Transvaginal hysterosonographic evaluation of septate uteri: a preliminary report

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The objective of this study was to evaluate the diagnostic value of hysterosonography in septate uterine congenital abnormalities and more particularly in septate uteri. A total of 14 patients with a history of repeated spontaneous abortion or infertility had previously undergone hysterosalpingography were included in this study. Patients were first examined by standard transvaginal ultrasound. Hysterosonography was then carried out by the intrauterine injection of an isotonic saline solution. The septate uteri were diagnosed by hysterosonography in all 14 patients (100%). Hysterosonography permitted the measurement of the thickness and height of the septum. Hysterosonography and transvaginal ultrasound enabled the correct diagnosis of malformation type in eight cases (57%). The accuracy of hysterosonography in postoperative control was greater than that of hysteroscopy. Transvaginal hysterosonography with saline solution is a low-cost, easy and helpful examination method for septate uteri. We propose that hysterosonography should be performed for the primary investigation of infertility and repeated miscarriages.

Key words: hysterosalpingography/hysteroscopy/hysterosonography/septate uteri/transvaginal sonography

Introduction

Ultrasonography has been used to study uterine morphology for ~20 years now. The uterus can be identified easily and the appearance of the uterine cavity and myometrium analysed in detail. The diagnostic contribution of ultrasound to the diagnosis of acquired uterine pathologies such as fibromas or endometrial cancers is now well established. Nevertheless, in cases of congenital abnormalities of the uterus, abdominal and transvaginal sonography have been used with varying success (Fedele et al., 1987).

When used as a screening test in congenital uterine anomalies (Valdes et al., 1984; Nicolini et al., 1987), transvaginal ultrasound has a sensitivity of almost 100%, although distinction between different types of abnormality is often impossible (Reuter et al., 1989). Ultrasound is operator dependent, and hardcopy images can be difficult for a third party to interpret (Randolph et al., 1986). Therefore, other methods are required to complete the diagnostic evaluation, particularly in those patients scheduled for corrective surgery.

Hysterosalpingography is the classic method by which to diagnose uterine abnormalities. It is an invasive test which requires the use of contrast medium and exposure to radiation. Although hysterosalpingography provides a good outline of the uterine cavity, the distinction between different types of lateral fusion disorder is sometimes impossible. Although recent reports have indicated a high diagnostic accuracy for magnetic resonance imaging (Marshall et al., 1987; Carrington et al., 1990; Pellerito et al., 1992) and three-dimensional ultrasound (Jurkovic et al., 1995) in the diagnosis of congenital uterine defects, these techniques are rarely used for this indication. Because of the limitations of current diagnostic methods, the final diagnosis is usually achieved by combining the results of two or more tests.

Sometimes intra-cavitary fluid discharges distend the uterine cavity (Laing et al., 1980) and improve sonographic contrast. Distension can also be obtained artificially by instilling a solution into the cavity (Richman et al., 1984; Roessell et al., 1987; Sahakian and Syrop, 1992), inducing a true sonographic hysterography. Since March 1993, we have developed an endovaginal ultrasound technique associated with the intrauterine injection of an isotonic saline solution, called hysterosonography. Hysterosonography allows the accurate investigation of the uterine endometrium and myometrium. The anatomical images obtained are easily interpreted and can be readily analysed. We (Gaucherand et al., 1995) have reported previously that this technique has a sensitivity of 95% in the study of endometrial and myometrial disease. The objective of this study was to evaluate the place of hysterosonography in the pre-operative diagnosis and postoperative control of septate uteri.

Materials and methods

In all, 14 patients who were referred to the Department of Gynaecology of the Hôpital de la Croix Rousse, Lyon, France for investigations of abnormal uteri were included in our study comparing the performance of hysterosonography with that of hysterosalpingography and transvaginal ultrasound. All these patients were referred with the diagnosis of an abnormal uterus. They had already had hysterosalpingography or transvaginal ultrasound. Nine patients had a history of repeated spontaneous abortion, two had primary sterility and three had threatened premature delivery, including two with breech presentation.

