Various Types of Niche Imaging by Sonohysterography: A Pictorial Review

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ABSTRACT
Cesarean scar defects (CSD) or niche are the myometrial discontinuity at the previous cesarean section scar region. Recently cesarean section delivery has been raised around the world markedly; therefore women with cesarean scar defects are increased and present in up to 19% of women post cesarean section. The increase of repeat cesarean section has been associated with an increase in complications in subsequent pregnancies such as scar pregnancy with life threatening bleeding, uterus rupture, placenta accreta and its subtypes and prolonged postmenstrual Spotting. The deeper the niche (or the thinner the overlying myometrium), the higher the risk for complications in a subsequent pregnancy.

Although the ability of transvaginal ultrasound (TVUS) to detect cesarean scars remains unknown, its higher frequency and proximity to the pelvic organs have been used as a powerful tool for detecting the uterine scar of a previous cesarean section. Recently with the increasing use of sonohysterography (SHG) (transvaginal ultrasound with saline infusion) detection of scar defect has been enhanced frequently.

Keywords: Cesarean scar defect, Niche, Sonohysterography, Transvaginal ultrasound.

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INTRODUCTION
A uterine niche is a kind of cesarean scar defect which is defined mostly as a triangular anechoic filling defect with a depth of at least 1 mm in the anterior wall of the uterus usually between the uterine body and in the cervix immediately under the bladder border in the region.1,2 Dehiscence can on the site of cesarean scar occur for a variety of reasons. Influencing factors are the recurrent Cesarean sections and retroflexed uterus and catgut sutures for hysterotomy closure at previous cesarean.3,4 The associated clinical symptoms of CS defect are: prolonged postmenstrual spotting, dysmenorrhea and chronic pelvic pain. Fertility may be affected due to presence of blood in cervical canal that impair the sperm transportation and severe defect may interfere with embryo implantation.5

Cesarean scar defect (CSD) can be identified by transvaginal sonography (TVS).3,6,7 It is not always possible to determine the number and size of scar defects or the thickness of the remaining myometrium over the defect through unenhanced ultrasound imaging.2,3,8 Saline contrast sonohysterography (SHG) may facilitate the diagnosis, especially in the measurement of myometrial thickness and the overlying intact myometrium.2,9,10

While the endometrial cavity is filled with saline, fluid outlines the niche and demarcated the border of the scar defect more clearly and facilitates detection and measurement of scar defect. These measurements are the best predictors for potential complications.

Scars are characterized as deficient if there was notable myometrial thinning on the site. The degree of thinning was expressed by ratio between a/b (Figs 1A and B). The loss of more than 50% of myometrium at the scar level was arbitrarily defined as a severe deficiency4 (Fig. 2). The width of the niche also can be measured by a straight superimposed line adjoining two apposition edge of scar over the niche (c). The depth of the niche is measured between the upper tip of the niche to midpoint of this line (d) (Figs 1A and B).

Patients needed to have completely empty bladder during the test. The ideal time for sonographic evaluation is the early follicular phase, because detection of a niche and measurement of its depth and size may be better detect in thin endometrium.11

The aim of this pictorial review is to introduce varying shape of niche in our cases which is captured by SHG. The study was approved by the ethics committee of Royan institute. Written consent form was taken from all participants.

Various shapes of uterine cesarean scar defects (niche) in TVS and SHG:12
- Thin linear defect (Fig. 3)
- Wedge shape defect (Fig. 4)
- Droplet defect (Fig. 5)
- Semicircular defect (Fig. 6)
- Rectangle defect (Fig. 7)
- Inclusion cyst defect (Fig. 8)
Figs 1A and B: Schematic diagram illustrating measurements of thickness of the residual myometrium over the defect (a), total intact myometrium (b), width (c), and depth (d) of the cesarean scar defect (CSD). The thickness of the residual myometrium is measured between the tip of the niche and serosal surface of the uterus (a) and the thickness of the normal myometrium adjacent to the defect (b) should be recorded. The width of the niche also can be measured by a straight superimposed line adjoining two apposition edge of scar over the niche (c). The depth of the niche is measured between the upper tips of the niche to midpoint of this line (d).

Fig. 2: Severe cesarean scar deficiency, more than 50% of myometrium at the scar level was lost

Fig. 3: Thin linear defect

Fig. 4: Wedge shape defect (triangular)

Fig. 5: Droplet
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- Irregular defect (Fig. 9)
- Multiple defects (Fig. 10).

It has been reported most niches had a semicircular (50.4%) or triangular shape (31.6%).

Comparing SHG and TVS the scar shape is similar in two techniques, but the borders of the scar defects at SHG delineate easier than in unenhanced ultrasound examination and most CSD appear to be larger at SHG. CSD may be misdiagnosed with the scar for underlying pathology or normal variants such as prominent cervical glands, post myomectomy diverticulum, synechiae, and focal adenomyosis.

According to some complications following CSD, routine sonography for detecting CSD has been suggested by some authors, in order to identify ‘silent’ or asymptomatic patients.

**Some Complications Accompanied with Cesarean Scar Defect**

**AUB (Abnormal Uterine Bleeding) and Niche**

There is an association between the width and depth of the CSD. Thurmond et al articulated that AUB with niche may be due to the fact that myometrial contractility around the area of the uterine scar is weak and niche acts as a reservoir.

In recent study by Taiseer MM et al the underlying mechanisms for these symptom are discussed. In this study, congested endometrial fold and small polyps confined to the scar are known to be responsible for abnormal uterine bleeding (AUB) and menorrhagia.

**Risk of Uterine Rupture**

The presence of a niche alone probably should not be considered as a risk factor for uterine rupture during a future pregnancy. There is a strong association between the degree of LUS (lower uterine segment) thinning measured near term and the risk of uterine rupture at birth (Fig. 11). Regnard et al found that, a presence of a previous uterine scar alone should be the most important factor in determining the risk of uterine rupture, the study results showed that the frequency of defects rose as the thickness of the lower uterine segment decreased. Therefore, when the lower uterine segment was thinner than 3.5 mm at 37 weeks of pregnancy, the risk of uterine rupture is greater.
Cesarean Scar Pregnancy

In CSP, the gestation sac is completely surrounded by myometrium and the fibrous tissue of the scar, quite separate from the endometrial cavity. Ultrasound is the first-line diagnostic tool for CSP. The majority of the CSPs have been diagnosed by transvaginal scan (TVS) in the early weeks of pregnancy (Fig. 12). Implantation of an embryo within the scar of a previous cesarean delivery is one of the rarest forms of ectopic pregnancy (EP). Such pregnancies fall into two groups; in type one the embryo starts to progress toward the uterine cavity and may result in live birth despite the high risk of a hemorrhage occurring during birth, type two consist of pregnancies in which the embryo is embedded deep within the cesarean scar (CS) and grows toward the bladder and abdominal cavity, which is very dangerous and needs to be terminated immediately.

A great deal of emphasis has been placed on its early detection and appropriate management. Early diagnosis can lead to prompt treatment, thus decreasing the likelihood of potentially serious complication.

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REFERENCES


