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## Case Report

## Distinguishing between interstitial and angular pregnancies: Is there a role for saline infusion sonohysterography?

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## ABSTRACT

**Objective:** Interstitial pregnancy occurs in the intramural segment of the Fallopian tubes, while angular pregnancy is one that is located in one of the lateral angles of the uterine cavity. The differential diagnosis and treatment of these conditions are important. We have used saline infusion sonohysterography (SIS) to help in differential diagnosis.

**Case report:** A 36-year-old female with a case of suspected left interstitial ectopic pregnancy was admitted. Her diagnostic laparoscopy showed no tubal ectopic pregnancy, and D&C demonstrated no villi. She underwent SIS which showed a sac in the interstitial part but close to the tubal ostium. The second case involves a 21-year-old female who was 9-weeks pregnant. Ultrasonography could not differentiate between interstitial and angular pregnancy. SIS clearly demonstrated angular pregnancy with a missed abortion, and therapeutic D&C was done smoothly.

**Conclusion:** From reviewing past literature, SIS does not appear to have any proven adverse effect on the pregnancy although it is not widely accepted. This article highlights the benefits of using SIS to aid in the differential diagnosis between the two conditions, especially in unusual cases like ours.

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## Introduction

The terms cornual, interstitial, and angular pregnancies are used inconsistently. Some authors use “interstitial” and “cornual” synonymously, while others refer to gestations in women with a single uterine horn, a bicornuate uterus, or a septate uterus as having cornual pregnancies. An interstitial pregnancy is a uterine but ectopic pregnancy, the pregnancy is located outside of the uterine cavity in that part of the fallopian tube that penetrates the muscular layer of the uterus. Angular pregnancy is located within the endometrial cavity in the corner of the uterine cavity where the tube connects. Interstitial pregnancies can be confused with angular pregnancies, but strict distinction between these two conditions is clinically important because the management methods and outcomes are different. Interstitial and angular pregnancies are the rarest types of ectopic gestation, with an estimated incidence of 1 in 2500 to 5000 live births and mortality rates that are generally greater than that of tubal pregnancies [1,2]. Conventional ultrasound has limitations in the differential

diagnosis of these two conditions. Thus, we present two difficult cases diagnosed with a technique called saline infusion sonohysterography (SIS), which showed high sensitivity as an investigative modality.

## Case report

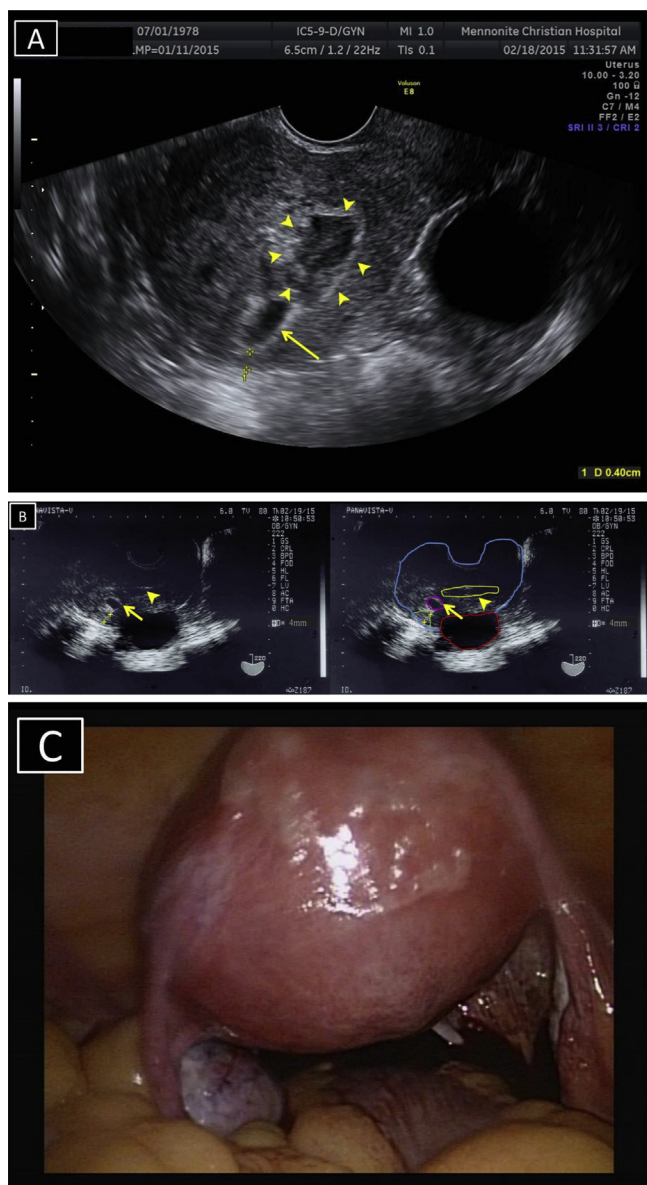
## Case 1

A 36-year-old female with a case of left interstitial ectopic pregnancy was admitted. She had secondary infertility and received ovulation treatment that included clomid and choriogonadotropin in our OBS department. B-HCG was 2708 mIU/ml, and no IUP was revealed ultrasonography on the 35th day, with ovulation presenting on the 15th day on her basal body temperature chart. Diagnostic laparoscopy showed no tubal ectopic pregnancy, and D&C demonstrated no villi.

