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Prospective study to assess risk factors for pelvic floor dysfunction after delivery

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Abstract

Background. To identify obstetric risk factors for de novo pelvic floor disorders after vaginal delivery. Methods. Antenatally asymptomatic women who delivered vaginally were interviewed on urinary, anal and sexual disorders antenatally, 6 and 12 months postpartum. Results. Of 967 women, 336 were included for final analysis. Urinary symptoms occurred in 27 and 23% of women at 6 and 12 months postpartum: univariate analysis showed a significant relation to the use of epidural analgesia (p = 0.04) and to a second stage of labour > 1 h (p = 0.02), the latter was confirmed significant by multivariate analysis. Anal incontinence occurred in 7.1 and 6.8% of women at 6 and 12 months postpartum, respectively. Dyspareunia was reported by 24% at 6 months, decreasing to 8% at 12 months (p < 0.0001).

Conclusions. Our study shows that a second stage longer than 1 h is associated with the development of postpartum urinary incontinence. Except for dyspareunia, pelvic floor dysfunction rarely resolves spontaneously.

Key words: Labour, pelvic floor dysfunction, urinary incontinence, anal incontinence, sexual dysfunction

Abbreviations: ICIQ: Questionnaire of the International Consultation on Incontinence

Improvement in obstetric monitoring and intervention has dramatically decreased immediate peripartum maternal morbidity and mortality. This has led to research being focused on the long-term effects of labour and delivery on women’s quality of life, with particular attention to pelvic floor disorders. However, the literature on this issue can sometimes be confusing and contradictory, for instance, the prevalence of stress urinary incontinence related to pregnancy and delivery has been reported to range from 3 to 67% (1–3). This wide difference in rates could be due to different populations being investigated, a variation in the types of subjects being recruited, and alternative methods of obstetric management being applied to labour and vaginal delivery (4). The majority of studies evaluated the impact of the obstetric risk factors only on stress urinary incontinence (5–7), and there is a lack of prospective studies investigating all aspects of pelvic function (including anal and sexual function).

There are a number of changes in obstetric care during delivery, such as the increasing use of vacuum extraction instead of forceps, and the wide use of epidural analgesia, which makes it difficult to draw reliable conclusions about the effect of vaginal delivery on pelvic floor dysfunction. Therefore, it is not easy to determine the best approaches to delivery for pelvic floor care; moreover, the identification of women who could benefit from a specific diagnostic, prophylactic and therapeutic program to prevent the long-term consequences of vaginal delivery, remains challenging.

The aim of this study was to prospectively assess the incidence and the evolution of de novo postpartum urinary, anal and sexual disorders in a population of parous women. We also tried to define
the role of single obstetric risk factors, including the use of epidural analgesia, on the development of pelvic floor dysfunction.

Material and methods

Between July and December 2004, consecutive women who underwent labour and delivery at the Obstetric and Gynecologic Department of the University of Insubria were considered for this prospective study. On admission to labour, women were asked for their consent to participate in the study. They answered questions about urinary, anal and sexual function during hospitalisation, and at 6 and 12 months after delivery via a telephone interview. Data regarding how the labour started, spontaneous or induced labour, and mode of delivery were also collected and then related to pelvic floor disorders.

Women were included regardless of parity, age and gestational week at delivery. Exclusion criteria were: the presence of urgency, anal or sexual symptoms prior to delivery (even if occurring during pregnancy); women delivered by caesarean section; twin pregnancy; difficulties in communication because of poor knowledge of the Italian language; and women who became pregnant during the follow-up period.

A standardised protocol for obstetric management was used. We follow the 'active management of labour' philosophy at our institution (8,9). The protocols include the following criteria: duration of labour should be ≤12 h in nulliparous and ≤6 h in multiparous women, duration of the second stage ≤2 h (≤3 h in case of epidural analgesia for nulliparous women), use of amniotomy and oxytocin to manage dystocia during the first and second stage, active management of the third stage (Syntocinon 10 IU im), selective use of episiotomy (medio-lateral episiotomy in all cases), continuous repair of episiotomy with cutaneous intradermical suture. The Kristeller manoeuvre or vacuum extraction is used only when the presenting part is at the pelvic floor. The Kristeller manoeuvre is a widely used procedure in Italy performed by the attending obstetrician and consists of exerting pressure on the woman’s abdomen at the level of the uterine fundus to aid the maternal expulsive efforts during the final phase of the second stage of delivery. An episiotomy was performed when the risk of perineal laceration was considered imminent or when prompt delivery was needed for fetal indications. Perineal tears were defined using the classification of Sultan (10). Women with breech presentation were always delivered by caesarean section and the use of forceps was avoided.

