Özgün Araştırma / Original Article

Jinekoloji - Obstetrik ve Neonatoloji Tıp Dergisi
The Journal of Gynecology - Obstetrics and Neonatology

DOI: 10.38136/jgon.934350

The impact of delivery mode and parity on development of pelvic organ prolapse and urinary incontinence

Doğum şekli ve paritenin pelvik organ prolapsusu ve üriner inkontinans gelişimi üzerine etkisi

Saliha SAGNIC [1] Orcid ID:0000-0002-5440-2940
Mahmut Kuntay KOKANALI [2] Orcid ID:0000-0002-0760-4460
Sabri CAVKAYTAR [3] Orcid ID:0000-0003-1584-8568
Melike DOĞANAY [4] Orcid ID:0000-0002-2603-1812

[1] Akdeniz University, Department of Gynecology Obstetrics, Division of Gynecologic Oncology. Antalya, Turkey
[2] Ankara City Hospital, Obstetrics and Gynecology, Ankara, Turkey.
[3] Bahçeşehir University, Obstetrics and Gynecology, İstanbul, Turkey
[4] Ankara City Hospital, Obstetrics and Gynecology, Ankara, Turkey.

ÖZ

Amaç: Doğum şekli (vajinal doğum yada sezaryen doğum) ve parite sayısının pelvik organ prolapsusu (POP) ve üriner inkontinans (UI) gelişimine etkisini araştırmak.

Gereç ve yöntemler: 2007-2012 yılları arasında POP ve UI ameliyatı geçiren 1500 kadın geriye dönük olarak değerlendirildi. Dışlama kriterlerinden sonra 875 kadın çalışmaya dahil edildi. POP ameliyatı öyküsü olan 353 kadın, POP ameliyatı olmayan 129 kontrol ile karşılaştırıldı ve anti-inkontinans ameliyatı öyküsü olan 201 hasta, böyle bir ameliyatı olmayan 192 kontrol ile karşılaştırıldı. Olası faktörlerin POP ve UI gelişimi üzerindeki çoklu etkisi lojistik regresyon ile belirlendi.

Bulgular: POP grubu ve kontroller ile anti inkontinans cerrahisi grubu ve kontrollerin özellikleri parite sayısı dışında benzerdi. Parite sayısı arttıkça POP ameliyatı olma riski daha yüksekti. En yüksek risk, 5 ve daha fazla doğum öyküsü olan kadınlarda bulundu. UI için multiparite bir risk faktörü olarak göründü, ancak inkontinans cerrahisine girme riski artan parite sayısı ile artmadı. Doğum şekli, hem POP hem de anti-inkontinans grubu için bir risk faktörü değildi.

Sonuç: Parite sayısı arttıkça POP riski artar ve multiparite de UI için bir risk faktörüdür. Birden fazla doğum planlayan kadınlar bu durumdan haberdar edilmelidir. Doğum şeklinin etkisi net olarak gösterilmediğinden, pelvik taban disfonksiyon insidansının uygun obstetrik bakım ile azaltılabileceğine inanıyoruz.

Anahtar sözcükler: Doğum; parite; prolaps; inkontinans

ABSTRACT

Aim: To investigate the effect of delivery mode (vaginal delivery or caesarean delivery) and parity number on the development of pelvic organ prolapse (POP) and urinary incontinence (UI).

Materials and methods: 1500 women who had undergone surgery for POP and UI between 2007-2012 were retrospectively evaluated. After exclusion criteria, 875 women were included. 353 women with a history of POP surgery were compared with 129 controls who had no POP and 201 patients with a history of anti-incontinence surgery were compared with 192 controls who had no such surgery. Multiple effects of possible factors on the development of POP and UI were determined by logistic regression.

Results: The characteristics of the POP group and the controls, as well as the anti-incontinence surgery group and controls, were similar, except parity number. The higher the parity number, the higher the risk of having POP surgery. The highest risk was found in women with a history of 5 and more deliveries. Multiparity appeared to be a risk factor for UI, but the risk of undergoing incontinence surgery did not increase as the number of parity increased. The delivery mode was not a risk factor for either POP or the anti-incontinence group.

Conclusion: The risk of POP increases with the increasing number of parity, and also multiparity is a risk factor for UI. Women planning more than one delivery should be informed about this concern. Since the impact of delivery mode has not been shown clearly, we believe the incidence of pelvic floor dysfunction can be decreased with proper obstetric care.

