

# Uterine artery chemoembolization followed by hysteroscopic resection for management of retained placenta accreta with marked vascularity after evacuation of first-trimester miscarriage in angular pregnancy: A case report

Akihiro Takeda<sup>a,\*</sup>, Wataru Koike<sup>b</sup>, Takaaki Katayama<sup>a</sup>

<sup>a</sup> Department of Obstetrics and Gynecology, Gifu Prefectural Tajimi Hospital, Tajimi, Gifu, Japan

<sup>b</sup> Department of Diagnostic Radiology, Gifu Prefectural Tajimi Hospital, Tajimi, Gifu, Japan

## ARTICLE INFO

### Keywords:

Angular pregnancy  
Diagnostic imaging  
Hysteroscopic resection  
Retained placenta accreta  
Uterine artery chemoembolization

## ABSTRACT

**Background:** Angular pregnancy is a rare form of eccentric intrauterine gestation. To determine the management strategy, angular pregnancy should be differentiated from interstitial pregnancy and cornual pregnancy.

**Case:** A 37-year-old woman (gravida 5, para 4) with no previous disease history was referred because of a retained placenta with hemorrhage 20 days following the manual vacuum aspiration of an intrauterine pregnancy performed after the diagnosis of miscarriage at 8 weeks of gestation. At the initial examination, a prominent vascular mass was identified in the left lateral portion of the uterus. The patient's serum  $\beta$ -human chorionic gonadotropin level was 1949 IU/L. Magnetic resonance imaging revealed an enlarged angular space occupied by a suspected retained placenta with expansion of the surrounding myometrium. Three-dimensional computerized tomography showed a prominent vascular mass with a feeding left uterine artery and draining thick left ovarian vein. The diagnosis consisted of retained placenta accreta with marked vascularity after evacuation of a miscarriage in a woman with angular pregnancy. Uterine artery chemoembolization was performed followed by the administration of a single dose of systemic methotrexate. Because the gestational mass persisted and spontaneous expulsion appeared to be unlikely, despite the gradual decline of serum  $\beta$ -human chorionic gonadotropin levels, hysteroscopic resection of the retained placenta was performed and the patient's subsequent recovery was uneventful.

## 1. Introduction

Eccentrically located intracavitary pregnancies, including traditionally termed as cornual and/or angular pregnancies, have long presented complex diagnostic and therapeutic challenges given their inherent relationship to interstitial ectopic pregnancy [1–4].

Angular pregnancy is a rare form of eccentric intrauterine gestation in which implantation of the embryo occurs in the lateral superior angle of the uterine cavity [1–3] (Fig. 1A, B, C). To determine the optimal management strategy, angular pregnancy should be differentiated from interstitial pregnancy, in which implantation occurs within the muscular layer of the most medial part of the fallopian tube (Fig. 1D), and cornual pregnancy, in which implantation occurs in one horn of the septate or bicornuate uterus, or the lateral portion of a rudimentary horn (Fig. 1E).

Recently, this disease entity has been clarified by demonstrating that a favorable obstetric outcome can occur in a significant number of women with angular pregnancy if it is appropriately managed following a precise diagnosis by first-trimester ultrasound [3,4]. However, it is evident that angular pregnancies may be associated with major obstetric morbidities, including postpartum hemorrhage, uterine rupture, and retained placenta, thus eventually requiring a hysterectomy [5]. Thus, cases in which gestational products from angular pregnancy are retained after abortion or delivery represent diagnostic and therapeutic challenges for the physician [6].

Here, a rare case of retained placenta accreta with marked vascularity after the evacuation of a first-trimester miscarriage in a woman with angular pregnancy is presented. The patient was successfully managed by uterine artery chemoembolization followed by

**Abbreviations:** CT, Computerized tomography; MRI, Magnetic resonance imaging; OV, Ovarian vein; UA, Uterine artery; UACE, uterine artery chemoembolization.

\* Corresponding author at: Department of Obstetrics and Gynecology, Gifu Prefectural Tajimi Hospital, 5-161 Maebata-cho, Tajimi, Gifu 507-8522, Japan.

E-mail address: [gyendoscopy@gmail.com](mailto:gyendoscopy@gmail.com) (A. Takeda).