Telephone interviews were carried out by a trained urogynaecologist, blinded to the previously collected data for each woman, at 6 and 12 months after delivery.

Interviews were based on questions present in the International Consultation on Incontinence Questionnaire (ICIQ) (11), using the validated Italian language form developed by Tubaro et al. (12). In addition, we investigated anal function with 5 items and sexual function with 2 additional items (1 question about anorgasmia and another about a woman’s overall judgment of her sex life) that were not incorporated in the ICIQ.

All symptoms were defined according to the standardisation of terminology proposed by the International Continence Society (13). In particular, stress urinary incontinence was defined as the complaint of involuntary leakage on effort or exertion or sneezing or coughing; overactive bladder was defined as a syndrome characterised by urgency with or without urge incontinence, often associated with frequency and nocturia. Mixed symptoms were considered when the two above-mentioned symptoms coexisted. Women who developed symptoms of urinary stress incontinence or overactive bladder were considered symptomatic for urinary dysfunction.

Analysis of data was intended to identify possible correlations between labour and delivery characteristics to the symptoms of pelvic floor dysfunction. All data were collected in a specifically generated database by the same person who administered the questionnaires. Ethics approval for this study was obtained from the Institution.

Statistical analysis was performed using Epistat 4.0 (Epistat Services Richardson, TX, USA) and GraphPad Prism, version 4.00 for Windows (GraphPad Software, San Diego, CA, USA). Continuous variables were compared with Mann-Whitney or Student’s t-test as appropriate. Proportions of categorical variables were analysed for statistical significance using the Fisher exact test. Multivariable logistic regression analyses were used to assess the effect of the obstetric risk factors on urinary, anal and sexual dysfunction and to determine the interaction of covariates. A p value <0.05 was considered statistically significant for all analyses.

Results

During the study period, 967 women delivered vaginally at our Department. A total of 446 patients complained of urinary, anal or sexual dysfunction prior to or during pregnancy, and were consequently excluded. Of the remaining 521 eligible patients,
123 patients did not give their consent to be included in the study, 47(11.8%) women refused one of the interviews, and 15 (3.8%) became pregnant again during the follow-up period. For final analysis, we considered 336 women with a median age of 33 (range: 18–44) years, 201 (59.9%) primiparous and 135 (40.1%) multiparous, respectively. Data about labour and delivery are summarised in Table I.

**Urinary dysfunction**

A total of 92 (27%) and 78 (23.2%) women complained of de novo urinary symptoms at the 6 and 12-months interview, respectively; the distribution between stress urinary incontinence, overactive bladder symptoms, and mixed symptoms is summarised in Table II. No new case of urinary incontinence occurred between the first and second postpartum interview. Parity, medio-lateral episiotomy, Kristeller manoeuvre, fetal weight, spontaneous versus induced labour and duration of labour did not show significant correlation with urinary symptoms at 12 months. However, the duration of the active second stage of labour and the use of epidural analgesia were significantly related to urinary dysfunction at univariate analysis. These data are shown in Table III. After multivariable analysis, only a duration of the active second stage >1 h remained significantly associated with the risk of urinary incontinence (OR: 2.19, CI 95%: 1.07–4.48; p = 0.03).

**Anal dysfunction**

A total of 24 (7.1%) women developed postpartum de novo anal incontinence 6 months after delivery. Among these, 21 (87.5%) reported passive incontinence, 2 (8.3%) urge incontinence and 1 (4.2%) mixed incontinence. One year after delivery, 23 (6.8%) women still complained of anal incontinence (gas, liquid and solid incontinence were present in 20, 2 and 1 cases, respectively); there was only 1 case of spontaneous remission of passive flatus incontinence. The rate of anal dysfunction did not differ significantly between primiparous and multiparous women (15/201 versus 8/135, respectively; p = 0.66). Fetal weight at birth, duration of labour and of the second stage, maternal age, episiotomy, degree of perineal tears and epidural analgesia did not increase the risk of developing anal incontinence.

