

# Maternal and neonatal outcome of vaginal delivery compared to cesarean delivery for singleton term-breech presentation

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## SUMMARY

**AUTHORS' CONTRIBUTION:** (A) Study Design · (B) Data Collection · (C) Statistical Analysis · (D) Data Interpretation · (E) Manuscript Preparation · (F) Literature Search · (G) No Fund Collection

**Objective:** The aim of the present study was to compare short-term maternal and neonatal outcomes in breech presentations at term according to the planned mode of delivery.

**Study design:** A retrospective cohort study including 453 women with singleton term breech deliveries (37-42 weeks) registered at Obstetrics and Gynecology Clinic in Pristina, University Clinical Center of Kosovo from January 2019 to December 2020. The data were collected from the birth register and pediatric records. The main outcome measures were neonatal and maternal mortality and morbidity, compared according to the mode of delivery.

**Results:** For 217 women (47.9%) a vaginal delivery was planned, of whom 83 (18.3%) were delivered vaginally. In 236 (52.1%) cases elective cesarean section was performed as planned. 134 (29.5%) were delivered by emergent cesarean section. Difference in mothers age between the three groups was statistically significant ( $p=0.011$ ). Nulliparous women were more common in the elective cesarean group compared to planned vaginal group (35.5% vs. 5.96%;  $p < 0.0001$ ). We found a statistically significant association between the maternal comorbidities and vaginal group vs. elective cesarean group (0.6% vs. 4.8%;  $p=0.015$ ). The mean gestational age at birth was significantly lower in the vaginal delivery group (37.8 weeks vs. 38.4 weeks;  $p<0.0001$ ) as was the mean birth weight (3285 g vs. 3925 g;  $p<0.0001$ ). The mean Apgar scores at one minute were lower in the planned vaginal group compared with the cesarean delivery groups (6.7 vs. 8.5 vs. 8.6;  $p<0.0001$ ). Admission to the NICU was significantly higher in the vaginal delivery group compared to the elective and emergent cesarean section group (2.8% vs. 0.8% vs. 1.1%;  $p<0.0001$ ) as was neonatal birth trauma (0.6 vs. 0.00 vs. 0.00;  $p=0.006$ ). Elective cesarean delivery is associated with significantly reduced likelihood of fetal complications (OR=0.085, 95% CI: 0.027-0.270,  $p<0.0001$ ), than the planned vaginal delivery. Statistically insignificant increase of maternal postpartum morbidity was also registered.

**Conclusion:** Elective cesarean birth for term-breech infants is associated with a clinically significant decrease in perinatal morbidity and mortality and with insignificant increase in short-term maternal morbidity, compared with planned vaginal birth.

**Keywords:** Breech presentation; Cesarean section; Intensive care; Neonatal; Apgar score

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**Word count:** 3974 **Tables:** 04 **Figures:** 00 **References:** 31

**Received:** 20.05.2023, Manuscript No. gpmp-23-99381; **Editor assigned:** 22.05.2023, PreQC No. P-99381; **Reviewed:** 12.06.2023, QC No. Q-99381; **Revised:** 19.06.2023, Manuscript No. R-99381; **Published:** 30.06.2023

## INTRODUCTION

Breech presenting fetus is at higher risk for hypoxia and traumatic injury during vaginal birth compared to vertex presentation.

Despite a large number of observational and randomized studies, the safest method of delivery for singleton-term breech presentations remains largely controversial.

The publication of the Term Breech Trial (TBT) reported lower perinatal mortality and lower serious neonatal morbidity in the planned cesarean group (1.6%) compared to the planned vaginal group (5%). Serious maternal morbidity and mortality showed no difference between the two groups (3.9% vs. 3.2%) [1].

Soon after its publication, TBT was largely criticized because of methodological and clinical design weaknesses including violation of inclusion criteria, different levels of standard of care between the participating centers, non-attendance of skilled clinicians and short-term assessment of neonatal morbidity [2].

