Transrectal ultrasonography in the assessment of congenital vaginal canalization defects

L.Fedele¹, A.Portuese², S.Bianchi³, G.Zanconato¹ and R.Raffaelli¹

¹Department of Obstetrics and Gynecology, ²Department of Radiology, Università di Verona, Policlinico Borgoroma, 37134 Verona and ³Department of Obstetrics and Gynecology, University of Milano, Italy

Our aim was to evaluate the reliability of transrectal ultrasonography in the pre operative assessment of congenital vaginal canalization defects. We studied nine patients, six with suspected Rokitansky syndrome and three with suspected complete transverse septum. Before corrective surgery all the patients underwent pelvic examination, transabdominal and transrectal ultrasonography. The ultrasonographic findings were compared with the surgical ones. Transrectal ultrasonography provided an accurate map of the pelvic organs showing the precise distances between the urethra and bladder anteriorly, rectum posteriorly, retrohymenal fovea caudally, and pelvic peritoneum cranially. Transrectal ultrasonography produced a picture that corresponded perfectly with the real anatomical situation. Conversely, abdominal ultrasonography provided inadequate images in six of our nine patients, and magnetic resonance imaging was responsible for a mistaken diagnosis in one patient with suspected transverse vaginal septum. In conclusion, if our results are confirmed in larger series, transrectal ultrasonography could be considered as a diagnostic procedure of choice in the assessment of vaginal canalization defects.

Key words: transrectal ultrasonography/vaginal agenesis/ vaginal atresia

Introduction

Congenital defects of vaginal canalization are rare anomalies which include transverse vaginal septum, vaginal agenesis alone or associated with uterine agenesis and partial vaginal atresia (Markham and Waterhouse, 1992). Surgical treatment may be efficacious provided that the anatomical characteristics of the individual cases are clearly defined. Unfortunately, this has not been easy until now as the generally used instrumental investigations, except magnetic resonance imaging (MRI) (Markham et al., 1987; Letterie et al., 1988; Fedele et al., 1990; McCarthy, 1990; Hugosson et al., 1991; Bakri et al., 1992), produce information that is not always adequate.

The availability of transrectal ultrasonography with biplane probe led us to evaluate this diagnostic procedure in the preoperative assessment of congenital vaginal canalization defects.

Materials and methods

We studied nine patients, six (patients 1–6) with suspected Rokitansky syndrome and three (patients 7–9) with suspected complete transverse septum. Patients 1–6 were sent for elective surgery at our department. This subgroup, aged between 15 and 19 years, had primary amenorrhoea, 46,XX karyotype, and reported the impossibility of having sexual intercourse. The secondary sex characteristics were normal, as were luteinizing hormone (LH), follicle-stimulating hormone (FSH), thyroid-stimulating hormone (TSH), prolactin, oestradiol and testosterone concentrations. At physical examination the external genitalia appeared normal with regular hymen beyond which was an indentation of depth varying from 0.5–1.5 cm at examination with a probe. Rectal exploration excluded the presence of haematocolpos and did not detect a uterus in patients 1–6. Abdominal ultrasonography demonstrated the absence of a vaginal canal in patients 1 and 3 and suspected absence of the vagina in patients 2, 4 and 6, and was inconclusive in patient 5 who was overweight. This technique visualized a hypoplastic uterus in three cases (patients 1, 4 and 6) and no uterus in the other three (patients 2, 3 and 5). Renal agenesis was observed in patient 2 and ectopic kidney in patients 1 and 6.

The three patients with suspected transverse vaginal septum, aged 14 to 18 years, were referred for primary amenorrhoea associated with cyclic pelvic pain. Patients 7 and 8 were sexually active and reported satisfactory sexual intercourse whereas patient 9 had still not had intercourse. At physical examination all three had normal secondary sexual characteristics and external genitalia. The former two had a blind, normally epithelialized vagina 3–4 cm long without evidence of cervical structures or communications with superior structures. Rectal examination revealed a slightly enlarged, tender uterus in patient 7 and in patient 8 a small median structure referable to a markedly hypoplastic uterus. In patient 9, who had a retrohymenal fovea of 0.5 cm, rectal exploration excluded the presence of haematocolpos and demonstrated a normal uterus. Transabdominal pelvic ultrasonography revealed a haematometra with not well-defined cervical structures and no haematocolpos in patient 7; in patient 8 the uterus was hypoplastic with an evident endometrial cavity, which was demonstrated also by MRI; and patient 9 clearly had haematometra and the cervix and vagina could not be distinguished clearly.