<https://doi.org/10.1016/j.crwh.2021.e00360>

Received 9 September 2021; Received in revised form 18 September 2021; Accepted 20 September 2021

Available online 23 September 2021

2214-9112/© 2021 The Authors.

Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

hysteroscopic resection.

## 2. Case presentation

A 37-year-old woman (gravida 5, para 4) with no previous disease history presented to her gynecologist with a positive urinary pregnancy test at 8 weeks of gestation. A diagnosis of spontaneous miscarriage with subchorionic hematoma was made (Fig. 2A, arrow), manual vacuum aspiration was performed, and the presence of chorionic villi was confirmed histologically.

Twelve days after evacuation, she again presented with persistent vaginal bleeding. Transvaginal ultrasonography detected a mass in the left lateral portion of the uterus. Twenty days after evacuation, she was referred because of increased vaginal bleeding under the suspicion of retained placenta accreta from an angular pregnancy or heterotopic interstitial pregnancy, following the evacuation of an intrauterine miscarriage.

At the initial examination, her serum  $\beta$ -human chorionic gonadotropin ( $\beta$ -hCG) level was 1949 IU/L (Fig. 2B). Upon transvaginal ultrasonography, a heterogenous mass was identified in the left lateral portion of the uterus (Fig. 2C, arrow). Color-Doppler ultrasonography revealed a turbulent vascular flow in the low-echoic structure of the mass lesion (Fig. 2D, arrow).

Because the mass lesion was not precisely localized by ultrasonography, magnetic resonance imaging (MRI) was performed. On T2-weighted MRI with curved planar reconstruction, which was done to show the image along with the longitudinal curved axis of the uterine cavity, the enlarged angular space was occupied by the retained placenta with a longitudinal diameter of 34 mm (Fig. 2E, arrow) and a well-preserved protruding muscular structure surrounded the mass.

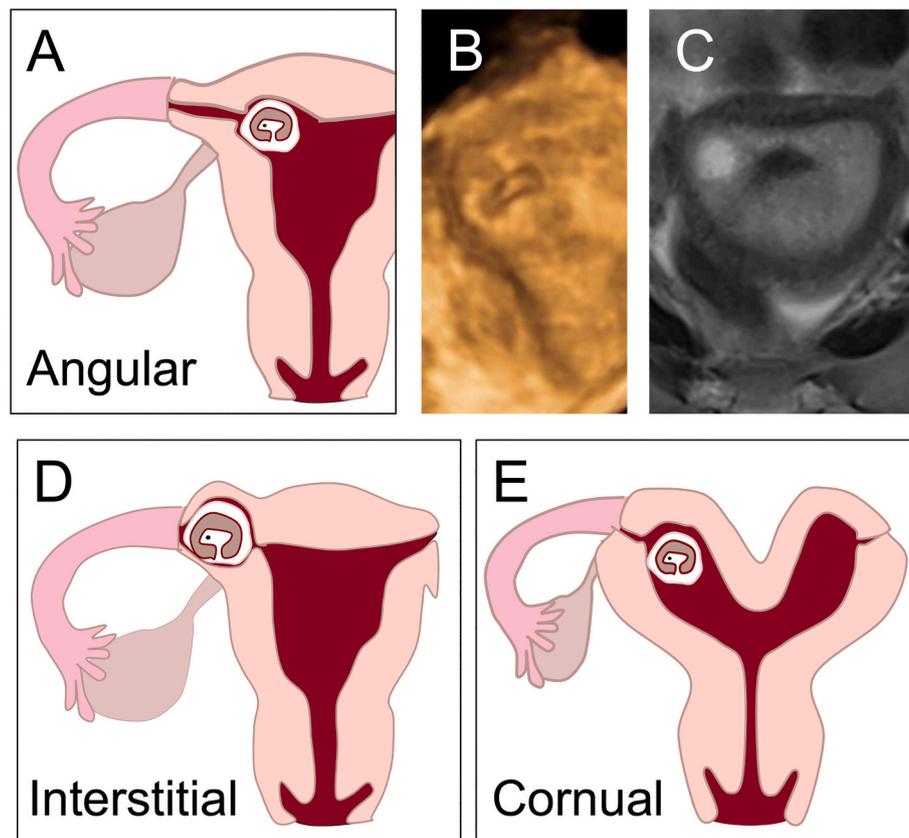
To identify the abnormal vascularization as well as vascular supply

to the gestational products, dynamic four-phase computerized tomography (CT) was additionally performed [7]. The arterial phase of the reconstituted three-dimensional CT revealed that a vascular mass (Fig. 2F, arrow, colored in pink) in the left angular portion contained a feeding left uterine artery (Fig. 2F, UA colored in brown) and a draining thick left ovarian vein (Fig. 2F, OV colored in blue).

