Supplementary Materials

Episiotomy Following Vaginal Birth: Incidence, Associated Factors and Perineal Outcomes in the Azores, Portugal

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All analyses were performed in JASP (version 0.18.3) on the final analytic sample of 277 term, singleton, cephalic vaginal births (full cohort) and on the subgroup of 198 spontaneous vaginal births. The outcome in all models is episiotomy (performed vs. not performed). Coefficients (β) are log-odds; adjusted odds ratios (aOR) are exp(β). Reference categories: 18–35 years for maternal age; multiparous for parity; spontaneous vaginal birth for instrumental birth; midwife for birth attendant; spontaneous onset of labour for induction; no epidural for epidural analgesia.

Table S1. Full output of the multivariable logistic regression models for episiotomy: full cohort (n = 277) and spontaneous vaginal births (n = 198).

Term	β	SE	Wald χ^2	p	aOR	95% CI for aOR
Full cohort (n = 277)						
Intercept	−1.245	0.238	27.384	<0.001	0.288	0.181–0.459
Maternal age >35 years	−0.194	0.374	0.268	0.605	0.824	0.396–1.715
Parity (primiparous)	1.533	0.282	29.532	<0.001	4.634	2.665–8.056
Instrumental birth	1.486	0.420	12.540	<0.001	4.418	1.941–10.053
Birth attendant (obstetrician)	−0.017	0.364	0.002	0.964	0.984	0.482–2.007
Spontaneous vaginal births (n = 198)						
Intercept	−1.247	0.257	23.599	<0.001	0.287	0.174–0.475
Maternal age >35 years	−0.524	0.483	1.177	0.278	0.592	0.230–1.526
Parity (primiparous)	1.654	0.330	25.128	<0.001	5.228	2.738–9.981
Birth attendant (obstetrician)	−0.046	0.371	0.016	0.900	0.955	0.462–1.974

Model summary, full cohort: null deviance 382.699 (df 276); residual deviance 309.951 (df 272); likelihood ratio $\chi^2(4) = 72.748$, $p < 0.001$; AIC 319.951; BIC 338.071; McFadden R^2 0.190; Nagelkerke R^2 0.308; Tjur R^2 0.245. Multicollinearity (tolerance / VIF): maternal age 0.967 / 1.034; parity 0.965 / 1.036; instrumental birth 0.586 / 1.708; birth attendant 0.587 / 1.703. Events per variable (129 episiotomies / 4) = 32.

Model summary, spontaneous births: null deviance 256.015 (df 197); residual deviance 224.663 (df 194); likelihood ratio $\chi^2(3) = 31.352$, $p < 0.001$; AIC 232.663; BIC 245.816; McFadden R^2 0.122; Nagelkerke R^2 0.202; Tjur R^2 0.157. Multicollinearity (tolerance / VIF): maternal age 0.976 / 1.024; parity 0.972 / 1.029; birth attendant 0.988 / 1.012. Events per variable (69 episiotomies / 3) = 23.

Table S2. Classification statistics of the multivariable models for episiotomy (cut-off 0.5). Reported only to characterise the models, which were specified as explanatory and are not intended for individual risk prediction.

Metric	Full cohort (n = 277)	Spontaneous vaginal births (n = 198)
Accuracy	0.729	0.717
AUC	0.778	0.725
Sensitivity	0.806	0.594
Specificity	0.662	0.783
Precision	0.675	0.594

AUC – area under the receiver operating characteristic curve.

Table S3. Multivariable logistic regression models for episiotomy with induction of labour and epidural analgesia forced into the model.

Term	β	SE	p	aOR (95% CI)
Full cohort (n = 277); LR $\chi^2(6) = 73.263$, $p < 0.001$; AIC 324.44				
Maternal age >35 years	−0.192	0.375	0.608	0.825 (0.396–1.719)
Parity (primiparous)	1.563	0.289	<0.001	4.773 (2.710–8.405)
Instrumental birth	1.478	0.424	<0.001	4.382 (1.908–10.064)
Birth attendant (obstetrician)	−0.012	0.366	0.973	0.988 (0.483–2.022)
Induction of labour	0.121	0.284	0.669	1.129 (0.647–1.969)
Epidural analgesia	−0.301	0.493	0.541	0.740 (0.282–1.944)
Spontaneous vaginal births (n = 198); LR $\chi^2(5) = 31.695$, $p < 0.001$				
Maternal age >35 years	−0.519	0.484	0.283	0.595 (0.231–1.536)
Parity (primiparous)	1.657	0.339	<0.001	5.242 (2.700–10.178)
Birth attendant (obstetrician)	−0.019	0.374	0.959	0.981 (0.471–2.042)
Induction of labour	0.195	0.334	0.558	1.216 (0.632–2.338)
Epidural analgesia	−0.025	0.582	0.966	0.975 (0.311–3.054)

Compared with the final model (Table S1), the aORs for parity and instrumental birth changed by 3.0% and 0.8%, respectively, in the full cohort; AIC was higher than in the final model (319.95), indicating no improvement in fit. Induction of labour and epidural analgesia were therefore not retained.

Table S4. Sensitivity analyses: multivariable models for episiotomy with maternal age as a continuous variable (per year) and with birthweight (per 100 g) added to the final model.

