Continuing Medical Education

Urinary Incontinence and Pelvic Organ Prolapse in Women

Prevention and Treatment

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Summary

Background: Pelvic floor disorders are common, especially in pregnancy and after delivery, in the postmenopausal period, and old age, and they can significantly impact on the patient's quality of life.

Methods: This narrative review is based on publications retrieved by a selective search of the literature, with special consideration to original articles and AWMF guidelines.

Results: Pelvic floor physiotherapy (evidence level [EL] 1), the use of pessaries (EL2), and local estrogen therapy can help alleviate stress/urge urinary incontinence and other symptoms of urogenital prolapse. Physiotherapy can reduce urinary inconti-nence by 62% during pregnancy and by 29% 3–6 months post partum. Anticholinergic and β-sympathomimetic drugs are indi-cated for the treatment of an overactive bladder with or without urinary urge incontinence (EL1). For patients with stress urinary incontinence, selective serotonin-noradrenaline reuptake inhibitors can be prescribed (EL1). The tension-free tape is the current standard of surgical treatment (EL1); in an observational follow-up study, 87.2% of patients were satisfied with the outcome 17 years after surgery. Fascial reconstruction techniques are indicated for the treatment of primary pelvic organ prolapse, and mesh-based surgical procedures for recurrences and severe prolapse (EL1).

Conclusion: Urogynecological symptoms should be specifically asked about by physicians of all relevant specialties; if present, they should be treated conservatively at first. Structured surgical techniques with and without mesh are available for the treat-ment of urinary incontinence and pelvic organ prolapse. Preventive measures against pelvic floor dysfunction should be offered during pregnancy and post partum.

U rogynecology is the specialty that deals with pelvic floor dysfunction in women. The most common disorders in this area are urinary incontinence and pelvic organ prolapse. They are influenced by a genetic predisposition and are usually of multifactorial origin. Pregnancy and delivery, postmenopause, and advanced age markedly affect their incidence.

Preventive treatments, such as postpartum pessary therapy to support the recovery of the pelvic floor connective tissue even when the patient has no symp-toms, are increasingly investigated in current studies. The primary therapy should always be conservative; pelvic floor exercises and pessary therapy are indicated for the treatment ofboth urinary inconti-nence and pelvic organ prolapse. Surgical methods in-volve either the reconstruction of the patient's native fascial structures or their replacement. The indi-cations for these procedures are now very clearly defined.

Methods

This article is largely based on the current AWMF guidelines, more recent reviews and studies *(Table, eTables 1–3)*, and clinical evaluations. Postpartum fecal incontinence is not addressed in this paper because of limitations of space.

Urogynecology

The most common disorders in urogynecology are urinary incontinence and pelvic organ prolapse.

Preventive treatment approaches

Pelvic floor protection must be integrated into the management of pregnancy and delivery.

Learning objectives

This paper is intended to help the reader to:
- recognize the associations of pregnancy, delivery, postmenopause, and polypharmacy with urogynecological conditions,
- know and assess preventive and conservative treatment approaches, and
- evaluate the surgical treatments of urinary incontinence and pelvic organ prolapse, with or without tissue replacement, with regard to indications and success rates.

Protecting the pelvic floor during pregnancy and delivery

Pregnancy and childbirth can cause pelvic floor dysfunction. Primary caesarean section lowers the risk of urinary incontinence or pelvic organ prolapse (1) but cannot be used as a general preventive measure against these problems: 12 women would have to undergo cesarean section to prevent a single case of prolapse, and 8 to prevent a single case of urinary incontinence (2). Yet there are women at high individual risk of postpartum pelvic floor disease who may benefit from elective caesarean section and should at least be informed of this option. UR-Choice is an evidence-based stratification program that can be accessed on the Internet and can estimate the risk from patient-supplied information *(Box)* (3). Likewise, intrapartum factors can influence the postpartum development of pelvic floor dysfunction *(Box)* (4). Peripartum pelvic floor protection measures can lower the risk of pelvic floor dysfunction *(Box)* (4).

Prevention and conservative management

Supporting musculoskeletal recovery with physiotherapy is a well-established and well-studied method. If it is begun in a structured manner early on in pregnancy, it can lessen the incidence of urinary incontinence by 62% during pregnancy and by 29% 3–6 months postpartum. Adequate data on the late postpartum period are unavailable (5).

There are as yet no scientifically proven measures that facilitate the recovery of pelvic floor connective tissue. Vaginal delivery increases the risk of prolapse in the postmenopausal period by a factor of four or eight compared to caesarean section in first- and second-time mothers, respectively; the risk increases less in further births (6, 7). Pessary therapy is an easily understandable method of opposing downward pressure; it should be offered both prophylactically and as part of the treatment of any symptoms, even mild ones, that might be prolapse-related, even though the

scientific data do not yet suffice to establish its efficacy.

The conservative treatment of pelvic floor dysfunction that has already become clinically manifest does not differ from the preventive approaches *(eTable 1)*. A directory of competent physiotherapists throughout Germany can be found at www.ag-ggup.de. The efficacy of pelvic floor training has been demonstrated (e1), is independent of age, and depends less on the kind of training than on its intensity (8). Electrostimulation can be offered in addition to pelvic floor training (9); clinical experience suggests it can be offered if the patient cannot adequately control the pelvic floor muscles, or with biofeedback triggering if coordinated contraction is possible. Electrostimulation to treat an overactive bladder differs from that used to treat bladder emptying dysfunction in terms of the nature of the applied current and its mode of application (e.g. transcutaneous tibialis posterior stimulation) and should be given before any invasive treatment.

