Evaluation of a new questionnaire for the presurgical diagnosis of bladder endometriosis

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BACKGROUND: The main objective was to evaluate the diagnostic accuracy of a new questionnaire for the presurgical diagnosis of bladder endometriosis in patients with a high suspicion index for this disease. METHODS: We included all patients of age <40 years undergoing laparoscopy or laparotomy for chronic pelvic pain. We partially modified the American Urologic Association Symptom Index with the aim of identifying bladder endometriosis among 157 women undergoing surgery for chronic pelvic pain. All patients underwent preoperative ultrasonography; selected patients, with suspected bladder endometriosis, underwent computed tomography and cystoscopy. The physicians performing both the preoperative evaluation and surgery were blinded to the questionnaires’ results. RESULTS: A total of 127 (81%) patients had pelvic endometriosis, 14 (8.9%) had bladder endometriosis. The questionnaires’ score for patients with and without bladder endometriosis was 21±8.7 and 4.6±5.7, respectively (P<0.0001). The area under the receiver operating characteristic curve was 0.951. With a cut-off of 9, sensitivity was 93% and specificity 88%. CONCLUSIONS: The questionnaire proved to be effective in identifying bladder endometriosis, allowing a proper diagnostic work-up and surgical treatment, and minimizing the risk of recurrence. In this primary referral centre for endometriosis the prevalence of the disease was high—therefore it may achieve a lower diagnostic accuracy when evaluated on a population of women with a lower prevalence of bladder endometriosis.

Keywords: bladder endometriosis; questionnaire; chronic pelvic pain; pelvic surgery; presurgical diagnosis

Introduction
Reports of bladder endometriosis in the last years have become relatively numerous (Chapron and Dubuisson, 1999; Comiter 2002; Nezhat et al., 2002; Seracchioli et al., 2002; Fedele et al., 2005), also due to the improvement of diagnostic invasive and non-invasive techniques. Bladder endometriosis is often not diagnosed during laparoscopy, because it is a disease involving the vesical detrusor (Vercellini et al., 1996; Fedele et al., 1998; Donnez et al., 2000; Chapron et al., 2002) and therefore may not be visible on the peritoneum covering the bladder. Patients with a late diagnosis of bladder detrusor endometriosis and persistence of pelvic pain, who have undergone repeated surgery for endometriosis, can be evaluated through specific diagnostic procedures such as cystoscopy and magnetic resonance imaging (MRI). In the majority of cases of bladder endometriosis, it is possible to perform the radiologic diagnosis with a transvaginal ultrasonography, without the need for MRI or CT (computed tomography) evaluations (Kinkel et al., 2006) which are expensive procedures and relatively invasive, and cannot be used routinely in all patients undergoing surgery for a suspicion of pelvic endometriosis. In this setting, the identification of a group of patients at a higher risk for this condition becomes necessary.

The American Urologic Association Symptom Index (AUASI) is a questionnaire which was originally created to assess the severity of benign prostatic hyperplasia (Barry et al., 1992; O’Leary et al., 1992), but has been found to accurately describe lower urinary tract symptoms in women (Carpero et al., 2003). We partially modified this questionnaire with the aim of assessing the presence of specific catamenial symptoms related to bladder endometriosis in patients with a high suspicion index for this disease.

Materials and Methods
We included in the study all patients of age<40 years undergoing laparoscopy or laparotomy for chronic pelvic pain from January 2003 to December 2004 at the University of Milan. Pelvic pain was defined as the presence for at least six months of dysmenorrhea and/or intermenstrual pelvic pain and/or deep dyspareunia of moderate or severe level, according to a previously described questionnaire
Table 1: Modified AUASI questionnaire for bladder endometriosis

<table>
<thead>
<tr>
<th>Over the past month, how often have you had a sensation of not completely emptying your bladder after you finished urinating?</th>
<th>Not at all</th>
<th>Less than 1 time in 5</th>
<th>Less than half the time</th>
<th>About half the time</th>
<th>More than half the time</th>
<th>Almost always</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over the past month, how often have you had to urinate again &lt;2 h after you finished urinating?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Did pain during urination increase in the pre-menstrual period?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Over the past month, how often have you found it difficult to postpone urination?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Over the past month, how often have you had pain after you finished urinating?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Over the past month, how often have you had discomfort and pain during urination?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How many times do you typically get up to urinate from the time you go to bed at night until the time you get up in the morning?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

(Fedele et al., 1993). Women with amenorrhea, undergoing hormonal suppressive treatment with GnRH analogues Danazol or Gestrinone, affected by psychotic disorders, severe depression or with a history of sexual abuse were excluded from the study. Patients who had prior surgical procedures for deep endometriosis or with a known disease of the excretory system were also excluded.

