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Outcomes of Pregnancy Following Surgery for Stress Urinary Incontinence: A Systematic Review

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Abstract

Purpose—Although few data have been published on the safety of childbearing after surgery for stress urinary incontinence, a large proportion of physicians recommend that women wait to complete childbearing before pursuing surgical treatment for stress urinary incontinence. We systematically reviewed the available literature to examine the safety of pregnancy after stress urinary incontinence surgery, and to measure the effect of such pregnancy on continence outcomes.

Materials and Methods—The review was conducted according to the recommendations of the MOOSE (Meta-Analysis of Observational Studies in Epidemiology) group. We performed a systematic review to identify articles published before January 2011 on pregnancy after incontinence surgery. Databases searched include PubMed®, EMBASE® and the Cochrane Review. Our literature search identified 592 titles, of which 20 articles were ultimately included in the review.

Results—Data were tabulated from case reports, case series and physician surveys. The final analysis in each category included 32, 19 and 67 patients, respectively. Urinary retention developed during pregnancy in 2 women, 1 of whom was treated with a sling takedown and the other with intermittent catheterization. Of these 2 women 1 also had an episode of pyelonephritis during pregnancy, possibly related to the intermittent catheterization. The incidence of postpartum stress urinary incontinence ranged from 5% to 18% after cesarean delivery and from 20% to 30% after vaginal delivery.

Conclusions—Although the data on outcomes in the literature are limited and further studies need to be performed on the subject, the current data suggests that any increase in risks for pregnancy after surgery for stress incontinence may be small. A low risk of urinary retention during pregnancy may exist. Although some data suggest that cesarean deliveries may result in a lower rate of recurrent stress urinary incontinence than vaginal deliveries, a formal analysis could not be performed with the available data.

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Keywords

urinary incontinence; suburethral slings; pregnancy

Stress urinary incontinence is a common condition reported to affect 25% to 57% of women.^{1–3} Although the peak age at onset is 45 to 49 years, this problem has also been reported to occur in 12.4% of women 40 years old or younger.⁴ Parity and age at first vaginal delivery have been shown to contribute most to the development of SUI, with the association between SUI and the first delivery being the strongest in women 20 to 34 years old (RR 2.2, 95% CI 1.8–2.6).¹ Many women who request surgical intervention for SUI may later wish to deliver more children. Minimally invasive approaches to sling surgery provide promising surgical options with low failure rates and few postoperative complications, making it an attractive option for women earlier in their lives. As the overall number of sling surgeries performed increases in younger and elderly patients, so potentially will the number of women who may bear children following surgery.

Traditionally, postponing surgical intervention was considered prudent because treatment of incontinence entailed more invasive operations. Many physicians currently recommend that women delay surgical treatment for stress incontinence until childbearing has been completed due to the potential disruption of pelvic support that may occur after pregnancy and childbirth. A questionnaire of 149 members of the American Urogynecologic Society revealed that 40% of polled physicians would always perform a cesarean delivery following incontinence surgery.⁵ Another survey of 251 obstetricians and gynecologists in the United Kingdom revealed that only 78% were prepared to perform a continence procedure on women who still wished to have children while 91% would offer a cesarean delivery to continent, pregnant women after surgery.⁶ Despite the prevalence of stress urinary incontinence among women and the popularity of surgery as a treatment option, there remains a paucity of literature regarding the outcomes of childbearing after surgery for SUI. An improved understanding of the literature may help in counseling such patients, and there has been no previously conducted systematic review on the subject. Therefore, we systematically reviewed the available literature to assess the safety of pregnancy and incontinence outcomes after surgery for SUI.

MATERIALS AND METHODS

Sources

The review was conducted according to the recommendations of the MOOSE group.⁷ The systematic review began with a literature search of PubMed, the Cochrane Library and EMBASE, including all articles published between 1947 and January 2011. The initial search was conducted with the aid of a librarian working at the RAND Corporation. Articles discussing pregnancy after a variety of surgical treatments for stress urinary incontinence were included, such as TVT®, TOT, Burch colposuspension and sling placement. MeSH® keywords and search terms included pregnancy, stress urinary incontinence and surgery, as well as various terms for procedures including sling, colposuspension, TVT, TOT, retropubic suspension, transobturator sling and continent surgery. The results were used to obtain the

titles, from which abstracts and full articles were obtained and used in our analysis. The search was completed on January 9, 2011.

The initial search of PubMed consisted of the specific terms pregnancy TVT, pregnancy transobturator sling, pregnancy retropubic suspension, pregnancy colposuspension, pregnancy sling surgery, pregnancy stress urinary incontinence surgery and pregnancy continent surgery. The results from each search term were compiled into a Word document and cross-referenced to identify duplicates. The final list of identified studies included the citation for all results using these terms.

Study Selection

The literature search included case series, case reports, review articles and questionnaire based physician surveys. To be included in analysis the studies had to be original research articles discussing pregnancy in women who had previously undergone surgery for SUI and the subsequent postpartum outcomes. Outcomes analyzed included recurrence of urinary incontinence, complications of incontinence surgery occurring during pregnancy and other potential complications of childbirth.