From the perimenopause onward, local estrogenization, applied over the long term twice weekly, is reasonable in the absence of contraindications. In the absence of scientific data on relative indications, common clinical experience suggests the efficacy of dish pessaries to reposition prolapsed pelvic organs, and of cube pessaries to reposition cystoceles or enteroceles if dishes do not provide enough support. The same holds for patients with a wide levator hiatus (i.e., a gap between the puborectalis muscle of the M. levator ani, limited anteriorly by the pubic bone), which is often the result of a levator avulsion. Rectoceles are less amenable to pessary therapy (e2). In cases of stress urinary incontinence, urethral pessaries with a knob (ring pessaries with a suburethral thickening) and foam tampons can be used for symptomatic treatment.

The pharmacotherapy of urinary incontinence

Drugs are an indispensable part of conservative treatment for the various types of urinary incontinence. Their proper indications and potential side effects must be borne in mind. If a drug is effective and well tolerated, its use over the long term may be the treatment of choice.

Anticholinergic and β3-sympathomimetic drugs for the treatment of overactive bladder

Anticholinergic drugs (also called antimuscarinic drugs) can improve the symptoms of overactive bladder ([OAB]) with or without incontinence ([11]; evidence level [EL] 1, strong consensus). Drugs of this type,

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Delivery and caesarean section

Primary caesarean section lowers the risk of urinary incontinence or pelvic organ prolapse but cannot be used as a general preventive measure against these problems:

The risk of prolapse in postmenopause

Compared to caesarean section, vaginal delivery increases the risk of prolapse in the postmenopausal period by a factor of four in first-time and eight in second-time mothers.

including darifenacin, tolterodine/fesoterodine, solifenacin, propiverine, oxybutynin, and trospium chloride, affect the efferent arm of micturition control by blocking the M2 and M3 receptors of the smooth muscle of the bladder (detrusor vesicae) (10), thereby increasing bladder capacity and prolonging the interval between successive micturitions. To avoid side effects that may lead to discontinuation of treatment, sustained-release (timed-release) preparations are generally recommended; the dose can be increased to improve the effect, if necessary. Alternatives include transdermal application to eliminate the first-pass effect, combination with drugs of other classes (instead of dose escalation), or intravesical application if the patient already requires intermittent self-catheterization.

The most common side effects are dry mouth, constipation, accommodation disturbance, and tachycardia (11). In elderly and postmenopausal women, the blood-brain barrier may be more permeable because of degenerative processes, and anticholinergics may be more likely to cause drowsiness, impaired concentration, and even hallucinations and delirium (e3). Thus, the neurologic state of patients taking anticholinergic drugs should be closely monitored, and special care should be taken to note potential anticholinergic preloading in patients taking multiple drugs at once ([9, 12]; strong recommendation). In the absence of comparative studies, no particular anticholinergic drug can be recommended as preferable to the others [13, 14].

Mirabegron (50 mg daily) is a β3-sympathomimetic drug that relaxes the detrusor muscle in the storage phase of bladder function by stimulating the physiologically noradrenergic β3-receptors (EL1). Its mechanism of action thus differs fundamentally from that of anticholinergic drugs, and it does not cause typical anticholinergic side effects such an increase in intraocular pressure (which can trigger glaucoma in postmenopausal and elderly patients) (15). In registration studies, mirabegon was found to significantly lower the frequency of incontinence episodes and to improve other outcome parameters compared to placebo in the treatment of bladder overactivity (16).

In contrast to the anticholinergic drugs, mirabegon does not cause dry mouth to any greater extent than placebo (16, 17). Mirabegon is not more effective than the classic anticholinergic drugs, but it is better tolerated, and patients taking it are therefore more likely to adhere to the treatment (18). Because mirabegon is a β3-sympathomimetic drug, its main side effect is the induction of arterial hypertension. It is contraindicated in patients whose systolic blood pressure exceeds 180 mm Hg or whose diastolic blood pressure exceeds 110 mm Hg. The patient's blood pressure should be measured before treatment and monitored while under treatment.

Desmopressin for the treatment of nocturia

Desmopressin, also known as DDAVP (1-desamino-8-d-arginine vasopressin), is an antidiuretic drug that has become a well-established treatment for nocturia without identifiable cause in adults since it was approved for this purpose in 2017 ([9, 12]; [EL1]; strong recommendation ["should be offered"]).

DDAVP is dosed differently for men and women, and the need to monitor the serum sodium level must be borne in mind, particularly in postmenopausal and elderly patients [12]. The sodium level should be measured at baseline, during the first week of treatment (day 4 to 8), and again one month later.

BOX

Risk factors for, and protection against, pelvic floor dysfunction*

- **Prepartum risk factors**
  - positive family history of the prospective mother
  - urinary incontinence before and during pregnancy
  - ethnicity
  - maternal age at delivery (> 35 years)
  - body-mass index (> 25 kg/m²)
  - estimated birth weight (> 4000 g)
  - parity

- **Intrapartum risk factors**
  - prolonged delivery (> 120 min)
  - median or mediolateral episiotomy < 60°
  - vacuum and forceps delivery

- **Peripartum pelvic floor protection**
  - adequate perineal protection
  - warm compresses
  - peridural anesthesia
  - upright birth position
  - pre- and postpartum pelvic floor physiotherapy

*modified from (3, 4)

The treatment of overactive bladder syndrome

Anticholinergic drugs are the primary treatment of overactive bladder syndrome, but treatment compliance is limited because of side effects.

The use of β3-sympathomimetic drugs

β3-sympathomimetic drugs are well tolerated and therefore associated with high compliance, but they can induce or worsen arterial hyptertension.

