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Original Research

Does Episiotomy Play a Role in the Development of Pelvic Organ Prolapse?

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Abstract

Background: Pelvic organ prolapse (POP) is a prevalent gynecological disorder affecting approximately one-third of women worldwide, characterized by the descent of pelvic organs and associated with symptoms such as pelvic pressure, incontinence, and sexual dysfunction, all of which significantly impair quality of life. This study investigated the relationship between episiotomy and the development of POP in women with a history of vaginal delivery. **Methods**: A retrospective cross-sectional study was conducted on a cohort of 1030 women admitted to two tertiary university hospitals between 2021 and 2024. Demographic, obstetric, and clinical data were collected, and POP was diagnosed using the Pelvic Organ Prolapse Quantification (POP-Q) system. **Results**: The median age of the participants was 44 (18–70) years, and POP was diagnosed in 321 (31.2%) patients. Women with POP had significantly higher age ($p < 0.001$), body mass index (BMI) ($p < 0.001$), waist-to-hip ratio (WHR) ($p < 0.001$), gravidity ($p < 0.001$), parity ($p < 0.001$), menopausal status ($p < 0.001$), macrosomic delivery ($p < 0.001$), and episiotomy rates ($p < 0.001$) compared with those without POP. However, smoking history ($p < 0.001$) and induced delivery ($p < 0.001$) were significantly higher in those without POP. Median episiotomy was significantly associated with posterior POP ($p < 0.001$), while mediolateral episiotomy was significantly associated with apical POP ($p < 0.001$). Age (odds ratio [OR] = 1.094, 95% confidence interval [CI]: 1.060–1.128, $p < 0.001$), BMI (OR = 1.464, 95% CI: 1.346–1.593, $p < 0.001$), parity (OR = 16.907, 95% CI: 10.508–27.203, $p < 0.001$), macrosomic delivery (OR = 8.221, 95% CI: 3.104–21.773, $p < 0.001$), and episiotomy (OR = 11.533, 95% CI: 5.660–23.501, $p < 0.001$) were strongly associated with increased risk of POP. However, smoking (OR = 0.073, 95% CI: 0.025–0.217, $p < 0.001$) was strongly associated with a decreased risk of POP. **Conclusions**: Episiotomy was independently associated with increased odds of POP, underscoring the importance of its selective use in obstetric practice.

Keywords: episiotomy; pelvic floor; pelvic organ prolapse

1. Introduction

Pelvic organ prolapse (POP) is a common gynecological health problem characterized by the displacement of pelvic organs into or out of the vaginal canal as a result of weakness in the pelvic floor muscles and connective tissues [1]. This condition causes symptoms such as pelvic pressure sensation, urinary and fecal incontinence, and sexual dysfunction, significantly negatively affecting women's quality of life [2].

Advanced age and menopause contribute to the development of POP by decreasing estrogen levels and collagen synthesis; high parity and prolonged labor increase mechanical stress on pelvic tissues; obesity and chronic constipation increase intra-abdominal pressure; persistent coughing and smoking cause repetitive stress and vascular compromise; and previous pelvic surgeries directly damage pelvic support structures [3]. However, vaginal delivery is one of the most important risk factors. Prolonged second-stage delivery, macrosomic babies, interventions such as forceps or vacuum, and perineal trauma disrupt pelvic floor integrity and facilitate the development of POP in the future [4,5]. In this context, episiotomy to prevent perineal trauma has been accepted as a standard obstetric intervention and has been widely practiced for many years. However, it has long been controversial due to uncertainties regarding its possible long-term effects on the pelvic floor [6].

In addition to studies suggesting that episiotomy may prevent uncontrolled tears by protecting pelvic structures [7,8], it has also been reported that tissue damage caused by surgical incision may contribute to the development of POP [9,10]. Cam *et al.* [7] showed that mediolateral episiotomy could reduce central defects of the anterior vaginal wall, while Urmee and Vwalika [8] reported improved short-term maternal outcomes. In contrast, Gün *et al.* [9] and Min *et al.* [10] described short- and long-term pelvic floor complications, including muscle dysfunction and urinary incontinence. In addition, Speksnijder *et al.* [11] stated that mediolateral episiotomy did not prevent levator ani muscle damage and emphasized that the effects of median and mediolateral techniques on the pelvic floor may differ. However, methodological limitations and small sample sizes make it difficult to reach definitive conclusions [9,11].

