

# Aspects of Pelvic Floor Protection in Spontaneous Delivery – a Review

## Aspekte einer Beckenbodenprotektion bei der Spontangeburt – eine Übersicht



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### ABSTRACT

The necessity of increasingly addressing aspects of pelvic floor protection, i.e., prevention of the most frequent female pelvic floor disorders, such as urinary incontinence, faecal incontinence and pelvic organ prolapse, is the result of the steadily improving understanding of the association of pregnancy and delivery with the prevalence of these disorders. About a quarter of all women experience one or more such symptoms during their life. Apart from age and weight, pregnancies and births play an important part. While initial discussion of pelvic floor protection often focused very rapidly on the mode of delivery and elective caesarean section as a possible protective intervention, it has become apparent in the last few decades how varied and wide-ranging the options are that can be used to protect against pelvic floor disorders. The mode of delivery as such is “only” one element among numerous other considerations and has diminished markedly in importance. Inter-professional and interdisciplinarity undoubtedly represent an important development as resulting recommendations must always be incorporated in an overall context that considers mother and child at the same time. Considering the pelvic floor only certainly does not make sense. This review article will analyze in greater detail important pre-, intra- and post-partum aspects that in their entirety can provide insight into the various aspects of pelvic floor protection. The authors regard the following article as an additional basis for discussion on achieving a sustained reduction in the incidence and prevalence of female pelvic floor disorders.

### ZUSAMMENFASSUNG

Die Notwendigkeit, sich zunehmend mit Aspekten der Beckenbodenprotektion, d. h. also der Prävention der häufigsten Erkrankungen des weiblichen Beckenbodens, wie der Harninkontinenz, der Stuhlinkontinenz und dem Descensus genitalis, auseinanderzusetzen, resultiert aus einem immer besser werdenden Verständnis der Zusammenhänge von Schwanger-

schaft und Geburt auf diese Erkrankungsprävalenzen. Rund ein Viertel aller Frauen erleben in ihrem Leben ein oder mehrere derartige Symptome. Hierbei spielen neben Alter und Gewicht auch Schwangerschaften und Geburten eine wichtige Rolle. Während zu den Anfängen dieser Diskussion um eine Beckenbodenprotektion oft sehr schnell auf den Geburtsmodus und hier die elektive Sectio als möglicher protektiver Intervention fokussiert wurde, hat sich über die letzten Dekaden gezeigt, wie vielschichtig und breit verteilt die Optionen sind, die zum Schutz vor Erkrankungen des Beckenbodens eingesetzt werden können. Der Geburtsmodus als solcher ist hierbei „nur“ ein Baustein zahlreicher anderer Überlegungen und ist in seiner Wichtigkeit deutlich nach hinten gerückt.

Eine wichtige Entwicklung hierbei stellt zweifelsohne die Interprofessionalität und Interdisziplinarität dar, denn resultierende Empfehlungen müssen immer in einen Gesamtkontext, der gleichsam Mutter und Kind berücksichtigt, eingebaut werden. Den Beckenboden isoliert zu betrachten, ist hierbei sicherlich nicht sinnvoll. Die vorliegende Übersichtsarbeit soll wesentliche prä-, intra- und postpartale Aspekte näher beleuchten, die in ihrer Gesamtheit Einblick in die unterschiedlichen Aspekte einer Beckenbodenprotektion liefern können. Die Autor\*innen verstehen die folgenden Seiten als ergänzende Diskussionsgrundlage, um die Inzidenzen und Prävalenzen von Erkrankungen des weiblichen Beckenbodens nachhaltig zu senken.

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## Introduction

The scientific community has sought for decades to assist delivery in a way that protects the pelvic floor [1]. It has become increasingly clear in recent years that blanket strategies or general recommendations, such as elective caesarean section as a basic element of pelvic floor protection, are not very sensible [2]. On the contrary, an individualised approach based on identification of a pregnant woman's specific risk profile with the individual counselling this allows should help to provide a sustained improvement to care during pregnancy, delivery and the puerperium [3, 4].