Keywords: Delivery; parity; prolapse; incontinence

Sorumlu Yazar/ Corresponding Author:
Saliha Sagnıc
Adres: Akdeniz University, Department of Gynecology Obstetrics, Division of Gynecologic Oncology. Antalya, Turkey
E-mail: drsalihasagnic@hotmail.com

Başvuru tarihi : 07.05.2021
Kabul tarihi : 14.10.2021

INTRODUCTION

Pelvic floor dysfunction (PFD) includes pelvic organ prolapse (POP), urinary incontinence (UI), overactive bladder syndrome, and fecal incontinence. With the prolongation of the average life expectancy, many women experience one or more of these problems (1,2).

POP is defined as the herniation of the pelvic visceral organs into the vagina. Although POP is not a cause of mortality, it can lead to serious morbidity and a worsening in quality of life in patients. Since most POPs are mildly asymptomatic and require a pelvic examination to diagnose true prolapse, it is difficult to predict the true incidence of the disease. Nevertheless, a woman's lifetime risk of surgery for POP or UI is estimated to be 11-19%, and 30% of these patients will need additional prolapse surgery in the future (1,2).

UI is defined by the International Continence Society (ICS) as an objective involuntary urinary loss that has become a social and hygienic problem (3). Estimation of the true prevalence of the types of incontinence is difficult due to the variability in the definition of UI. Half of the women with urinary incontinence are diagnosed with stress urinary incontinence (SUI). The second most frequent type is mixed urinary incontinence (MUI), and the least common is urge urinary incontinence (UUI). These rates vary with age, and UUI becomes the most common type among elderly women (4). The specific factor that causes UI in young patients is often easily detected but is multifactorial in elderly women. In the elderly population, neuro-urinary pathologies, aging-related factors, additional systemic diseases, drugs, functional and cognitive disorders cause UI (4). The exact prevalence of UI is unknown because of the lack of medical support for incontinence. Considering this nonattendance of reporting, the average prevalence of UI for the entire female population is estimated to be 30%; 5.5-32%, and 10.5-59% in the premenopausal period ad postmenopausal period respectively (5,6).

POP and UI can coexist in 80% of paient with PFD (7). Each of these may be mild or asymptomatic. Several risk factors for POP and UI have been identified including birth, pregnancy, age, menopause, obesity, hysterectomy, congenital dysfunction, functional disorder, race, genetics, increased intraabdominal pressure (constipation, chronic cough, occupational risk), some connective tissue diseases, smoking, pelvic floor trauma, and spina bifida. The most important factor in the etiology is the injury of the endopelvic fascia, levator ani, or perineum concerning birth trauma (8). However, the biological mechanism of damage to the pelvic floor during pregnancy and delivery has not been fully elucidated.

In this study, we aimed to investigate the effect of the number and type of delivery on the development of POP and UI in women suffering from PFD.

MATERIALS AND METHODS

This retrospective study was conducted at Zekai Tahir Burak Woman's Health Education And Research Hospital and 1500 women who underwent surgery for POP or UI between 2 November 2007 – 31 June 2012 were evaluated. 875 patients were included in the study by following the exclusion criteria. After obtaining the Regional Hospital Ethics Committee approval, the data were collected from the hospital database. Age, height, weight, body mass index (BMI), modes of delivery (vaginal delivery, cesarean section), systemic diseases (hypertension, diabetes mellitus, heart failure, chronic obstructive pulmonary disease, neurological disease, constipation, lumbar disc hernia, and other systemic diseases), drugs that are constantly used, habits, previous abdominopelvic and urogynecologic surgeries, POP stages classified according to the POP-Q quantification system, type of UI and operations performed were obtained for each woman. The UI type was determined according to the patient's complaint and urogynecological examination. No urodynamic tests were used in the diagnosis of these patients.

Women with menopausal status, smoking, chronic obstructive pulmonary disease, lumbar disc hernia, previous surgical procedures for POP and UI, constant drug use that could cause UI, systemic and neurological diseases, and hysterectomy were excluded. Consequently, it was aimed to examine the effect of number and type of delivery on the development of POP and UI.

Patients who operated for POP and SUI were evaluated independently. 353 patients who underwent surgery for POP were compared with 129 patients who had no POP at the pelvic examination. In addition, 201 patients undergoing surgery for SUI were compared with 192 patients who did not undergo any anti-incontinence surgery. Prolapse and non-prolapse patients were compared in terms of age, BMI, abdominopelvic surgical history, obstetrics history, parity numbers, and birth patterns.