TABLE

Some of the recommendations that have been updated in the S3 guideline on pelvic organ prolapse, listed here for illustrative purposes with selected new randomized, controlled trials

n	Comparison	Study design	Primary endpoint	Results [95% CI]	Adverse events
Study: van Ijsselmuiden et al. (2020) (e31)					
126	laparoscopic sacrohysteropexy vs. vaginal sacrospinal hysteropexy	anatomical apical recurrences	apical recurrences in 1/54 (2%) vs. 2/58 (3%)		the two operations have the same recurrence rates
Study: Lucot et al. (2018) (e32)					
262	laparoscopic sacrocolpopexy vs. transvaginal mesh for cystocele	reoperations	n = 6/129 (5%) vs. n = 14/128 (11%) reoperations for complications 1 (1%) vs. 11 (9%)*	continence operations: 4/129 (3%) vs. 1/128 (0.8%) de novo dyspareunia: 10/71 (14 %) vs. 18/61 (30 %)*	sacrocolpopexy and vaginal mesh inserts are both effective; after sacrocolpopexy there is less dyspareunia
Study: Lucot et al. (2022) (e33)					
209	laparoscopic sacrocolpopexy vs. transvaginal mesh for cystocele	recurrences and complications. 4-year follow-up	vaginal apex (POPQ C) in mm – 51.7 ± 27.1 vs. – 59.7 ± 1.7 complications 2% [0; 4.7] vs. 8.7% [3.4; 13.7]: HR 4.6 [1.007; 21]*	de novo/exacerbated dyspareunia 3%, 2/65 vs. 10%, 6/61	sacrocolpopexy and vaginal mesh inserts are both effective; after sacrocolpopexy there is less dyspareunia
Study: Bataller et al. (2019) (e34)					
120	laparoscopic sacrocolpopexy vs. vaginal anterior mesh	apical recurrences anterior recurrences	57/58 (98%) vs. 55/58 (95%) 34/58 (58%) vs. 32/58 (55%)	de novo dyspareunia 3 (7%) vs. 7 (19%)	sacrocolpopexy and vaginal mesh inserts are both effective; after sacrocolpopexy there is less dyspareunia
Study: Coolen et al. (2017) (e35)					
74	laparoscopic vs. open sacrocolpopexy	PGI (Patient's Global Impression) score	71% (22/31) vs. 74% (20/27)		laparoscopy is just as good as open surgery and is to be preferred
Study: Noe et al. (2015) (e36)					
83	pectopexy with vaginal and laparoscopic fascial reconstruction, vs. sacrocolpopexy	anatomical recurrences	1/42 (2%) vs. 4/41 (10%)	sacropexy 5 de novo defecation disturbance vs. 0 for pectopexy	pectopexy is a good option for apical prolapse
Study: Schulten et al. (2019) (e37)					
208	sacrospinal hysteropexy vs. vaginal hysterectomy with uterosacral ligament fixation	anatomical recurrences/symptoms (combined endpoint) follow-up: 60 months	anatomical recurrences: 46/102 (45%) vs. 51/102 (50%) difference: –4.8 [-18.5; 8.9]	stress incontinence: 2 vs. 7	vaginal surgery with and without hysterectomy is equivalent
Study: Jelofsek (2018) (e38)					
374	uterosacral ligament fixation vs. sacrospinal fixation 5-year follow-up	feeling of bulging; lowering of the apex by > 1/3 of the upper vagina, reoperation	68/133 (51%) vs. 80/134 (60%) (combined endpoint)		similar outcomes from both procedures
Study: Ahmed et al. (2020) (e39)					
84	anterior repair with suburethral sling versus anterior 4-arm mesh insertion	stress incontinence and recurrent prolapse	6/42 (12%) vs. 3/43 (7%) 6/41 vs. 1/43		recurrent prolapse: both procedures comparable stress urinary incontinence: possibly anterior repair with suburethral sling

; CI, confidence interval; HR, hazard ratio; POPQ, Pelvic Organ Prolapse Quantification; *statistically significant, p ≤ 0.05

In elderly women, DDAVP-induced hyponatremia with its potential cognitive and neuromuscular effects is a cofactor for falls and delirium. This must be weighed against the potentially fatal consequences of nocturia itself, as nocturia, too, increases the patient's tendency to fall (12). Moreover, any other medications the patient may be taking need to be continually rechecked for potentially dangerous interactions.

SSNRI for the treatment of stress urinary incontinence

Duloxetine is a selective serotonin-norepinephrine reuptake inhibitor (SSNRI). It is commonly used as an antidepressant and also has alpha-adrenergic and anticholinergic effects.

Three randomized, placebo-controlled trials have shown that duloxetine, in a dosage of 40 mg bid, lowers the frequency of incontinence episodes by 50%, compared to 30–40% with placebo (20). 10% of treated patients became continent ([9]; [EL1], strong recommendation ["should be offered"]). Some evidence suggests that duloxetine combined with pelvic floor exercises may be more effective than duloxetine alone ([9, 21]; open recommendation).

Postmenopausal and elderly women benefit especially from the favorable side-effect profile of duloxetine, as do patients with cardiovascular diseases. For patients taking multiple drugs, the potential interactions and side effects (e.g., nausea) of duloxetine must be borne in mind, along with the gradually tapering introduction and discontinuation of the drug (strong recommendation).

Surgical treatment
Stress urinary incontinence

More than 25 years ago, a new type of operation for female stress urinary incontinence was introduced by Ulmsten et al. (22, 23) that revolutionized the surgical treatment of stress incontinence. The tension-free alloplastic sling (preferably made of polypropylene), implanted under the middle third of the urethra and brought out behind the pubic bone, stabilizes the pubourethral ligaments and the suburethral fascial structures.

In view of the very good long-term success rates (87.2% patient satisfaction at 17 years, [24]), suburethral tape placement is recommended in the recently updated AWMF guideline on urinary incontinence in women (9) as the exclusive primary treatment in all women with uncomplicated stress incontinence (i.e., those without prior incontinence surgery, neurological symptoms, or pelvic organ prolapse, and for whom further pregnancies are not an issue; [EL1]; strong recommendation). If suburethral tape insertion is not indicated, alternative procedures such as colposuspension, fascial sling insertion, submucosal urethral injection of bulking agents, or artificial sphincter creation may be used, after the patient is thoroughly informed and the surgeon is aware of her expectations, depending on the expertise and preference of the treating center. Vaginal laser therapy is treated as a conservative procedure in the current AWMF guideline; it can be considered for women with incontinence for small amounts of urine (< 10 g in the 1-hour pad test) (open recommendation, [25]).