Additionally, in a further follow-up study, the authors of Term Breech Trial found no statistically significant differences in neonatal and maternal outcomes 2 years after birth [3].

Due to the criticism surrounding the TBT results and the fact that several subsequent publications reported no evidence of overall increased mortality or severe morbidity for breech infants born vaginally, major opinion-making institutions changed or updated their guidelines.

ACOG Committee opinion in 2001, recommended planned cesarean section for patients with persistent breech at term and state "that planned vaginal delivery may no longer be appropriate" [4]. However, in 2010, the ACOG Committee on Obstetric Practice reaffirmed the recommendation in ACOG Committee Opinion Nr. 340, that planned vaginal delivery of a term singleton breech delivery may be reasonable under hospital-specific guidelines for eligibility and labor management [5].

RCOG guideline on the management of breech presentation recommend external cephalic version (ECV) to be offered for women with breech presentation at term and if declined or unsuccessful, women should be counselled on the risks and benefits of planned vaginal delivery vs. planned cesarean section (I-A) [6].

On the other hand, several studies are consistent with

the TBT results and showed that planned cesarean delivery is associated with lower risk of perinatal morbidity. A retrospective study of 1116 singleton breech presentations at term, conducted by Golfier F, et al. reported increased mortality and morbidity for infants in the vaginal group and recommended elective cesarean for singleton term breech presentations [7].

Additionally, a meta-analysis conducted by Berhan and Haileamlak, with a total sample size of 258.953 women, reported that the relative risk of perinatal mortality and morbidity was two to five-fold higher in the planned vaginal group compared to the planned cesarean birth [8].

A Cochrane database systematic review showed that perinatal death or severe neonatal morbidity was reduced with planned cesarean section, and that proportional reductions were similar in countries with high and low national perinatal mortality rate [9].

Since publication of the TBT, a significant fall of the vaginal breech delivery rate was registered. Several observational studies suggest that increased elective cesarean rate is associated with decreased composite neonatal morbidity and mortality especially with cesarean delivery without labor.

In a large retrospective cohort study conducted by Vlemmix F, et al. which used data from the Dutch national perinatal registry from 1999 up to 2007, authors reported an increase in the elective cesarean rate from 24-60% and that 338 cesarean section would be required to prevent one perinatal death [10]. Similarly, Rietberg CC, et al. calculated that in order to avoid one fetal death 175 cesarean section would be needed [11].

Yet, based on several studies there is no convincing evidence that cesarean section is superior to planned vaginal birth in terms of maternal and neonatal outcomes.

The evidence supporting vaginal breech birth in selected patients is provided by a large observational multicenter study (PREMODA) conducted in 138 French and 36 Belgian maternity units with 8105 singleton breech fetuses at term. In this study, the combined neonatal outcome did not differ significantly between the planned vaginal *vs.* planned cesarean delivery groups even after controlling for confounding variables [12].

A returned focus on planned vaginal breech deliveries is further supported by several studies that revealed vaginal delivery as a safe option with implementation of strict pre-selection criteria and controlled decision-making before labor [13,14].

Michel S, et al. in their study observed an increase of vaginal deliveries for breech presentations from 24.0% in 2000-2004 to 38.5% in 2004-2008 ( $p < 0.001$ ) without statistically significant decrease on composite neonatal mortality and morbidity before and after application of their protocol for breech presentation [15].

In a longitudinal retrospective study conducted by Martel-Santiago CR, et al. authors observed no difference

in moderate to severe neonatal morbidity between the term breech and cephalic deliveries. Hence, authors concluded that the implementation of a specific protocol for selecting pregnant women with breech presentation as candidates for vaginal delivery achieved perinatal outcomes, similar to births in cephalic presentation [16].

Current evidence demonstrates no difference regarding the cognitive/psychomotor outcomes or adult intellectual performance between the two modes of delivery [17].