Positive diagnosis

The 14 patients underwent hysterosalpingography. A diagnosis of septate uteri was made if the angle between the two cavities was <75°. A bicornuate uterus was suspected for angles >105° (Reuter...
Findings of Findings of hysterosalpingography or transvaginal ultrasound

<table>
<thead>
<tr>
<th>Findings of hysteroscopy</th>
<th>Findings of hysterosalpingography or transvaginal ultrasound*</th>
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<tbody>
<tr>
<td>Septa</td>
<td>Non-septa</td>
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<tr>
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<td>8 (8)</td>
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<tr>
<td>Non-septa</td>
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<td>Total</td>
<td>8 (8)</td>
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</tbody>
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*Figures for transvaginal ultrasound are given in parentheses.

Transvaginal hysterosonographic evaluation of septate uteri

<table>
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<tr>
<th>Findings of hysteroscopy</th>
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<tr>
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<td>Non-septa</td>
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*Figures for hysterosalpingography are given in parentheses.

Table III. Hysteroscopic and hysterosonographic postoperative control

<table>
<thead>
<tr>
<th>Cases</th>
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<th>Hysterosonography</th>
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</tr>
<tr>
<td>2</td>
<td>Perfect</td>
<td>Perfect</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Septum remaining (20 mm)</td>
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<tr>
<td>4</td>
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<td>9</td>
<td>Septum remaining (25 mm)</td>
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Surgery control
Each patient underwent laparoscopic and hysteroscopic resection. Quality control of the surgical treatment was carried out in 10 patients 45 days postoperatively by hysteroscopy and hysterosonography using the procedure described above.

Results
Eight of the 14 patients had septate uteri according to hysterosalpingography (57%). Bicornuate uteri were diagnosed in six of the 14 patients (43%; Table I). In one case, hysterosonography showed deformation of the uterine cavity by fibromas but the congenital abnormality was not suspected.

Transvaginal ultrasound gave normal results in three of the 14 patients (21%). In eight cases the malformation was indeed suspected by transvaginal ultrasound (57%). In one patient the diagnosis of septate uterus was not possible because of a polyfibroid uterus, while in two other patients the diagnosis was not suspected because of uterine retroversion. Hysterosonography enabled the diagnosis of septate uteri (Table II) in all 14 cases (100%). The maximal thickness of the uterine septum and its height relative to the internal os could always be determined (Figure 1); two uteri were completely septate (100%), six had a partial septum (75%) and in the remaining six the septum was classified as moderate (50%). The patient with the fibromatous uterus was easily examined and the two cavities were visible by the injection of a saline solution. Perfect visualization of the endometrium, enhanced by the contrast medium, indicated the intra-cavitary position of the fibroma. Surgical resection of the septum and fibroma was performed at the same time.

The therapeutic result (Table III) was checked 45 days after surgery. Hysteroscopy and hysterosonography were both used in 10 patients and the results agreed in nine patients. In one patient, hysteroscopy showed the persistence of a spur on the uterine fundus, while this was not detected by hysterosonography.

The sensitivity of hysterosalpingography and transvaginal ultrasound in the diagnosis of septate uteri was 57%. In contrast, all cases of septate uteri were clearly identified by hysterosonography. Furthermore, the reliability of transvaginal ultrasound was reduced because there were six false negatives. There were no false negative or false positive diagnoses of septate uteri with hysterosonography.

Discussion
Congenital uterine anomalies are associated with an increased risk of miscarriage (Jones et al., 1980), premature delivery,
fetal loss in utero, malpresentation and Caesarean section. The diagnosis of a congenital uterine anomaly is usually made in patients with a previous pregnancy loss, while the prevalence in the population is unknown. This is partly because of the lack of a simple and accurate diagnostic test which can be used in low-risk patients. Septate uteri are more often associated with miscarriages caused by poor vascularization of the septum (Musich and Behrman, 1978; Fedele et al., 1993). Surgical correction of the intrauterine septum is necessary to avoid obstetric complications. Formerly, removal of the septum was performed by transabdominal metroplasty (McShane et al., 1983). Currently, operative hysteroscopy is proposed as the procedure of choice for the management of these disorders. Goldenberg et al. (1995) and Cararach et al. (1994) respectively reported 88.7 and 75.0% pregnancy rates after operative hysteroscopy. The rate of pregnancy wastage dropped from 86.5 to 42.8% after surgery. Accurate diagnosis of the type of malformation is absolutely necessary before deciding on surgery.