The main aim of this study was to investigate the relationship between episiotomy and the development of POP. In this context, demographic, obstetric, and clinical characteristics of women with a history of vaginal delivery were examined to assess whether episiotomy and the different techniques used are independent risk factors for POP. Understanding this relationship may help refine perineal management strategies during childbirth and guide clinicians in minimizing long-term pelvic floor complications.

2. Materials and Methods

2.1 Study Design

This retrospective cross-sectional study included 1030 women with a history of vaginal delivery who were admitted to the obstetrics and gynecology departments of two tertiary university hospitals between 2021 and 2024.

2.2 Inclusion Criteria

The study included women who presented with symptoms of pelvic floor dysfunction (e.g., pelvic pain, vaginal fullness, urinary incontinence, frequent urination, fecal incontinence, and difficulty in defecation) and were evaluated for POP during routine gynecologic examinations; demographic data, obstetric history, and anthropometric measurements were fully accessible from the electronic medical records and physical archive files.

2.3 Exclusion Criteria

Patients with previous pelvic surgery, neurologic diseases that may affect pelvic floor function, multiple pregnancies, third- or fourth-degree perineal tears during delivery, congenital pelvic floor anomalies, a history of malignancy or radiotherapy in the pelvic region, a history of vaginal delivery in the year preceding the gynecological examination, and missing data were excluded. Third- and fourth-degree perineal tears were excluded because they represent severe obstetric injuries that independently cause extensive pelvic floor and sphincter damage, thereby introducing a major confounding factor when evaluating the isolated effect of episiotomy on pelvic floor outcomes [12,13].

2.4 Covariates and Descriptive Data

Data including age, gravidity, parity, body mass index (BMI), waist-to-hip ratio (WHR), smoking status, educational level (primary/secondary/high school/university), annual income level (low/medium/high), menopausal status, history of constipation, and history of chronic cough were retrospectively obtained from medical records. In addition, information regarding induced delivery, operative vaginal delivery (forceps/vacuum), macrosomic delivery, presence and type of episiotomy (median/mediolateral), and POP stage (0/I/II/III/IV) and type (anterior/posterior/apical) was recorded. The presence and type of episiotomy were obtained retrospectively from delivery notes, electronic medical records, and physical archive files, and no blinding was performed during data extraction.

2.5 Group Selection

The diagnosis of POP was made via the Pelvic Organ Prolapse Quantification (POP-Q) system. POP severity was classified according to the staging system recommended by the International Urogynecology Association (IUGA) and the International Continence Society (ICS) [14]. Protrusion of the anterior vaginal wall due to weakened pelvic floor support of the bladder and anterior vaginal wall is defined as anterior POP; herniation of the rectum or posterior vaginal wall towards the posterior vaginal wall due to weak support structures is defined as posterior POP; and downward displacement of the uterus or vaginal dome along the vaginal canal due to loss of ligamentous and fascial support is defined as apical POP [14]. According to the POP-Q system, patients with stage II or higher prolapse were classified into the POP group.

2.6 Statistical Analysis

Statistical analysis was performed using SPSS for Windows, version 26.0 (SPSS Inc., Chicago, IL, USA). Categorical variables, presented as numbers with their corresponding percentages, were evaluated using the chi-square test. Continuous variables were expressed as median (minimum–maximum) according to the Kolmogorov-Smirnov test. Comparisons were made using the Mann-Whitney U test for data that did not show a normal distribution.

Binary logistic regression analyses were performed to determine the independent risk factors for POP. In the first step, univariate logistic regression analysis was performed for each variable. Variables found to be significant at the $p < 0.05$ level in univariate analysis and clinically significant confounding factors (age, BMI, parity, smoking, macrosomic delivery, chronic cough, constipation, and episiotomy) were included in the multivariate model. The backward stepwise likelihood ratio method was used to prevent overfitting and to make variable selection transparent.

Multicollinearity between independent variables was assessed by the variance inflation factor (VIF), tolerance, and condition index values before multivariate analysis. In general, VIF $>$5 or condition index $>$30 were considered significant collinearity indicators. Since severe multicollinearity (VIF $>$60) was found between gravidity and parity, only parity was included in the model as a variable representing birth history. In addition, the menopause variable was excluded from the multivariate model because it showed moderate collinearity with age (VIF $\approx$ 3.4) and both variables represented the same biological process.