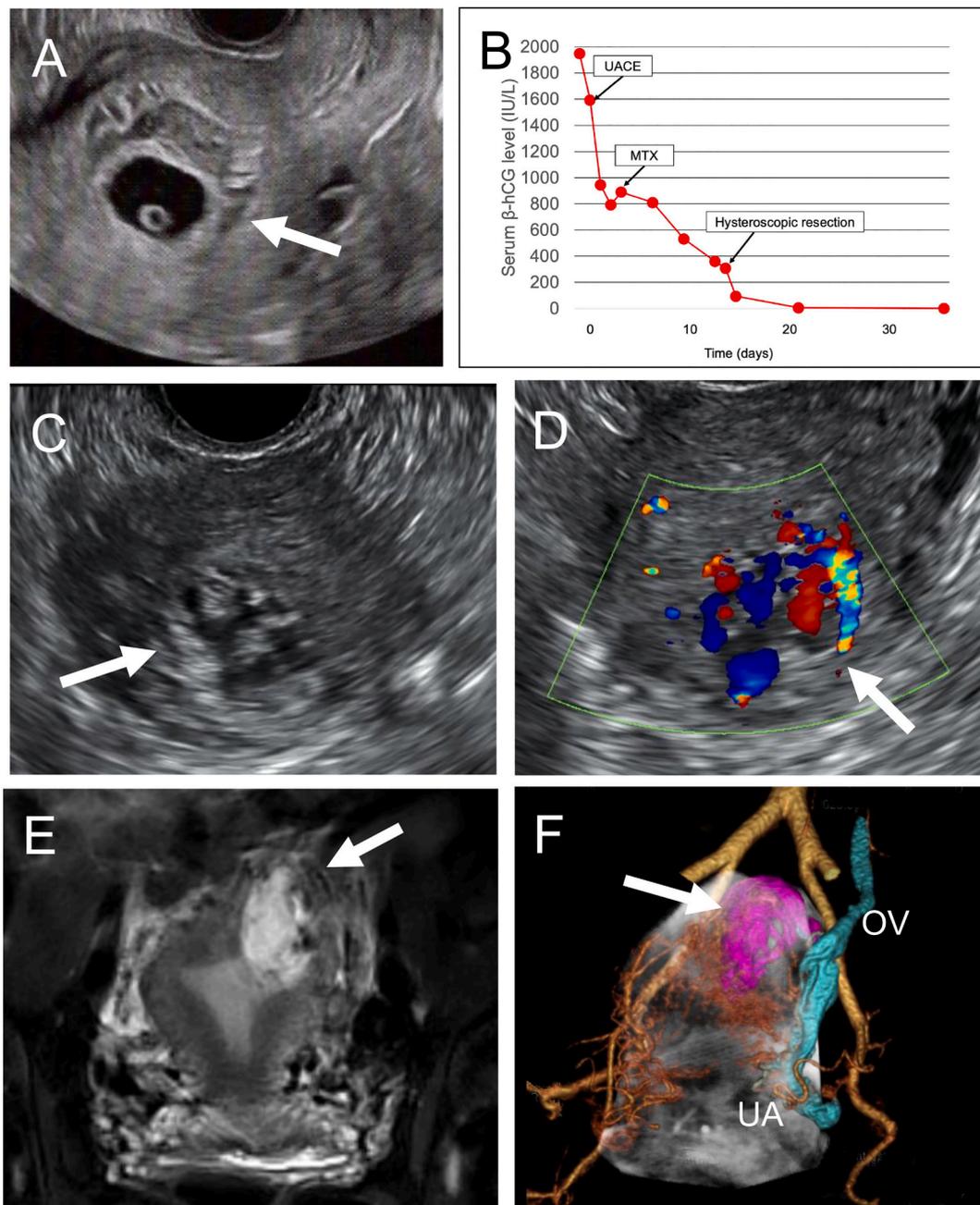
Based on these findings, a diagnosis was made of retained placenta accreta with marked vascularity following evacuation of a miscarriage with angular pregnancy. After receiving counseling on the potential risk of hemorrhage during conservative management and the possible need for hysterectomy in the event of failed management, the patient opted to undergo uterine artery chemoembolization (UACE) [7,8] to devascularize the retained gestational products for immediate hemostasis as a primary conservative intervention. This would permit safer removal by subsequent hysteroscopic surgery, which would be applicable in the event that spontaneous expulsion did not occur.