Along with the treating gynaecologist, the midwife also bears great responsibility for the health of the pelvic floor of women in their pregnancy, during delivery and in the puerperium. Roughly two thirds of all women are supported by midwives during pregnancy and the postnatal period [5] and a midwife is present at every delivery, often with sole responsibility when the delivery takes place physiologically (Midwifery Act, HebG). The task of the midwife involves preventive advice antenatally, prevention of intrapartum pelvic floor injuries and recovery of pelvic floor function post partum. As the woman's person of trust in the continuous care setting [6] the midwife can have special access to the woman in the very personal aspects of her pelvic floor function and dysfunction. She can convince women of the benefits of preventive measures during pregnancy, which is highly appreciated [7, 8]. In the postnatal period the midwife is an important confidant who is told about any impairment of pelvic floor function and can either improve this herself by suitable measures or refer the woman to suitable treatment by physiotherapy or urogynaecology and cooperate with these.

Specialised physiotherapy as part of an interdisciplinary team can improve the care of pregnant women and young mothers as regards their pelvic floor health, encourage the women's own resources and at the same time advise on counselling and treatment by other health professions. Even though specialised physiotherapy can offer good treatment options for pelvic floor dysfunction, the fundamental understanding is to sensitise women at an early stage for their pelvic floor health, promote pelvic floor health and reinforce resources regarding all aspects of women's health.

## Method

This narrative review looks at the most important aspects of possible pelvic floor protection without claiming to be complete. A selective literature search was performed regarding risk factors and possible preventive approaches to pelvic floor injuries and dysfunction, which included existing reviews and recommendations. An interprofessional search for synergies between midwifery, physiotherapy and obstetrics under urogynaecological aspects should be particularly emphasised.

We omitted a systematic review. There is adequate literature on risk factors, but few interventional studies of clearly defined prevention aims that could have been refined by the PICO model ("Patient intervention comparison outcome").

The available data were summarised under clinically relevant points of view, with possible conclusions and recommendations.

## Overview/Review

### Prevalence of urinary and anal incontinence and prolapse in pregnancy and after vaginal delivery

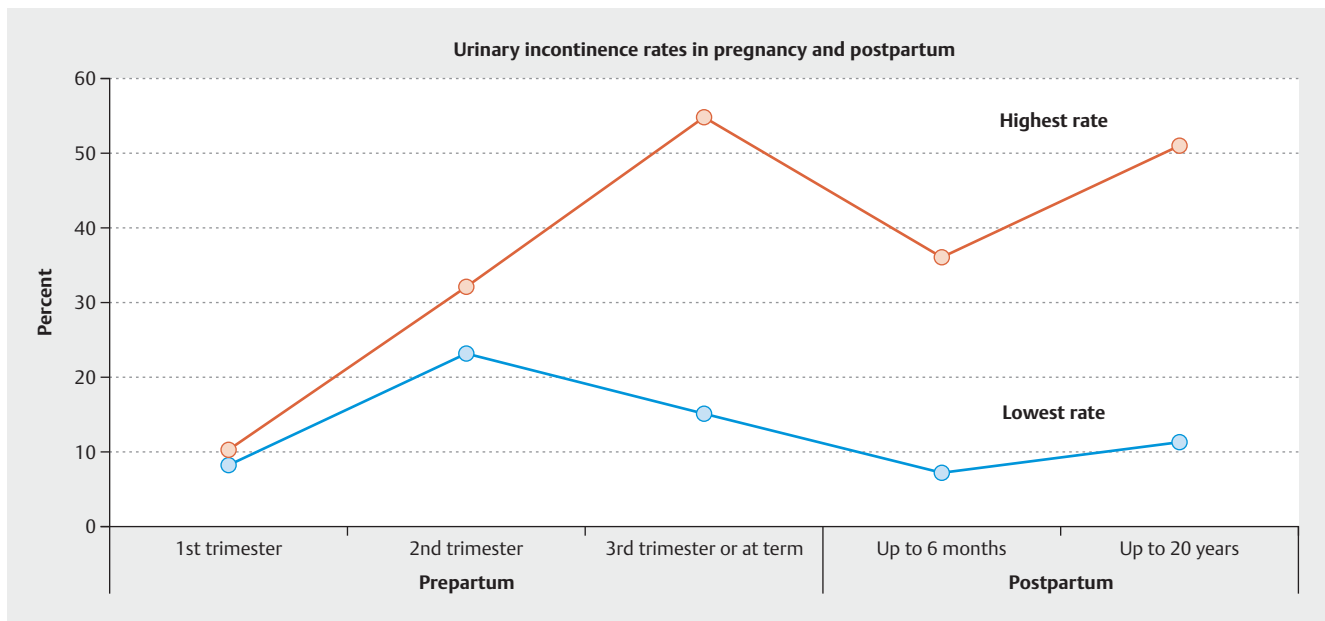
Urinary incontinence rates increase in the course of pregnancy. Roughly 8–10% of women report mainly stress incontinence in the first trimester [9]. In the second trimester approx. 23–32% of women are incontinent and 15–35% at term [9]. Among 43 279 Norwegian women, 58% had urinary incontinence in week 31, with a figure of 40% among primiparous women (n = 12 679) [10]. In a longitudinal study with 223 Berlin women initially, 49% were incontinent in the third trimester [11].

