Splenosis is a benign, acquired condition characterized by the ectopic implantation of splenic tissue, typically following traumatic splenic rupture or splenectomy, with an estimated incidence ranging from 16% to 67%.[1,2] The most common mechanism of splenosis implantation is direct seeding of splenic tissue onto peritoneal surfaces after trauma. Less commonly, hematogenous spread via the splenic vein may lead to ectopic deposits in distant sites such as the liver, gastrointestinal tract, pelvic cavity, or even subcutaneous tissues.[1] Although generally asymptomatic, splenosis can closely resemble malignant or metastatic disease on imaging, as it often presents as multiple nodular lesions scattered throughout the abdomen or pelvis.[3] Due to its nonspecific clinical and radiologic features, accurate diagnosis of splenosis remains a significant challenge in clinical practice.

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Herein, we report a rare case of multiple splenosis implants in the abdominal and pelvic cavities of a young woman. This case highlights the diagnostic value of comprehensive imaging evaluation and clinical history in identifying splenosis. Our report aims to enhance diagnostic awareness and prevent unnecessary surgical intervention in similar presentations.

Materials and Methods

Ultrasound Examination

The transvaginal ultrasound examination was performed using Mindray's Resona 8 system equipped with a transvaginal probe (frequency range: 5–9 MHz). During the procedure, the patient was positioned in lithotomy with appropriate bladder distension. The probe, covered with a sterile sleeve and coated with coupling gel, was inserted vaginally to scan the uterus, bilateral ovaries, and adnexal regions. Multiplanar scanning (sagittal, coronal, and transverse planes) was conducted to evaluate uterine morphology—including intrauterine device (IUD) position—the size and morphology of both ovaries, internal echogenicity, and the presence of any adnexal abnormalities. For the right adnexal mass identified, detailed assessment included its margins, shape, internal echogenic uniformity, and relationship with adjacent structures such as the right ovary and bowel.

Color Doppler flow imaging (CDFI) was applied to evaluate vascular distribution and blood flow signals within and around the lesion.

For the supplementary three-dimensional ultrasound examination, a volumetric probe (frequency range: 4–9 MHz) was used to acquire pelvic volumetric data based on the two-dimensional ultrasound findings. Post-processing techniques, including multiplanar reconstruction and surface rendering, were applied to visualize the spatial location of the mass in the right adnexal region and its anatomical relationship with the right ovary and adjacent intestinal loops.

The equipment used for abdominal ultrasound examinations was identical to that used for transvaginal examinations, employing a convex array abdominal probe with a frequency range of 2–5 MHz. Patients were instructed to fast for at least 8 hours before the examination. The liver, gallbladder, pancreas, kidneys, and spleen were scanned sequentially, with particular emphasis on assessing the spleen's anatomical location. Multiplanar scanning of the left upper abdomen was performed to confirm whether normal splenic tissue was present and to detect any abnormal structures. Finally, dynamic real-time scanning of the splenic region was conducted, and findings were recorded to verify the presence or absence of normal splenic morphology.

Contrast-Enhanced Abdominal Computed Tomography (CECT)

The examination was performed using a 64-slice or higher multi-detector spiral computed tomography (CT) scanner. The patient was positioned supine, and an initial non-contrast scan covering the entire abdomen and pelvis (from the hepatic dome to the symphysis pubis) was obtained. Subsequently, a contrast-enhanced scan was performed using a non-ionic iodinated contrast agent (eg, iopamidol, 300 mg I/mL). The contrast agent was administered via an automatic injector through the antecubital vein at a rate of 3.0–3.5 mL/s, with a total dose of 1.0–1.5 mL per kilogram of body weight. Dynamic contrast-enhanced scanning was then conducted in three phases: arterial (25–30s after injection), portal venous (50–60s), and delayed (120–180s). The scanning range and technical parameters were consistent with those of the non-contrast scan. Post-processing techniques, including multiplanar reconstruction (MPR) and maximum intensity projection (MIP), were applied to evaluate the size, distribution, density, and enhancement characteristics of nodules in the abdomen, pelvis, and right adnexal region.

