Transvaginal hysterosonographic evaluation of septate uteri: a preliminary report

B. Salle, P. Sergeant, P. Gaucherand, I. Guimont, P. de Saint Hilaire and R. C. Rudigoz

Department of Gynaecology, Obstetrics, Infertility and Ultrasound, Hôpital de la Croix Rousse, 93 Grande Rue de la Croix Rousse, 69004 Lyon, France

1To whom correspondence should be addressed.

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 who 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 hysterotomy. 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

Ultrasound 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; Roessel 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 et al., 1984; Roessel et al., 1987). Sometimes intra-cavitary fluid discharges distend the uterine cavity (Richman et al., 1984; Roessel 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.
Table I. Hysterosalpingography and transvaginal ultrasound results in septate uteri

<table>
<thead>
<tr>
<th>Findings of hysteroscopy</th>
<th>Findings of hysterosalpingography or transvaginal ultrasound*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Septa</td>
</tr>
<tr>
<td>Septa</td>
<td>8 (8)</td>
</tr>
<tr>
<td>Non-septa</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Total</td>
<td>8 (8)</td>
</tr>
</tbody>
</table>

*Figures for transvaginal ultrasound are given in parentheses.

et al., 1989); for angles between 75 and 105° the choice was left to the examiner.

Each patient then underwent a conventional B-mode transvaginal sonography carried out in the luteal phase of their cycle. An ATL Ultra Mark 9 (Advanced Technology Laboratories, Bothel, WA, USA) was used with a 5 MHz vaginal probe. The ultrasound examinations were all carried out by the same operator. The pelvic examination routinely included the position, size and morphology of the uterine fundus. In a second instance, hysterosonography was carried out. The hysterosonography method was based on fluid instillation into the uterine cavity to induce distension, thus considerably improving the sonographic contrast. The procedure was carried out in the consultation room and needed a gynaecological examination table and a basin to collect the leakage. The uterine cervix was exposed with a speculum disinfected with iodine solution. A syringe containing 50 ml isotonic saline solution was attached to a polyethylene catheter (CCD Laboratories, Paris, France), which was introduced into the cervix. The catheter was 18.5 cm long, with an external diameter of 1.6 mm and an internal diameter of 1.1 mm. It did not have a balloon so as to avoid any pain. About 60 ml saline solution were necessary for the whole procedure. The speculum was then withdrawn and the endovaginal probe introduced. Transverse and sagittal sections were recorded while injecting the physiological serum, i.e. the saline solution. The septum was visualized as an echogenic portion separating the uterine cavity into two parts. The septum's weight was calculated on repetitive transverse sections of the uterus. The septum was classified as complete (100%) if it reached the internal os, partial (75%) if it reached the isthmus and moderate (50%) if it only reached the uterus corpus. Its thickness was calculated across its widest part, most often at the site of insertion of the fundus. The final diagnosis was confirmed by laparoscopy and hysteroscopy, and the 14 patients had the septum corrected surgically.

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.

Hysterosalpingography 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 miscarriage caused by poor vascularization of the septum
(Musich and Behrman, 1978; Fedele et al., 1993). Surgical
correction of the intruterine 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 uterus 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


Received on November 16, 1995; accepted on February 6, 1996