On digital subtraction angiography [7,8], hyperintense staining of the vascular mass (Fig. 3A, arrow) was evident and it was determined that the blood flow originated from the left uterine artery (Fig. 3A, arrowhead) and the anastomosing right uterine artery (not shown). After identifying the feeding branches of the bilateral uterine arteries by fluoroscopic guidance, a microcatheter was placed. Subsequently, infusional chemotherapy with dactinomycin (0.5 mg/body) (Cosmegen; Merck & Co., Inc., Whitehouse Station, NJ, USA) was performed through the bilateral uterine arteries. Gelatin sponge particles (Serescue; Astellas Pharmaceutical Co., Tokyo, Japan) were then directly injected intra-arterially for thrombosis with complete arterial occlusion.

One day after UACE, uterine hemorrhage ceased and selective devascularization around the gestational mass in the angular portion was confirmed by ultrasonography (data not shown). The patient's serum  $\beta$ -hCG level promptly declined. On the third day following UACE,



**Fig. 1.** (A) A schematic view of angular pregnancy. (B) Three-dimensional ultrasonography showing the gestational products in the right angular portion of the uterus at 5 weeks of gestation. (C) Axial T2-weighted MRI scan showing the gestational products in the right angular portion of the uterus at 5 weeks of gestation. (D) A schematic view of interstitial pregnancy. (E) A schematic view of cornual pregnancy in the bicornuate uterus.