As the recommendation for treatment is not affected by the findings of further differential diagnostic testing (functional urethral length, urethral hypermobility, maximum urethral closure pressure), urodynamic tests should be performed preoperatively only if they affect the choice of treatment or if complicated stress urinary incontinence is present.

Retropubic placement of suburethral slings is associated with a somewhat higher risk of bladder injury and overcorrection compared with transobturator implantation, which, however, is more likely to cause dyspareunia and inguinal pain and there is less long-term data ([9], strong consensus).

Urge urinary incontinence/bladder overactivity

If the conservative treatment of urge urinary incontinence or bladder overactivity fails, there are two main surgical treatment options, which differ in their duration of action, invasiveness, and patient preference. Conservative treatment fails in 80% of patients after one year for various reasons: unrealistic expectations, intolerable side effects, contraindications, insufficient efficacy (26).

Intravesical onabotulinum toxin A injection has been approved for primary use in the treatment of overactive bladder at a total dose of 100 U, with injections into the detrusor muscle at 20 different locations in individual doses of 5 U each (simple recommendation ["can be offered"]). The definition of an overactive bladder requires the exclusion of neurological causes (for which higher doses of toxin are needed) and of other defined disease entities affecting the urinary tract. The procedure can be performed on an outpatient basis under local anesthesia, but hospitalization and treatment under regional or general anesthesia are recommended in cases that will also involve hydrodistention (bladder distention with a hydrostatic irrigation fluid pressure of 60 cm H2O)


SSNRI for the treatment of stress urinary incontinence

Some evidence suggests that duloxetine combined with pelvic floor exercises may be more effective than duloxetine alone.

The surgical treatment of stress urinary incontinence

In view of the very good long-term success rates, suburethral tape placement is recommended in the recently updated AWMF guideline on urinary incontinence in women as the exclusive primary treatment in all women with uncomplicated stress incontinence

Figure 1:
a) Cystocele through a central fascial defect with flattening of the vaginal rugae and atrophic colpitis
b) Cystocele through a lateral defect with preserved vaginal rugae and uterine prolapse
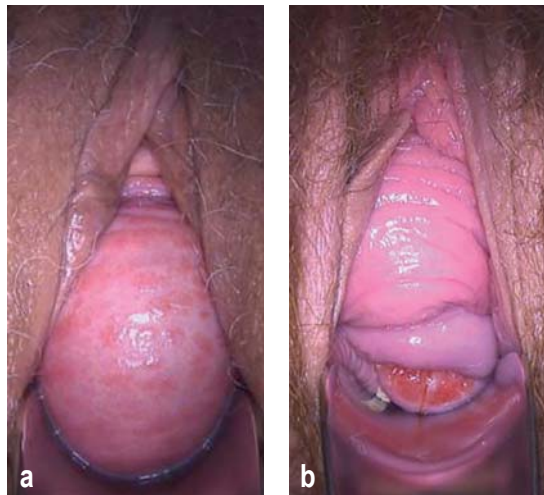
and bladder biopsy for the detection or exclusion of carcinoma in situ or interstitial cystitis. Although onabotulinum toxin A irreversibly inhibits preterminal acetylcholine degranulation by inactivating the membrane-bound transport protein SNAP 25, a single treatment does not have a lifelong effect, because of the regeneration of nerve terminals and the synthesis of new SNAP 25. In idiopathic overactive bladder, diminution of the effect is to be expected within 6–9 months, necessitating reinjection. Patient preference surveys have revealed that many patients decline onabotulinum toxin injections for fear of complications of the regularly repeated transurethral procedures (urinary tract infections, strictures, bladder voiding dysfunction with need for self-catheterization). This type of treatment seems particularly suitable for elderly patients, as the expected total number of injections is proportional to the patient's life expectancy, and multiple injections may lead to tachyphylaxis (although there are no scientific data on this point).

As onabotulinum toxin injections into the detrusor are not very effective against sensory urge without detrusor instability (27), pre-interventional urodynamic studies to differentiate between sensory and motor urge may aid in patient selection and help lower the high treatment dropout rate, which is 70% at five years (28).

In younger patients who feel comfortable with high technology, bladder overactivity that has failed to respond to conservative treatment can be treated with uni- or bilateral sacral neuromodulation (strong recommendation ["should be offered"]). Minimally invasive

test stimulation, known as percutaneous neuroevaluation (PNE), should be carried out before permanent implantation. PNE is particularly suitable for women who have been found to benefit, at least to some extent, from non-surgical peripheral neuromodulation methods involving vaginal electrodes or posterior tibial nerve stimulation. (The latter is a method for neuromodulatory stimulation of the sympathetic nervous system at the level of the sacral plexus, leading to detrusor relaxation and increased urethral sphincter tone; its precise mechanism of action is not known.) Successful test stimulation predicts long-term therapeutic success. Finite battery capacity necessitates periodic reoperations to replace the neuromodulator device, at intervals of about five years. Studies have shown that 67% of the women with bladder overactivity who are treated with neuromodulation are satisfied and comply with therapy (29). Unlike onabotulinum toxin A, sacral neuromodulation is equally effective for sensory and motor urge (30). Some of the previously existing limitations on the practical utility of neuromodulation have now been obviated by the development of electromagnetically rechargeable neuromodulators that do not need to be surgically replaced, and by the development of MRI-compatible electrodes and devices.

The treatment of extraurethral urinary incontinence

Extraurethral urinary incontinence is usually caused by a vesicovaginal fistula arising iatrogenically after surgery. If the patient reports the postoperative loss of urine without straining or urge, either immediately (because of a lesion that arose directly during surgery) or after an interval of approximately 10 days (because of a fistula resulting from tissue necrosis), an attempt can be made to treat conservatively with temporary urinary diversion. On the other hand, postoperative fistulae that have been present for three months or more or are due to radiotherapy require surgical closure. This should only be performed in a center with special expertise in fistula surgery (31, 32).

