Can cesarean section prevent uroginecological complications?

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Abstract
Pelvic floor dysfunction (PFD) is the term connected with different clinical conditions such as urinary incontinence, anal-fecal incontinence, pelvic organ prolapse, pelvic pain syndrome and sexual dysfunction. In women the main risk factors for PFD are pregnancy and delivery, obesity, menopause and chronic pulmonary diseases. Main risk factors for PFD associated with delivery are large fetus, shape of pelvic floor, position of the fetus, mode of delivery (vaginal, operative vaginal delivery) and prolonged labor [11, 21]. Among proposed methods, which can prevent PFD, are pelvic floor muscle training and cesarean section. The analysis of risks and benefits doesn’t support the thesis that cesarean section is panaceum for prevention of pelvic floor injuries and disorders related to pregnancy.

Key words: delivery, cesarean section, uroginecological complications

Introduction
Pelvic floor dysfunction (PFD) is the term connected with different clinical conditions such as urinary incontinence, anal-fecal incontinence, pelvic organ prolapsed, pelvic pain syndrome and sexual dysfunction. In women the main risk factors for PFD are pregnancy and delivery, obesity, menopause, chronic pulmonary diseases. Almost 25% of women report at least one of the above mentioned clinical conditions [11, 27].

The main clinical symptoms of pelvic floor dysfunction among women are urinary incontinence (25–45%), anal incontinence (11–15%) and pelvic organ prolapse (5–10%). It was indicated that knowledge and misperceptions about PFD are the main factors influencing the frequency of diagnosis of these complications.

Pregnancy and delivery are among the most important causes of PFD. The aim of this review is to present the pathophysiology of pelvic floor dysfunction during pregnancy as well as preventative methods of this complication.

Pathophysiology of pelvic floor dysfunction
De Lancey i wsp. [7] presented graphical model of different phases of pelvic floor function. They distinguished three phases:

- phase 1 – predisposing factors: genetics;
- phase 2 – inciting factors associated with delivery: large fetus, shape of pelvic floor, position of fetus, mode of delivery, prolonged labor;
- phase 3 – intervening factors: age, physical activity, obesity, chronic diseases.

Genetic predisposition is a well documented risk factor for PFD, confirmed by molecular studies as well as by observation of twins. Altman et al. [1] analyzed 3376 monozygotic and 5067 dizygotic female twins and in the aspect of PFD found greater similarities in outcome in monozygotic twins.

Among others, molecular genetic studies have focused on polymorphisms of collagen. Analysis of polymorphisms of such genes as COL1A1 (collagen type Ia1) and COL3A1 (collagen type III) demonstrated its significant increase in women with urinary incontinence (UI) or pelvic organ prolapse (POP) [5, 18]. From biological point of view it could partially explained the inadequate support of the pelvic organs during pregnancy and difficulties with repair of stretch injuries or tears observed during vaginal delivery (mainly operative – forceps delivery) [19].

During pregnancy, hormonal changes that prepare the pelvic floor for delivery and the increased pressure from the gravid uterus may be involved in pelvic floor relaxation [6]. The concentrations of relaxin and progesterone change significantly during physiological pregnancy. Relaxin plays an important role in maintaining urinary continence during pregnancy stimulating tissue growth in lower urinary tract. Its maximum is around 10–14 weeks, after it decrease to stable values in the middle of pregnancy. Progesterone, which concentration