Laboratory Tests

For differential diagnostic purposes, serum tumor marker testing was performed. Five milliliters of fasting venous blood were collected from the patient. Using chemiluminescent immunoassay analyzers with corresponding reagents, the following markers were measured: carcinoembryonic antigen (CEA), carbohydrate antigen 19–9 (CA19-9), carbohydrate antigen 125 (CA125), and human epididymis protein 4 (HE4). The reference ranges were as follows: CEA < 5 ng/mL, CA19-9 < 37 U/mL, CA125 < 35 U/mL, and HE4 < 150 pmol/L.

Diagnostic Criteria and Data Analysis

The diagnosis of splenic implantation in the abdominal and pelvic cavities was established based on the following comprehensive criteria. Clinically, the patient had a clear history of traumatic splenic rupture followed by surgical repair. On imaging, the diagnosis relied on the identification of adnexal or intra-abdominal masses with sonographic and radiologic characteristics consistent with splenic tissue, including their vascular pattern and enhancement behavior on contrast-enhanced imaging. Laboratory evaluation included assessment of tumor markers to exclude malignancy. All imaging data were independently reviewed by two senior sonographers and one senior radiologist, each with more than 10 years of clinical experience. Any discrepancies were resolved through joint discussion until consensus was reached.

Case Report

A 31-year-old female patient presented for follow-up after undergoing an abortion and IUD placement. She reported no discomfort, had no significant past medical history, and exhibited no abnormalities on physical examination. A previous abdominal ultrasound performed at an outside hospital subjectively noted a smaller-than-average spleen but did not include specific measurements. Transvaginal ultrasonography at our hospital revealed a normally appearing uterus with the IUD appropriately positioned (Figure 1A and B). The right ovary measured approximately 4.5 × 3.0 × 3.5 cm (Figure 1C). Notably, in the right adnexal region, a hypoechoic mass measuring about 3.2 × 1.7 × 2.3 cm was identified, poorly demarcated from the right ovary. The mass exhibited homogeneous echogenicity, a well-defined boundary, irregular morphology, and a surrounding capsule-like structure. It was located adjacent to the right ovary and bowel loops (Figure 1D). CDFI demonstrated abundant internal blood flow within the mass, with partial arterial supply originating from the ovarian artery (Figure 1E). No abnormalities were observed in the left ovary and left adnexal region (Figure 1F). Additionally, an anechoic area measuring approximately 1.7 cm in depth was noted in the pelvic cavity (Figure 1G). Three-dimensional ultrasound further confirmed that the mass was located in the pelvic cavity, attached to the right ovary and intestinal tract, and remained poorly demarcated from the ovary (Figure 2A and B).

To further investigate the origin and nature of the right adnexal mass, we expanded the imaging evaluation to include the entire abdomen. Initial abdominal ultrasound revealed no abnormalities in the liver and kidney (Figure 3A). However, the spleen was not visualized in its typical anatomical location. A spleen-like structure in the left upper abdomen was identified as the left lobe of the liver (Figure 3B). Subsequent dynamic ultrasound scanning of the splenic region confirmed the absence of normal splenic tissue (Video S1). Notably, a surgical scar was observed in the patient's left upper abdomen during the examination. Further review of her medical history revealed that she had sustained a traumatic splenic rupture 10 years earlier due to a fall during a mugging. At that time, she was treated at an outside hospital with

