Lower urinary tract infection

Urinary tract infection (UTI) is the most common medical complication of pregnancy.¹ The incidence of asymptomatic bacteriuria during pregnancy is 2–5%¹ and if not treated, up to 20% of women will develop a lower UTI. The overall incidence of UTI in pregnancy is 8%.² The increased susceptibility to UTI is thought to be due to various physiological changes, which include changes in bladder volume, decreased bladder tone and ureteric dilatation, all of which lead to the development of urinary stasis.³ Urinary tract infection during pregnancy can cause significant potential morbidity for both mother and baby, including:³

- chorioamnionitis
- endometritis
- fetal growth restriction
- stillbirth
- preterm labour and delivery
- increased perinatal mortality
- mental retardation
- developmental delay.

In light of this, early recognition and treatment can reduce maternal and fetal morbidity. A Cochrane review⁴ has shown that antibiotic treatment is effective at curing UTI, but there are insufficient data with which to recommend any specific treatment regimen or duration.

The risk of recurrent UTI in pregnancy is around 4–5%. Long-term, low-dose antimicrobial cover and single-dose antimicrobial cover in intercourse-related UTI may be considered as prophylactic measures.⁵
Lower urinary tract dysfunction

Epidemiology

Urinary incontinence is defined as the complaint of any involuntary leakage of urine. During pregnancy the prevalence varies between 32% and 64% and is higher in parous than in nulliparous women. The prevalence is low in the first trimester but rises rapidly during the second and third trimesters. In a 6-year longitudinal study, MacArthur et al. showed that the prevalence of persistent urinary incontinence postpartum was 24%.

Stress urinary incontinence (SUI) is the involuntary leakage of urine on exertion, sneezing or coughing. It is common during pregnancy, but it generally resolves in the postpartum period.

Overactive bladder syndrome (OAB) is defined as urgency with or without urge incontinence, usually with frequency and nocturia. The incidence of OAB symptoms in pregnancy is up to 18% and symptoms appear to increase with greater gestation but decrease rapidly after childbirth. While dry OAB (without urinary incontinence) has no negative effect on quality of life, wet OAB (with urinary incontinence) compromises quality of life both during and after pregnancy.

Brown et al. showed that stress and mixed urinary incontinence are more common during pregnancy than urge urinary incontinence alone, the incidence of which is 5.9%. A population study showed that urinary incontinence is associated with increasing age, first pregnancy and increasing parity.

Pathophysiology and aetiology

The exact pathophysiology of lower urinary tract dysfunction during pregnancy is not clear. It has been suggested that high levels of relaxin, an increased glomerular filtration rate, increased urinary bladder neck mobility, the gravid uterus and altered connective tissue composition may all play a role. Vaginal delivery has been thought to cause postpartum SUI. There is an association between parity, delivery and the development of SUI. Several reports show an increased risk of SUI following vaginal delivery compared with caesarean section; however, caesarean section appears to be only partially protective against the development of SUI 6 years after delivery. The development of SUI after vaginal delivery is thought to be a consequence of muscular and neuromuscular injuries of the pelvic floor as well as damage to the suburethral fascia. Damage to the levator ani has been well documented following vaginal delivery and is thought to be associated with the subsequent development of lower urinary tract symptoms.

While urodynamic studies are commonly used in the investigation of lower urinary tract symptoms in non-pregnant women, there are differences in the study parameters between the pregnant and non-pregnant population. Pregnancy is associated with lower first sensation and strong desire to void, and a decrease in the maximum cystometric capacity. In light of this, urodynamic studies are not considered reliable at assessing bladder function in pregnancy, and are of more interest in the research setting.

Management of stress urinary incontinence

Management in pregnancy and the early postpartum period is mainly conservative and includes lifestyle interventions, physical therapies and the use of anti-incontinence devices, pads and catheters: these are considered to have a low risk of adverse effects and do not affect subsequent treatments. There is evidence that pelvic floor muscle training during a first pregnancy reduces the likelihood of postnatal urinary incontinence. The National Institute for Health and Clinical Excellence guideline on the management of urinary incontinence in women recommends that pelvic floor muscle training is offered to women in their first pregnancy as a preventive strategy. Furthermore, the 4th International Consultation on Incontinence showed that continent pregnant nulliparous women who participated in intensive supervised pelvic floor muscle training were less likely to experience urinary incontinence in late pregnancy and the early postpartum period. Pelvic floor muscle training should also be offered as first-line therapy to women with persistent urinary incontinence 3 months after delivery.

Poor response to pelvic floor muscle training in the early postpartum period may be caused by neurogenic injury, which may resolve over time. Allen et al. showed that there is evidence of nerve damage in over 80% of women after vaginal delivery. This may take several months to recover and may interfere with women’s ability to isolate and contract the pelvic floor muscles in the early postpartum period.