Table 1. Comparison of those with and without episiotomy.

	Those with an episiotomy (n = 329)	Those without an episiotomy (n = 701)	*p* value
Age (years) (Median (Min.–Max.))	50 (18–70)	43 (18–70)	<0.001
BMI (kg/m^2) (Median (Min.–Max.))	24.14 (17.57–32.81)	26.51 (22.24–44.07)	<0.001
WHR (Median (Min.–Max.))	0.80 (0.58–1.09)	0.88 (0.74–1.46)	<0.001
Gravida (Median (Min.–Max.))	5 (2–7)	4 (1–7)	0.008
Parity (Median (Min.–Max.))	4 (0–6)	3 (0–6)	0.008
Smoking (n, %)	72 (21.9%)	32 (4.6%)	<0.001
Education level (n, %)			
Primary school	221 (67.2%)	528 (75.3%)	0.006
Secondary school	34 (10.3%)	21 (3.0%)	<0.001
High school/University	74 (22.5%)	152 (21.7%)	0.770
Annual income level (n, %)			
Low	178 (54.1%)	209 (29.8%)	<0.001
Medium	114 (34.7%)	402 (57.3%)	<0.001
High	37 (11.2%)	90 (12.8%)	0.469
Menopause (n, %)	179 (54.4%)	296 (42.2%)	<0.001
Constipation (n, %)	34 (10.3%)	68 (9.7%)	0.751
Chronic cough (n, %)	37 (11.2%)	79 (11.3%)	0.991
Induced delivery (n, %)	129 (39.2%)	216 (30.8%)	0.008
Operative delivery (n, %)	41 (12.5%)	19 (2.7%)	<0.001
Macrosomic delivery (n, %)	84 (25.5%)	19 (2.7%)	<0.001
POP (n, %)	159 (48.3%)	162 (23.1%)	<0.001
Degree of POP (n, %)			
Grade II (n, %)	156 (47.4%)	158 (22.5%)	<0.001
Grade III (n, %)	3 (0.9%)	4 (0.6%)	0.686
POP type (n, %)			
Anterior (n, %)	97 (29.5%)	117 (16.7%)	<0.001
Posterior (n, %)	124 (37.7%)	78 (11.1%)	<0.001
Apical (n, %)	35 (10.6%)	87 (12.4%)	0.412

BMI, body mass index; POP, pelvic organ prolapse; WHR, waist-to-hip ratio; Min., minimum; Max., maximum.

Pairwise correlation analyses were performed to assess possible hidden associations and the risk of over-adjustment and residual confounding effects in the model. In these analyses, weak positive associations were found between parity and macrosomic delivery (r = 0.206) and parity and episiotomy (r = 0.094), and moderate positive associations were found between episiotomy and macrosomic delivery (r = 0.355). These results indicate that there was no significant risk of multicollinearity or over-adjustment in the model and were consistent with the VIF values (1.14–1.46) and the highest condition index (20.6).

Odds ratios (OR) and 95% confidence intervals (CI) were calculated for each variable. Model fit was assessed using the Omnibus test, Hosmer-Lemeshow goodness-of-fit test, and Nagelkerke R^2 statistic. The significance level used to determine statistical significance was set at $p <$ 0.05.

3. Results

3.1 Demographic and Obstetric Characteristics of the Total Cohort

Of the 1030 patients who met the inclusion criteria, the median age was 44 (18–70) years, the median BMI was 26.45 (17.57–44.07) kg/m^2, the median WHR was 0.88 (0.58–1.46), median gravidity was 4 (1–7), and median parity was 3 (0–6). Educational level was as follows: primary school (n = 749, 72.7%), high school/university (n = 226, 21.9%), and secondary school (n = 55, 5.3%). The annual income level was as follows: medium (n = 516, 50.1%), low (n = 387, 37.6%), and high (n = 127, 12.3%).

A total of 475 patients (46.1%) were postmenopausal. Among patients, 33.5% (n = 345) had induced delivery, 11.3% (n = 116) chronic cough, 10.1% (n = 104) history of smoking, 10% (n = 103) macrosomic delivery, 9.9% (n = 102) constipation, and 5.8% (n = 60) operative vaginal delivery.