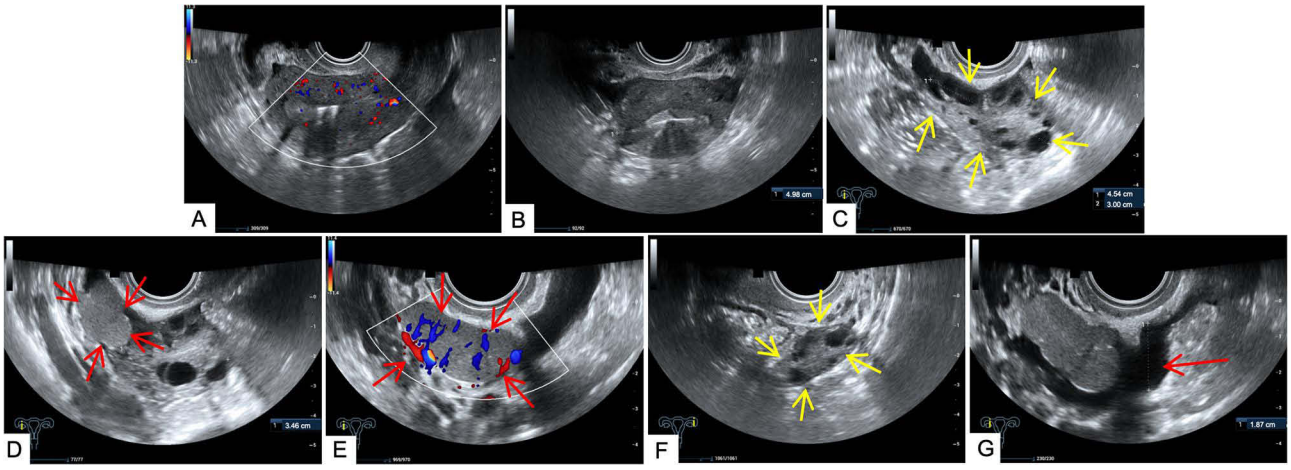

Figure 1 Transvaginal ultrasound findings. (**A** and **B**) Sagittal and coronal views of the uterus with correctly positioned IUD. (**C**) Right ovary (yellow arrows). (**D**) Right adnexal hypoechoic mass adjacent to ovary and bowel (red arrows). (**E**) CDFI showing internal vascularity of the mass (red arrows). (**F**) Left ovary and adnexal (yellow arrows). (**G**) Pelvic hypoechoic fluid area (red arrows). "i" indicates the body surface marker on the probe; numbers before "cm" denote corresponding measurement distances.

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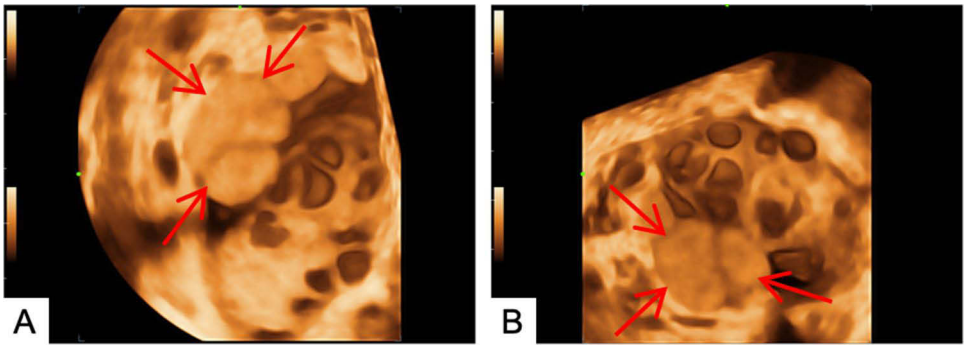

Figure 2 Three-dimensional imaging. (**A** and **B**) Exact position of the right adnexal mass (red arrows).