Foreign language articles were included in our review and interpreted by a professional interpreter. In this review all articles were in English except for 2 French articles.^{8,9} The articles excluded from analysis were those that discussed general pelvic floor damage after childbirth, basic science articles and editorials. Two reviewers (JTA and MEP) independently reviewed each study title and abstract. Then a reviewer (MEP) extracted the data from the selected articles and created data tables. The second reviewer (JTA) edited and modified the tables. Disagreements were resolved by consensus.

Data Abstraction and Synthesis of Results

Our literature search yielded no randomized trials. Data available included case series, case reports and physician surveys. Therefore, it was necessary to discriminate among the survey based studies based on the method of data collection. The first group collected the medical records from the surveyed physicians documenting the course of each pregnancy and the outcomes. The second group consisted of studies that surveyed physicians about their patients without collecting medical documentation. Study results were then entered into tables depending on the category into which they fit (case series/case reports, medical record based surveys and subjective surveys). Data abstraction forms were adapted from those previously used in a systematic review conducted to evaluate intravesical botulinum toxin for overactive bladder symptoms.¹⁰

Each table outlined the available data for each case, including patient age, parity, type of incontinence surgery performed, interval between surgery and pregnancy, urinary incontinence status during pregnancy, delivery method, urinary incontinence status after pregnancy, complications after childbirth and followup length. Because of the heterogeneity of patients, outcomes and data collection methods, we were unable to pool the data for statistical analysis in a methodologically sound fashion. Thus, the data are presented in a narrative format.

RESULTS

Our search identified 592 titles, of which 25 were selected for screening based solely on the relevance of the title. The flow diagram of article selection is presented in the figure. Of these articles 18 were included in the review. We were also able to identify 2 additional articles by examining the reference lists of the selected articles, bringing the total number of articles reviewed to 20. Of the selected studies 18 were case reports or case series, 1 was a medical record based survey and 1 was a questionnaire based study that queried physicians about their subjectively reported professional experiences. Of the 6 articles rejected after screening, 1 did not address surgery for stress urinary incontinence, 1 reported on a surgical procedure not commonly performed for stress urinary incontinence, 1 was a clinical editorial response, 1 did not include any original research and 3 did not address pregnancy after incontinence surgery.

Case Reports

Of our selected articles 18 were case reports or case series discussing a total of 32 patients.^{8,9,11–26} The case reports covered a variety of surgical treatment methods. There were 25 patients who delivered an infant after undergoing sling procedures,^{8,9,15–23,25,26} including 3 after Burch colposuspension,^{13,24} 2 after Marshall-Marchetti-Krantz colposuspension,²⁴ 1 after periurethral collagen injection,¹² and 1 after Pereyra urethropexy and Vesica® sling.¹¹

The patient age range at incontinence surgery in the case reports was 18²⁶ to 45 years²³ (median 35). The interval between surgery and subsequent pregnancy ranged from 0⁸ to 53 months¹³ (median 6). Parity of the women in these case reports ranged from 1^{8,17,20,22,23,26} to 5.¹⁹ There were 8 studies that lacked information on the delivery methods for previous pregnancies,^{9,11,12,19,22–24,26} but those reports that included these data listed all previous deliveries as vaginal.

Data on urinary status during pregnancies after surgical treatment for urinary incontinence were available in all but 2 of the case reports.^{20,26} Of these 1 reported mixed urinary incontinence during the prenatal period⁹ and 5 reported the return of stress urinary incontinence during the prenatal period.^{12,15,17,21,24} In 1 report a series of complications occurred throughout the pregnancy in a woman with a history of a Pereyra urethropexy and Vesica sling placement.¹¹ She experienced recurrent urinary tract infections that were confirmed by urine culture, the first occurring with dysuria at 18 weeks, and the second, *Pseudomonas aeruginosa* pyelonephritis, occurring at 32 weeks. The patient also experienced urinary retention at 25 weeks of gestation, necessitating the placement of a Foley catheter, which may have predisposed her to pyelonephritis. In 1 case report urinary retention was treated with sling incision during the second trimester of pregnancy, which resulted in the recurrence of stress urinary incontinence.²²

Of the 32 patients who had pregnancies after incontinence procedures 17 delivered an infant by cesarean section and 15 delivered vaginally. Of these 15 patients 3 (20%) had postpartum SUI, including 1 reporting mixed urinary incontinence implying a stress incontinence component, another reporting urine loss at high abdominal pressure and the third

experiencing recurrent SUI treated with a second TOT procedure.^{17,26} Of the 17 women who delivered via cesarean 3 (18%) reported recurrent postpartum stress urinary incontinence.^{11,21,22,24} In 1 case series several women reported unchanged urge urinary incontinence symptoms from before pregnancy, yet they were not considered to have recurrent urinary incontinence caused by pregnancy.²⁶ The overall incidence of persistent SUI after delivery in case reports and series, regardless of delivery mode, was 6 of 32 (19%). Followup for the case reports ranged from 1.5¹³ to 44 months¹⁷ (median 12).