The surgical treatment of pelvic organ prolapse
Without or with tissue replacement

Typical symptoms of prolapse include a dragging and foreign-body sensation, a bulge in the vaginal introitus, and bladder and bowel emptying dysfunction. Stress and urge incontinence may be present simultaneously, but huge prolapses tend be accompanied by micturition disorders with high residual volumes, leading to frequency, urgency, and recurrent urinary tract infections.

Urge urinary incontinence / bladder overactivity

If surgery for an overactive bladder is planned, the two main surgical options must be weighed against each other: onabotulinum toxin A injection and sacral neuromodulation.

An alternative for younger patients

In younger patients who feel comfortable with high technology, bladder overactivity that has failed to respond to conservative treatment can be treated with uni- or bilateral sacral neuromodulation

Manifestations of these types are an indication for surgical treatment if the patient so desires and/or conservative treatment with a pessary has failed (33).

A prerequisite to joint decision-making on individualized treatment is the detailed evaluation of the descending compartments and the associated symptoms. Moreover, the appropriate surgical treatment(s) needs to be chosen from a wide range of options, with attention to the issues of simultaneous total or subtotal hysterectomy, opportunistic salpingectomy, or adnexectomy, as well as preventive or therapeutic continence surgery. Note should also be taken of the patient's specific wishes, e.g., absence of a vaginal scar for optimally preserved sexual function, keeping the uterus, avoiding (or using) alloplastic material, a vaginal, laparoscopic, or combined procedure, and the preferred type of anesthetic. Patients should be told that mesh complications are more common in smokers (33).

With autologous tissue/fascial reconstruction

In the primary situation, surgery with autologous tissue is usually possible (33, 34). In the case of a cystocele due to a median defect *(Figure 1a)* of the anterior endopelvic fascia, anterior colporrhaphy is a good option (EL1). Prolapse of the anterior vaginal wall with preservation of the vaginal rugae, due to lateral avulsion at the arcus tendineous fasciae pelvis *(Figure 1b)*, can be treated with paravaginal defect repair, or indirectly with an apical prolapse operation (EL3). The surgeon must be aware that there is usually an accompanying support defect in the middle compartment (33, 35), which should be corrected at the same time (e4) to improve success rates (69% vs. 54%; [EL3]; [33]).
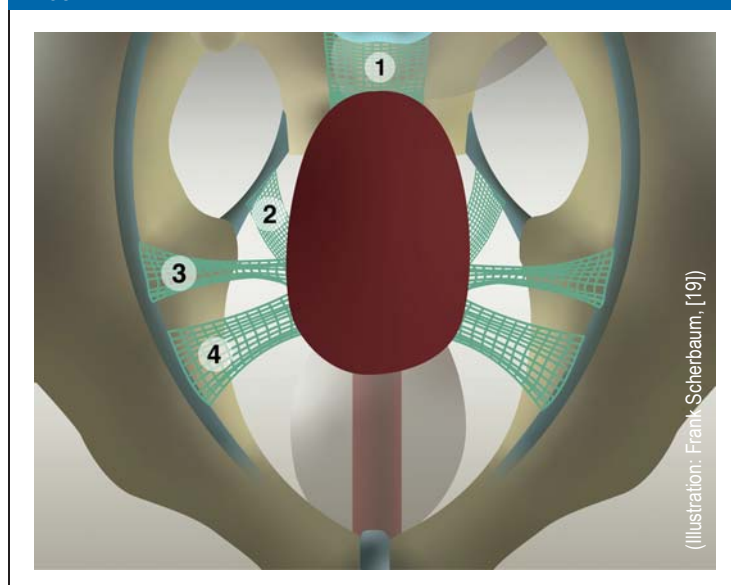
For apical fixation of the uterus or vaginal vault, transvaginal or laparoscopic uterosacral ligament plication or transvaginal sacrospinal fixation can be performed with success rates of approximately 90% (33, 34) (EL1). The urogynecological success rate is the same with uterus preservation or with concurrent hysterectomy (36) (EL1). Subsequently, uterus-preserving surgery should be offered if the uterus is otherwise healthy (but with caution in the presence of cervical elongation).

Rectocele is treated by posterior colporrhaphy, with success rates around 80% (33, 34, 37) (EL1). Patients with dysfunctional defecation but without any subjective sensation of prolapse can be treated alternatively with transanal surgery (EL1). If rectal prolapse is present at the same time, an interdisciplinary evaluation should be carried out to determine

Mesh-assisted hysteropexy techniques:
1) sacrohysteropexy, 2) vaginal sacrospinous bilateral hysteropexy, 3) hysteropexy according to Dubuisson (mesh running retroperitoneally toward the ventrolateral abdominal wall), 4) pectopexy according to Noè.

(Illustration: Frank Scherbaum, [19])

whether, for example, simultaneous anterior rectopexy with hystero- or colpopexy may be appropriate

With tissue replacement

After the U. S. Food and Drug Administration issued a warning about the potential complications of vaginal mesh surgery, the medical device classification of vaginal mesh was changed and the manufacturers were asked to provide further data; failing this, a number of countries introduced a moratorium or ban on the use of vaginal mesh. It is recommended by the Working Group on Urogynecology and Pelvic Floor Reconstruction, as well as in the German-language, evidence-based AWMF guideline, that alloplastic materials should be used in vaginal surgery for prolapses only to treat recurrences, if there is an increased risk of recurrence, or in accordance with the patient's wishes (e5). This statement does not pertain to the abdominal use of mesh, which has a lower rate of complications than vaginal use (including dyspareunia) (e6). The current standard is type 1 mesh (lightweight, large-pored, monofilament) mesh, made of polypropylene or polyvinylidene fluoride. Biological allografts (made of, e.g., porcine mucous membranes or fascia lata) were not

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Prolapse surgery

A prerequisite to joint decision-making on individualized treatment is the detailed evaluation of the descending compartments and the associated symptoms.