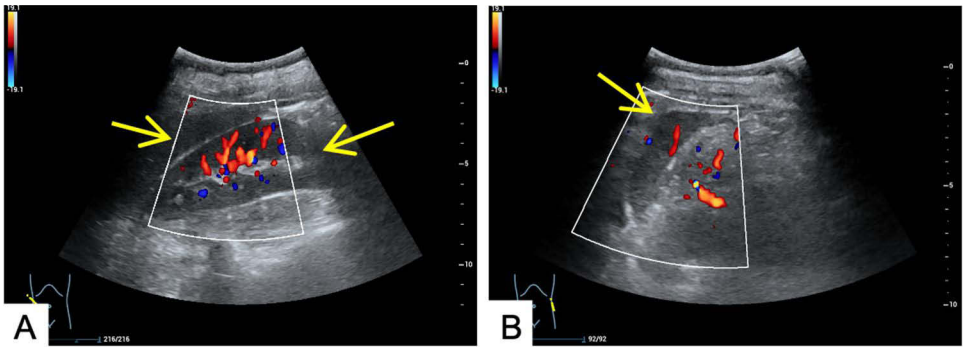

Figure 3 Abdominal ultrasound. (**A**) Liver (left yellow arrow) and kidney (right yellow arrow). (**B**) Left upper abdomen in the splenic region (yellow arrow). "i" indicates the body surface marker on the probe.

splenic repair rather than splenectomy. Subsequent annual physical examinations, including abdominal ultrasounds, did not reveal any abnormalities; however, the examining physicians had verbally noted that the spleen appeared smaller than normal. Tumor markers, including CEA, CA19-9, CA125, and HE4, were all within normal limits.

CECT subsequently revealed the absence of normal splenic morphology and parenchymal density in the left upper abdomen. Unexpectedly, in addition to the right adnexal mass, multiple round or ovoid nodules of varying sizes were identified in the left abdomen, lower abdomen, and pelvis (Figure 4A). The largest nodule, located in the right adnexal region, measured approximately 3.2×1.8 × 2.4 cm, while the remaining nodules ranged from 0.5 to 1.1 cm in diameter. All nodules demonstrated homogeneous soft tissue density and well-defined margins. Dynamic CECT revealed marked enhancement of the lesions (Figure 4B).

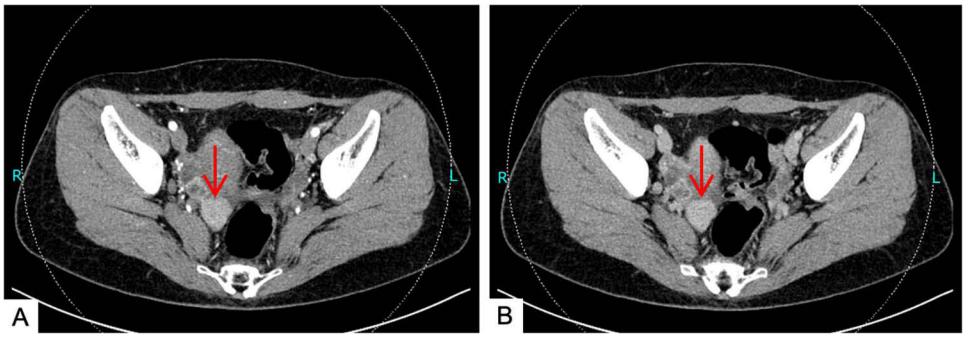

Figure 4 CECT. (**A**) Multiple soft tissue nodules in the abdomen, pelvis and right adnexal region (red arrows). (**B**) Enhancement of nodules on dynamic CECT (red arrows). "L" and "R" indicate the left and right sides of the body, respectively.

Based on the clinical history, ultrasonography, and CECT findings, the lesion was considered benign and consistent with multiple splenosis involving the abdominal and pelvic cavities, while malignant conditions were effectively ruled out. Given the absence of symptoms, no specific treatment was indicated, and regular follow-up was advised. No significant change in lesion was observed over a one-year follow-up period.