Episiotomy was performed in 31.9% (n = 329) of patients, 20.1% (n = 207) had mediolateral episiotomy, and 11.8% (n = 122) had median episiotomy. The POP rate was 31.2% (n = 321). The stage of POP was as follows: 30.5% (n = 314) stage II, 8.2% (n = 84) stage I, 0.7% (n = 7) stage III, and 0 (0%) stage IV. The POP types were anterior in 20.8% (n = 214), posterior in 19.6% (n = 202), and apical in 11.8% (n = 122).

Table 2. Comparison of median and mediolateral episiotomy.

	Median episiotomy (n = 122)	Mediolateral episiotomy (n = 207)	*p* value
Age (years) (Median (Min.–Max.))	51 (38–70)	49 (18–70)	<0.001
BMI (kg/m^2) (Median (Min.–Max.))	31.22 (28.48–32.81)	21.69 (17.57–28.36)	<0.001
WHR (Median (Min.–Max.))	1.04 (0.94–1.09)	0.72 (0.58–0.94)	<0.001
Gravida (Median (Min.–Max.))	4 (3–6)	5 (2–7)	<0.001
Parity (Median (Min.–Max.))	3 (2–5)	4 (0–6)	<0.001
Smoking (n, %)	35 (28.7%)	37 (17.9%)	0.022
Education level (n, %)			
Primary school	97 (79.5%)	124 (59.9%)	<0.001
Secondary school	9 (7.4%)	25 (12.1%)	0.244
High school/University	16 (13.1%)	58 (28%)	0.002
Annual income level (n, %)			
Low	91 (74.6%)	87 (42%)	<0.001
Medium	31 (25.4%)	83 (40.1%)	0.007
High	0 (0.0%)	37 (17.9%)	<0.001
Menopause (n, %)	72 (59%)	107 (51.7%)	0.198
Constipation (n, %)	4 (3.3%)	30 (14.5%)	0.002
Chronic cough (n, %)	15 (12.3%)	22 (10.6%)	0.778
Induced delivery (n, %)	79 (64.8%)	50 (24.2%)	<0.001
Operative delivery (n, %)	13 (10.7%)	28 (13.5%)	0.556
Macrosomic delivery (n, %)	13 (10.7%)	71 (34.3%)	<0.001
POP (n, %)	62 (50.8%)	97 (46.9%)	0.488
Degree of POP (n, %)			
Grade II (n, %)	62 (50.8%)	94 (45.4%)	0.343
Grade III (n, %)	0 (0.0%)	3 (1.4%)	0.298
POP type (n, %)			
Anterior (n, %)	43 (35.2%)	54 (26.1%)	0.078
Posterior (n, %)	62 (50.8%)	62 (30.0%)	<0.001
Apical (n, %)	0 (0.0%)	35 (16.9%)	<0.001

3.2 Comparison of Those With and Without Episiotomy

Age (50 (18–70) years vs. 43 (18–70) years; $p < 0.001$), gravidity (5 (2–7) vs. 4 (1–7); $p = 0.008$), parity (4 (0–6) vs. 3 (0–6); $p = 0.008$), smoking (n = 72 (21.9%) vs. n = 32 (4.6%); $p < 0.001$), menopause (n = 179 (54.4%) vs. n = 296 (42.2%); $p < 0.001$), induced delivery (n = 129 (39.2%) vs. n = 216 (30.8%); $p = 0.008$), operative vaginal delivery (n = 41 (12.5%) vs. n = 19 (2.7%); $p < 0.001$), macrosomic delivery (n = 84 (25.5%) vs. n = 19 (2.7%); $p < 0.001$), and POP (n = 159 (48.3%) vs. n = 162 (23.1%); $p < 0.001$) were significantly higher in those with episiotomy. However, BMI (26.51 (22.24–44.07) kg/m^2 vs. 24.14 (17.57–32.81) kg/m^2; $p < 0.001$) and WHR (0.88 (0.74–1.46) vs. 0.80 (0.58–1.09); $p < 0.001$) were significantly higher in those without episiotomy (Table 1).