Prolapse surgery with autologous tissue

In the primary situation, surgery with autologous tissue (by fascial reconstruction) is usually possible

superior to autologous tissue in any way (33, 34). Options in uterus-preserving surgery include vaginal bilateral sacrospinal fixation with thin mesh arms (EL3), laparoscopic sacrohystero- or cervicopexy with mesh interposition between the sacrum and the cervix (EL2), and bilateral pectopexy involving fixation with mesh arms at the iliopectineal ligament (EL3) (34, *Figure 2*). On the other hand, when hysterectomy is performed, sacrocolpopexy with mesh extension both anteriorly (to bladder neck) and posteriorly (to the level of the levator ani muscles) addresses all support defects and achieves 5-year success rates of more than 90% (33, 34, 38) (EL1).

Alloplastic tissue replacement in the anterior compartment, e.g., with bilateral sacrospinous hystero- or colpopexy, can be considered for recurrent or large prolapses, levator defects due to vaginal delivery, obesity, or heavy physical labor, or if the patient desires the best anatomic surgical outcome with a transvaginal approach (33, 39). Current mesh systems can be used to repair cystoceles and apical defects at the same time, with anatomic and subjective success rates over 90% (EL1) (33, 34, 39).

Complications such as vesical, vaginal, and rectal mesh erosion, and extensive scarring causing pain, dyspareunia, and vaginal shortening, are rare but may necessitate (usually partial) mesh removal with no guarantee of success. Simple vaginal mesh erosions can be repaired locally with estriol and partial removal if necessary. There is no evidence to support the use of vaginal mesh in the posterior compartment (34, 37) (EL1). In general, concomitant hysterectomy should be avoided when synthetic mesh is used, because this increases the mesh-related complication rate (33, 34) (EL3).

In case of simultaneous stress urinary incontinence
If the prolapse is accompanied by stress urinary incontinence, either symptomatic or masked (i.e., urinary leakage after prolapse repositioning/under pessary therapy), simultaneous continence surgery should be offered (EL1). For vaginal procedures, suburethral tape insertion is most appropriate for this purpose. For abdominal procedures, Burch colposuspension may be appropriate. Prophylactic continence surgery should be avoided (EL1), given the low risk of de novo stress urinary incontinence (34, 40).

Prolapse surgery with tissue replacement
The use of alloplastic materials in vaginal surgery for prolapses is recommended only to treat recurrences, if there is an increased risk of recurrence, or in accordance with the patient's wishes.

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Further information on CME

- Participation in the CME certification program is possible only via the Internet: cme.aerzteblatt.de. This unit can be accessed until 2 February 2024. Submissions by letter, e-mail, or fax cannot be considered.

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- This article has been certified by the North Rhine Academy for Continuing Medical Education. CME points can be managed using the "uniform CME number" (einheitliche Fortbildungsnummer, EFN). The EFN must be stated during registration on www.aerzteblatt.de ("Mein DÄ") or entered in "Meine Daten", and consent must be given for results to be communicated. The 15-digit EFN can be found on the CME card (8027XXXXXXXXXX).

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► **Supplementary material**

eReferences, Case Report:
www.aerzteblatt-international.de/m2022.0406

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CASE REPORT

A 64-year-old woman presents to a pelvic floor center complaining of a vaginal foreign body sensation and pollakisuria. She states that a urinary tract infection has already been ruled out and that she has already been given a prescription for solifenacin 5 mg qd. The pollakisuria worsened while she was taking this drug; only small amounts of urine could be voided each time despite the urge to urinate, and she sporadically lost urine upon standing up. Solifenacin was discontinued for these reasons, and darifenacin was prescribed; urination became easier again, but pollakisuria persisted. Darifenacin was discontinued as well because of worsening constipation. Gynecological examination revealed a third-degree cystocele and first-degree uterine prolapse; no rectocele was detected, and ultrasonography revealed a residual urine volume of 150 mL aside from the cystocele. As a conservative measure, a sieve cup pessary was inserted, a pessary change in four weeks was planned, and vaginal estrogenization twice a week was prescribed. At four weeks, the patient reported that, despite the pessary, the feeling of pressure and pollakisuria had not improved. The sieve cup pessary was removed, and a cube pessary was prescribed with instructions that it should be inserted every morning and removed in the evening. Under this treatment, the sensation of descent improved and micturition became less frequent, and there was no longer any residual urine after micturition. The daily pessary change was not tolerated, and an alternative was agreed upon with the patient: surgical transvaginal correction of the cystocele with fascial reconstruction.

eTABLE 1

Current randomized controlled trials (RCTs) and meta-analyses on local estrogenization, pessary therapy, and pelvic floor conditioning