The patient returned to the clinic on the 39th day with B-HCG of 9710 mIU/ml and no intrauterine pregnancy, but left interstitial ectopic pregnancy was suspected based on ultrasonography (Fig. 1A). On the next day, she underwent SIS (Fig. 1B) in the operating room, which showed a sac in the interstitial part but close to the tubal os. Laparoscopic examination also did not

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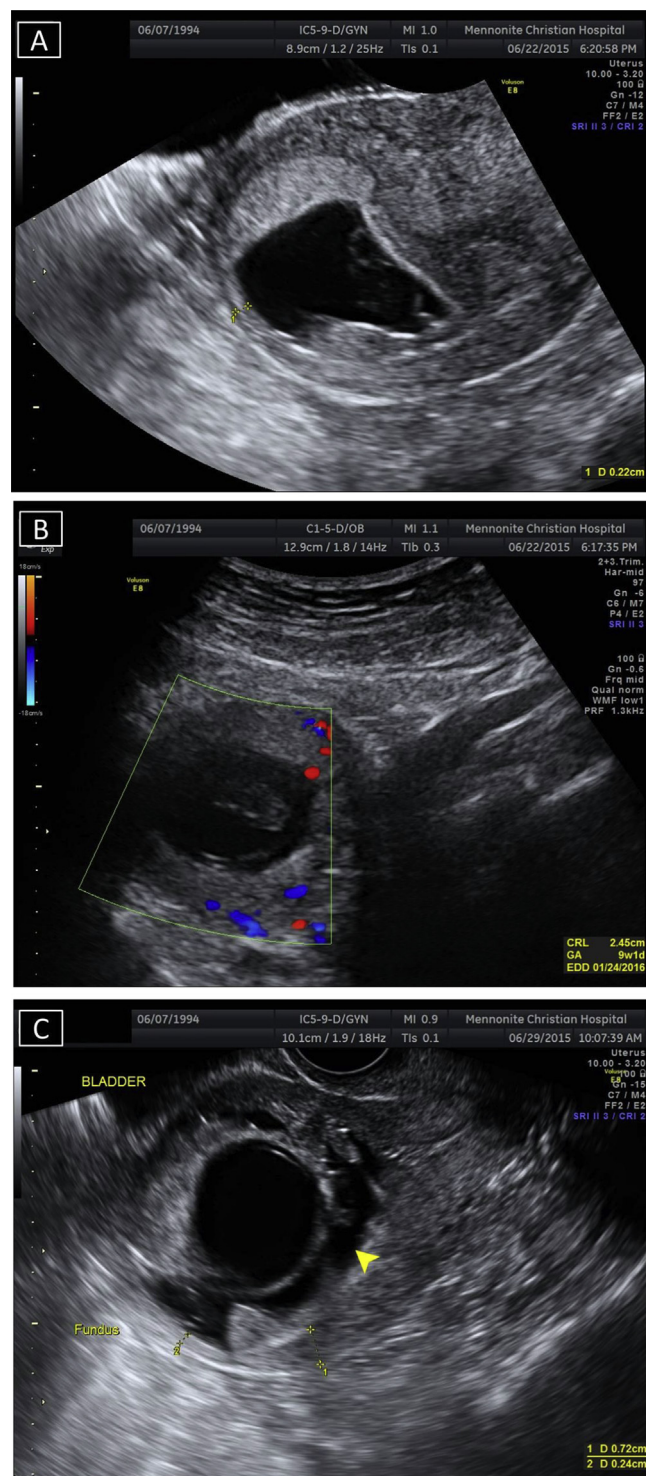


**Fig. 1.** A 36-year-old female was with the left interstitial ectopic pregnancy. **A**, Transvaginal grayscale ultrasound image demonstrating a gestational sac (yellow arrow) suspected to be located in the interstitial portion and no apparent intrauterine pregnancy (yellow arrow head). **B**, Grayscale SIS endovaginal image of the uterus demonstrates a gestational sac (yellow arrow) located in the interstitial part but close to the tubal os. The saline infusion endometrial cavity (yellow arrow head) appears empty. The right side is Correlating diagram. **C**, Laparoscopic view shows no uterine asymmetry, swelling, or round ligament displacement.

demonstrate any asymmetry, swelling, or round ligament displacement due to the small gestational sac (Fig. 1C). Laparoscopic-guided suction D&C were performed with successful results.

