First Vaginal Delivery at an Older Age: Does It Carry an Extra Risk for the Development of Stress Urinary Incontinence?

Asnat Groutz,* Limor Helpman, Ronen Gold, David Pauzner, Joseph B. Lessing, and David Gordon
Urogynecology and Pelvic Floor Unit, Department of Obstetrics and Gynecology, Lis Maternity Hospital, Tel Aviv Sourasky Medical Center, affiliated to the Sackler School of Medicine, Tel Aviv University, Tel Aviv, Israel

Aims: First delivery at an older age is not an uncommon event in modern obstetric practice. The present study was undertaken to compare the prevalence of postpartum stress urinary incontinence (SUI) according to maternal age and mode of delivery. Methods: Fifty two consecutive elderly primiparae (mean age 40.0 ± 1.8) who underwent spontaneous vaginal delivery, 42 consecutive young primiparae (mean age 26.2 ± 2.5) who underwent spontaneous vaginal delivery were interviewed 1–2 years postpartum about the symptom of SUI. Women who had SUI before pregnancy were not enrolled. Obstetric data were collected from computerized hospital records. Results: The prevalence of SUI 1–2 years after spontaneous vaginal delivery was significantly higher in elderly compared with younger primiparae (38.5% vs. 9.8%, respectively). Elderly primiparae who underwent elective cesarean section had a significantly lower prevalence of postpartum SUI than those delivered vaginally (16.7% vs. 38.5%, respectively). Further comparison of stress-incontinent versus continent elderly primiparae failed to reveal significant demographic or obstetric differences, except for increased prevalence of SUI during pregnancy among incontinent patients (45% vs. 19%, respectively). Conclusions: First vaginal delivery at an older age carries an increased risk for postpartum SUI. Stress-incontinent women also had higher prevalence of SUI during pregnancy. This finding implies that the pathophysiologic process of SUI begins during pregnancy, prior to active labor and delivery. Nonetheless, elective cesarean section in these women has a protective effect and lowers the risk of developing postpartum SUI. Neurourol. Urodynam. © 2007 Wiley-Liss, Inc.

Key words: childbirth; elderly primiparae; maternal age; pregnancy; stress urinary incontinence

INTRODUCTION

Pregnancy and childbirth have long been considered as risk factors in the genesis of pelvic floor disorders. Mechanical and hormonal changes during pregnancy, as well as the mechanical strain during labor and delivery, may all cause partial denervation of the pelvic floor, and direct injury to pelvic muscles and connective tissue. These injuries may further lead to the development of stress urinary incontinence (SUI), anal incontinence, pelvic organ prolapse, and/or voiding dysfunction. Although many studies have shown some correlation between obstetric parameters and the development of these symptoms, there is no consensus regarding the impact and relative contribution of the different risk factors. Moreover, the etiology of pelvic floor disorders is multifactorial. Additional risk factors, other than pregnancy and childbirth, include heredity, collagen abnormalities, obesity and aging [Rortveit et al., 2001, 2003a,b; Grodstein et al., 2003].

First delivery at an older age is not an uncommon event in modern obstetric practice, and the association between advanced maternal age and various pregnancy complications is well established. However, it is still unknown whether elderly primiparae are also at increased risk for childbirth-associated pelvic floor injury. The present study was undertaken to compare the prevalence of SUI among elderly versus younger primiparae 1–2 years after spontaneous vaginal delivery and to assess the risk for postpartum SUI associated with different modes of delivery among elderly primiparae.

METHODS

Elderly primiparae were defined as being 37 years old and over. Young primiparae were defined as being 20–29 years old.

No conflict of interest reported by the author(s). Abbreviations: SUI, stress urinary incontinence

*Correspondence to: Asnat Groutz, MD, Urogynecology, Lis Maternity hospital, Tel Aviv Sourasky Medical Center, & Weizman Street, Tel Aviv, Israel. E-mail: agroutz@yahoo.com
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The study population comprised of 186 primiparae who delivered in the obstetric ward of the Lis Maternity Hospital, Tel Aviv Sourasky Medical Center. The study population was divided into three subgroups according to maternal age and mode of delivery: 52 consecutive elderly primiparae who underwent spontaneous vaginal delivery, 42 consecutive elderly primiparae who underwent elective cesarean section, and 92 consecutive young primiparae who underwent spontaneous vaginal delivery. Pre-term deliveries, multi fetal pregnancies, instrumental-assisted deliveries and non-elective cesarean sections, were all excluded. Patients who underwent elective cesarean section were not given a trial of labor.