In Kosovo, the vast majority of breech deliveries take place in the Obstetrics/Gynecology Clinic of University Clinical Center of Kosovo, the only tertiary referral care service in Kosovo, with an average number of 10.000 deliveries per year. The option of vaginal breech delivery is becoming infrequent event in our Clinic due to the lack of obstetric skills among younger obstetricians and most importantly, the lack of national guidelines for management of term breech presentation. Facilities for ultrasound examination, intermittent electronic fetal heart-rate monitoring, emergency cesarean section, regional anesthesia and neonatal service are available in our Clinic. In patients who opt for vaginal breech delivery current hospital criteria include: no contraindication to vaginal birth, no prior cesarean section, term gestation, estimated fetal weight  $\geq 2000$  and  $\leq 3800$  gr and no hyperextension of the fetal head evaluated by ultrasound.

However, there are no recent data from our country that can be used for unbiased counselling and informed decision-making for our patients.

The aim of the present study was to compare short-term maternal and neonatal outcomes in breech presentations at term according to the planned mode of delivery.

## MATERIALS AND METHODS

### Data collection

The patients records at the Clinic for Obstetrics and Gynecology in Pristina from January 2019 to December 2020 were searched for term breech deliveries. Data on maternal age, parity, maternal preexisting morbidities, maternal complications, gestational age, birthweight, Apgar score and mode of delivery were retrospectively extracted from the medical charts. Pediatric records were examined for all neonates transferred to the neonatal intensive care unit (NICU). The study population included women with a singleton, term (37-42 weeks) breech fetuses during the study period. Exclusion criteria were preterm births, multifetal pregnancies, congenital malformations, antepartum stillbirth and missing or incomplete data.

### Mode of delivery

Mode of delivery was deduced retrospectively from the hospital records and deliveries were divided in three groups based on the mode of delivery. Women planned to be delivered by elective cesarean section and without labor were classified in the planned elective cesarean group. Low

risk women for vaginal breech birth that had uncomplicated vaginal breech delivery comprised planned vaginal group. Cesarean sections performed due to obstetric complications before or during labor, after a previous decision for vaginal delivery were categorized in the emergent cesarean group.

### Neonatal and maternal outcome factors

Neonatal outcomes examined were one-minute and five-minute Apgar score, admission to the NICU, fetal birth trauma and neonatal mortality.

Maternal outcomes of interest were episiotomy, vaginal and perineal trauma, urinary tract infection, blood loss >1000 ml, blood or plasma transfusion, deep vein thrombosis, puerperal infections and uterine tamponade.

### Ethical considerations

This research was approved by the Ethical Review Committee, University Clinical Center of Kosovo with reference number 01-1360-20. All research was conducted assuring confidentiality of the research data.

### Statistics

The statistical analysis was performed using XLSTAT 2016. Differences between the three groups were evaluated using the two-sided Fisher's exact test. The p values <0.05 were considered statistically significant. Non-parametric tests were applied when appropriate. The association between categorical variables were quantified as odds ratios (ORs) with 95% confidence interval (95% CI).

## RESULTS

During the study period 560 of 18.247 (3.0%) pregnancies were breech presentations at the Clinic for Obstetrics and Gynecology in Pristina. The overall cesarean section rate during the two-year study period was 35.4%, thus 6.472 deliveries were cesarean.

107 infants were excluded based on the exclusion criteria and the final study population totaled 453 deliveries, of which 83 (18.32%) were delivered vaginally, 236 (52.10%) were in the planned elective cesarean group and 134 (29.58%) in the emergent cesarean group.

Maternal demographic and obstetric data compared between the three groups are detailed in **Tab. 1**.

The mean age of the mothers for all deliveries was 29.53 years, with a range from 15-46 years. Differences between the three groups regarding mother's age were statistically significant (p=0.011).

Nulliparous women were more common in the elective cesarean group compared to planned vaginal group (35.5% vs. 5.96%; p < 0.0001).