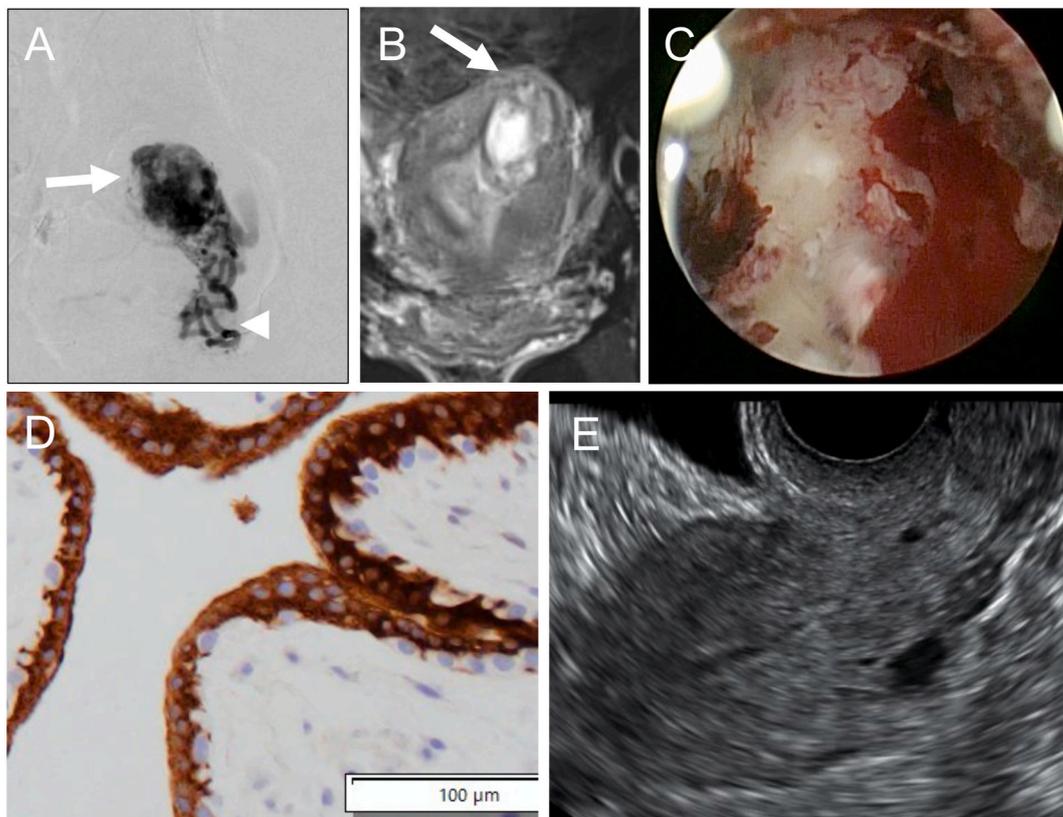
**Fig. 2.** (A) Transvaginal ultrasonography scan showing miscarriage with subchorionic hematoma (arrow) at 8 weeks of gestation. The image was obtained by the patient's gynecologist before evacuation. (B) Changes in serum  $\beta$ -hCG levels in relation to treatment. The gestational products were devascularized by uterine artery chemoembolization (UACE) with dactinomycin and a single dose of systemic methotrexate (MTX), followed by hysteroscopic resection. Following these interventions, the disease course was uneventful. A normal serum  $\beta$ -hCG level was achieved with resolution of the gestational products without the need for additional therapy at 35 days after UACE. The normal serum  $\beta$ -hCG level was 6 IU/L. (C) Transvaginal ultrasonography scan showing the retained placenta accreta with a heterogenous appearance (arrow) in the left lateral angle of the uterus at 20 days following the evacuation of miscarriage. (D) Prominent vascular flow in the retained placenta accreta in an angular pregnancy (arrow). (E) T2-weighted MRI scan with curved planar reconstruction showing an enlarged angular space occupied by the retained placenta with a longitudinal diameter of 34 mm (arrow). The protruding surrounding muscular structure was well preserved. (F) The arterial phase of the reconstituted three-dimensional CT scan showing a vascular mass (arrow, colored in pink) in the left angular portion containing a feeding left uterine artery (UA colored in brown) and a draining thick left ovarian vein (OV colored in blue). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

a single dose of methotrexate (75 mg/body) was administered intramuscularly, because of a slight increase in the patient's serum  $\beta$ -hCG level (Fig. 2B). Thereafter, the patient's serum  $\beta$ -hCG level gradually decreased.

Twelve days after UACE, a gestational mass 31 mm in diameter was still evident on MRI (Fig. 3B, arrow). Some downward movement of the gestational mass with thickening of the surrounding myometrium was

also evident. However, because spontaneous expulsion of the retained placenta appeared to be unlikely, a hysteroscopic resection [7,8] was performed.

Utilizing the cutting loop of a resectoscope as a curette, the villous tissue adhering to the angular uterine wall was gently removed (Fig. 3C) using a repetitive motion to minimize thermal injury to the uterine structure. A histopathological examination of the excised tissue



**Fig. 3.** (A) Digital subtraction angiography showing hyperintense staining of the vascular mass (arrow) in which blood flow primarily originated from the left uterine artery (arrowhead). (B) Axial T2-weighted MRI scan showing the persistence of the gestational mass 31 mm in diameter with some downward movement and thickening of the surrounding myometrium on day 12 after UACE. (C) A hysteroscopic view showing degenerated villous tissue adhering to the angular portion of the uterine wall. (D) Positive immunostaining of  $\beta$ -hCG in trophoblasts from the excised retained placenta accreta in an angular pregnancy. Scale bar = 100  $\mu$ m. (E) Transvaginal ultrasonography scan showing a well-preserved uterine structure. The serum  $\beta$ -hCG levels decreased to below normal ( $<6$  IU/L) without significant hemorrhagic complications on day 35 after uUACE.

confirmed the presence of viable villous tissue with positive serum  $\beta$ -hCG immunostaining (Fig. 3D).