Urinary incontinence rates of 7–36% are described six to 13 weeks post partum [9, 11, 12], and approximately 8% of women are faecal incontinent 3 months post partum [12].

Stress incontinence was present in 15–31% of women 6 months post partum [9].

Urinary incontinence rates of 11 to 51% one year post partum are described [9, 11]. About 30% of women with 3rd or 4th degree perineal tears have anal incontinence [13].

Two longitudinal studies report urinary and faecal incontinence up to 20 years after delivery. 38% of women have persistent



► **Fig. 1** The lowest and highest urinary incontinence rates in the course of pregnancy and post partum described in the studies are shown.

urinary incontinence and 6% have faecal incontinence [12, 14, 15]. These prevalences are shown in ► **Fig. 1**.

### General risk factors for pelvic floor symptoms

Various risk factors for pelvic floor dysfunction were investigated in the studies:

- Urinary incontinence in pregnancy: women who have urinary incontinence in pregnancy also suffer from it more often post partum [16].
- Age over 35 years: greater age at first delivery and especially over 35 years has been described in different studies as a risk for defects of the levator ani muscle and functional pelvic floor impairment such as urinary and faecal incontinence [9–12, 16, 17] (urinary incontinence risk increases by a factor of 2–4 [11, 12, 17]).
- Obesity: BMI over 25 kg/m<sup>2</sup> increases the risk for urinary incontinence by a factor of 1–3 [10–12, 16–18], and also for anal incontinence [12, 15, 18].
- Positive family history: if female relatives are incontinent, the risk for the pregnant women increases 2–3-fold [11, 17].
- Uncertain voluntary pelvic floor contraction: if the women were uncertain during pregnancy whether they could perform voluntary pelvic floor contractions they became incontinent post partum more often [11].

In summary, it was found that there are (partially) modifiable risk factors for pelvic floor dysfunction and women should be informed of these: age over 35 years, overweight, positive family history and inability to perform voluntary pelvic floor contraction. In the case of other risk factors such as incontinence in pregnancy, birth weight over 4000 g, long second stage of labour (see section on “Postpartum possibilities for prevention and treatment of incontinence and prolapse”) and positive family history, help should

be offered early to women (e.g., pelvic floor rehabilitation, early pessary treatment).

The validated pelvic floor questionnaire with integrated risk module for pregnant and postpartum women provides assistance in counselling [11]. In addition, the online UR-CHOICE risk calculator ([www.riskcalc.org](http://www.riskcalc.org)), which is based on the long-term observations of MacArthur et al. and Gyhagen et al., can be used readily for individual counselling [2, 12, 14, 19]. It calculates the incidence of symptoms with different combinations of risks for vaginal delivery compared with caesarean section.