n	Comparison	Study design	Primary endpoint	Results [95% confidence interval]	Adverse events
Study: Verghese et al. (2020) (e7)					
325	pre- and postoperative administration of local estradiol vs. no application	randomized pilot study	Compliance > 75 % Applikation	preoperatively 79 % (34/43), 83 % (35/42) 6 weeks postoperatively	no serious complications related to estrogenization
			secondary urinary tract infections	8/42 (19 %) vs. 4/42 (10 %)*	
			symptom questionnaires	no differences	
Study: Chiengthong et al. (2022) (e8)					
78	postmenopausal pessary therapy with estriol 0.03 mg intravaginally + Lactobacillus vs. without	randomized controlled trial (RCT)	bacterial vaginosis	2/35 (6%) vs. 2/32 (6%) after 14 weeks	vaginal bleeding in a single patient in the control group
			normal flora index	8/37 (6%) vs. 5/35 (6%)*	
			ICIQ-VS questionnaire	4.5 vs. 7.0	
Study: Lillemon et al. (2022) (e9)					
39	vaginaler Estrogenring vs. Placebo-Vaginalring	RCT	changes in the microbiome and urogenital symptoms	no significant changes in Lactobacilli or the microbiome	unclear
Study: Probst et al. (2020) (e10)					
130	continuous pessary therapy for 24 vs. 12 weeks (= standard)	RCT	frequency of occurrence of vaginal epithelial lesions/erosions non-inferiority margin 7.5 percentage points	group differences –5.7 percentage points [-7, 4; 4.0] = longer duration of use non-inferior	none
Study: Boyd et al. (2021) (e11)					
132	effect of pessary therapy on size of genital hiatus and degree of prolapse	Cohort study	mean change of genital hiatus (GH) and POPQ stage	-0.47 ± 1.02 cm* anterior compartment -0.47 ± 0.76* posterior compartment -0.47 ± 1.02* middle compartment -0.32 ± 1.33*	not reported
Study: Nekkanti et al. (2022) (e12)					
50	urethral pessary vs. disposable continence tampon	RCT	improvement of stress incontinence (Patient Global Impression of Improvement[PGI-I])	80 % (8/10) vs. 75 % (9/12) study underpowered because of low patient recruitment	none
Study: Stafne et al. (2022) (e13)					
855	targeted vs. no pelvic floor exercises during pregnancy	RCT	rate of urinary incontinence 7 years postpartum	78 (51 %) vs. 63 (57 %)	none
Study: Luginbuehl (2022) (e14)					
96	pelvic floor training with vs. without reflex contraction exercises	RCT	changes in the ICIQ short-form questionnaire	2.9 vs. 3.0	none

n	Comparison	Study design	Primary endpoint	Results [95% confidence interval]	Adverse events
Study: De Marco et al. (2022) (e15)					
52	pelvic floor exercises with or without manual therapy	RCT	changes in the ICIQ short-form questionnaire	10,6 (± 4,9) vs. 11,2 (± 5,7)	none
Study: Leonardo et al. (2022) (e16)					
562	pelvic floor exercises with or without biofeedback, and pelvic floor exercises vs. electro-stimulation	systematic review and meta-analysis of RCTs	changes (mean differences) in two symptom questionnaires: King´s Health (KHQ) + Incontinence Impact Questionnaire (IIQ)	KHQ: −2.8 [−17.1; 11.5] IIQ: −2.5 [−0.5; 5.5] KHQ: 16.5 [6.1; 26.9]* IIQ: 5.3 [1.6; 9.1]* for electrostimulation	none
Study: Wang (2022) (e17)					
	pelvic floor exercises vs. no intervention in women with prolapse	meta-analysis	changes of the mean Prolapse Symptom Score POP-SS and POPQ stage	changes −1.7 [-2.4; 0.9]* RR 1.5 [1.1; 2.0]* long-term data without significant change	none

* p ≤ 0.05
ICIQ, International Consultation on Incontinence Questionnaire; POPQ, pelvic organ prolapse quantification; RR, risk ratio

eTABLE 2

Current key studies on the pharmacotherapy of urinary incontinence in women

n	Comparison	Study design	Primary endpoint	Results [95% CI]	Adverse events
Study: Chapple et al. (2013) (e18)					
928	mirabegron 25, 50, 100, 200 mg vs. placebo vs. tolterodin (ER) 4 mg	RCT single-/double-blinded, placebo-controlled	reduction of urinary frequency/24 hr	[- 1,9; – 2,1] ; [2,1; – 2,2] vs. 1.4 vs. 2.0*	increased heart rate with mirabegron 100 (1.3%) and 200 (3%) mg vs. placebo (0.6%) vs. tolterodine (1.2%)
Study: Wagg et al. (2017) (e19)					
4040	fesoterodine 4 or 8 mg vs. placebo	RCT, double-blinded, placebo-controlled	reduction of urinary incontinence episodes and urinary frequency/24 hr	– 1.1 vs. – 0.5* – 2.4 vs. – 1.5*	dose reduction because of side effects: fesoterodine 4 mg 3%, 8 mg 1%, placebo 1%
Study: Nitti et al. (2013) (e20)					
557	botulinum toxin 100 U vs. placebo at 12 weeks	RCT double-blinded, placebo-controlled, multicenter phase 3 trial	reduction of the number of incontinence episodes per day	– 2.65 vs. – 0.87* complete continence 22.9 % vs. 6.5%	uncomplicated urinary tract infection 15.5 % vs. 5.9 % intermittent self-catheterization 6.1 % vs. 0 %
Study: Sand et al. (2017) (e21)					
261	desmopressin 25 µg vs. placebo	randomized, double-blinded, multicenter, placebo-controlled	reduction of nocturia	– 1.46 vs. 1.24*	none
Study: Mirzaei et al. (2021) (e22)					
60	solifenacin (10 mg) vs. duloxetin (20 mg)	RCT, single-blinded	questionnaire (ICIQ-OAB)	from 14.86 to 9.66* vs. from 13.90 to 8.76* no difference between groups	side effects: dry mouth, lack of appetite 33.3% and 20% vs. 26.7% and 16.7%*

CI, confidence interval; ICIQ-OAB, International Consultation on Incontinence Questionnaire – Overactive bladder; RCT, randomized controlled trial; *p ≤ 0.05

eTABLE 3

Current key studies on the surgical treatment of stress urinary incontinence in women