One to two years postpartum, all women were interviewed regarding the symptom of SUI. We chose this time period because a previous study showed that primiparous women with SUI, 3 months postpartum, are at increased risk of long-lasting symptoms [Viktrup and Lose, 2001]. Moreover, women who had a second pregnancy and delivery within this time period were excluded. The symptom of SUI was defined as an involuntary leakage of urine with coughing, laughing, sneezing, or any other physical effort. Women were asked whether they had ever experienced SUI before pregnancy. Those who had SUI before pregnancy were excluded. Thus, only cases of de novo childbirth-associated SUI were analyzed. Furthermore, we considered only “regular” urinary incontinence as defined by Thomas et al. [1980]: “involuntary excretion or leakage of urine in inappropriate places or at inappropriate times twice or more a month, regardless of the quantity of urine lost.” Patients were also asked whether they had consulted a physician regarding their urinary incontinence, and whether they desired further evaluation and treatment.

Obstetric data were collected from a computerized database. Details of maternal, fetal, obstetric and anesthesiologic parameters were obtained, and included: maternal age, weight and height, gestational age at delivery, length of first and second stages of labor, use and type of analgesia (epidural, narcotics), perineal trauma (posterolateral episiotomy, tears), birth weight and Apgar scores. Prevalence of SUI during pregnancy and at 1–2 years postpartum, as well as demographic and obstetric parameters, were analyzed and compared among the three study subgroups.

Statistical analysis was performed using Student’s t-test for continuous data or \( \chi^2 \) for categorical data. \( P < 0.05 \) was considered statistically significant. Data are summarized as mean ± standard deviation (M ± SD), or percentage according to the variables.

**RESULTS**

Fifty-two consecutive elderly primiparae (mean age 40.0 ± 1.8) who underwent spontaneous vaginal delivery, 42 consecutive elderly primiparae (mean age 40.7 ± 3.6) who underwent elective cesarean section, and 92 consecutive young primiparae (mean age 26.2 ± 2.5) who underwent spontaneous vaginal delivery were enrolled. Demographic and obstetric characteristics of the three study subgroups are presented in Table I. The three subgroups were comparable with respect to maternal height, gestational age at delivery, use of epidural anesthesia, episiotomy (among parturients delivering vaginally) and Apgar scores, as well as the prevalence of SUI during pregnancy. Mean maternal body weight was found to be significantly higher among elderly primiparae regardless of mode of delivery. Among parturients delivering vaginally, length of second stage of labor and newborn birth weights were significantly higher in younger primiparae. Among elderly primiparae, birth weights were significantly higher in patients undergoing elective cesarean section.

The prevalence of SUI 1–2 years after spontaneous vaginal delivery was significantly higher in elderly compared with younger primiparae (38.5% vs. 9.8%, respectively; \( P < 0.001 \)). Elderly primiparae who underwent elective cesarean section had a significantly lower prevalence of postpartum SUI than those delivered vaginally (16.7% vs. 38.5%, respectively, \( P = 0.02 \)).

Comparison of stress-incontinent versus continent elderly primiparae 1–2 years after spontaneous vaginal delivery is shown in Table II. The prevalence of SUI during pregnancy was significantly higher among those who were stress-incontinent postpartum (45% vs. 18.8%, respectively; \( P = 0.04 \)). All other demographic and obstetric parameters were comparable among incontinent and continent women.

Most (80–90%) of the stress-incontinent women in each age group had not consulted a physician regarding their symptoms. However, on direct questioning, half of these symptomatic women expressed their desire for further evaluation and treatment.