**Sexual dysfunction**

At 6 and 12 months postpartum, 302 (89.9%) and 330 (98.2%) women had restarted their sexual activity, respectively. The median interval between delivery and first sexual intercourse was 3 (range: 0–10) months. At 6 months, 3 of the 302 sexually active women (1%) complained of coital urinary incontinence; one woman referred spontaneous resolution at the 12-month interview. De novo dyspareunia was reported by 72 of 302 (23.8%) women at 6 months. This symptom decreased to 26 of 330 (7.9%) women at 12 months (p < 0.0001), and no case of new onset was registered between the 2 interviews. Episiotomy, perineal tears, parity, fetal weight, labour induction, duration of labour, lactation and use of epidural analgesia were not significantly associated with dyspareunia.

Decrease of libido and anorgasmia were reported by 52 of 302 (17.2%) and 38 of 302 (12.6%) women after 6 months, and by 54 of 330 (16.3%) and 43 of 330 (13%) after 12 months. At final follow-up, 274 (83%) cases considered their sex life unchanged, 17 (5%) cases considered it improved, and 40 (12%) cases considered it worsened. None of the obstetrical risk factors investigated in the present study was found to be significantly associated with a worsened sex life at final follow-up.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Operative deliveries (vacuum)</th>
<th>Use of Kristeller manoeuvre</th>
<th>Epidural analgesia</th>
<th>Duration of labour (mins)</th>
<th>Episiotomy</th>
<th>Perineal tears</th>
<th>First degree</th>
<th>Second degree</th>
<th>Third degree</th>
<th>Fourth degree</th>
<th>Manual delivery of placenta</th>
<th>Blood loss &gt; 500 ml</th>
<th>Duration of active second stage &gt;1 h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative deliveries (vacuum)</td>
<td>4 (1.2%)</td>
<td>124 (35.9%)</td>
<td>140 (40.6%)</td>
<td>405 (60–720)</td>
<td>173 (51.5%)</td>
<td>116 (34.6%)</td>
<td>85 (73.3%)</td>
<td>28 (24.1%)</td>
<td>3 (2.6%)</td>
<td>2 (1.6%)</td>
<td>6 (1.8%)</td>
<td>71 (21.1%)</td>
<td>40 (11.9%)</td>
</tr>
</tbody>
</table>
Discussion

This prospective study shows a high incidence of pelvic floor disorders after delivery. In particular, urinary incontinence can affect 27.4% of parous women 6 months postpartum, with only a small proportion of women having spontaneous resolution. Surprisingly, urinary dysfunction is still present in 23.2% of patients 1 year after delivery, regardless of the type of incontinence (stress, urge or mixed). It has been reported that urinary dysfunction at 9 months after delivery is strongly predictive of urinary symptoms 10 years later (14). We suggest that urinary incontinence at 6 months should be considered as an indication for diagnostic and therapeutic intervention.

Our detailed analysis of obstetric risk factors showed that the duration of the active second stage of labour >1 h and the use of epidural analgesia were significantly related to the development of de novo urinary incontinence using univariate analysis. After multivariable analysis, only the duration of the active second stage was significantly associated with urinary incontinence. A possible explanation for this finding is that prolonged pushing by the women during delivery is responsible for acute denervation of the pudendal nerves and damage to the perineal muscles, even without an episiotomy or visible perineal tears (15). The alternative explanation for the increased length of the active second stage is an indicator of a large baby relative to the size of their mother. This would then lead to increased trauma to the pudendal nerve and pelvic musculature. Epidural analgesia was associated with a prolonged second stage, so that it could indirectly influence the development of pelvic floor damage. In our population, the second stage was longer than 1 h in 26 out of the 114 patients (22.8%) who received epidural analgesia compared to 14 out of 222 (6.3%) without analgesia (p < 0.0001). However, to date the possible role of epidural analgesia on the development of pelvic floor dysfunction is not completely understood (16–18). Our data on the urinary symptom impact of a prolonged second stage has practical implications and should be taken into account in routine obstetric practice, and an attempt should be made to reduce the length of the active second stage in order to minimise the risk of postpartum urinary symptoms.