Thirty-five days after UACE, the uterine structure was well preserved according to ultrasonography (Fig. 3E) and serum  $\beta$ -hCG levels had decreased to below the normal value ( $<6$  IU/L) without significant hemorrhagic complications. This was followed by a resumption of a natural menstrual cycle 70 days following UACE.

### 3. Discussion

The actual rate of early pregnancy loss from angular pregnancy has been reported to be 20% [3]. Recent advances in imaging have facilitated the development of a diagnostic algorithm for angular pregnancy in the first trimester [9]. However, there are no established procedures for assessing the status of retained placenta accreta spectrum disorders [10], after either abortion [11] or delivery [6], in angular pregnancy.

In general, transvaginal ultrasonography is the initial modality of choice for the diagnosis of abnormal placentation [9]. Moreover, real-time color-Doppler flow analysis can detect the development of unusual blood flow within the uteroplacental tissue [7,8]. However, even with the additional use of three-dimensional volume rendering on ultrasonography, a critical imaging issue remains regarding the relationship between the retained gestational products and the surrounding uterine structure in angular pregnancy [12].

MRI, which has a large-field multiplanar view and high resolution of soft-tissue components, can be used to identify the relationship between gestational products and the angular portion of the uterine cavity more clearly than ultrasonography [12]. For the patient in this report, the relationship between the retained placental tissue in the angular portion

of the uterus and the surrounding myometrium became evident in the curved multiplanar view of the MRI scan after equivocal findings had been obtained by ultrasonography. This approach enabled a differential diagnosis from interstitial pregnancy in the current case of angular pregnancy.

Despite the advent of conservative strategies that facilitate uterine preservation, the most appropriate treatment for retained placenta accreta in angular pregnancy remains unclear [11]. Once the retained placenta is detected after abortion or delivery in a patient with angular pregnancy, the choice of therapeutic options includes waiting for spontaneous expulsion through observational management, medical intervention using methotrexate, curettage and hysteroscopic removal, or a combination of these procedures [6,11].

Because of the retention of conceptional products, the risks and difficulties of treatment include infection, uterine perforation, bleeding, intrauterine adhesion, and secondary infertility [11]. Therefore, the most appropriate modality should be selected on an individual basis according to the condition of the patient and the preference of the treating physicians.

Where the patient desires uterine preservation, hysteroscopic resection, rather than simple evacuation or curettage, is a favorable conservative surgical option. This procedure is associated with reduced risk of angular perforation, and minimized damage to the uterine wall integrity or placental remnant, but outcomes that may eventually necessitate hysterectomy [11].

During hysteroscopic resection, there is a potential risk of hemorrhage, which may eventually necessitate secondary intervention to achieve hemostasis, which may complicate the preservation of fertility [7,8]. Thus, hysteroscopic management should be considered only when

abnormal vascular development cannot be identified in the retained placental tissue [7,8].

Imaging criteria should be determined to facilitate the identification of cases in which hysteroscopic resection of the retained placenta accreta can be safely performed in angular pregnancy. Based on the limited experience, to achieve a successful outcome in the hysteroscopic management of abnormal placentation [7,8], an assessment of uteroplacental neovascularization in the retained placental tissue as well as the surrounding myometrium is essential to avoid the risk of significant hemorrhage during treatment.

In the present case of retained placenta accreta in angular pregnancy, three-dimensional CT angiography detected the marked development of vascularity around the angular portion. As a result, there was a concern that hysteroscopic resection may cause life-threatening hemorrhage. If unsuccessful, this would eventually necessitate hysterectomy in a woman who desired fertility preservation in the event that hemostasis was unsuccessful.

Therefore, UACE, which has already been demonstrated to be effective for achieving immediate devascularization in the preoperative management of cesarean scar pregnancy [7], as well as in cases with retained placenta accreta after abortion or delivery [8], was selected as an adjunctive preoperative measure before hysteroscopic resection.

Marked devascularization in the angular portion of the uterus was achieved by embolization of the bilateral uterine arteries that fed the gestational mass, with a marked neovascularization and cytotoxic effects from dactinomycin treatment. Consequently, the retained placenta was safely resected hysteroscopically without significant loss of blood. Therefore, preoperative UACE may be a feasible option when performing uterus-conserving hysteroscopic surgery for retained placenta accreta with prominent vascular flow after the evacuation of a miscarriage in patients with angular pregnancy.