Patients with and without incontinence surgery were compared according to age, BMI, abdominopelvic surgical history and presence of second or more POP, obstetrics history, parity numbers, and birth patterns.

Data analysis was performed with the Statistical Package for Social Sciences (SPSS Inc, Chicago, Illinois, USA) package program 17.0. The distributions of the data were evaluated using the Kolmogorov Smirnov test. Parametric methods were used in the analysis of variables with normal distribution, and nonparametric methods were used in the analysis of variables having no normal distribution. Normally distributed continuous variables were assessed by using independent Student's t-test and non-normal distribution variables by using the Mann-Whitney-U test. Categorical variables were compared by using the Chi-square test. Logistic regression analysis was used to evaluate the multiple effects of parity and delivery on prolapse and incontinence. p-value <0.05 was considered statistically significant.

RESULTS

When we compared the women who underwent POP surgery (N=353) and women who did not have POP surgery (N=129), there were no statistically significant differences between the groups in terms of women's age, BMI, history of previous abdominopelvic surgery. However, statistically significant differences were found between the groups when comparing according to the number of parity (p=0.029) and delivery mode (p=0.046) (Table 1).

Table 1. Characteristics of women with and without pelvic organ prolapse surgery

	POP surgery (N=353)	No POP Surgery (N=129)	p
Age (years)	48.43±11.37	46.98±8.04	0.415
BMI (kg/m²)	27.17±4.92	28.54±4.73	0.214
Abdominopelvic surgery	45 (12.4)	11 (9.0)	0.230
Number of parity			
0	7 (2.0)	8 (6.2)	
1	75 (21.2)	27 (20.9)	
2	146 (41.4)	53 (41.1)	0.029
3	78 (22.1)	28 (21.7)	
4	38 (10.8)	13 (10.1)	
≥5	9 (2.5)	2 (1.6)	
Delivery mode			
Nulliparity	7 (2.0)	8 (6.2)	
VD	188 (53.3)	53 (41.1)	0.046
CS	130 (36.8)	56 (43.4)	
VD+CS	28 (7.9)	12 (9.3)	

Data presented as mean±standard deviation or n (%).
POP: Pelvic organ prolapse; BMI: Body mass index; VD: Vaginal delivery; CS: Cesarean section
p<0.05 was considered as statistically significant.

In the multiple logistic regression models, increasing parity was associated with increased odds of having POP surgery, on the contrary, the delivery mode was not. As the parity number increases in women, the risk of surgery due to POP increases. The risk of surgery for POP is about 2 times higher in patients with a parity number of 3 or more than in a nulliparous woman. This risk is up to 9 times in the grand multipara (Table 2).

Table 2: Logistic regression analysis of parity and delivery mode on pelvic organ prolapse

	OR	95%CI	p
Number of parity			
0	Reference	---	---
1	1.10	0.63-1.30	**<0,001**
2	1.41	0.71-7.31	**<0,001**
3	2.29	1.10-4.78	**<0,001**
4	3.18	1.48-3.11	**<0,001**
≥5	9.27	5.00-15.00	**<0,001**
Delivery mode			
Nulliparity	Reference	---	---
VD	2.08	0.48-9.05	0.328
CS	0.83	0.27-2.60	0.753
VD+CS	1.38	0.54-3.51	0.505

OR: Odds ratio; CI: Confidence interval; VD: Vaginal delivery; CS:Cesarean section
p<0.05 was considered as statistically significant.

There was no statistically significant difference when the women who underwent incontinence surgery (N=201) and who did not have incontinence surgery (N=192) were compared regarding woman's age, BMI, history of previous abdominopelvic surgery, and presence of ≥stage 2 accompanying POP. On the other hand, a statistically significant difference was found between the groups according to the parity number (p=0.042) but not delivery mode (p=0.215) (Table 3).