Contidence pessaries are used in the management of SUI and can be considered as an alternative to other conservative treatment. They are believed to increase urethral resistance by augmenting urethral closure during episodes of increased intra-abdominal pressure. Their effectiveness in non-pregnant women has been described in several studies, most of which had small samples with short-term follow-up. While there are no reports on their effectiveness in the management of SUI in pregnant women, they are used both during pregnancy and in the postpartum period. They may be offered to women who do not respond well to pelvic floor muscle training.

Pregnancy, childbirth and continence surgery

Once they have exhausted conservative treatments, some women may want further intervention for treating their SUI. The role of surgery for SUI in women who wish further pregnancies is a difficult and ethically challenging dilemma. In those women who have not yet completed their family there are several factors that should be considered. The first is the effect of pregnancy and childbirth on previous continence surgery. There are data to suggest that, after a continence date.

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procedure, delivery by caesarean section may have a protective effect.\textsuperscript{25,26} It has been shown that the rate of postpartum incontinence in women who have had previous bladder neck suspension or midurethral sling is higher after caesarean section than after vaginal delivery.\textsuperscript{25,26} There is emerging evidence, however, (although only in the form of case reports) that vaginal delivery may not increase the risk of recurrence of SUI when compared with caesarean section.\textsuperscript{27}

Secondly, women should also be counselled about the success rates of primary, secondary and tertiary procedures for incontinence. Data taken from women in the non-pregnant population suggest a significant reduction in success rates with an increasing number of procedures. The efficacy of colposuspension is 81\% after the first procedure, 25\% after the second and 0\% after three colposuspensions.\textsuperscript{28} The results are similar for midurethral tapes in women with a previous failed continence procedure.\textsuperscript{29}

Women should be counselled that pregnancy and delivery may have a deleterious effect on the outcome of previous surgery and that elective caesarean section may be only partially protective. MacArthur et al.\textsuperscript{9} found that delivery exclusively by caesarean section was associated with less persistent urinary incontinence compared with those delivered by caesarean section in addition to vaginal delivery; however, the prevalence of persistent symptoms is still high (14\%).

Periurethral bladder neck injection with bulking agents is a useful option for short-term symptomatic relief of SUI\textsuperscript{30} and would be a suitable option for women who are yet to complete their families, as this does not appear to affect subsequent surgery such as a retropubic sling. Groenen et al.\textsuperscript{31} proposed a management strategy for women with SUI who still want to conceive or for women who want to become pregnant after previous incontinence surgery (see Box 1). However, any decision about surgery should be made in conjunction with the woman after careful consideration of the pros and cons of surgical intervention.

**Box 1. A proposed management strategy for women with stress urinary incontinence who want to conceive or who want to become pregnant after previous incontinence surgery**

- Advise women to try to complete their family before incontinence surgery.
- If a woman becomes pregnant after incontinence surgery, institute conservative treatment.
- If the woman is continent after previous incontinence surgery, caesarean section should be considered; however, if the incontinence procedure has not been successful, vaginal delivery may be suggested.
- If incontinence recurs or persists postpartum, await spontaneous recovery for at least 6 months to 1 year.
- A repeat midurethral sling procedure, if necessary, is the most likely to be safe and effective.

**Management of overactive bladder symptoms**

There appears to be little evidence available on the treatment of OAB symptoms in pregnancy; neither are there any studies that assess the effect of bladder and pelvic floor muscle training. The mainstay of treatment is conservative and includes lifestyle modifications, fluid manipulation, avoiding caffeine, bladder and pelvic floor muscle training, and alternative therapies such as acupuncture. The use of antimuscarinics during pregnancy and breastfeeding is recommended only when the medication is of clear benefit to the mother. A MEDLINE search did not reveal any studies on the use of antimuscarinics during pregnancy. However, the US Food and Drug Administration have listed antimuscarinics as either:

- category B drugs: animal reproduction studies have failed to demonstrate a risk to the fetus and there are no adequate and well-controlled studies in pregnant women
- OR animal studies have shown an adverse effect, but adequate and well-controlled studies in pregnant women have failed to demonstrate a risk to the fetus in any trimester

OR:

- category C drugs: animal reproduction studies have shown an adverse effect on the fetus and there are no adequate and well-controlled studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks.

**Pelvic organ prolapse**

**Background**

The severity of pelvic organ prolapse (POP) as measured by the Pelvic Organ Prolapse Quantification (POP-Q) staging system appears to increase during pregnancy in nulliparous women. However, the stage does not change significantly postpartum. The POP-Q stage may be higher in women delivered vaginally than in women delivered by caesarean section, with the most frequent site of prolapse being the anterior compartment.\textsuperscript{32} Prospective quantification of POP showed that postpartum 52\% of nulliparous women had stage 2 prolapse, 37\% had developed a prolapse in a new compartment and 15\% had developed a more severe degree of prolapse compared with antenatal examinations.\textsuperscript{33}

**Pathophysiology and aetiology**

Mant et al.\textsuperscript{34} showed that age, parity and weight were significantly associated with increased risk of developing prolapse, but parity was shown to have the strongest relationship. The pelvic organs are supported by three mechanisms:
Urogynaecological management in pregnancy and early postpartum period

- the pelvic floor musculature and its intact nerve supply
- the integrity of the connective tissue of the suspensory ligaments and endopelvic fascia
- the posterior angulation of the vagina.