Discussion

Splenosis refers to the autotransplantation of splenic tissue fragments following traumatic splenic rupture or splenectomy.[1] These ectopic implants are anatomically and functionally independent of the native spleen, lacking vascular and neural connections.[4] The ectopic splenic tissue is completely isolated and can be distributed throughout the abdominal cavity.[4] Its localization is largely determined by the original anatomical position of the spleen and the pathways through which the tissue fragments disseminate.[3] Common implantation sites include the serosal surface of the small intestine, greater omentum, parietal peritoneum, mesentery, and pelvis, while less common sites include the liver, diaphragm, and other supradiaphragmatic organs.[3] The concept of post-traumatic splenosis was first introduced by von Kuttner in 1910 based on autopsy findings, and its ectopic implantation mechanism was experimentally validated by von Staubenrauch in 1912 using animal models.[4] In the present case, a right adnexal mass was incidentally identified during follow-up ultrasonography in a woman who had previously undergone abortion and IUD placement. Further abdominal imaging, combined with a detailed medical history review, led to a definitive diagnosis of multiple splenosis involving the abdominal and pelvic cavities. Notably, this case underscores the importance of considering ectopic splenic tissue in the differential diagnosis of adnexal masses. Despite its imaging resemblance to a malignant adnexal mass, the lesion was correctly identified as benign splenosis through comprehensive imaging assessment and clinical correlation, thereby avoiding unnecessary surgical intervention. This case reinforces the diagnostic value of integrated imaging analysis and highlights the need for vigilance in similar clinical practice.

The mechanism underlying splenosis primarily involves the rich vascular supply of the spleen and the dissemination of splenic tissue fragments into the abdominal and pelvic cavities following trauma or splenectomy.[1,5] These fragments interact with surrounding fibrous tissue to form a scaffold, which subsequently supports differentiation into lymphocytes, endothelial sinusoids, capillaries, and ultimately splenic-like tissue—resulting in autologous ectopic implantation.[1] There are three main pathways of implantation. The first and most common mechanism is direct implantation, in which involves the deposition of splenic tissue fragments onto adjacent structures—such as the omentum, parietal peritoneum, serosal surface of the intestinal wall, and pelvic cavity—following traumatic injury.[6] The second mechanism is Irrigation-mediated dissemination, in which intraoperative peritoneal lavage with saline disperses splenic fragments to distant peritoneal surfaces, leading to secondary implantation.[1] The third and relatively rare mechanism is hematogenous spread, whereby splenic progenitor cells disseminate through the splenic venous circulation and seed distant organs, most commonly the liver.[7,8] Clinically, splenosis is generally asymptomatic and is often discovered incidentally during physical examinations or evaluation for unrelated conditions,[1] as demonstrated in the present case. In rare cases, splenosis may present with non-specific symptoms such as abdominal pain, palpable mass, distension, or even intestinal obstruction. These manifestations are usually associated with unusual implant locations or excessive proliferation of ectopic splenic tissue.[9–11] Because of its nonspecific clinical feature, splenosis can be mistaken for malignant or metastatic disease, potentially leading to unnecessary surgical intervention. Therefore, thorough medical history-taking—particularly regarding any prior splenic trauma or splenectomy—is essential for making an accurate diagnosis.

Splenosis typically present as homogeneous, well-defined round or ovoid nodules on ultrasound. On CDFI, these lesions appear hypoechoic or isoechoic with abundant internal vascularity. Contrast-enhanced ultrasound (CEUS) enhances diagnostic accuracy; for example, in hepatic splenosis, lesions typically exhibit homogeneous hyperenhancement during the arterial and portal phases with persistent enhancement in the late phase, in contrast to the washout pattern characteristic of malignant lesions.[12,13] On CT, they exhibit soft tissue density and show enhancement during the arterial and portal venous phases, resembling that of native splenic tissue.[12,14] Magnetic resonance imaging (MRI) demonstrates characteristic low T1 and high T2 signal intensity, consistent with that of normal splenic parenchyma.[3,15] Additionally, ^{99m}Tc-labeled heat-denatured erythrocyte scintigraphy, ^{99m}Tc-sulfur colloid single-photon emission computed tomography (SPECT), or image-guided biopsy can aid in confirming the diagnosis of splenosis and preventing

unnecessary treatment.[16–19] Although ^{99m}Tc-labeled heat-denatured erythrocyte scintigraphy is considered the gold standard for the definitive diagnosis of splenic tissue, this modality was not utilized in the present case. The patient was asymptomatic, and the diagnosis was strongly supported by multimodal imaging findings and a documented history of surgical repair for traumatic splenic rupture. Furthermore, the imaging characteristics—multiple well-defined nodules with homogeneous enhancement—were highly suggestive of splenosis. Given this clinical context, additional confirmatory imaging was deemed unnecessary.