Unfortunately, those women with anal incontinence did not have spontaneous regression with time. Many authors have reported that the incidence of anal incontinence is strongly dependent on the occurrence of anal-sphincter tears during vaginal

Table III. Association between obstetric risk factors and urinary symptoms.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Yes (n = 78)</th>
<th>No (n = 258)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primiparous</td>
<td>41 (52.6%)</td>
<td>160 (62%)</td>
<td>0.15</td>
</tr>
<tr>
<td>Episiotomy</td>
<td>41 (52.6%)</td>
<td>132 (51.2%)</td>
<td>0.89</td>
</tr>
<tr>
<td>Kristeller manoeuvre</td>
<td>8 (10.3%)</td>
<td>33 (12.6%)</td>
<td>0.69</td>
</tr>
<tr>
<td>Fetal weight &gt;4000 g</td>
<td>4 (5.1%)</td>
<td>18 (6.9%)</td>
<td>0.79</td>
</tr>
<tr>
<td>Induced labour</td>
<td>20 (25.6%)</td>
<td>81 (31%)</td>
<td>0.40</td>
</tr>
<tr>
<td>Duration of labour (min)</td>
<td>440 (60–720)</td>
<td>390 (60–600)</td>
<td>0.80</td>
</tr>
<tr>
<td>Epidural analgesia</td>
<td>34 (43.6%)</td>
<td>80 (31%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Duration of active second stage &gt;60 min</td>
<td>16 (20.5%)</td>
<td>24 (9.3%)</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Table IV. Prospective studies on anal incontinence after vaginal delivery.

<table>
<thead>
<tr>
<th>Study</th>
<th>Parity</th>
<th>Vaginal delivery</th>
<th>Follow up (weeks)</th>
<th>Anal incontinence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sultan et al. (29)</td>
<td>Primi</td>
<td>79</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Multi</td>
<td>48</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>Donnelly et al. (32)</td>
<td>Primi</td>
<td>168</td>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>Rieger et al. (33)</td>
<td>Primi</td>
<td>37</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Zetterstrom et al. (34)</td>
<td>Primi</td>
<td>38</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Fynes et al. (35)</td>
<td>Multi</td>
<td>59</td>
<td>6–12</td>
<td>17</td>
</tr>
<tr>
<td>Abramowitz et al. (36)</td>
<td>Primi/multi</td>
<td>202 including multi</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Mean</td>
<td>Primi</td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Multi</td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Present study</td>
<td>Primi</td>
<td>201</td>
<td>26–52</td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>Multi</td>
<td>135</td>
<td></td>
<td>5.9</td>
</tr>
</tbody>
</table>
The incidence of anal incontinence in our population is lower than described in the majority of the prospective published series (Table IV); these findings are consistent with our low incidence of third and fourth degree perineal tears (0.9%) in comparison with the 18% reported by Fenner (21). We believe that our policy of selective medio-lateral instead of median episiotomy is protective against posterior perineal tears involving the anal sphincter (22).

Sexual dysfunction was reported at a high rate of de novo dyspareunia (23.8%) 6 months postpartum, without any correlation to episiotomy, evident perineal tears or any other analysed risk factor. The underlying predisposing condition is unclear, but it could be neuromuscular stretching, often not evident at the moment of delivery or scarring postpartum. In contrast to the high persistence of urinary and anal incontinence, dyspareunia regressed in the majority of cases; its etiology is multifactorial and consequently may not only be related to anatomic damage or changes. Sexual function is dependent on many mechanisms associated more with psychologic than organic factors, as suggested by the high rates of anorgasmia and loss of libido at 6 months.

A limitation of the present study is the number of women included for final analysis, although it is comparable to many other reports, the majority of which are retrospective (1,2,5–8).

However, we believe that the strength of our report is determined by the following factors: its prospective design, the standardised management of labour and delivery, and the fact that the questionnaire was administered to all patients by a fully trained urogynaecologist. Moreover, this is one of the few studies simultaneously evaluating all aspects of pelvic floor function after delivery. This can better reflect the real impact of vaginal childbirth and obstetric risk factors on a woman’s quality of life.

Our high dropout rate has a high probability of having no or very little impact on our results, since all the considered risk factors were comparable between those women excluded and included in the study (Table V).

In conclusion, we confirm that vaginal delivery has a relevant impact on women’s urinary, anal, and sexual function. Except for pain during intercourse, perineal dysfunction does not have a tendency to spontaneously regress if it is still present 6 months after delivery. Women should be routinely asked for the presence of these symptom disturbances at postpartum follow-up visits in order to start a prompt and effective diagnostic and therapeutic program. We found a strong association between urinary disorders and a prolonged active second stage of labour; this should indicate more aggressive obstetrical management in order to reduce the active second stage of delivery.

References