n	Comparison	Study design	Primary endpoint	Results [95% CI]	Adverse events
Study: Schellart et al. (2014) (e23)					
193	MiniArc vs. TOT	randomized, non-blinded, non-inferiority design	Improved PGI-I score	MiniArc is not inferior to TOT after 3 years	13% serious adverse events with MiniArc, 11% with TOT
Study: Itkonen Freitas et al. (2022) (e24)					
223	TVT vs. polyacrylamide hydrogel (bulkamide)	randomized, non-blinded, non-inferiority design	patient satisfaction questionnaire	bulkamide is inferior to TVT at 3 years*	43.5% complication rate for DVT, 24% for bulkamide*
Study: Dogan et al. (2018) (e25)					
201	needle-free single-incision muscular sling (SIMS) vs. TOT	randomized, non-blinded, single-center	negative cough test	SIMS and TOT are comparably effective at 2 years (90% vs. 85% cure)	13% complication rate with TOT, 7% with SIMS* (SIMS significantly fewer symptoms)
Study: Holdø et al. (2017) (e26)					
307	Burch colposuspension vs. TVT	non-randomized, non-simultaneous case series comparison	recurrent incontinence	revision rates at 12 years, 11% (colposuspension) vs. 2% (TVT)*	16% complication rate with colposuspension vs. 11% with TVT
Study: Lau et al. (2013) (e27)					
100	TOT vs. TOT after vaginal prolapse net (Prolift)	non-randomized, prospective case series comparison	negative cough test	at 3–6 months, 86% cure rate for TOT versus 62% for TOT after vaginal mesh*	9% complication rate with TOT after vaginal mesh vs. 0% with TOT*
Study: Ward KL (2008) (e28)					
344	Burch colposuspension vs. TVT	prospectively randomized, non-blinded multicenter trial	negative 1 hour pad test	at 5 years, 81% cure rate for colposuspension vs. 90% for TVT	more recto- and enteroceles with colposuspension*, complication rate 11% with colposuspension vs. 8% with TVT
Study: Karmakar (2017) (e29)					
341	transobturator tape, inside-out vs. outside-in	postal follow-up of a randomized, controlled trial	patient satisfaction, measured with the PGI-I	71.6 % satisfaction and 14% improvement	in 7.96% new urinary incontinence surgery required, 4.5% erosion rate, 4.32% pain, in 1.4% therapy required
Study: Dejene et al. (2022) (e30)					
334 601	follow-up of up to 15 years	cohort study	Frequency of of surgical revisions	at 10 years, 6.9%; at 15 years, 7.9% increased risk of surgical revision, in women aged 18–29 vs. ≥ 70 years	approx. 50 % of surgical revisions necessitated by tape erosion

PGI-I, Patient Global Impression Incontinence; TOT, transobturator tape; TVT, tension-free vaginal tape" (retropubic);
*p ≤ 0.05

CME credit for this unit can be obtained via cme.aerzteblatt.de until 2 February 2024.

Only one answer is possible per question. Please select the answer that is most appropriate.

Question 1
Which selective serotonin-noradrenaline reuptake inhibitor has been shown in randomized, controlled trials to lessen the frequency of incontinence episodes?
a) venlafaxine
b) milnacipran
c) duloxetine
d) desvenlaflaxine
e) levomilnacipran

Question 2
What is the most important adverse effect of the β3–-sympathomimetic drug mirabegran?
a) glaucoma
b) constipation
c) arterial hypertension
d) urinary retention
e) cognitive dysfunction

Question 3
What should be monitored in postmenopausal and elderly women taking desmopressin?
a) serum sodium
b) serum potassium
c) serum calcium
d) oxygen saturation
e) blood pressure

Question 4
What conclusion regarding the treatment of urogenital descent can be drawn from the studies of Lucot et al. (2018, 2022)?
a) Transvaginal nets are associated with a lower risk of dyspareunia than sacrocolpopexy.
b) Sacrouterine ligament fixation is markedly superior to sacrospinal fixation.
c) Laparoscopy has a higher complication rate than open surgery and should therefore only be performed in selected cases.
d) Sacrocolpopexy is associated with a lower risk of dyspareunia than the surgical implantation of transvaginal nets.
e) Pectopexy is not an option for the treatment of apical descent.

Question 5
What is the preferred primary surgical treatment for women with uncomplicated stress incontinence, according to the updated AWMF guideline?
a) vaginal laser treatment
b) colposuspension
c) fascial sling procedure
d) suburethral alloplastic band insertion
e) urethral bulkamide injection

Question 6
A 70-year-old woman presents with a large recurrent stage 3 cysto- cele and descent of the normal-sized uterus to the introitus. Pessaries are inadequate to correct the descent in the presence of major levator defects. What should be recommended as the first choice of surgical treatment?
a) vaginal hysterectomy and anterior vaginoplasty
b) vaginal hysterectomy und anterior vaginal net insertion
c) laparoscopic hysterectomy and sacrocolpopexy
d) anterior vaginal net insertion with bilateral sacrospinal hysteropexy
e) anterior and posterior vaginoplasty

Question 7
What properties characterize the synthetic nets that are the current standard for alloplastic tissue inserts in urogynecology?
a) lightweight, small-pore, multifilament
b) lightweight, large-pore, monofilament
c) heavy, large-pore, bifilament
d) heavy, small-pore, monofilament
e) middleweight, intermediate-pore, multifilament

Question 8
A multimorbid, obese 78-year-old woman with an overactive bladder complains of daily episodes of urinary incontinence. Even though she uses pads, she often has to change her underwear, because her bladder empties almost completely after the urge episodes. What treatment should be recommended?
a) desmopressin 5–10 mg/day
b) solifenacin 100 mg/day
c) mirabegron 100 mg/day
d) hydrodistention of the bladder and injection of 100 U onabotulinum toxin
e) sacral neuromodulation

Question 9
The conservative management of urinary urge incontinence fails by one year in what percentage of women so treated?
a) 0%   b) 20%   c) 40%   d) 60%   e) 80%

Question 10
A thin 24-year-old woman gave birth to a daughter (birth weight 3200 g) by spontaneous vaginal delivery three years ago and suffered for approximately 6 months afterward from stress urinary incontinence, which she was able to control successfully with pelvic floor exercises. She is now pregnant again and fears that a second spontaneous vaginal delivery could make her incontinent again, but this time permanently, even though her mother has no such problems to this day. She plans to have no more than two children. How should she be advised?
a) follow a wait-and-see strategy
b) plan a primary caesarean section with simultaenous hysterectomy and surgical repair of the retaining mechanism of the pelvis
c) take hormones during pregnancy
d) targeted physical therapy during pregnancy and post partum; use UR Choice in case of concern
e) laser treatment after the puerperium

► **Participation is possible only via the internet:**
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