### Table I. Patient Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Elderly primiparae</th>
<th>Younger primiparae</th>
<th>Elderly primiparae</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VD</td>
<td>BD</td>
<td>CS</td>
</tr>
<tr>
<td>No. of patients</td>
<td>52</td>
<td>92</td>
<td>42</td>
</tr>
<tr>
<td>Age (yr)</td>
<td>40.0 ± 1.8</td>
<td>26.2 ± 2.5*</td>
<td>40.7 ± 3.6</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>74 ± 11.0</td>
<td>59 ± 8.9*</td>
<td>76.1 ± 19.1</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>165 ± 6.3</td>
<td>163 ± 6.7</td>
<td>165.4 ± 6.4</td>
</tr>
<tr>
<td>Gestational age (wk)</td>
<td>39.1 ± 1.7</td>
<td>39.7 ± 1.3</td>
<td>38.6 ± 1.3</td>
</tr>
<tr>
<td>First stage (min)</td>
<td>360 ± 392</td>
<td>303 ± 138</td>
<td>NR</td>
</tr>
<tr>
<td>Second stage (min)</td>
<td>89 ± 64.5</td>
<td>106 ± 53.9*</td>
<td>NR</td>
</tr>
<tr>
<td>Episiotomy (%)</td>
<td>42 (80.1)</td>
<td>78 (84.8)</td>
<td>NR</td>
</tr>
<tr>
<td>Epidual anesthesia (%)</td>
<td>46 (88.5)</td>
<td>86 (93.5)</td>
<td>42 (102)</td>
</tr>
<tr>
<td>Apgar 1 min</td>
<td>8.8 ± 0.7</td>
<td>8.9 ± 0.26</td>
<td>8.9 ± 0.3</td>
</tr>
<tr>
<td>Apgar 5 min</td>
<td>9.8 ± 0.6</td>
<td>9.9 ± 0.2</td>
<td>9.8 ± 0.8</td>
</tr>
<tr>
<td>Birth weight (g)</td>
<td>3037 ± 438*</td>
<td>3242 ± 455</td>
<td>3311 ± 619</td>
</tr>
<tr>
<td>SUI during pregnancy (%)</td>
<td>15 (28.8%)</td>
<td>26 (28.3)</td>
<td>11 (26.2)</td>
</tr>
<tr>
<td>Postpartum SUI (%)</td>
<td>20 (38.5)*</td>
<td>9 (9.8)</td>
<td>7 (66.7)</td>
</tr>
</tbody>
</table>

SUI, stress urinary incontinence; VD, spontaneous vaginal delivery; CS, elective cesarean section.

*Significantly different from the corresponding figures in the same line, \( P < 0.05 \).
## DISCUSSION

Labor and delivery have long been known as the major causes of pelvic floor injury. However, it is unknown whether the insult begins during pregnancy, prior to the active process of labor and delivery, and how important are other risk factors, such as maternal age, weight, genetics, and life style. Results of our study suggest that postpartum SUI is related to advanced maternal age at first delivery and the pregnant status, and not only to obstetric trauma per se. Results also suggest that incontinence is not fully preventable by elective cesarean section at term.

Data regarding the association between maternal age and the development of SUI are scarce. Fritel et al. [2004] conducted a retrospective cohort survey investigating SUI 4 years after first delivery. Of 669 eligible women, 307 (46%) completed a mailed questionnaire. Of these, 36% underwent assisted forceps delivery and 10% underwent cesarean section. The main risk factors for SUI 4 years postpartum were maternal age >30 years at first delivery, incontinence before and during pregnancy, vaginal delivery and prolonged labor. However, these results should be interpreted cautiously because of the heterogeneous study group, the inclusion of patients with symptoms of SUI before pregnancy, possible recall bias associated with a retrospective questionnaire remote from the index event, and the partial response rate.

In a recently reported large epidemiological study, all women who delivered over the course of a year in three maternity units were asked to complete a mailed questionnaire 3 months postpartum [Glazener et al., 2006]. Of 10,989 eligible women, 7,879 (72%) completed the questionnaire, 3,405 of whom were primiparous with singleton births. De novo postpartum incontinence was associated with older maternal age and vaginal delivery. The likelihood increased most for the oldest women (35 and over). However, incontinence first occurring during pregnancy and still presented at 3 months postpartum was not associated with maternal age. Of the original cohort of 10,989 eligible women, 4,214 (38%) completed a follow up questionnaire 6 years later [MacArthur et al., 2006]. Older maternal age at first birth (>30 years), parity and vaginal delivery were found to be significant risk factors for persistent and long-term urinary incontinence.

DeLancey et al. [2003] used magnetic resonance imaging (MRI) to explore the appearance of the levator ani muscle after vaginal delivery. The study population consisted of 80 stress-incontinent primiparous, 80 continent primiparous, and 80 nulliparous controls. The primiparous women were scanned 9–12 months after vaginal delivery. As many as 20% of the primiparous were found to have levator ani muscle defects on MRI. No similar defects were identified in nulliparous women. Stress incontinent women were twice more likely to have levator ani defects than continent women. In a recently published report of the same cohort, obstetric factors associated with levator ani injury were analyzed [Kearney et al., 2006]. Levator ani muscle defects were found to be associated with difficult vaginal delivery (forceps, anal sphincter rupture, episiotomy and prolonged second stage of labor) and with older maternal age. Primiparous with levator ani defects were, on average, 3.5 years older than those without identifiable injury (32.8 ± 5.9 vs. 29.3 ± 4.7, respectively, P = 0.001).