Our results indicate that hysterosonography may become an important and high-performance tool in characterizing uterine anatomy and diagnosing congenital uterine anomalies. Although our series is small, we have reported previously our experience of hysterosonography in 104 cases of endometrial disease. Hysterosonography allowed the clear visualization of septate uteri and measurement of the height and maximal thickness of the septum. With the injection of saline solution, ultrasound can be carried out independently in the follicular or luteal phase. The examination takes only a few minutes, and transverse and longitudinal sections can be made. The length of the septum is calculated on repetitive transverse sections through the uterine fundus, body and isthmus. The most useful plane was the transverse section through the whole length of the uterus from the fundus to the cervix. This enabled the measurement of uterine depth, of the fundal cleft and of the length of the uterine septum. In contrast, these planes, being perpendicular to the direction of the ultrasound beam, cannot be visualized by transvaginal ultrasound. They are also difficult to obtain on transabdominal ultrasound because the full urinary bladder has a tendency to push the uterus backwards with its anterior surface parallel to the abdominal wall.

Comparison between hysterosonography and hysterosalpingography shows a good correlation between the two methods. The advantages and limitations of the two techniques can be illustrated clearly. Hysterosonography can be used effectively in patients with fibroid uterus. On the other hand, when the fibromas are extensive, the diagnosis of a congenital abnormality is difficult regardless of which diagnostic method is used (hysterosalpingography, transvaginal ultrasound or three-dimensional ultrasound). Fibromas cast a shadow in two-dimensional ultrasound, making exploration of the uterine cavity difficult. It has been suggested that uterine abnormalities could be diagnosed by B-mode ultrasound, but our results show that it has significant limitations. It can detect most cases of septate uteri but gives a certain number of false negatives. A retroverted uterus is often impossible to analyse completely. In any case, because of the impossibility of obtaining tiered transverse sections along the axis of the uterine fundus, the distinction between bicornuate and septate uteri is difficult.

The most important advantage of hysterosonography over hysterosalpingography is the ability to visualize both the uterine cavity and the myometrium by a single technique. This gives full information about the extent of the congenital abnormality, and also facilitates the diagnosis of the type of malformation.

Diagnosis of these abnormalities is based on accurate measurement of the uterine fundus and the length of the septum, which cannot always be determined by transvaginal ultrasound and hysterosalpingography. In such cases, the diagnosis is based on indirect measurements and on a subjective impression of the uterine fundus. Hysterosonography is the best diagnostic tool in comparison with all other routine paraclinical tests to detect congenital abnormalities of the uterus.

Being cheap and easy to perform, hysterosonography may be preferable to all other routine clinical diagnostic methods. Hysterosalpingography, hysteroscopy nor laparoscopy alone enables the accurate diagnosis of various fusion anomalies.
This is important in the case of septate uteri because surgical correction is often indicated in patients with a septate uterus. To achieve a reliable diagnosis of septate uterus, hysterosalpingography and laparoscopy, or hysteroscopy and laparoscopy, are necessary. The need to use two procedures delays the diagnosis, increases the risks associated with each technique and often increases costs and patient discomfort.

Confirmation of the surgical resection of the septum is important before a new pregnancy can be allowed. Many teams carry out this confirmation by hysteroscopy. Our results show that hysterosonography is more accurate than hysteroscopy as the natural spur of the uterine fundus can be mistaken for the remainder of the septum by hysteroscopy, whereas hysterosonography allows a detailed study of the uterine fundus (Figure 2) by transverse and sagittal sections (Narayan and Goswamy, 1993).

In conclusion, by using hysterosonography, it is possible for the first time to perform a complete ultrasound examination of uterine morphology, including both the uterine cavity and uterine muscle. Although our number of cases is small, the simplicity of the technique has led us to routinely perform hysterosonography after transvaginal sonography in cases of repeated spontaneous abortion or suspected uterine abnormality. We believe that hysterosonography is the method of choice for the diagnosis of congenital abnormalities of the uterus.

References


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