Prior to surgery, all women were asked to complete the questionnaire modified from the AUASI, of which three questions that were designed to assess irritative symptoms, especially during the perimenstrual period, were added to replace three questions concerning obstructive symptoms (Table 1). Each question has only one answer that corresponds to a numeric value; all questions have the same value and their sum represents the total score. All patients then underwent a diagnostic work-up that aimed to identify possible endometriotic lesions of the bladder, including a transvaginal ultrasound, whose diagnostic accuracy has been previously demonstrated (Fedele et al., 1997). Patients with suspected bladder endometriosis underwent a CT scan and cystoscopy. The final diagnosis of vesical detrusor endometriosis was made on the basis of histological evaluation of the surgically resected lesions. During surgery the bladder was accurately evaluated also in patients without suspect ultrasonographic findings. The physicians performing the preoperative evaluation and those performing the surgical procedure were blinded to the results of the questionnaire. Endometriosis was staged according to the Revised American Fertility Society (AFS) classification (1985). The local Institution approved the study. However, since the evaluation of the new questionnaire did not imply any modification of the clinical management of the patients with chronic pelvic pain, Institute Review Board approval was not required.

Data were analysed using the Statistical Package for the Social Sciences 12.0 (SPSS, Inc., Chicago, IL, USA). Continuous parametric variables were assessed using the Student’s t-test and non-parametric analysis with Mann–Whitney U-test. Chi-square analysis was used for nominal variables. A P < 0.05 was considered statistically significant. The diagnostic accuracy of each possible cut-off for the score sum of the questionnaire was assessed by analysing the receiver operating characteristic (ROC) curve. Sensitivity and specificity were calculated and the best cut-off point was considered to be that corresponding to the highest sum of specificity and sensitivity. Data are presented as mean ± SD.

Results

During the study period, 168 women met the inclusion criteria and 157 (93.5%) completed the questionnaire. Table 2 shows age of the women included in the study as well as the surgical pathological diagnosis. Endometriosis was diagnosed in 127 (81%) patients.

Bladder detrusor endometriosis was found and excised in 14 women (8.9% of all women and 11% of the subgroup with endometriosis), and all had AFS stage IV endometriosis. All patients had peritoneal implants, and ovarian involvement of endometriosis was found in 10 patients in this subgroup, whereas deep posterior cul-de-sac implants were reported in 6 patients. Tubo-ovarian adhesions were identified in 9 patients. The endometriotic lesion involved the bladder dome in 4 patients and the bladder base in 10 patients. None had non-endometriotic disease of the bladder or of the urinary tract. In 13 patients, bladder endometriosis had been preoperatively diagnosed by means of transvaginal ultrasound, CT and cystoscopy, whereas in one patient it was unexpectedly found at surgery. A nodule was palpated anteriorly at transvaginal examination in 13 patients (92.8%). Symptoms reported by

Table 2: Characteristics of the 157 patients who completed the questionnaire

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Age (Mean ± SD; years)</td>
<td>33.2 ± 5.4</td>
</tr>
<tr>
<td>Diagnosis*</td>
<td></td>
</tr>
<tr>
<td>Endometriosis</td>
<td>127 (80.9%)</td>
</tr>
<tr>
<td>Myomas</td>
<td>18 (11.5%)</td>
</tr>
<tr>
<td>Adenomyosis</td>
<td>6 (3.8%)</td>
</tr>
<tr>
<td>Pelvic inflammatory disease</td>
<td>16 (10.2%)</td>
</tr>
<tr>
<td>Ovarian cyst (non-endometriotic)</td>
<td>21 (13.4%)</td>
</tr>
<tr>
<td>Surgery</td>
<td></td>
</tr>
<tr>
<td>Laparotomy</td>
<td>44 (28.0%)</td>
</tr>
<tr>
<td>Laparoscopy</td>
<td>113 (72.0%)</td>
</tr>
</tbody>
</table>

*sum may be larger than number of subjects because of multiple pathologies diagnosed in the same patients.
this subgroup of patients were the following: dysmenorrhea \( (n = 14, 100\%) \), chronic pelvic pain \( (n = 4, 28.6\%) \), deep dyspareunia \( (n = 6, 42.9\%) \), catamenial suprapubic pain \( (n = 9, 64.3\%) \), cyclic dysuria \( (n = 12, 85.7\%) \) and hematuria \( (n = 5, 35.7\%) \). Six patients had undergone prior uterine surgery (cesarean section in 4; myomectomy in 3).