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increases until the end of gestation, may relax smooth muscles in the urinary system, reducing ureter, bladder and urethral tone [26]. Changes of the tone of smooth muscles of pelvic floor during pregnancy were the background to create the hypothesis, which connected joint hypermobility and PFD. Such association wasn’t confirm by the study of Derpapas et. [8]. On the other hand, using translabial ultrasound, Dietz et al. [10] analyzed peripheral joint mobility and pelvic organ mobility as measures of connective tissue properties. Study was performed on 200 nulliparous women regarding delivery mode and progress of labor. Pelvic organ mobility was significantly associated with total length of second stage of delivery; the lowest mobility was seen in women who required cesarean section in the second stage. In another study Dietz and Bennett [9] found that significant increase in pelvic organ mobility was after operative vaginal delivery (forceps), which caused the greatest changes. Several studies analyzed bladder neck mobility during pregnancy. Using ultrasound it was found that 30% of primigravidae have mobility of bladder neck in the middle of pregnancy. In this group of women incidence of postnatal stress urinary incontinence was significantly higher. Currently, bladder neck mobility during pregnancy is accepted as predictor of postnatal pelvic floor dysfunction [12, 17].

Antenatal urinary incontinence was found as an independent risk factor for the post partum urinary and fecal incontinence [3, 23, 24]. Onset of urinary incontinence during pregnancy and its continuation for 3 months after delivery is a risk factor for urinary incontinence in the future life. Viktrup et al. [30] demonstrated that the majority of women (91%), which had urinary incontinence during pregnancy and 3 months after delivery, had symptoms of urinary incontinence 12 years later. According to the final results of the study by van Brummen et al. [28] the presence of stress urinary incontinence in early pregnancy is predictive for this complication both for women who delivered vaginally or by cesarean section.

Main risk factors for PFD associated with delivery are parity, large fetus, shape of pelvic floor, position of fetus, mode of delivery (vaginal, operative vaginal delivery) and prolonged labor. The risk of PFD increases up to 8-fold after one vaginal delivery and 20-fold following three vaginal deliveries in comparison with cesarean deliveries. Additional risk factors proposed by Chan et. [4] are first trimester body mass index and smoking status. Trauma of levator ani, stretch injury of the pudendal nerve or trauma of sphincter ani are the main complications observed during delivery related to above mentioned risk factors [16].

Many changes are observed in pelvic floor structure as pregnancy advances. Using advanced imaging technologies such as three/four-dimensional transperineal ultrasound or magnetic resonance it is possible to analyze pelvic floor structures including the levator ani muscle, sphincter ani, paravaginal and paraurethral tissues. During pregnancy descent of bladder neck, cervix and anorectal junction are observed [4].

Handa et al. [15] used magnetic resonance imaging (MRI) to compare pelvic anatomy in the groups of women with or without pelvic floor disorders 6–12 months after first delivery. According to the results of their study, MRI did not reliably distinguish postpartum women with uterovaginal prolapse or symptoms of urinary or fecal incontinence.

Intervening factors, the third phase of pelvic floor function, which are not connected with pregnancy and delivery will not be discussed in this review.

Mode of delivery and pelvic floor dysfunction

As it was mentioned above vaginal delivery and prolonged labor are among the most frequent causes of PFD. The explanation of such relation may be the presence of increase in the urethrovesical angle, urethral mobility, hiatal dimension as well as levator ani muscle injury. The prevalence of urinary incontinence three months postpartum is about 30% in women with spontaneous vaginal delivery and 15% for women after cesarean section.

During last decades many studies analyzed relation between mode of delivery and PFD. Leijonhufvud et al. [20] analyzed two cohorts of women: 33167 with cesarean section and 63229 with vaginal delivery in anamnesis. They demonstrated that women who had vaginal delivery had increased overall risk of incontinence (hazard ratio 2.9) and prolapse surgery (hazard ratio 9.2) compared to women who underwent cesarean deliveries. Rotveit and Hannestad [25] searching for the association between mode of delivery and pelvic floor dysfunction conducted a literature search in PubMed. In the discussion they wrote: “Overall research indicates that cesarean section may protect against urinary incontinence in women in fertile age, but the effect does not persist when the women become older and the prevalence of incontinence is highest”. From that point of view the indication of urinary incontinence for cesarean section and moment of its performance are
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very important. Groutz et al. [13] demonstrated that prevalence of stress urinary incontinence was similar following spontaneous vaginal delivery and cesarean section performed for obstructed labor. According to the conclusions of the study by Gyhagen et al. [14] there was no difference in the prevalence of UI or UI > 10 years after an acute or an elective cesarean section. Different results were observed by Chin et al. [6]. In their opinion emergency cesarean section may be a major risk factor for postpartum urinary incontinence and interfere with the benefit of elective cesarean section performed for prevention of pelvic floor injury.