Before corrective surgery all the patients underwent transrectal ultrasonography using an EUB-45 (Hitachi®, Tokyo, Japan) ultrasound scanner with a biplane two-dimensional, axial and sagittal convex probe of 6.5 MHz. A water-filled balloon was placed over the tip of the endorectal transducer. The latter was inserted into the rectum and advanced until a midline image of the cervix was visualized in a longitudinal scan. The uterine cervix, parametria, vagina and rectum walls were evaluated by moving the transducer along its longitudinal axis and rotating it 130–140° along the main axis in both axial and longitudinal planes. The six patients with suspected Rokitansky syndrome underwent laparoscopy during which Vecchietti’s procedure...
as modified by us (Fedele et al., 1994) was carried out to create a neovagina. Combined abdominal and vaginal corrective surgery were performed on the three patients with suspected transverse vaginal septum.

**Results**

Table I summarizes the anatomical findings at preoperative transrectal ultrasonography and those observed at surgery.

**Transrectal ultrasound findings**

**Patients with suspected Rokitansky syndrome**

The vagina was absent in all patients of this subgroup (patients 1–6), with a retrohymenal dimple of depth varying from 0.5–1.5 cm. Transrectal ultrasonography also provided an accurate map of the pelvic organs showing the precise distances between the urethra and bladder anteriorly, rectum posteriorly, retrohymenal fovea caudally and pelvic peritoneum cranially (Figures 1 and 2). Also the uterus was absent in all six cases. A midline Müllerian rudiment, non-cavitary, was identified in only three of them (patients 1, 4 and 6).

**Patients with suspected transverse vaginal septum (patients 7–9)**

Vaginal atresia, starting from the mid-third of the vagina and extending cranially for 4 cm, absence of vaginal fornices, and a cervix with filiform canal were observed in patient 7 (Figure 3). Haematometra was also present. In patient 8 the mid-third of the vagina had a septum of about 2 cm thickness, above which the sonographer visualized a fibrous structure without any cavitation, referable to a uterine rudiment without endometrium. Patient 9 presented vaginal agenesis, a retrohymenal depression of 0.5 cm, a canalized cervix, and haematometra (Figure 4).

**Surgical findings**

In the suspected Rokitansky syndrome group laparoscopy confirmed the diagnostic suspicion in all six cases, demonstrating the absence of a normal uterus. Midline uterine rudiments were observed in three patients (patients 1, 4 and 6) and lateral uterine rudiments in the other three. At exploration with a probe under anaesthesia, the space between the urethra, bladder and rectum was imperforate. The patients with suspected transverse vaginal septum underwent different surgical procedures. In patient 7 exploratory laparotomy confirmed the presence of a uterus with haematometra, with the other characteristics normal. After making a small fundal incision, a probe was advanced caudally through the cervical canal. Under the guidance of the inferior tip of the probe, a dissection of the space between the rectum and bladder was performed, which revealed the presence of dense fibrous tissue connected to the cavitary cervical rudiment. The fibrous tissue was excised and the vaginal mucosa was anastomosed by interrupted Dexon II stitches to the external part of the cervix. In patient 8, who reported cyclic pelvic pain, exploratory laparotomy was
### Vaginal canalization defects

Table 1. Anatomical findings at preoperative transrectal ultrasonography and at surgery

<table>
<thead>
<tr>
<th>Patients</th>
<th>Age (years)</th>
<th>Vaginal length (cm)</th>
<th>Transrectal ultrasonographic findings</th>
<th>Findings at surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16</td>
<td>0.5</td>
<td>No vagina, midline rudimentary uterus</td>
<td>Vaginal agenesis, midline rudimentary uterus</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>1</td>
<td>No vagina, no uterus</td>
<td>Vaginal agenesis, absent uterus</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
<td>1</td>
<td>No vagina, no uterus</td>
<td>Vaginal agenesis, absent uterus</td>
</tr>
<tr>
<td>4</td>
<td>18</td>
<td>1</td>
<td>No vagina, midline rudimentary uterus</td>
<td>Vaginal agenesis, midline rudimentary uterus</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
<td>1.5</td>
<td>No vagina, no uterus</td>
<td>Vaginal agenesis, absent uterus</td>
</tr>
<tr>
<td>6</td>
<td>17</td>
<td>0.5</td>
<td>No vagina, midline rudimentary uterus</td>
<td>Vaginal agenesis, midline rudimentary uterus</td>
</tr>
<tr>
<td>7</td>
<td>14</td>
<td>4</td>
<td>Haematometra, cervix with filiform canal, atresia of upper half of the vagina</td>
<td>Uterus with haematometra, cavitary cervical rudiment, partial vaginal atresia</td>
</tr>
<tr>
<td>8</td>
<td>18</td>
<td>3</td>
<td>Uterine rudiment without endometrium, no cervical structure visualized, septum of the mid third of the vagina</td>
<td>Hypoplastic uterus, cervical atresia</td>
</tr>
<tr>
<td>9</td>
<td>16</td>
<td>0.5</td>
<td>Haematometra, canalized cervix, no vagina</td>
<td>Uterus with haematometra, canalized cervix and vaginal agenesis</td>
</tr>
</tbody>
</table>