A statistically significant association was found between the multiparity and planned vaginal, elective cesarean and emergent cesarean group (12.3% vs. 16.5% vs. 21.4%; p<0.0001).

In 99 women (21.8%) maternal preexisting morbidities were noticed namely, hypertension 32 (7.0%), uterine or vaginal congenital anomaly 18 (3.9%), anemia 9 (1.9%), thrombocytopenia 6 (1.3%), diabetes 6 (1.3%). Twenty-eight patients or 6.1% had one or more comorbidities.

**Tab. 1.** Maternal demographic and obstetric data in the planned vaginal, planned elective cesarean section and emergent cesarean section groups.

Variables	Planned Vaginal n=83 (18.32%)	Planned Elective Cesarean Section n=236 (52.10%)	Emergent Cesarean Section n=134 (29.58%)	All Deliveries n=453 (100.00%)	p value *
Age Mean (Min-Max) years	29.04 (15-44)	29.03 (18-43)	30.72 (18-46)	29.53 (15-46)	<b>0.011 #</b>
<b>Parity</b>					
Nulliparity n (%)	27 (5.96)	161 (35.54)	37 (16.44)	225 (49.67)	<b>&lt; 0.0001<sup>&amp;</sup></b>
Multiparity n (%)	56 (12.36)	75 (16.56)	97 (21.41)	228 (50.33)	<b>&lt; 0.0001<sup>&amp;</sup></b>
<b>Maternal preexisting morbidities</b>					
Hypertension n (%)	8 (1.77)	18 (3.97)	6 (1.32)	32 (7.06)	0.289 <sup>&amp;</sup>
Uterine or vaginal congenital anomaly n (%)	1 (0.22)	8 (1.77)	9 (1.99)	18 (3.97)	0.126 <sup>&amp;</sup>
Anemia n (%)	2 (0.44)	5 (1.10)	2 (0.44)	9 (1.99)	0.907 <sup>&amp;</sup>
Thrombocytopenia n (%)	0 (0.00)	3 (0.66)	3 (0.66)	6 (1.32)	0.482 <sup>&amp;</sup>
Diabetes - any type n (%)	0 (0.00)	4 (0.88)	2 (0.44)	6 (1.32)	0.742 <sup>&amp;</sup>
Maternal comorbidities n (%)**	3 (0.66)	22 (4.86)	3 (0.66)	28 (6.18)	<b>0.015 <sup>&amp;</sup></b>
<b>Obstetric data</b>					
Gestational age Mean (Min-Max) weeks	37.82 (37-40)	38.41 (37-42)	38.51 (37-40)	38.33 (37-42)	<b>&lt; 0.0001 #</b>
Birth weight Mean (Min-Max) grams	3285.00 (3000-3570)	3925.00 (3100-4750)	3325.00 (3000-3650)	3375.00 (3100-3650)	<b>&lt; 0.0001 #</b>
* Differences between the three subgroups were evaluated. Two-sided p<0.05 was considered statistically significant (bold font).					
# Kruskal-Wallis test.					
<sup>&amp;</sup> Fisher's exact test.					
** Maternal comorbidities include hypothyreosis, Systemic Lupus Erythematosus (SLE), primipara iuvenilis, obesitas, metroplastica sec. Strassman, cholestasis, former obstetric complication (PPH), IVF, myoma uteri permagna, epilepsia, acute appendicitis.					

We found a statistically significant association between the maternal comorbidities and planned vaginal group *vs.* elective cesarean group (0.6% *vs.* 4.8%;  $p = 0.015$ ).

The mean gestational age at birth was significantly lower in the vaginal delivery group *vs.* elective cesarean group (37.8 weeks *vs.* 38.4 weeks;  $p < 0.0001$ ).

Mean birthweight of neonates was significantly lower in the vaginal group compared to the elective cesarean group and emergent cesarean group (3285 g *vs.* 3925 g *vs.* 3325 g;  $p < 0.0001$ ).

Neonates of the mean birthweight 3925g (range 3100-4750g) were delivered by elective C-section in 52.1% cases.