### Antenatal possibilities of pelvic floor protection

Many women start in pregnancy to concern themselves with pelvic floor function and their prior knowledge of this varies. In an interdisciplinary approach by obstetricians, midwives and physiotherapists, a basic understanding should be established as regards sensitising women at an early stage for their pelvic floor health, promoting pelvic floor health and reinforcing resources regarding all aspects of women’s health. Gynaecologists managing the pregnancy have an important function.

The muscle strength of the pelvic floor diminishes in pregnancy. This is due to physiological processes and anatomical changes in the pelvis, such as a reduction in muscle tone, lengthening of the rectus abdominis and all abdominal muscle structures, and laxity of the ligaments in the pelvis [20]. Attempts to prepare the pelvic floor muscles during pregnancy for the forthcoming birth in order to prevent pelvic floor injuries or dysfunction are based on preparatory stretching of perineal tissues or strengthening the striated pelvic floor muscles, thus, for instance, strengthening the striated urogenital sphincter muscle.

In preparing pregnant women for their delivery with regard to their perineal health, it is important, especially in primiparae, to sensitise them for the tension of their pelvic floor with contracting

and relaxing, i.e. to enable them to alter the tension of the pelvic floor by consciously tensing and releasing it. This sensitivity and “feel” for the pelvic floor is often completely unknown and new for primiparae [21] and demands empathic guidance using individually adapted and suitable visualisation of pelvic floor tension so that the woman can develop this awareness [22, 23]. In working with women, it is often apparent that not only the ability to tense the pelvic floor must be taught and practised but also that conscious relaxation and opening of the pelvic floor, which is important during birth, is difficult for them. There are no valid studies and evidence with regard to the preventive efficacy of these aspects of midwives’ work which are based especially on empiricism, handed-down knowledge and experience [24, 25]. There is a great need for development in midwifery research. This could and should then lead to evidence-based and thus more consistent instruction by midwives in this area [26].

The measures for antenatal pelvic floor protection that have been investigated for efficacy in the literature, as well as little-studied measures from the area of phytotherapy and attempts at pelvic floor sensitisation, are described below, without making any claim to be complete.

### EPI-No

General procedure: start at 37–38 weeks, 15–20 minutes, practise daily. The balloon is introduced two-thirds of its length into the vagina and inflated to below the pain threshold, and the balloon is then withdrawn slowly from the vagina.

- Effect: perineum more often intact [27]
- No effect: M. sphincter ani muscle injury [28]
- No effect: pelvic floor injuries [28, 29]
- No effect: episiotomy rate, duration of second stage, analgesia requirement, vaginal infections [27]

**Conclusion:** EPI-No tends to have no effect [20].

### Perineal massage

General procedure: start at 34–36 weeks, perineal massage for 10 minutes daily: insert the thumb 3–5 cm into the vagina, move sideways and towards the anus, use a lubricant gel. Positive influence on local metabolism and lymphatics.

- Effect: reduced pain in the perineal region [30, 31]
- Effect: shortened second stage of labour [32]
- No effect: perineal injuries [31]
- Inconsistent: episiotomy rate: less [32], the same [33]

**Conclusion:** The effect of perineal massage is reduced pain perception in the perineal region [20].

### Phytotherapy

Raspberry leaf tea: two cups daily from 36 weeks, widespread form of birth preparation. No proven protective effect on perineal tissues but positive influence on mental preparation for giving birth [34].

Hay flower steam bath: daily for 10 minutes from 36 weeks. Traditional measure for preparing to give birth. Hypothesis: coumarins in the hay flowers have a muscle-relaxant and vasodilatory

effect on perineal tissue. This should lead to an increase in connective tissue elasticity [35].

**Conclusion:** Phytotherapy does not have any confirmed direct effect on the pelvic floor muscles but could support the woman in her mental preparation for birth by introducing a ritualised action but this has not yet been confirmed in studies [36].