Damage to any of these during pregnancy or parturition can predispose to POP later in life.35 Hormonal changes during pregnancy are thought to alter the quality of connective tissue. Progesterone relaxes smooth muscle and relaxin plays a role in connective tissue remodelling, allowing tissue stretching, which may be irreversible if tissues are stretched beyond their physiological limits. This can be seen in vitro by measuring the biomechanical properties of collagen within connective tissues, which have been shown to be altered in pregnancy.36

Direct myogenic injury as well as denervation of the nerves supplying the muscles of the pelvic floor occurs during pregnancy, especially during vaginal delivery.37 Evidence of this can also be seen clinically on ultrasound of the pelvic musculature in the postpartum period. This has shown avulsion of the levator ani from their attachments in one-third of women after vaginal birth.38 Furthermore, women with levator avulsion defects were found to be twice as likely to show POP than women without.39

Management of pelvic organ prolapse during pregnancy and postpartum

As parity and childbirth are important factors in the causation of POP, women should be advised to complete their families before considering surgical treatment.

The mainstay of treatment for symptomatic POP during pregnancy and the postpartum period is conservative. There is little evidence in the literature on the management of prolapse in pregnancy and the majority of treatment rationales have been extrapolated from the results of studies on conservative management of SUI. The aim of treatment is to improve symptoms. Conservative treatment includes lifestyle interventions such as:

- stopping smoking
- reducing exacerbating predisposing factors, including heavy lifting and chronic coughing
- treating constipation
- pelvic floor muscle training
- using vaginal pessaries.

Vaginal rings and pessaries can be offered as a conservative treatment option for women with symptomatic POP during pregnancy and in the postpartum. The aim is to manage POP by mechanically supporting the pelvic viscera. They can be changed without risk to mother or fetus. Modern pessaries are made from a variety of materials, including rubber, plastic and silicone. While there are no studies about the use of rings and pessaries during pregnancy and the postpartum, there is good evidence that they provide symptomatic relief and may prevent worsening of POP in the non-pregnant population; this evidence has been adopted for use in pregnancy.40

If women have surgery for POP and they then fall pregnant, it is important to advise them about the effect of any future pregnancy and delivery on their previous surgery. Because of the paucity of data on this subject, the advice given to women is anecdotal. However, it seems logical to advise women who have had POP surgery to have supervised pelvic floor muscle training as soon as possible in pregnancy. Mode of delivery is contentious. A discussion about the risks of vaginal delivery and caesarean section is essential and should include the risks of pregnancy and delivery on the potential development of further prolapse. A clinician will usually offer elective caesarean section to women with previous successfully repaired POP, should they become pregnant and if their prolapse does not deteriorate during pregnancy, because of the uncertainty of the effect of vaginal delivery on the development of de novo prolapse. This is, again, a difficult decision and should be made in conjunction with the woman once she has carefully considered the implications of surgery.

Fertility-preserving pelvic organ prolapse surgery

A minority of women with symptomatic prolapse may wish to have surgery but retain their fertility: these women should initially be offered conservative management. If conservative measures fail, surgery can then be considered. The aims of surgery are to improve symptoms and restore anatomy and function while preserving future fertility.

A variety of uterine-preserving surgical operations for symptomatic POP have been described, using a vaginal, abdominal or laparoscopic approach. Uterosacral suspension/plication, sacrospinous uterosacral fixation and sacrohysteropexy – either open or laparoscopic – are among the most common procedures. There are limited data regarding the effects of surgery on fertility, delivery and the durability of these procedures after pregnancy and delivery. A review41 shows that laparoscopic or open hysteropexy seems to be a safe procedure, with cure rates ranging from 91–100% at 3 month to 5 year follow-up. However, reports on pregnancy and delivery following hysteropexy are mostly in the form of case reports and series. Two case series of around 60 women42,43 in total reported four cases of term deliveries, all by caesarean section, and one early pregnancy loss. There are no reports of vaginal delivery after hysteropexy.

Summary

- Lower urinary tract symptoms are common during pregnancy and the postpartum period.
**Effective diagnosis and treatment of UTI during pregnancy reduces the risks of maternal and fetal complications, including prematurity and increased maternal morbidity and perinatal mortality.**

**Urinary incontinence is common during pregnancy: treatment is usually conservative.**

**Women who are yet to complete their families or who have undergone a previous continence procedure and are contemplating pregnancy should be counselled regarding the effects of pregnancy and childbirth on the durability of the procedure. Caesarean delivery may be protective.**

**The effect of pregnancy and childbirth on previous POP surgery is not known, although it is believed to increase the risk of recurrence.**

**Women presenting with symptomatic POP who have not completed their family should be encouraged to try conservative treatments until their family is complete.**

**Careful consideration should be made regarding surgery for prolapse or incontinence prior to pregnancy and careful counselling is needed regarding the subsequent mode of delivery and the likelihood of recurrence.**

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**References**


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