Neonatal mortality and neonatal morbidity were compared according to the route of delivery (**Tab. 2.**).

All measures of adverse neonatal outcomes occurred at significant higher rate in vaginal group than in elective and emergent cesarean group. There was one intrapartum fetal death in the vaginal group due to cephalic entrapment (0.2%).

Statistically significant association between the mean 1st minute Apgar scores and vaginal, elective and emergent cesarean section was found (6.7 *vs.* 8.5 *vs.* 8.6;  $p < 0.0001$ ). There was also significant difference in the mean Apgar scores at the age of five minutes between the three groups (7.8 *vs.* 7.5 *vs.* 7.5;  $p < 0.0001$ ).

Number of infants admitted to the NICU was significantly higher after vaginal delivery compared with elective and emergent cesarean section (2.8% *vs.* 0.8% *vs.* 1.1%;  $p < 0.0001$ ).

We identified three cases of neonatal birth injuries in the medical birth register, all in the vaginal delivery group. The difference between the neonatal birth trauma and three delivery groups was statistically significant ( $p = 0.006$ ). Among the three neonates with birth trauma, one infant had brachial plexus injury, one was diagnosed with hypoxic ischemic encephalopathy (HIE grade1) and one had cephalohematoma with clavicular fracture.

Maternal outcomes by mode of delivery are shown in **Tab. 3.** The elective/emergent cesarean group had higher rates of postsurgical maternal morbidity than the vaginal group but no significant difference was found.

Of the maternal postpartum morbidity analyzed, urinary tract infection, blood loss >1000 ml, blood or plasma transfusion, puerperal infections and uterine tamponade were higher in the elective/emergent cesarean *vs.* the vaginal group although no significant difference was observed. Of those with vaginal delivery, an episiotomy was performed in 33 (7.2%) and perineal/vaginal trauma was registered in 15 (3.3%).

Evaluation of the maternal and fetal complication risk according to the mode of delivery is detailed in **Tab. 4.**

For the purpose of dichotomic (binary) comparisons, "Any fetal complication" was defined as presence of 5th minute Apgar score <7, fetal trauma and/or admission to the NICU (**Tab. 4.**).

Using logistic regression analysis, it was estimated that the elective cesarean delivery was less likely performed in case of multiparity (OR=0.350, 95% CI: 0.189-0.651,  $p < 0.001$ ) and is associated with significantly reduced likelihood of fetal complications (OR=0.085, 95% CI: 0.027-0.270,  $p < 0.0001$ ), than the planned vaginal delivery. Statistically insignificant increase of maternal postpartum morbidity was also registered.

Planned vaginal *vs.* emergent cesarean section was associated with significantly reduced odds of perinatal fetal complications (OR=0.231, CI: 0.084-0.633;  $p = 0.084$ ).

Emergent cesarean section has almost three times higher probability in multiparous patients (OR=2.726, CI:1.615-4.603;  $p < 0.0001$ ) and is associated with increased maternal complications (OR=1.803, CI:1.020-3.185;  $p = 0.042$ ) than the planned elective cesarean section.

## DISCUSSION

This study is one of the first studies to analyze, in a small sample, the difference in short-term maternal and perinatal

**Tab. 2.** Neonatal outcomes in the planned vaginal, planned elective cesarean section and emergent cesarean section groups.