Results of our study support these aforementioned reports. The prevalence of SUI 1–2 years after spontaneous vaginal delivery was found to be four times higher in elderly compared with younger primiparous women (38.5% vs. 9.8%, respectively; P < 0.05). Importantly, elderly primiparous had shorter deliveries and smaller babies than younger primiparous. These findings reflect narrower “safety margins” in the obstetric management of elderly primiparous. The high prevalence of postpartum SUI, despite the lack of obstetric trauma in these women, highlights the importance of other, non-obstetric risk factors, such as maternal age. It is also possible, that tissue recovery in elderly women is impaired—although, to date, there is no scientific evidence to support this speculation.

SUI is also an exceedingly common symptom during pregnancy, but in most women spontaneous resolution occurs within several weeks after delivery [Viktrup et al., 1992]. It is unknown, however, whether women with pregnancy-associated SUI are at increased risk for incontinence in later life. Results of our study reveal that stress-incontinent primiparous 1–2 years postpartum also had higher prevalence of SUI during pregnancy. Similarly, several other studies suggested that regardless of the mode of first delivery, new onset of SUI during pregnancy is associated with increased risk of long-lasting SUI [Wilson et al., 1996; Groutz et al., 1999, 2004; Thorp et al., 1999; Persson et al., 2000; Pregazzi et al., 2002]. These findings imply that the pathophysiologic process of SUI begins during pregnancy, prior to active labor and delivery.

The influence of mode of delivery on pelvic floor trauma has also been addressed in several studies. It is especially interesting...
to compare primiparae undergoing elective cesarean delivery, avoiding the trauma associated with labor, to those delivering vaginally. Data on this issue is scarce and conclusions are inconsistent. Recently, Rortveit et al. [2003b] investigated the association between childbirth and urinary incontinence in a large community-based cohort of 15,307 women who were younger than 65 years of age, and who were either nulliparous, or had undergone only cesarean or only vaginal deliveries. The prevalence of SUI was 4.7% in the nulliparous group, 6.9% in the cesarean section group and 12.2% in the vaginal delivery group. Further classification of cesarean sections into elective versus non-elective, performed in a subgroup of 239 primiparae, failed to reveal a statistically significant difference. However, non-elective cesarean sections were analyzed as one group with no further differentiation between cesarean sections for obstructed labor and other obstetric conditions (i.e., fetal distress, maternal indications, etc). Grouping all cesarean section deliveries into one category may be associated with an overestimation bias, as it is possible that in cases of cesarean section performed for obstructed labor, pelvic floor injury is already too extensive to be reversed by surgical intervention. A previous study by our group [Groutz et al., 2004] was designed to include only primiparae, and categorized indications for cesarean section. Our data demonstrated a similar prevalence of SUI 1 year postpartum among primiparae after vaginal delivery and after cesarean section for obstructed labor (10.3% and 12%). Conversely, elective cesarean section, with no trial of labor, was associated with a significantly lower prevalence of postpartum SUI (3.4%), suggesting a protective effect. A similarly constructed study by Chin et al. [2006] compared the prevalence of postpartum SUI among women undergoing elective cesarean section, emergent cesarean section and vaginal delivery. Elective cesarean section was found to be associated with a lower prevalence of SUI 1 year postpartum compared to both vaginal delivery and emergent cesarean section.

Results of our present investigation find a significantly lower prevalence of SUI 1–2 years postpartum among primiparae who underwent elective cesarean section compared to those delivered vaginally within the elderly age group (16.7% and 38.5%, respectively; $P = 0.02$). This suggests that the mechanical strain of labor and delivery makes a significant contribution to the development of postpartum SUI, in addition to maternal age and to the hormonal and mechanical effects of pregnancy. Whether the prevention of pelvic floor injury should be an indication for elective cesarean section in this age group remains to be established. It should be borne in mind that cesarean section may expose women to greater morbidity and mortality, and that the apparently protective effect of cesarean section may vanish with aging, or with further surgical interventions. Better understanding of pathophysiologic mechanisms associated with pelvic floor dysfunction, may provide the possibility to use appropriate preventive measures, or alternatively to suggest elective cesarean section in selected cases.

REFERENCES


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