In conclusion, a precise evaluation using diagnostic imaging accelerated the conservative management of retained placenta accreta with marked vascularity after evacuation of a miscarriage in a patient with angular pregnancy by hysteroscopic resection following UACE.

#### Contributors

Akihiro Takeda was involved in drafting the manuscript.  
Wataru Koike contributed to patient management.  
Takaaki Katayama contributed to patient management.  
All authors read and approved the final manuscript.

#### Conflict of interest

The authors declare that they have no conflict of interest regarding the publication of this case report.

#### Funding

No specific grant from funding agencies in the public, commercial, or not-for-profit sectors supported the publication of this case report.

#### Patient consent

Written informed consent was obtained from the patient for publication of this case report.

#### Provenance and peer review

This case report was peer reviewed.

#### Acknowledgements

We thank Enago (<https://www.enago.jp>) for English language editing.

#### References

- [1] E.K. Arleo, E.M. DeFilippis, Cornual, interstitial, and angular pregnancies: clarifying the terms and a review of the literature, *Clin. Imaging* 38 (6) (2014) 763–770.
- [2] C.Q. Marfori, M. Kotzen, Angular vs. interstitial pregnancy: A case report highlighting diagnostic nuances with stark management differences, *Case Rep. Womens Health* 19 (2018 Jun 20) e00068.
- [3] K.J. Bollig, D.J. Schust, Refining angular pregnancy diagnosis in the first trimester: a case series of expectant management, *Obstet. Gynecol.* 135 (1) (2020) 175–184.
- [4] A.R. Finlinson, K.J. Bollig, D.J. Schust, Differentiating pregnancies near the uterotubal junction (angular, cornual, and interstitial): a review and recommendations, *Fertil. Res. Pract.* 6 (2020 May 4) 8.
- [5] R.P. Jansen, P.M. Elliott, Angular intrauterine pregnancy, *Obstet. Gynecol.* 58 (2) (1981) 167–175.
- [6] E. Nakatsuka, K. Mimura, M. Endo, T. Miyake, A. Kakigano, S. Matsuzaki, Y. Kawanishi, T. Tomimatsu, T. Kimura, Conservative management for adherent placenta after live birth in angular or interstitial pregnancies: a new entity "angular placenta attachment", *Taiwan J. Obstet. Gynecol.* 59 (6) (2020) 975–979.
- [7] A. Takeda, K. Koyama, S. Imoto, M. Mori, T. Nakano, H. Nakamura, Diagnostic multimodal imaging and therapeutic transcatheter arterial chemoembolization for conservative management of hemorrhagic cesarean scar pregnancy, *Eur. J. Obstet. Gynecol. Reprod. Biol.* 152 (2) (2010) 152–156.
- [8] A. Takeda, K. Koyama, S. Imoto, M. Mori, K. Sakai, H. Nakamura, Placental polyp with prominent neovascularization, *Fertil. Steril.* 93 (4) (2010) 1324–1326.
- [9] Y. Tanaka, K. Mimura, T. Kanagawa, E. Kajimoto, K. Takahashi, A. Kakigano, S. Fujita, Y. Kinugasa-Taniguchi, M. Endo, T. Kimura, Three-dimensional sonography in the differential diagnosis of interstitial, angular, and intrauterine pregnancies in a septate uterus, *J. Ultrasound Med.* 33 (11, 2014) 2031–2035.
- [10] American College of Obstetricians and Gynecologists, Society for Maternal-Fetal Medicine, Obstetric care consensus no. 7 summary: placenta accreta spectrum, *Obstet. Gynecol.* 132 (6) (2018) 1519–1521.
- [11] C. Li, L. Cong, W. Wang, Two cases of larger cornual residual villi, treated by the hysteroscopic cold knife, *J. Obstet. Gynaecol. Res.* 46 (11) (2020) 2430–2434.
- [12] R.A. Parker 3rd, M. Yano, A.W. Tai, M. Friedman, V.R. Narra, C.O. Menias, MR imaging findings of ectopic pregnancy: a pictorial review, *Radiographics.* 32 (5) (2012) 1445–1460.