Variables	Planned Vaginal n=83 (18.32%)	Planned Elective Cesarean Section n=236 (52.10%)	Emergent Cesarean Section n=134 (29.58%)	All Deliveries n=453 (100.00%)	p value *
<b>Apgar score</b>					
1 <sup>st</sup> minute Mean (Min-Max)	6.71 (0-8)	8.57 (6-10)	8.63 (5-10)	8.45 (0-10)	<b>&lt; 0.0001</b> §
5 <sup>th</sup> minute Mean (Min-Max)	7.84 (0-9)	7.54 (4-9)	7.51 (4-9)	7.38 (0-9)	<b>&lt; 0.0001</b> §
Admission to the NICU n (%)	13 (2.87)	4 (0.88)	5 (1.10)	22 (4.86)	<b>&lt; 0.0001</b> #
Neonatal birth trauma n (%)**	3 (0.66)	0 (0.00)	0 (0.00)	3 (0.66)	<b>0.006</b> #
Intrapartum fetal death n (%)	1 (0.22)	0 (0.00)	0 (0.00)	1 (0.22)	0.183 #

\* Differences between the three subgroups were evaluated. Two-sided  $p < 0.05$  was considered statistically significant (bold font).

# Kruskal-Wallis test.

§ Fisher's exact test.

\*\* Neonatal birth trauma includes brachial plexus injury, hypoxic ischemic encephalopathy, cephalohematoma, clavicular fracture and other birth injuries.

**Tab. 3.** Maternal outcomes in the planned vaginal, planned elective cesarean section and emergent cesarean section groups.

Variables	Planned Vaginal n=83 (18.32%)	Planned Elective Cesarean Section n=236 (52.10%)	Emergent Cesarean Section n=134 (29.58%)	All Deliveries n=453 (100.00%)	p value *
Episiotomy n (%)	33 (7.28)	0 (0.00)	0 (0.00)	33 (7.28)	<b>&lt; 0.0001</b>
Perineal/vaginal trauma n (%) **	15 (3.31)	0 (0.00)	0 (0.00)	15 (3.31)	<b>&lt; 0.0001</b>
Postpartum morbidity - total n (%) *	10 (2.21)	32 (7.06)	29 (6.40)	71 (15.67)	0.084
Urinary tract infection n (%)	4 (0.88)	13 (2.87)	16 (3.53)	33 (7.28)	0.059
Blood loss > 1000 ml n (%)	5 (1.10)	16 (3.53)	12 (2.65)	33 (7.28)	0.700
Puerperal infections n (%)***	5 (1.10)	16 (3.53)	12 (2.65)	33 (7.28)	0.482
Uterine tamponade n (%)	0 (0.00)	3 (0.66)	3 (0.66)	6 (1.32)	0.420
Deep vein thrombosis n (%)	0 (0.00)	1 (0.22)	0 (0.00)	1 (0.22)	1.000
Blood or plasma transfusion n (%)	2 (0.44)	5 (1.10)	1 (0.22)	8 (1.77)	0.634

\* Some patients had more than one morbidity.  
 \* Differences between the three subgroups were evaluated using the two-sided Fisher's exact test. The p values <0.05 was considered statistically significant (bold font).  
 \*\* Perineal and other obstetric lacerations, such as labial, periurethral lacerations, vaginal lacerations.  
 \*\*\* Endometritis, episiotomy infection, surgical site infections, infected hematoma (excluding mastitis and respiratory infections).

**Tab. 4.** Evaluation of the maternal and fetal complication risk according to delivery types.

Groups	B	SE	p *	Odds Ratio	LB (95%)	UB (95%)
<b>Planned vaginal vs. planned elective cesarean section</b>						
Multiparity	-1.049	0.316	<b>0.001</b>	0.350	0.189	0.651
Maternal postpartum morbidity	0.317	0.425	0.456	1.372	0.597	3.154
Any fetal complication	-2.469	0.592	<b>&lt; 0.0001</b>	0.085	0.027	0.270
<b>Planned vaginal vs. emergent cesarean section</b>						
Multiparity	0.013	0.310	0.966	1.013	0.552	1.861
Maternal postpartum morbidity	0.702	0.406	0.084	2.017	0.910	4.469
Any fetal complication	-1.467	0.515	<b>0.004</b>	0.231	0.084	0.633
<b>Planned elective vs. emergent cesarean section</b>						
Multiparity	1.003	0.267	<b>&lt; 0.0001</b>	2.726	1.615	4.603
Maternal postpartum morbidity	0.589	0.290	<b>0.042</b>	1.803	1.020	3.185
Any fetal complication	0.947	0.676	0.161	2.577	0.685	9.689