3.3 Comparison of Median and Mediolateral Episiotomy

Age (51 (38–70) years vs. 49 (18–70) years; $p < 0.001$), BMI (31.22 (28.48–32.81) kg/m^2 vs. 21.69 (17.57–28.36) kg/m^2; $p < 0.001$), WHR (1.04 (0.94–1.09) vs. 0.72 (0.58–0.94); $p < 0.001$), smoking (n = 35 (28.7%) vs. n = 37 (17.9%); $p = 0.022$), induced delivery (n = 79 (64.8%) vs. n = 50 (24.2%); $p < 0.001$), and posterior POP (n = 62 (50.8%) vs. n = 62 (30.0%); $p < 0.001$) were significantly higher in those with median episiotomy. Gravidity (5 (2–7) vs. 4 (3–6); $p < 0.001$), parity (4 (0–6) vs. 3 (2–5); $p < 0.001$), constipation (n = 30 (14.5%) vs. n = 4 (3.3%); $p = 0.002$), macrosomic delivery (n = 71 (34.3%) vs. n = 13 (10.7%); $p < 0.001$), and apical POP (n = 35 (16.9%) vs. n = 0 (0.0%); $p < 0.001$) were significantly higher in those with mediolateral episiotomy (Table 2).

3.4 Comparison of Those With and Without POP

Age (53 (38–70) years vs. 39 (18–61) years; $p < 0.001$), BMI (29.38 (18.48–44.07) kg/m^2 vs. 25.78 (17.57–44.07) kg/m^2; $p < 0.001$), WHR (0.97 (0.61–1.46) vs. 0.85 (0.58–1.46); $p < 0.001$), gravidity (6 (4–7) vs. 4 (1–6); $p < 0.001$), parity (5 (3–6) vs. 3 (0–5); $p < 0.001$), menopause (n = 225 (70.1%) vs. n = 250 (35.3%); $p < 0.001$), macrosomic delivery (n = 77 (24.0%) vs. n = 26 (3.7%); $p < 0.001$), and episiotomy (n = 159 (49.5%) vs. n = 170 (24.0%); $p < 0.001$) were significantly higher in those with POP. However, smoking (n = 94 (13.3%) vs. n = 10 (3.1%); $p < 0.001$), and induced delivery (n = 291 (41.0%) vs. n = 54 (16.8%); $p < 0.001$) were significantly higher in those without POP (Table 3).

Table 3. Comparison of those with and without POP.

	Those with POP (n = 321)	Those without POP (n = 709)	*p* value
Age (years) (Median (Min.–Max.))	53 (38–70)	39 (18–61)	<0.001
BMI (kg/m^2) (Median (Min.–Max.))	29.38 (18.48–44.07)	25.78 (17.57–44.07)	<0.001
WHR (Median (Min.–Max.))	0.97 (0.61–1.46)	0.85 (0.58–1.46)	<0.001
Gravida (Median (Min.–Max.))	6 (4–7)	4 (1–6)	<0.001
Parity (Median (Min.–Max.))	5 (3–6)	3 (0–5)	<0.001
Smoking (n, %)	10 (3.1%)	94 (13.3%)	<0.001
Education level (n, %)			
Primary school	206 (64.2%)	543 (76.6%)	<0.001
Secondary school	14 (4.4%)	41 (5.8%)	0.429
High school/University	101 (31.5%)	125 (17.6%)	<0.001
Annual income level (n, %)			
Low	69 (21.5%)	318 (44.9%)	<0.001
Medium	218 (67.9%)	298 (42.0%)	<0.001
High	34 (10.6%)	93 (13.1%)	0.254
Menopause (n, %)	225 (70.1%)	250 (35.3%)	<0.001
Constipation (n, %)	38 (11.8%)	64 (9.0%)	0.162
Chronic cough (n, %)	30 (9.3%)	86 (12.1%)	0.191
Induced delivery (n, %)	54 (16.8%)	291 (41.0%)	<0.001
Operative delivery (n, %)	22 (6.9%)	38 (5.4%)	0.421
Macrosomic delivery (n, %)	77 (24.0%)	26 (3.7%)	<0.001
Episiotomy (n, %)	159 (49.5%)	170 (24.0%)	<0.001
Episiotomy type (n, %)			
Median (n, %)	62 (19.3%)	60 (8.5%)	<0.001
Mediolateral (n, %)	97 (30.2%)	110 (15.5%)	<0.001

Table 4. Risk factors for POP.

