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Platinum Priority – Review – Female Urology – Incontinence

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## Long-term Impact of Mode of Delivery on Stress Urinary Incontinence and Urgency Urinary Incontinence: A Systematic Review and Meta-analysis

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### Abstract

**Context:** Stress urinary incontinence (SUI) and urgency urinary incontinence (UUI) are associated with physical and psychological morbidity, and large societal costs. The long-term effects of delivery modes on each kind of incontinence remain uncertain.

**Objective:** To investigate the long-term impact of delivery mode on SUI and UUI.

**Evidence acquisition:** We searched Medline, Scopus, CINAHL, and relevant major conference abstracts up to October 31, 2014, including any observational study with adjusted analyses or any randomized trial addressing the association between delivery mode and SUI or UUI  $\geq 1$  yr after delivery. Two reviewers extracted data, including incidence/prevalence of SUI and UUI by delivery modes, and assessed risk of bias.

**Evidence synthesis:** Pooled estimates from 15 eligible studies demonstrated an increased risk of SUI after vaginal delivery versus cesarean section (adjusted odds ratio [aOR]: 1.85; 95% confidence interval [CI], 1.56–2.19;  $I^2 = 57\%$ ; risk difference: 8.2%).

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Metaregression demonstrated a larger effect of vaginal delivery among younger women ( $p = 0.005$ ). Four studies suggested no difference in the risk of SUI between spontaneous vaginal and instrumental delivery (aOR: 1.11; 95% CI, 0.84–1.45;  $I^2 = 50\%$ ). Eight studies suggested an elevated risk of UUI after vaginal delivery versus cesarean section (aOR: 1.30; 95% CI, 1.02–1.65;  $I^2 = 37\%$ ; risk difference: 2.6%).

**Conclusions:** Compared with cesarean section, vaginal delivery is associated with an almost twofold increase in the risk of long-term SUI, with an absolute increase of 8%, and an effect that is largest in younger women. There is also an increased risk of UUI, with an absolute increase of approximately 3%.

**Patient summary:** In this systematic review we looked for the long-term effects of childbirth on urinary leakage. We found that vaginal delivery is associated with an almost twofold increase in the risk of developing leakage with exertion, compared with cesarean section, with a smaller effect on leakage in association with urgency.

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## 1. Introduction

Stress urinary incontinence (SUI) is defined as the involuntary loss of urine on effort or physical exertion, or on sneezing or coughing. Urgency urinary incontinence (UUI) is defined as involuntary loss of urine associated with a sudden and compelling desire to pass urine [1]. Both from the population perspective and from an individual perspective, SUI and UUI are the most burdensome and bothersome of all urinary symptoms in women [2]. SUI and UUI are associated with substantial physical and psychological morbidity, and large societal costs [3,4]. Established risk factors for urinary incontinence include age and body mass index (BMI) [5]; the prevalence of these conditions is therefore likely to increase with future demographic changes.

Although advances in treatment during the last two decades have decreased morbidity, primary prevention of long-term SUI and UUI remains highly desirable. Mode of delivery is one potentially modifiable risk factor. Vaginal childbirth is known to have major impacts on the pelvic floor, weakening bladder neck support [6] and compromising innervation [7]. Cesarean delivery, particularly prelabor cesarean, is believed to offer substantial protection against such pelvic floor trauma; in contrast, assisted vaginal delivery, with vacuum or forceps, is believed to carry increased risks of trauma. The World Health Organization statement on caesarean section rates recommends that the ideal rate for caesarean sections is between 10% and 15% [8]. Observed rates, however, vary widely between countries. Although rates are <10% in most low-income countries [9], middle- and high-income countries have seen substantial increases since the 1970s. In 2011 rates were 24% in the United Kingdom [10], 33% in the United States [11], and 54% in Brazil [12]. The increasing use of cesarean section has substantial negative public health consequences, including peripartum infection, bleeding, and thrombosis, and it has an impact on future pregnancies [8]. Any positive consequences from the increased use of cesarean have not been well quantified.

An extensive body of evidence from the first year after delivery demonstrates that in this initial postpartum period, rates of SUI are higher in women delivering vaginally than those delivering by cesarean [13,14]. The long-term effects

of delivery mode, however, are more important to patients than transient postpartum incontinence. Therefore to reach a better understanding of the association between individual delivery modes and the long-term risk of SUI and UUI, we conducted a systematic review and meta-analysis.

## 2. Evidence acquisition

We registered the protocol (PROSPERO 2013: CRD42013006213) and followed the Preferred Reporting Items for Systematic Reviews and Meta-analysis guidance [15].

### 2.1. Search strategy

An experienced research librarian (M.A.) collaborated in planning the search strategy, performed on October 31, 2014, in Medline (1946 to present), Scopus (1995 to present), and CINAHL (1960 to present). We also searched abstracts published from the annual meetings of the International Continence Society and the International Urogynecological Association (1999–2014). The searches were conducted without language restrictions and adapted for each electronic database. The details of searches are available in Supplement 1.

### 2.2. Study selection

We included any randomized trial, cross-sectional, or cohort study that recorded the delivery mode as well as SUI and/or UUI outcome beyond 1 yr after delivery among primi- and multiparous women and provided an analysis comparing at least two delivery modes with SUI and/or UUI. Because previous studies have established prognostic factors for SUI and UUI [16–20], we included only cross-sectional or cohort studies with an analysis that adjusted/matched for at least one of the following: age [3,16], BMI [17,19,20], or parity [18].

Because SUI and UUI have different etiologies [21–23], we excluded studies that reported on incontinence but did not report specifically on either SUI or UUI (eg, “any urinary incontinence”). We also excluded studies that only reported surrogate measures, such as urodynamic testing, cough stress test, or treatment rates. Reasoning that small studies

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