### Supervised pelvic floor training

General procedure: individualised, finding-based programme of tensing and relaxation of the pelvic floor and synergistic muscles in different dosages/positions with and without aids

- Effect: reduced duration of the second stage of labour [37]
- Effect: reduced incidence of urinary incontinence [38–40]
- Effect: improved pelvic floor muscle strength [38, 41]
- No effect: pelvic floor injuries [42, 43]
- Inconsistent results regarding anal continence: no effect [40], reduction [44]

**Conclusion:** Functional pelvic floor training leads to a shortened duration of the second stage of labour and reduced incidence of urinary incontinence and possibly of anal incontinence [20].

### Supervised exercises to sensitise the pelvic floor (increase in pelvic floor awareness)

Yoga: start at 26 weeks, 60 minutes three times a week.

- Effect: less pain experienced, fewer interventions, fewer caesarean sections, shorter duration of the first and second stages of labour [45]

Group therapy: pelvic floor perception exercises, muscle training (slow and fast contractions) under supervision by physiotherapists or midwives, duration 60 minutes weekly.

- Aim: improvement in pelvic floor control and psychological preparation of the woman to give birth [46]

**Conclusion:** Exercises to increase pelvic floor awareness can promote a physiological course of delivery by sensitising the women for opening and letting go during delivery.

### Specialised physiotherapy

In their prospective randomised study Salvesen et al. show that antenatal physiotherapy pelvic floor training is associated with a lower incidence of a prolonged second stage of labour lasting more than 60 minutes [47]. In addition, this training has a preventive effect with regard to possible postpartum urinary incontinence [48, 49] and reduces perineal trauma [42]. Antenatal physiotherapy was also shown to have protective effects with regard to postpartum stress urinary incontinence [9], summarised in [50]. All women should therefore be given the possibility of training [51]. Unlike what was previously thought, antenatal pelvic floor training has no disadvantages for delivery. The hypothesis that a strengthened pelvic floor has negative effects on delivery was refuted [52].

### Influencing modifiable risk factors

Achieving normal weight before pregnancy to reduce the risk of urinary incontinence during and after pregnancy is denoted a

grade A recommendation by Wesnes et al. in their review article [53], and a reduction in potential episodes of constipation is also helpful in reducing the incidence of urinary incontinence (level 2) [53].

Even though maternal age should not be considered a modifiable risk factor, the first vaginal delivery is recommended before the age of 35 years from the aspect of pelvic floor protection as even an age of more than 30 years represents a risk factor for developing a prolapse later in the woman's life [54].

### Vitamin D

A recent analysis by Stafne et al. showed that women with a reduced vitamin D level suffer significantly more often from urinary incontinence during pregnancy [55, 56]. The extent to which basic vitamin D supplementation during pregnancy has protective effects for the pelvic floor is still unclear.

## Intrapartum possibilities for reducing birth injuries and postpartum pelvic floor dysfunction

### Perineal protection

General procedure: protecting the perineum with the hand when the baby's head crowns is regarded as the midwife's very particular skill. The perineal protection method was developed especially for horizontal delivery positions and is more difficult in upright positions. The general procedure is to support the perineum with the hand that is laid flat on the perineum. With the other hand, the speed at which the baby's head emerges is arrested. The front of the head is held back and guided slightly towards the perineum until it has emerged fully below the symphysis [57, 58]. Perineal protection should achieve the following to protect the woman's pelvic floor: slow emergence of the head so as to stretch the perineum slowly, emergence of the head at its smallest circumference, avoidance of tears [57, 58].

In the literature the terms "hands on" (perineal protection), "hands off" (no touching of the head and perineum), "hands poised" (no touching of the perineum, arresting the speed of emergence of the baby's head by light pressure) or a combination of the two "hands off/poised" methods is used.