Table 3. Characteristics of women with and without incontinence surgery

	Incontinence surgery (N=201)	No Incontinence surgery (N=192)	p
Age (years)	49.17 ±12.85	47.43±8.98	0.118
BMI (kg/m^2)	28.15 ±4.67	27.65±5.10	0.388
Abdominopelvic surgery	100 (49)	100 (52.0)	0.612
POP ≥2 stage	70 (34.8)	59 (30.7)	0.419
Number of parity			
0	4 (2.0)	6 (3.1)	
1	11 (5.4)	8 (4.1)	
2	59 (29.1)	52 (27.0)	0.042
3	72 (35.5)	67 (34.7)	
4	34 (18.1)	34 (17.6)	
>5	23 (11.3)	26 (13.5)	
Delivery mode			
Nulliparity	4 (2.0)	6 (3.1)	
VD	112 (55.1)	107 (55.4)	0.215
CS	59 (29.0)	54 (28.0)	
VD+CS	28 (13.7)	26 (13.5)	

Data presented as mean±standard deviation or n (%).
BMI: Body mass index; POP: Pelvic organ prolapse; VD: Vaginal delivery; CS: Cesarean section
p<0.05 was considered as statistically significant

Table 4: Logistic regression analysis of parity and delivery mode on urinary incontinence

	OR	95%CI	p
Number of parity			
0	Reference	---	---
1	1.08	1.01-1.64	0.239
2	1.25	1.02-2.54	**0.012**
3	1.09	1.01-1.77	**0.027**
4	1.12	1.01-2.05	**0.018**
≥5	1.07	1.01-1.56	0.056
Delivery mode Nulliparity	Reference	---	---
VD	0.58	0.30-1.14	0.112
CS	1.82	0.51-6.51	0.357
VD+CS	0.69	0.35-1.36	0.284

OR: Odds ratio; CI: Confidence interval; VD: Vaginal delivery; CS:Cesarean section
p<0.05 was considered as statistically significant.

When nulliparous patients were considered as the reference point for women who had undergone incontinence surgery, the risk of having incontinence surgery in the primiparous woman was 1.08 compared to nulliparous patients, and this risk was not statistically significant (p = 0.239). On the other hand, women with 2,3 or 4 deliveries had significantly increased risks (p=0.012; p=0.027; p=0.018, respectively) compared to nulliparous, but higher parity did not increase the risk of having UI surgery. The mode of delivery was not associated with increased odds of having UI surgery. The results of multiple logistic regression analysis are presented in Table 4.

DISCUSSION

In this study, we aimed to investigate the effect of delivery mode and parity on POP and UI in women. In many studies, age, vaginal delivery, and obesity were identified as risk factors for PFD. Additionally, it has been suggested that diabetes mellitus, connective tissue diseases, and neurological disorders may also be risk factors (9-12). Our study mostly includes premenopausal women and, the BMI of these women is <30 kg /m2. The study group must be of this age group and non-obese patients, because age and obesity are much more important than the parity and delivery mode among the risk factors that cause PFD in the elderly population (13).

Although the most important factor that tends to develop PFD seems to be Vaginal Delivery (VD), data supporting this finding has been obtained from observational studies and there are no randomized controlled studies. Nevertheless, the cause-and-effect relationship between PFD and pregnancy and delivery has been demonstrated in the woman who has delivered at least once (14,15). Similar to these studies, our study showed that parity was higher in women who underwent POP and UI surgery.

Previous studies have also shown that the likelihood of developing POP and UI increases as the parity increases (14,15). But the greatest reason for the increase in the prevalence of PFD

is the first delivery (16). Subsequent deliveries also result in additional increased risk. However, in some studies, no increased risk was shown with parity (17,18). In a study conducted in the United Kingdom, parity was found to be the strongest association factor for the risk of having POP surgery among all risk factors when compared to nulliparous. Women with one delivery had 4 times higher and women with two deliveries had an 8.4 times higher risk of having symptomatic POP (19). In our study, as the number of deliveries increases, the risk of surgery due to POP increases. When the number of parity was evaluated in patients undergoing UI surgery, the increased risk for women delivered once was not found to be statistically significant, but the risk in women who delivered 2, 3, and 4 children was statistically significant. In addition, the risk was not statistically significant in women delivered 5 or more times.

Many studies have reported a significant relationship between VD and PFD (15,16,20). Researchers who thought VD was more effective in the development of PFD compared pelvic muscle strength in patients with VD and Cesarean Section (CS). Friedman et al. determined that women who delivered vaginally had lesser pelvic muscle strength compared to women who delivered by CS (21). In addition, levator damage is also demonstrated by magnetic resonance imaging in women delivered vaginally, but the mechanism of damage is not fully understood. During vaginal and operative delivery, anal sphincter lacerations and episiotomy also increased the risk of levator damage (22).