	Univariate analysis			Multivariate analysis		
	OR	95% CI	*p*	OR	95% CI	*p* value
Age	1.141	1.120–1.162	<0.001	1.094	1.060–1.128	<0.001
BMI	1.178	1.140–1.217	<0.001	1.464	1.346–1.593	<0.001
Parity	7.612	5.904–9.814	<0.001	16.907	10.508–27.203	<0.001
Smoking	0.210	0.108–0.409	<0.001	0.073	0.025–0.217	<0.001
Menopause	4.303	3.238–5.718	<0.001	-	-	-
Constipation	1.353	0.885–2.070	0.163	-	-	-
Chronic cough	1.339	0.864–2.075	0.192	-	-	-
Operative delivery	1.299	0.755–2.235	0.344	-	-	-
Macrosomic delivery	8.290	5.192–13.237	<0.001	8.221	3.104–21.773	<0.001
Episiotomy	3.112	2.355–4.111	<0.001	11.533	5.660–23.501	<0.001

Model fitting tests: Omnibus test: chi-square = 900.745, $p = 0.000$; Hosmer-Lemeshow test: chi-square = 7.565, $p = 0.477$; Nagelkerke R square = 0.820.

3.5 Risk Factors for POP

Age (OR = 1.094, 95% CI: 1.060–1.128, $p < 0.001$), BMI (OR = 1.464, 95% CI: 1.346–1.593, $p < 0.001$), parity (OR = 16.907, 95% CI: 10.508–27.203, $p < 0.001$), macrosomic delivery (OR = 8.221, 95% CI: 3.104–21.773, $p < 0.001$), and episiotomy (OR = 11.533, 95% CI: 5.660–23.501, $p < 0.001$) were strongly associated with increased risk of POP. However, smoking (OR = 0.073, 95% CI: 0.025–0.217, $p < 0.001$) was strongly associated with a decreased risk of POP (Table 4).

4. Discussion

In this study, the demographic, obstetric, and clinical characteristics of women with a history of vaginal delivery were analyzed to determine whether episiotomy and its techniques were independent risk factors for POP. Women in the episiotomy group were older, had higher gravidity and parity, and had higher rates of menopause, smoking, induced delivery, operative vaginal delivery, macrosomic delivery, and POP. Median episiotomy was significantly associated with posterior POP, whereas mediolateral episiotomy was associated with apical POP. In the POP group, age, BMI, WHR, gravidity, parity, menopause, macrosomic delivery, and episiotomy rates were significantly higher, whereas smoking and induced delivery rates were lower. Episiotomy, advanced age, increased BMI, high parity, and macrosomic delivery were significantly associated with increased odds of POP, while smoking and induced delivery were associated with decreased odds of POP.

Advanced age, high parity, obesity, menopause, difficult/intervention delivery, genetic predisposition, chronic cough, and heavy physical activity have been reported as risk factors for POP [15–19]. There are conflicting data suggesting that smoking may increase the risk of recurrence by weakening collagen metabolism and decreasing the risk by suppressing estrogen metabolism [20]. Although data suggest that induction with prostaglandin may increase the risk of POP, it has not been proven to be an independent risk factor [21]. In our study, smoking and induced delivery were more common among women without episiotomy. This may be related to the clinicians' tendency to avoid episiotomy in high-risk obstetric situations or to the tissue changes associated with smoking, which could alter perineal elasticity and affect the decision-making during delivery. Advanced age, increased BMI, high parity, and macrosomic delivery were shown to increase the risk of POP, in agreement with the literature. In contrast, smoking was found to decrease the risk of POP, and this finding supports the protective effect reported in the literature. Induced delivery was not found to be an independent risk factor for POP, in accordance with the literature.