Effects of the hands-off/poised method:

- Lower episiotomy rate [57, 59, 60]
- Greater probability of intact perineum [57]
- Less pain in the perineal region after 24 hours [57, 60]
- No difference in the duration of the second stage of labour [57]
- No difference in postpartum blood loss > 500 ml [57]

Discussion: the studies are not clear in confirming the theoretically protective influence of the hands-off method. Fewer episiotomies are performed but anal sphincter injuries are more frequent [57, 61–63]. Prospective studies that investigated proactive perineal protection found a reduction in OASIS (obstetrical anal sphincter injuries) [64, 65].

Because of this heterogeneity, a clear recommendation regarding perineal protection cannot be given even when the latest Cochrane Review is considered [59].

### Warm compresses

General procedure: application of warm compresses to the perineum when the baby's head starts to crown. Mode of action: relaxation of the tissue [66].

Effect:

- Fewer perineal injuries [67]
- Higher rate of uninjured perineum [67]
- Fewer episiotomies [67–70]
- Details unclear: water temperature (reported as up to 70° Celsius, time of application, duration of application [67])
- There is no evidence for the benefit of warm compresses soaked with coffee, as often used by midwives.
- Although the benefit of warm compresses is known, they are little used by midwives [66].

### Delivery position

The second stage of labour is the delivery stage that causes the most stress for mother and baby. Instruction on a suitable delivery position is an important factor in safe vaginal delivery and for the woman's perineal health.

Upright delivery positions: standing, sitting (birthing chair), squatting, kneeling (quadruped position) [57]. Horizontal delivery positions: lying on back or side, with or without lithotomy position [57].

Advantages of upright delivery positions for mother and baby compared with horizontal positions [71]:

- Reduction in the duration of the second stage, especially in primiparae [71]
- Reduced rate of assisted vaginal deliveries [71]
- Reduction in the episiotomy rate [71, 72]
- Lower rate of changes in the foetal heart rate [71]
- Higher satisfaction of the woman because of better control of the situation [73]

Disadvantages:

- Slightly increased risk of second or third degree perineal injuries [71, 74], more with standing compared with sitting positions [74].  
But: the rate of perineal injuries can even be reduced when the woman is encouraged by the midwife to push spontaneously and not when told (see below: directed pushing) and the baby's head and body are delivered in two contractions [75]. Perineal injuries in upright positions occur more often in multiparae than in primiparae [76].
- Higher rate of women with blood loss of more than 500 ml [72]

No difference:

- Rate of neonates that needed intensive care [71]
- No difference between kneeling and sitting positions [77]

**Conclusion:** Upright delivery positions have a range of advantages for mother and baby, especially a shorter second stage of labour, fewer assisted vaginal procedures and episiotomies, greater satisfaction in the woman and no change in foetal heart rate. The woman should therefore be encouraged to use this. This is also important given women's still traditional ideas of giving birth in lithotomy position. Since the risk for perineal injuries is greater

with upright positions, especially in multiparae, and also for increased blood loss, the midwife should note these aspects in particular and take precautions where necessary [57].

### Pushing/directed pushing

General procedure: pushing is forced expiration against a closed mouth and nose, while squeezing the abdominal muscles at the same time. In obstetrics, this manoeuvre is also termed the Valsalva manoeuvre in the second stage and is often performed in supine position with the knees drawn up [58].

Recommendation: In 2018 the WHO published a recommendation on the method of pushing in the second stage of delivery in which no advantages were expressed for directed pushing with regard to the duration of the second stage, the mode of delivery, the incidence of perineal injuries and urinary incontinence [78].

Since directed pushing has a range of disadvantages (increased pressure in the chest, subconjunctival haemorrhages in the eye, exhaustion in the women, impairment of the woman's basic confidence in her own ability to give birth [79]), in combination with the disadvantages of the supine delivery position (see above), the woman should not usually be told when to push but should follow her own urge to push.

### Length of the second stage of labour

To draw conclusions about the effects of a prolonged second stage of labour on the pelvic floor, it is essential to define the physiological duration of the second stage. This is still difficult [80]. By definition the second stage lasts from when the cervix is fully dilated until delivery of the baby. The American College of Obstetricians and Gynecologists (ACOG) recommends a definition of the second stage of 3 hours [81].