The score sum of the questionnaire was 21 ± 8.7 for patients with bladder endometriosis and 4.6 ± 5.7 for patients without bladder endometriosis \( (P < 0.0001) \). Figure 1 shows the ROC curve for the modified questionnaire. The area under the curve is 0.951, corresponding to an excellent diagnostic accuracy. The cut-off value that maximizes the sum of sensitivity and specificity is 9, with a sensitivity of 93% and a specificity of 88%. The cut-off value that allows 100% sensitivity with 80% specificity is 8. A cut-off value of 29 allows 99% specificity, but with 29% sensitivity.

**Discussion**

The questionnaire evaluated in the present study showed an excellent diagnostic accuracy in the preoperative diagnosis of bladder detrusor endometriosis in women with cyclic pelvic pain. Most of the eligible patients agreed to complete the questionnaire and both the preoperative evaluation and the surgical procedure were performed by physicians who were blinded to the results of the questionnaire. The systematic transvaginal ultrasonographic evaluation, along with CT and cystoscopy in suspect cases, allowed the preoperative diagnosis in all but one case (92.9%) of histologically confirmed bladder endometriotic lesions. In particular, the use of transvaginal ultrasound as a screening test, which had previously proved to be accurate in the detection of bladder endometriosis (Fedele *et al.*, 1997), minimized the risk of neglecting bladder endometriotic lesions during surgery. On the other hand, the limits of the cystoscopic evaluation must be considered, as often there is no involvement of the mucosa. However, in the majority of cases there is a fixed protuberance that deforms the inner bladder profile and that undermines the mucosa, presenting with bluish-reddish areas that are suggestive for endometriosis.

In order to correctly interpret the results of the present study, we must point out that most patients with chronic pelvic pain that are referred to our centre are affected by endometriosis. These patients indeed are affected by cyclic pelvic pain, with symptoms occurring typically during menses—this category of patients has a considerable risk of having endometriosis (Hurd, 1998). As a consequence, the prevalence of bladder endometriosis in our series is high. When evaluated on a population of women with a lower prevalence of bladder endometriosis, this new questionnaire would probably have a lower diagnostic accuracy.

Three different methods for the non-invasive preoperative diagnosis of endometriosis have been previously proposed. Two of them were developed for the identification of deep posterior endometriosis (Revised American Fertility Society classification, 1985; Chapron *et al.*, 2005). The most accurate method is the one proposed by Koninckx *et al.* (1996), which is based on pelvic examination during menstruation and evaluation of CA 125 levels in the follicular phase. This diagnostic model allows a sensitivity of 83% and a specificity of 87%. However, it does not distinguish between women with deep lesions and women with endometriotic ovarian cysts. Conversely, such discrimination is possible with the model introduced by Chapron *et al.* (2005). This model, which is validated on a larger series of patients as compared with the one by Koninckx *et al.* (1996), is based on the presence of dyschezia during menstruation and deep dyspareunia, and allows diagnosis of deep posterior endometriosis with a sensitivity of 74.5% and a specificity of 68.7%. Eskenazi *et al.* (2001) evaluated the accuracy of the preoperative diagnosis of endometriosis based on transvaginal ultrasound, bimanual gynecologic examination and the clinical history. Only ovarian endometriotic cysts were accurately diagnosed by transvaginal ultrasound, whereas other localizations of endometriosis were not adequately predicted by this method.

To our knowledge, this is the first study evaluating a screening questionnaire, i.e. specifically designed for the preoperative diagnosis of bladder endometriosis. The questionnaire proved very effective in identifying patients with bladder endometriosis, achieving both high sensitivity and high specificity. Therefore, the questionnaire could allow the selection of patients with a high score value to become candidates for a specific presurgical diagnostic work-up to confirm the presence of an endometriotic bladder lesion. A correct preoperative diagnosis is of paramount importance in order to plan an adequate surgical procedure, and minimizes the risks of overlooking an endometriotic bladder lesion at surgery or of performing an incomplete surgical resection (Chapron *et al.*, 2003). This may eventually help to minimize the postoperative persistence or recurrence of both the vesical lesion and the pain symptoms.
References


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