#### Case 2

The second case involves a 21-year-old female who was 9-weeks pregnant. Ultrasonography could not differentiate between interstitial and angular pregnancy because the thin myometrial layer (0.22 cm) surrounding the chorionic sac and the inner sac seemed



**Fig. 2.** The second case involves a 21-year-old female who was 9-weeks pregnant. **A**, 2D transvaginal grayscale reveals thin myometrial layer of 0.22 cm surrounding the chorionic sac, and the inner sac seems close to the endometrial cavity. **B**, Color Doppler demonstrates CRL of 2.45 cm with loss of FHM. **C**, A grayscale SIS endovaginal image of the uterus demonstrates an expanded uterine cavity (arrow head) with saline solution surrounding the gestational sac.

close to the endometrial cavity (Fig. 2A). A CRL of 2.45 cm with a loss of FHM was found (Fig. 2B). SIS clearly demonstrated angular pregnancy with a missed abortion (Fig. 2C), and therapeutic D&C were done smoothly.

## Discussion

Angular pregnancy is an intrauterine pregnancy with a distinct clinical course from interstitial pregnancy. The pregnancy is implanted medial to the uterotubal junction in the lateral angle of the uterine cavity and near the proximal ostium of the fallopian tube [3]. In contrast to an interstitial pregnancy, an angular pregnancy is located medial to the round ligament.

For the patient in the first case, the sac was surrounded by 0.4 cm myometrium, but the medial edge was close to the margin of the endometrial cavity, which is compatible with two of the Timor-Tritsch criteria for diagnosis of interstitial pregnancy (empty uterus and thin surrounding myometrium). In the Timor-Tritsch definition, three sonographic criteria can be used: (a) empty uterine cavity; (b) chorionic sac separated by 1 cm from the most lateral edge of the uterine cavity; and (c) a thin myometrial layer surrounding the chorionic sac [4].

Furthermore, no Ackerman interstitial line could be identified in this case [5]. The laparoscopic appearance also did not show any bulging related to the round ligament because the gestational sac was too small. It did not fulfill all the different criteria for interstitial pregnancy. Doubt was raised regarding the exact implantation site of the gestation (interstitial versus angular). However, the sac was clearly identified in the interstitial part of the tube and was very close to the tubal os during the SIS examination performed in the operating room. The sac was easily removed by suction curettage.

In the second case, it was difficult to differentiate between interstitial and angular ectopic pregnancy through regular transvaginal ultrasonography. However, SIS indicated angular pregnancy. While interstitial pregnancies account for only 2–4% of all ectopic gestations, they cause a disproportionately high incidence of hemoperitoneum and shock, and they usually require surgical intervention. However, expectant management for angular pregnancy can be considered a successful option in a symptom-free patient. Although Jansen and Elliot report a 38.5% rate of missed abortion and uterine rupture rates of 13.6% and 23%, respectively. Placental accretism is also a frequent complication [6,7].

In terms of outcome, an interstitial ectopic pregnancy is considered nonviable because the fetus is unable to survive. In angular pregnancy, although it can potentially result in a living baby, the serious subsequent results make termination of the pregnancy an important option. Therefore, SIS could be a useful method after detailed discussion about when these two conditions occur.

Differential diagnosis between interstitial and angular pregnancy remains difficult and challenging. In 1992, three criteria for the diagnosis of interstitial pregnancy were proposed by Timor-Tritsch et al., which have specificity of 88–93% and sensitivity of 40% [4]. A year later, Ackerman et al. described the “interstitial line sign,” which had sensitivity of 80% and specificity of 98% in diagnosing interstitial pregnancy [5]. We have presented the SIS method for distinction between these two conditions after carefully counselling. The SIS procedure involves instilling fluid into the uterine cavity through a plastic catheter and obtaining enhanced endometrial visualization. Conventional transvaginal ultrasonography without fluid contrast cannot adequately evaluate the echogenic endometrium. The addition of saline distends the uterine cavity and creates a sharp interface between the gestational sac and endometrium, which helps to identify the location of the

gestational sac either within or outside the uterine cavity. Although with markedly improved sonographic techniques, 3D sonography makes it possible to delineate the interstitial part of the fallopian tube and define the relationship of the gestation with the uterine cavity more clearly [8]. This method could thus facilitate the differential diagnosis between interstitial ectopic and angular pregnancy. However, since expensive high-resolution 3D ultrasound may not be available, SIS may be a good alternative.

MRI offers benefits of multiplanar imaging, a lack of ionizing radiation, greater soft-tissue contrast than sonography, and more specific characterization of tissues and fluids. MRI can be used to help better define the location of the gestational sac with respect to the endometrium [9]. However, due to the difficulty of access to MRI in an emergency setting and the cost of the machine, the role of MRI in the diagnosis of these conditions is still debatable [10]. Alternatively, SIS is a simple, cheap, and elegant outpatient ultrasound procedure that is designed to help in differentiation.

Interstitial pregnancy sometimes is frequently confused with angular pregnancy, and strict distinction between them is difficult but clinically important due to the different treatment approaches. SIS has the potential to provide more accurate, inexpensive, and less-variable images, particularly when regular transvaginal scan fails to differentiate between interstitial and angular pregnancies and when expertise in difficult ultrasound examinations or MRI is not readily available.

Although, the utilization of SIS in a potentially viable angular pregnancy is not widely accepted, we hope that the additional evidence could help support a new found use of this traditional method in improving differential diagnosis and management of interstitial and angular pregnancies.

## Conflict of interest

The authors have no conflicts of interest.

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