Medical Record Based Case Series

Of the 20 selected articles 1 used medical records to assess the outcomes of 27 patients who became pregnant after surgery for urinary incontinence.²⁷ This article collected medical records from other physicians by contacting 3,400 obstetricians and gynecologists listed on the French national telephone list. The series included data on 20 patients who had undergone a TVT or TOT procedure for SUI before pregnancy. Patient age at surgery ranged from 20 to 42 years (median 35). The time between surgery and pregnancy ranged from 3 to 63 months with a median of 18, while the parity range was 1 to 4.

This study represents 20 cases of pregnancy after incontinence surgery. However, because 1 pregnancy was still ongoing at publication, we included only 19 cases in our analysis. In the pregnancies presented in these articles there were 2 reports of mixed urinary incontinence and 1 of stress urinary incontinence. Of the 19 pregnancies 9 were delivered by cesarean section and 10 were delivered vaginally. Stress urinary incontinence developed in 1 (11%) of the 9 patients who delivered by cesarean section and 3 (30%) of the 10 who delivered vaginally. The overall incidence of postpartum urinary incontinence, regardless of delivery mode, was 4 of 19 cases (21%). Followup ranged from 3 to 52 months (median 13).

Subjective Reporting: Physician Questionnaire Studies

Of the 20 selected articles 1 study of 67 patients contained information that was subjectively reported by physicians via questionnaires.⁵ Specific data were largely unavailable, including type of incontinence surgery performed, age at surgery, time between surgery and pregnancy, and incontinence status during pregnancy and followup. Of these 67 patients 37 had delivery via cesarean section and 30 had vaginal delivery. Ultimately 10 women (15%) experienced postpartum SUI, namely 8 (27%) of the 30 who delivered vaginally and 2 (5%) of the 37 who delivered by cesarean section.

DISCUSSION

The management of stress urinary incontinence in women who may later become pregnant remains a challenge, and the literature regarding the outcomes of pregnancy after surgery is limited. However, although the published pool of data describing pregnancies after surgery for SUI is small, descriptions of complications of subsequent pregnancies is even more limited. Although some may attribute the paucity of available data on complications to publication bias, incomplete gathering in this review or reporting bias, it is possible that it is due to the little additional risk to pregnancies occurring after surgery for stress urinary incontinence. To our knowledge there are no documented cases of fetal injury or death due

to sling related complications in the literature to date. The available data appear to suggest that surgery for stress incontinence in women who choose to have children later in life may carry only a minimal risk of complications. When counseling a woman of childbearing age about the risks of surgery for stress incontinence, it is reasonable to discuss the small but real risk of urinary retention that may occur during a later pregnancy based on the limited current data.

The issue of delivery method after stress urinary incontinence surgery is a significant one that should also be addressed with patients interested in subsequent pregnancies. Some authors in this review recommend cesarean delivery for women who become pregnant after incontinence surgery. A cesarean delivery in this setting may potentially result in a lower rate of SUI recurrence than a vaginal delivery. However, there was wide variation among the reviewed articles, with a 5% to 18% incidence of SUI after cesarean delivery and a 20% to 30% incidence after vaginal delivery. Although the data are mixed, the option of cesarean delivery as a possible means to prevent recurrent incontinence should also be discussed. If concomitant prolapse repairs are performed with surgery for stress incontinence, then a later cesarean delivery may better avoid potential complications of labor and delivery.

Many urologists, gynecologists and obstetricians continue to recommend delaying incontinence surgery until childbearing is complete. However, such a strategy may not be ideal for women who are significantly bothered by urinary leakage given the potential for dramatic improvement in quality of life. Sling procedures may pose an extremely low risk of danger to the fetus, and it appears that the risks to the mother may be low as well. However, we recognize the limitations of this assertion as it is based on a relatively small number of patients primarily presented in case reports and case series. Given the heterogeneity of the case series and various methods of reporting, data could not be pooled in a methodologically sound fashion. Further investigations are warranted to better guide clinical decision making. For women with stress incontinence who still wish to complete their families, the risks of poor outcomes in pregnancies after sling surgery appear to be small based on the limited data available, although patient care guidelines cannot be established at this time.

CONCLUSIONS

Our review suggests that, based on the limited available literature, there may be a minimal increased risk in pregnancy after SUI surgery, although additional studies need to be completed. A low risk of urinary retention could exist in the prenatal period. While more data are needed for conclusive recommendations to be drawn regarding the impact of repeat pregnancy and delivery on continence outcomes, considering sling placement may be appropriate in women wishing to bear children at a later date.

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Abbreviations and Acronyms

SUI	stress urinary incontinence
TOT	transobturator tape
TVT	tension-free vaginal tape

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Figure.
Literature flow of eligible studies of pregnancy after surgery for SUI