Despite studies emphasizing the role of VD in the development of PFD, it is still unclear whether CS has a protective effect on this issue. A community-based EPINCOT study including 15307 women has demonstrated an increased risk of UI in women who underwent CS compared to nulliparous women, but VD increased this risk more (23). In the BREECH study, women who had underwent planned CS at term due to breech presentation were compared with women who had VD at term due to breech presentation in terms of UI incidence in the postpartum 2nd year and no difference was found (24). In another study conducted by Wilson et al., patients with VD and CS were compared in terms of UI and found that the incidence of UI in patients with two CSs was significantly higher than that of VDs. However, women with 3 or more CSs were found to be similar to those who had 3 VDs (25). This result may be due to the cumulative effect of recurrent gestation itself or the denervation damage that occurred during the CS on the pelvic floor. Nevertheless, the protective effect of CS in preventing PFD has been shown in several studies (26,27). In our study, POP and UI surgery were not found to be related to delivery mode. The important factor in the development of PFD may be going into labor, rather than delivery mode. in a study comparing the effect of CS before and after the onset of labor on the development of PFD, Novellas et al. found that straining during labor causes 2.7 times more damage than the fetal head crowning in the pelvic floor muscles (28). However, because of the retrospective design of our research, information on whether the CS performed in the first or second stage of the labor, and CS indications (eg, macrosomic baby, cephalopelvic disproportion, etc.) were not available in our study. Whether we have not found a difference in the risk of having POP and UI surgery between delivery modes may depend on the lack of adjusting of these confounding factors.

This study has some negative aspects. The major disadvantage was its retrospective design resulting in limited access to all possible effective factors for the development of PFD. Previous studies have indicated that CS in the second stage of labor may not offer protection for the pelvic floor. The obstetrical records of participants were collected from the hospital database and due to study design, delivery events such as episiotomy or perineal lacerations, I duration of the second stage of labor, gestational age, epidural anesthesia, the position of the fetal head, birth weight, CS indications, performing CS in the first or second stage of labor were not available. Therefore, we could not evaluate the CS or VD group regarding labor properties. This limitation should be considered while interpreting our results. To make a definite judgment about the mode of delivery, other potential obstetrical risk factors should be analyzed via further studies. Additionally, our study population was also relatively small and was conducted by data from a single center in Turkey. Thus we believe that further studies with more participants and from different races and ethnicity are needed to justify and generalize our results.

In conclusion, we found an increased risk of PFD among women with the increased parity and we believe that this risk can be reduced by limiting the parity.

REFERENCES

1. Bo K, Frawley HC, Haylen BT, Abramov Y, Almeida FG, Berghmans B, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for the conservative and nonpharmacological management of female pelvic floor dysfunction. Int

Urogynecol J. 2017 Feb; 28(2):191-213.

2. Smith FJ, Holman CD, Moorin RE, Tsokos N. Lifetime risk of undergoing surgery for pelvic organ prolapse. Obstetrics and Gynecology. 2010;116(5):1096-100.

3. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, et al. The standardization of terminology in lower urinary tract function: report from the standardization sub-committee of the International Continence Society. Urology. 2003;61(1):37-49.

4. DuBeau CE, Kuchel GA, Johnson T, 2nd, Palmer MH, Wagg A, Fourth International Consultation on I. Incontinence in the frail elderly: report from the 4th International Consultation on Incontinence. Neurourology and Urodynamics. 2010;29(1):165-78

5. Ebbesen MH, Hunskaar S, Rortveit G, Hannestad YS. Prevalence, incidence, and remission of urinary incontinence in women: longitudinal data from the Norwegian HUNT study (EPINCONT). BMC Urol. BMC Urology; 2013;13(1):1.

6. Khullar V, Sexton CC, Thompson CL, Milsom I, Ebel Bitoun C, Coyne K. The relationship Between BMI and Urinary Incontinence Subgroups: Result From EpiLUTS. Neurourol Urodyn.2014;33:392–9.

7. Maher CM, Feiner B, Baessler K, Glazener CM. Surgical management of pelvic organ prolapse in women: the updated summary version Cochrane Review. International Urogynecology Journal. 2011;22(11):1445-57.

8. Samuelsson EC, Victor FT, Tibblin G, Svardsudd KF. Signs of genital prolapse in a Swedish population of women 20 to 59 years of age and possible related factors. AJOG. 1999;180(2 Pt 1):299-305.

9. Åkervall S, Al-Mukhtar Othman J, Molin M, Gyhagen M.Symptomatic pelvic organ prolapse in middle-aged women: a national matched cohort study on the influence of childbirth. Am J Obstet Gynecol. 2020 Apr;222(4):356.e1-356.e14.