Based on the information presented above a simple question can be presented: Does elective cesarean section is optimal solution for the prevention of PFD observed after pregnancy? First of all we should remember that cesarean section has still many negative consequences for mother and child. Secondly, cesarean section reduces the risk for pelvic floor injury but does not completely prevent it.

The results of the studies presented above indicate, that a high number of confounding factors makes it difficult to prepare recommendations regarding the mode of delivery in physiological pregnancy in aspect of eventual urogynecological complications post partum. From other side unambiguous identification of all risk factor of PFD at this moment is difficult and almost impossible. Nowadays, only the women with previous anal sphincter rupture identify the group of patients with a high risk for pelvic floor injury in which indication for cesarean section looks reasonable. Mahony et al. [22] demonstrated that vaginal delivery with preexisting sonographically confirmed anal sphincter defect has a relative risk of 11.2% for anal incontinence and that in 26% of women a marked deterioration of the anal incontinence was observed.

Prevention of pelvic floor dysfunction during pregnancy

It is very important to recognize the influence of pregnancy on pelvic floor in order to indicate how to prevent such complications. The problem is complicated because we can’t define unambiguously all risk factors for PFD. Presently, pelvic floor muscle training and cesarean section are offered as methods of prevention.

Pelvic floor muscle training (PFMT) during and after pregnancy is recognized as efficient method of prevention of PDF. As increased bladder neck mobility is possible marker of postpartum stress incontinence, Reilly et al. [24] performed randomized controlled trial of antenatal floor exercises in the group of primigravidae with such marker diagnosed in pregnancy. Pelvic floor exercises performed under control of physiotherapists were performed from 20 weeks until delivery. After delivery stressed incontinence was diagnosed in 19.2% of women in the exercising group with 32.7% in the control group ($p < 0.05$). Boyle et al. [2] reviewed randomized or quasi-randomized trials in pregnant or postnatal women, which included pelvic muscle training (Cochrane Database of Systematic Reviews). In the opinion of these authors the main aim of physiotherapy during pregnancy is to increase strength, endurance and coordination of muscles. The main hypothesis is that trained muscles might be less prone to the injury and easier retrain after damage. In this review 22 trials were analyzed; 8485 women (4231 PFMT, 4254 control). The main conclusions from this review are:

- For women having their first baby, PFMT can prevent urinary incontinence up to six month after delivery;
- PFMT is an appropriate treatment for women with persistent postpartum urinary incontinence;
- PFMT could have special value in the group of women who have bladder neck hypermobility in early pregnancy, have a large baby or forceps delivery.

Despite the role of cesarean section in the decreasing frequency of PFD after delivery its application as preventative procedure is questionable. It has been shown that it is necessary to perform 8–9 cesarean sections to avoid one case of urinary incontinence [14]. We don’t have enough information to be able to define unequivocally the group of pregnant women with high risk of pelvic floor injuries. Additionally, at the present only observational studies but no randomized controlled studies are available what makes great difference from the point of view of final decisions. Such situation doesn’t permit to prepare adequate recommendations.

Conclusion

For obstetricians the challenge lies in defining women at high risk for severe pelvic floor dysfunction following birth. In this group of women appropriate physiotherapy and mode of delivery should be proposed. It is still open question whether the prevention of pelvic floor injury should be an indication for elective cesarean section. The analysis of the risks and benefits doesn’t support the thesis that cesarean section is panaceum for prevention of pelvic floor injuries and disorders related to pregnancy.
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