Current research has revealed conflicting findings regarding the effect of episiotomy on the development of POP. Some studies have reported that episiotomy does not pose a significant risk of POP and may even provide protective effects in certain anatomical structures [22,23]. In contrast, other studies have identified episiotomy as a significant and strong risk factor for the development of POP [24,25]. In a systematic review, episiotomy was not shown to be an independent risk factor for POP; some findings even suggest that episiotomy may have a potentially protective effect against the severity and prevalence of POP when confounding factors such as age, parity and mode of delivery are controlled [26]. In our study, age, gravidity, parity, menopause, smoking, induced delivery, operative vaginal delivery, macrosomic delivery, and POP rates were significantly higher in the episiotomy group. However, episiotomy was found to be a significant risk factor for the development of POP independent of these factors. This finding suggests that the possible effect of episiotomy on pelvic floor integrity may be more pronounced than reported in the previous systematic review.

It has been reported that median episiotomy is associated with the development of posterior POP and may predispose individuals to serious pelvic floor injuries, such as levator ani muscle avulsion due to its advancement along the same line as pubovisceral muscle structures [27]. Recent imaging and functional studies have clarified the mechanisms linking episiotomy to pelvic floor dysfunction. Levator ani trauma or avulsion detected by translabial ultrasound or MRI is a major contributor to postpartum pelvic weakness [28,29]. Median episiotomy, extending parallel to pubovisceral fibers, may increase the risk of levator detachment, while mediolateral incision only partially mitigates this effect [24,25,27]. Disruption of the perineal body and perineal membrane further compromises posterior support, and electromyographic data indicate persistent neuromuscular impairment after episiotomy [10]. In addition, collagen remodeling and altered connective-tissue elasticity within the perineal scar may reduce the tensile strength of pelvic supports, facilitating POP development over time. Although it has been suggested that mediolateral episiotomy may limit central defects by reducing stress distribution in the anterior vaginal wall [22], however this method has not been shown to significantly reduce levator ani injuries or POP symptoms [11]. In our study, the rates of posterior POP in the median episiotomy group and apical POP in the mediolateral episiotomy group were significantly higher. Furthermore, median episiotomy was more frequently associated with POP compared with mediolateral episiotomy. This association may be partly explained by the higher prevalence of factors such as increased BMI, WHR, smoking, and induction rates in the median episiotomy group. However, the frequency of parity, constipation, and macrosomic delivery in the mediolateral episiotomy group may have facilitated the development of apical POP by increasing the load on the apical support structures.

The strength of our study is the detailed examination of the effect of episiotomy on the development of POP in a large group of patients. Demographic, obstetric, and clinical data were comprehensively evaluated, median and mediolateral episiotomy techniques were compared, and POP was classified by the objective POP-Q, minimizing the effect of possible confounding factors through multivariate analysis.

Limitations

However, the retrospective and cross-sectional design limits the establishment of a causal relationship, and the data were obtained from only two centers, thereby limiting generalizability. In addition, it should be considered that inter-center practice differences and individual clinician experience or preference may have influenced the choice of episiotomy technique, representing a potential confounding factor in the interpretation of our results. Furthermore, although our dataset was based on detailed delivery records, the indications for performing episiotomy could not be fully standardized, and minor recall or recording bias cannot be completely excluded. The absence of imaging or functional pelvic floor assessment should also be considered among the inherent limitations of retrospective designs. In order to increase the contribution of our findings to clinical practice, they should be confirmed in prospective studies with multivariate models and supported by multicenter studies.

5. Conclusions

In conclusion, our findings suggest that episiotomy may be associated with an increased risk of POP development, independent of known factors such as age, BMI, parity, and macrosomic delivery. Median episiotomy appeared to be more frequently related to posterior POP, whereas mediolateral episiotomy was more often associated with apical POP. These observations highlight the need for further studies to clarify the potential long-term associations between episiotomy and pelvic floor health. Future prospective longitudinal studies incorporating perineal ultrasound, elastography, or MRI-based pelvic floor measurements are warranted to better elucidate structural variations and the long-term impact of episiotomy.

Availability of Data and Materials

Data generated and analyzed during the study are available from the corresponding author. However, such data are not publicly available.

Author Contributions

CT: performed the research; SK, AMB, DT, and CET: data collection; SK: data analysis. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

The study was approved by the Non-Interventional Clinical Research Ethics Committee of the Kafkas University Faculty of Medicine (27/03/2024/05, 80576354-050-99/425). This study complied with the recommendations of the Declaration of Helsinki for human biomedical research. As this was a retrospective study conducted using anonymized medical records, individual informed consent was not required, as approved by the local ethics committee.

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Conflict of Interest

The authors declare no conflict of interest.

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