The shorter the definition of the physiological duration of the second stage, the more obstetric interventions occur [82]. It has been shown that simply prolonging the permitted time interval led to a marked increase in the rate of vaginal deliveries [83]. Women whose (physiological) pause in contractions in the transition phase was tolerated and who therefore (by definition) had a markedly longer duration of the second stage of labour had fewer postpartum infections or haemorrhages and no differences in neonatal outcome ([84], 2008) and a reduced caesarean section rate was recorded [85].

The duration of the second stage of labour should therefore be established so as to enable the maximum rate of vaginal deliveries with minimum risk for morbidity of mother and baby. The risks of an excessively long second stage of labour include, for instance, chorioamnionitis, a higher risk of assisted vaginal delivery, more severe perineal injuries (3rd/4th degree) and uterine atony [83, 86] as well as prolonged and incomplete regeneration of colorectal and anal dysfunction [87]. Low et al. describe an 8.9% rise in the risks of levator ani injury per 15 minutes of active second stage of labour [88]. A prolonged second stage over 150 minutes is described in some studies as a risk factor [9, 16, 89]. In this connection, however, it is unclear whether the complications that occurred could have been prevented by earlier intervention or whether they were partially the cause for the prolonged second stage [80]. In any case, further studies are needed to explore

these associations in order to find the right balance between waiting as long as possible and timely intervention [90].

### Episiotomy

The different forms of episiotomy are controversial. The proponents of median episiotomy, who prefer this for reasons of better wound healing and a lower rate of dyspareunia, accept a markedly increased risk for anal sphincter injury (3rd/4th degree) (OR 2.4–2.9) [91, 92]. Those who prefer mediolateral episiotomy achieve much lower rates of 3rd/4th degree injury with allegedly more painful wound healing, though this was not confirmed in studies. The general recommendation is for restrictive/selective use of mediolateral episiotomy [92]; in the Cochrane Update of 2017, routine use of episiotomy was inferior to a restrictive approach [93]. Fodstad et al. found no differences with regard to dyspareunia, pain or wound infection in 300 deliveries with median, mediolateral or lateral episiotomy [94].

In assisted vaginal delivery mediolateral episiotomy has a protective effect with regard to more severe birth injuries [95]. As regards the "correct" angle for mediolateral episiotomy it has been shown that the angle when the episiotomy is performed differs by about 15 degrees from the angle at the time it is sutured [96]. Eogan et al. describe a 3rd/4th degree rate of just less than 10% with a suturing angle of 25° compared to 0.05% with an angle exceeding 45° [97]. The 3rd/4th degree risk is reduced by 50% per 6° increase in the incision angle [97]. The correct incision angle recommended with mediolateral episiotomy is 60° [98].

Episiotomy performed at an angle of about 60° to the midline is therefore an option, especially with assisted vaginal delivery, for reducing the number of more severe perineal lacerations and should be considered especially in women with a perineal length below 30 mm (measured early in the first stage of labour) [99]. Future studies will show whether performing "elective episiotomy" in these women is useful [99]. Moreover, the restrictive/selective use of mediolateral episiotomy is preferable to routine use [93].

### Epidural anaesthesia

If epidural anaesthesia is considered from purely pelvic floor protection aspects, Jango et al. showed in  $n = 214\,256$  deliveries that EDA had protective effects regarding sphincter injuries (3rd/4th degree), recording an OASIS rate of 6.5% (aOR 0.84; 95% CI 0.81–0.88;  $p = 0.0001$ ) [100].

### Postpartum possibilities for prevention and treatment of incontinence and prolapse

Preventive measures in the postnatal period are described below. Symptomatic women with stress urinary or faecal incontinence, especially after injuries of the anal sphincter complex, require intensive diagnostics and treatment and are not the subject of this review article. Please refer to the appropriate AWMF guidelines.