*Patients 1–6 had suspected Rokitansky syndrome; patients 7–9 had suspected complete transverse septum.*

Figure 3. Transrectal ultrasonography in a case of aplasia of the upper third of the vagina. Sagittal midline scan. The upper third of the vagina (hatched) is substituted by a fibrous tract connected to the uterus (U) dilated by a haematometra.

Figure 4. Transrectal ultrasonography in a case of vaginal agenesis with functioning uterus. Sagittal midline scan. Missing vagina between rectum (R) and bladder (B). The uterus (U) has normal volume and hypoplastic cervix.

performed on the basis of MRI as well as abdominal ultrasonography, both of which had demonstrated a hypoplastic uterus with an endometrial cavity. This patient had hypoplastic uterus without functioning endometrium and without any cervical remnant. The uterine rudiment was removed. Also in patient 9 exploratory laparotomy revealed a uterus, haematometra, and regular adnexa. As in the other cases, a probe was inserted through the uterine fundus, and under its guidance the space...
between the urethra, bladder and rectum was dissected from below. This allowed visualization of the cervical canal whereas no vaginal structure was observed. The operation was completed by insertion of a cavitary acrylic resin form.

Discussion

Transrectal ultrasonography accurately defined the pelvic anatomical characteristics of the present series of patients with vaginal canalization defects, as assessed by comparison with anatomical observations made during corrective surgical interventions and not with other imaging techniques.

The series is certainly small but vaginal canalization defects are rare. Moreover, many anatomical variants exist in this malformation class. This means that the clinician should obtain as much anatomical information as possible preoperatively. Most importantly, to carry out adequate surgical correction the surgeon needs to know if the vaginal malformation consists of a complete agenesis or a partial atresia. Other information is also useful: the extension of the imperforate portion of the vagina, the presence of a uterus or uterine rudiment and its characteristics (whether it is cavitary and a cervix is present), and the presence of haematocolpos and its extension. Lastly, the space between the urethra, bladder and rectum must be visualized. The possibility of visualizing the cervix and cervical canal adequately is particularly important, also for prognostic reasons, as the presence or absence of the cervical canal is considered fundamental in the decision whether or not to conserve the uterus (Bates and Wiser, 1985; Fliegner and Pepperell, 1994). Until now the tools available to the clinician to resolve these questions have been transabdominal pelvic ultrasonography and MRI (Markham and Waterhouse, 1992).

The resolution of the former is generally insufficient with respect to the complexity of the problems and this technique often does not provide adequate scans at the level of the suspected vaginal atresia (Scanlan et al., 1990). Several reports describe the possibility of adequate visualization of these anomalies by MRI (Markham et al., 1987; Letterie et al., 1988; Fedele et al., 1990; McCarthy, 1990; Hugusson et al., 1991; Bakri et al., 1992). However, this technique succeeds in obtaining sufficiently precise images only in the presence of haematic collections which give a high density signal in T2-weighted scans. Furthermore, MRI has limited versatility and is very expensive. Analysis of the information provided by the various diagnostic methods in this series showed that transrectal ultrasonography was the only one able to produce a picture that corresponded perfectly with the real anatomical situation. On the contrary, abdominal ultrasonography provided inadequate images in six of our nine patients, and MRI was responsible for a mistaken diagnosis in one patient with suspected transverse vaginal septum.

In our opinion, transrectal ultrasonography represents a significant advance in the diagnostic methods available to evaluate congenital vaginal canalization anomalies. In fact, transabdominal ultrasonography and MRI have various limitations as mentioned above, and transvaginal ultrasonography is obviously not applicable in women without a vagina. Moreover, the image definition of the latter technique is not adequate to visualize structures cranial to the imperforate portion of the vagina in subjects with a vaginal pouch. However, larger studies are required before transrectal ultrasonography can be considered definitively as a diagnostic procedure of choice in the assessment of vaginal canalization defects.

References


Received on July 1, 1998; accepted on October 22, 1998