Term	β	SE	p	aOR (95% CI)
A. Maternal age continuous – full cohort (n = 277); LR $\chi^2(4) = 72.482$, $p < 0.001$				
Maternal age (per year)	−0.001	0.024	0.952	0.999 (0.952–1.047)
Parity (primiparous)	1.553	0.290	<0.001	4.725 (2.677–8.339)
Instrumental birth	1.467	0.419	<0.001	4.338 (1.909–9.860)
Birth attendant (obstetrician)	−0.009	0.363	0.980	0.991 (0.486–2.020)
B. Maternal age continuous – spontaneous vaginal births (n = 198); LR $\chi^2(3) = 30.351$, $p < 0.001$				
Maternal age (per year)	−0.014	0.028	0.626	0.986 (0.933–1.042)
Parity (primiparous)	1.672	0.338	<0.001	5.325 (2.745–10.328)
Birth attendant (obstetrician)	−0.031	0.370	0.933	0.970 (0.470–2.001)
C. Final model plus birthweight – full cohort (n = 277); LR $\chi^2(5) = 73.073$, $p < 0.001$				
Maternal age >35 years	−0.175	0.376	0.641	0.840 (0.402–1.753)
Parity (primiparous)	1.577	0.294	<0.001	4.841 (2.722–8.610)
Instrumental birth	1.493	0.421	<0.001	4.450 (1.952–10.148)
Birth attendant (obstetrician)	−0.041	0.367	0.910	0.960 (0.467–1.971)
Birthweight (per 100 g)	0.021	0.036	0.570	1.021 (0.951–1.097)

LR – likelihood ratio.

Table S5. Perineal outcomes by maternal age group (n = 277).

Maternal age group	n	Intact perineum n (%)	Episiotomy n (%)	Spontaneous tear n (%)
<20 years	13	0 (0.0)	7 (53.8)	7 (53.8)
20–29 years	123	39 (31.7)	60 (48.8)	31 (25.2)
30–39 years	129	36 (27.9)	58 (45.0)	38 (29.5)
≥40 years	12	5 (41.7)	4 (33.3)	3 (25.0)
Total	277	80 (28.9)	129 (46.6)	79 (28.5)

Percentages are row percentages. Episiotomy and spontaneous tear are not mutually exclusive. Chi-square test for episiotomy across age groups: $\chi^2 = 1.497$, df = 3, $p = 0.683$.

Table S6. Bivariate associations between maternal, foetal and obstetric characteristics and spontaneous perineal tear (n = 277).

Variable	Category	Spontaneous tear n (%)	χ^2	p	OR (95% CI)
Maternal age	>35 years	11 (21.6)	1.482	0.224	0.639 (0.309–1.320)
	18–35 years (Ref.)	68 (30.1)			
Parity	Primiparous	30 (22.9)	3.849	0.050	0.588 (0.345–1.002)
	Multiparous (Ref.)	49 (33.6)			
Birth plan	Yes	3 (25.0)	–	1.000 *	0.829 (0.218–3.145)
	No (Ref.)	76 (28.7)			
Induction of labour	Yes	35 (28.5)	0.000	0.983	0.994 (0.588–1.681)
	No (Ref.)	44 (28.6)			
Epidural analgesia	Yes	72 (28.7)	0.036	0.850	1.092 (0.440–2.709)
	No (Ref.)	7 (26.9)			
Instrumental birth	Yes	21 (26.6)	0.204	0.652	0.874 (0.487–1.570)
	No (Ref.)	58 (29.3)			
Birth attendant	Obstetrician	42 (32.3)	1.724	0.189	1.419 (0.841–2.395)
	Midwife (Ref.)	37 (25.2)			
Foetal macrosomia	Yes	4 (66.7)	–	0.057 *	5.227 (0.938–29.134)
	No (Ref.)	75 (27.7)			

n – number of women with a spontaneous perineal tear; % – percentage with a spontaneous tear within each exposure category (row percentage); χ^2 – Pearson's chi-square test; p – probability value; OR – unadjusted odds ratio for the first-listed category relative to the reference category (Ref.); 95% CI – 95% confidence interval. * Fisher's exact test (expected cell count < 5). Spontaneous tear includes the 11 women who experienced both episiotomy and a spontaneous tear. The degree of spontaneous tears was not documented. Spontaneous perineal tear was a secondary, descriptive outcome and was not subjected to multivariable analysis.

Table S6 (continued). Continuous maternal and neonatal characteristics according to spontaneous perineal tear (n = 277).

Variable		Spontaneous tear (n = 79)	No spontaneous tear (n = 198)	p
Maternal age (years)	Mean ± SD	29.2 ± 5.9	29.8 ± 6.0	0.490
Gestational age (weeks)	Mean ± SD	39.2 ± 1.1	39.1 ± 1.0	0.496
Birthweight (g)	Mean ± SD	3341.8 ± 379.4	3214.7 ± 407.3	0.018

SD – standard deviation; p – Student's t-test for independent samples.

Figure S1. Receiver operating characteristic (ROC) curve of the multivariable logistic regression model for episiotomy in the full cohort (n = 277); AUC = 0.778.