Recent studies have highlighted the pivotal role of multimodal imaging in the diagnosis of splenosis. CEUS has attracted increasing attention for its ability to replicate the enhancement patterns of normal splenic tissue, thereby improving specificity in differentiating benign splenosis from metastatic disease. Evidence indicates that the combination of CEUS and MRI enables accurate identification of intrahepatic splenosis based on characteristic enhancement kinetics and signal intensity profiles.[20] In cross-sectional imaging, CT and MRI remain indispensable tools for evaluating lesion morphology, distribution, and internal characteristics.[12,15] Furthermore, several case series and reviews have proposed a structured diagnostic framework integrating CEUS, CT, and MRI to improve diagnostic consistency for ectopic splenic lesions, and this multimodal approach is increasingly recommended.[21] By integrating these imaging modalities, clinicians can more accurately distinguish splenosis from malignancy, minimize unnecessary biopsies or surgical resections, and achieve more precise noninvasive diagnoses. In the present case, the lesion appeared as a hypoechoic mass in the right adnexal region, poorly demarcated from surrounding structures and connected to the right ovary and adjacent bowel. It demonstrated a cystic border and prominent internal vascularity, with partial arterial supply derived from the ovarian artery. These features were partially consistent with previously reported ultrasonographic findings of splenosis.[20] Subsequent abdominal CT confirmed the presence of multiple round or ovoid nodules in the right adnexal region, pelvis, and left abdomen. These nodules exhibited homogeneous soft tissue density and marked contrast enhancement, in line with previously described CT characteristics of splenosis.[14,22]

As the spleen is a vital immune organ, the incidence of fulminant infections following total splenectomy is significantly higher than that in the general population.[23] Moreover, splenic nodules may retain compensatory immunologic function. Therefore, asymptomatic splenosis generally does not require treatment.[1,5]

This case report has several limitations. First, the diagnosis of splenosis was primarily based on imaging findings and clinical correlation rather than histopathological confirmation or nuclear medicine imaging such as ^{99m}Tc-labeled heat-denatured erythrocyte scintigraphy, which may reduce diagnostic certainty. Second, as a single case, it cannot fully represent the spectrum of clinical manifestations and imaging characteristics associated with splenosis. In addition, the absence of long-term follow-up data limits the evaluation of lesion morphology and stability over time. Nevertheless, the diagnosis in this case is strongly supported by multimodal imaging features, comprehensive clinical assessment, and a documented history of surgical repair following traumatic splenic rupture, all of which are consistent with previously reported diagnostic criteria for splenosis.

Conclusion

In conclusion, we report a case of abdominopelvic splenosis in a young woman, incidentally detected during routine follow-up after abortion and IUD placement. The diagnosis was established through a series of imaging studies, supplemented by thorough review of the patient's medical history and additional imaging evaluations. Given the absence of symptoms, no intervention was necessary. This case underscores the importance of considering splenosis in the challenging differential diagnosis of adnexal or abdominopelvic masses, particularly in patients with a history of splenic trauma or surgery. Comprehensive imaging evaluation plays a critical role in recognizing splenosis, thereby preventing misdiagnosis as malignancy and avoiding unnecessary surgical intervention.

Abbreviations

IUD, intrauterine device; CDFI, Color Doppler flow imaging; CECT, Contrast-enhanced abdominal computed tomography.

Data Sharing Statement

All data supporting the findings of this study are available from the corresponding authors upon reasonable request. Data access requests may be directed to Dr. Jing Zhao (email: zhaojing1@scsfybjy1.wecom.work).

Ethics Approval

This study protocol was reviewed and approved by the Ethics Committee of the Sichuan Provincial Maternity and Child Health Care Hospital. The Ethics Committee of the Sichuan Provincial Maternity and Child Health Care Hospital also approved the publication of the case details.

Consent to Participate

Written informed consent was obtained from the patient for participation in this case study and for publication of the clinical data and images.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests in this work.

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