### Postnatal exercises/physiotherapy

Reasonable pelvic floor rehabilitation can start immediately after delivery. The emphasis is not on training the pelvic floor muscles per se initially but rather (re-)sensitisation of the women for her genital region, pelvic floor perception and sensitisation for the al-

tered pelvic floor perception and functions, help with excretion, decongestant exercises, recovery of pelvic mobility, sensitisation and stabilising exercises for the altered statics, dealing correctly with the reduced trunk stability due to rectus diastasis, relaxation of the back muscles etc. [23]. Palpation to assess the pelvic floor structure, function and voluntary contraction is not only helpful but also recommended internationally (PERFECT scheme) [101]. In the setting of continuous postnatal visits at home, the supervising midwife has early and low-threshold access to mothers in their familiar environment and in individual care. Recovering control over the pelvic floor is the fundamental requirement for further pelvic floor work.

Identification of antenatal risk factors and classification of deliveries that may have involved trauma and structural injury necessitates risk assessment from the physiotherapy aspect also. This assessment should be made within the first few days post partum and will lead to appropriate classification. Whether this can be established as a screening procedure will be the subject of future scientific discussion.

Functional pelvic floor work after birth has a significant regenerative effect in urinary incontinence [102–104] and significantly improves general physical regeneration [105]. This should therefore be implemented especially in combination with everyday behaviour that spares the pelvic floor in both the early and late postpartum period [48, 49]. Independent exercising in addition to the exercise classes improves the effect of physiotherapy [103].

A single instruction by physiotherapists on pelvic floor activation, which would be possible to organise in many obstetric departments, does not alter the number of incontinent women but markedly increases adherence [106].

There is evidence for an association between the existence of rectus diastasis and organ prolapse, back pain and reduced quality of life. Because of this, reducing rectus diastasis and achieving functional responsiveness of abdominal muscles can be seen as a supplementary aim to prevent organ prolapse [107]. Reducing the rectus diastasis by adapted functional abdominal muscle training can start in the early postnatal period [108], and specific instructions should be given [107, 109].

Ideal care of women who have given birth is ensured by interdisciplinary collaboration between midwives and physiotherapists, obstetricians and also urogynaecologists, especially for women with serious pelvic floor injuries and dysfunction. In an ideal case, urogynaecology care is not necessary in the puerperium. The midwife as person of trust with close contact directly after delivery can identify and treat any problems; use of standardised assessments (general and symptom-based history, clinical examination [110]) is sensible so that physiotherapists and urogynaecologists can then be involved if necessary or the woman can be referred for specific further treatment. In this collaboration, which is concerned with restoration of a woman's pelvic floor functionality and sensitivity, the emphasis should be not on competition but on interdisciplinarity for the women's benefit [7, 111].

## Pessary therapy

To date there has been little experience regarding postpartum pessary therapy though initial pilot studies appear to indicate options for possible further studies [112, 113]. Besides improving the prolapse sensation, it is thought that a pessary can assist immediate postpartum stabilisation of connective tissue structures of the pelvic floor so positive effects in terms of postnatal recovery of pelvic floor function are also conceivable. Studies of this are planned.

## Conclusion

There are large overlaps between midwifery, specialised pelvic floor physiotherapy and urogynaecology with regard to pelvic floor protection. An individualised risk assessment for every mother-to-be can be a basis for a sustained improvement in the quality of care during pregnancy, delivery and the postnatal period. The aim of this article is to describe interdisciplinary and inter-professional synergies based on a selective literature search so that women can be advised appropriately, and preventive strategies can be developed where necessary.

Achieving peripartum pelvic floor protection has many aspects and individualised approaches, and empathic communication can help to support women in their desire for natural delivery and dispel fears but at the same time identify risk situations and react accordingly. Individualised risk assessment of each mother-to-be is an important alternative to blanket prevention strategies.

## Conflict of Interest

Markus Hübner: PROMEDON GmbH consultant, Aesculap AG consultant. The other authors declare that there is no conflict of interest.

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