10. Lawrence JM, Lukacz ES, Liu IL, Nager CW, Luber KM. Pelvic floor disorders, diabetes, and obesity in women: findings from the Kaiser Permanente Continence Associated Risk Epidemiology Study. Diabetes Care. 2007;30(10):2536-41.

11. Chen B, Yeh J. Alterations in connective tissue metabolism in stress incontinence and prolapse. The Journal of Urology. 2011;186(5):1768-72.

12. Busacchi P, Perri T, Paradisi R, Oliverio C, Santini D, Guerrini S, et al. Abnormalities of somatic peptide-containing nerves supplying the pelvic floor of women with genitourinary prolapse and stress urinary incontinence. Urology. 2004;63(3):591-5.

13. Romano M, Cacciatore A, Giordano R, La Rosa B. Postpartum period: three distinct but continuous phases. Journal of Prenatal Medicine. 2010;4(2):22-5.

14. Kepenekci I, Keskinkilic B, Akinsu F, Cakir P, Elhan AH, Erkek AB, et al. Prevalence of pelvic floor disorders in the female population and the impact of age, mode of delivery, and parity. Diseases of the Colon and Rectum. 2011;54(1):85-94

15. Sensoy N, Dogan N, Ozek B, Karaaslan L. Urinary incontinence in women: prevalence rates, risk factors, and impact on quality of life. Pakistan Journal of Medical Sciences. 2013;29(3):818-22.

16. Zhu L, Bian XM, Long Y, Lang JH. Role of different childbirth strategies on pelvic organ prolapse and stress urinary incontinence: a prospective study. Chinese Medical Journal. 2008;121(3):213-5

17. Connolly TJ, Litman HJ, Tennstedt SL, Link CL, McKinlay JB. The effect of mode of delivery, parity, and birth weight on the risk of urinary incontinence. International Urogynecology Journal and Pelvic Floor Dysfunction. 2007;18(9):1033-42.

18. Murad-Regadas SM, Regadas FS, Rodrigues LV, Furtado DC, Gondim AC, Dealcanfreitas ID. Influence of age, mode of delivery and parity on the prevalence of posterior pelvic floor dysfunctions. Arquivos de Gastroenterologia. 2011;48(4):265-9.

19. Mant J, Painter R, Vessey M. Epidemiology of genital prolapse: observations from the Oxford Family Planning Association Study. BJOG. 1997;104(5):579-85.

20. Gyhagen M, Bullarbo M, Nielsen TF, Milsom I. Prevalence and risk factors for pelvic organ prolapse 20 years after childbirth: a national cohort study in singleton primiparae after vaginal or cesarean delivery. BJOG : An International Journal of Obstetrics and Gynaecology. 2013;120(2):152-60.

21. Friedman S, Blomquist JL, Nugent JM, McDermott KC, Munoz A, Handa VL. Pelvic muscle strength after childbirth. Obstetrics and Gynecology. 2012;120(5):1021-8.

22. Kearney R, Miller JM, Ashton-Miller JA, DeLancey JO. Obstetric factors associated with levator ani muscle injury after vaginal birth. Obstetrics and Gynecology. 2006;107(1):144-9.

23. Rortveit G, Daltveit AK, Hannestad YS, Hunskaar S, Norwegian ES. Urinary incontinence after vaginal delivery or cesarean section. The New England Journal of Medicine. 2003;348(10):900-7.

24. Whyte H, Hannah ME, Saigal S, Hannah WJ, Hewson S, Amankwah K, et al. Outcomes of children at 2 years after planned cesarean birth versus planned vaginal birth for breech presentation at term: the International Randomized Term Breech Trial. AJOG. 2004;191(3):864-71.

25. Wilson PD, Herbison RM, Herbison GP. Obstetric practice and the prevalence of urinary incontinence three months after delivery. BJOG. 1996;103(2):154-61.

26. Leijonhufvud A, Lundholm C, Cnattingius S, Granath F, Andolf E, Altman D. Risks of stress urinary incontinence and pelvic organ prolapse surgery in relation to mode of childbirth. AJOG. 2011;204(1):70 e1-7.

27. Blomquist JL, Muñoz A, Carroll M, Handa VL.Association of Delivery Mode With Pelvic Floor Disorders After Childbirth. JAMA. 2018 Dec 18;320(23):2438-2447.

28. Novellas S, Chassang M, Verger S, Bafghi A, Bongain A, Chevallier P. MR features of the levator ani muscle in the immediate postpartum following cesarean delivery. International Urogynecology Journal. 2010;21(5):563-8.