\* Multiple logistic regression analysis was used and the values p<0.05 was considered statistically significant (bold font).  
 B: regression coefficient; SE: Standard Error; LB: Lower Bound and UB: Upper Bound at 95% confidence intervals.

outcomes in breech presentations at term according to the mode of delivery in a low-middle income country. During the study period, elective cesarean section was the major delivery method in nulliparous women (35.5%). The majority of elective C-section in the nulliparous group were cesarean delivery on maternal request. Data from a prospective case-control study comparing neonatal outcome in nulliparous *vs.* multiparous women reported no significant difference between the two parity groups except for the significantly higher rate of cesarean section during labor in nulliparous women and concluded that nulliparity is not an exclusion criterion for vaginal term-breech birth [18].

Conversely, Gilbert WM, et al. showed that term breech fetuses delivered vaginally had significantly increased neonatal mortality in nulliparous women [19].

Based on our results, in our setting nulliparity is still considered as exclusion criterion for an intended vaginal breech delivery by vast majority of obstetricians which is explained by high proportion of nulliparous women in the elective cesarean group. Current study found that from a total of 228 multiparous women, 97 (21.4%) were delivered

by cesarean section during labor because of obstetric complications. Other studies suggest that nulliparous mothers compared to multiparous group have an increased rate of adverse pregnancy outcome in terms of neonatal morbidity, perinatal mortality and obstetric complications, which, the current study does not support [20].

In the present study, association between maternal comorbidities and planned vaginal delivery *vs.* elective cesarean delivery was statistically significant (0.6% *vs.* 4.8%; p= 0.015). The higher prevalence of one or more maternal comorbidities in elective cesarean group is partly explained by the fact that vaginal delivery was contraindicated because of maternal medical condition. Evidence suggest that medical comorbid conditions are associated particularly, with an increasing portion of severe maternal morbidity and account for half of maternal deaths [21].

In our study, neonates of the mean birthweight 3925g were delivered by elective C-section in 52.1% of cases. The authors of a FRABAT prospective cohort study, reached the conclusion that a fetal birthweight above 3.8 kg does not increase probability of adverse fetal outcome and similar to our results showed significantly higher rate of cesarean section in a high weight group ( $\geq 3.8$ kg) [22].

Data from our retrospective study showed that planned elective cesarean section of term breech infants was associated with low perinatal morbidity. In women with singleton term breech pregnancies, vaginal birth was associated with higher risk of neonatal morbidity, neonatal birth trauma, low 1st minute Apgar scores and higher rate of NICU admissions compared with planned elective and emergent cesarean section. There was one intrapartum fetal death in the vaginal group due to birth trauma (0.2%). Evidence suggest that a clinically significant increase in perinatal mortality and neonatal morbidity for breech fetuses delivered vaginally, is also related to the antenatal acquired risk factors and increased susceptibility to the vaginal route of delivery [23].

Our current findings that planned cesarean delivery for term-breech fetuses appears to optimize fetal outcome are consistent with other studies and a meta-analysis which also reported significantly higher perinatal mortality and morbidity following vaginal birth compared to elective cesarean section [8,14,24].

In accordance with previous publications our data showed that vaginal delivery was associated with significantly lower mean 1st minute Apgar scores compared to the elective and emergent caesarean section ( $p < 0.0001$ ) [14].

In the current study, the rate of admission to the NICU was significantly higher for the vaginal delivery group compared to elective C-section (2.8% vs. 0.8%;  $p < 0.0001$ ) hence, our data were similar to the study conducted by Goffinet F, et al. which reported 54 (2%) infants transferred to the NICU in the planned vaginal group [12].

Although, planned cesarean delivery became prevalent standard for care and management of breech presentations, the best mode of delivery is controversial. Several studies found no statistically significant differences regarding a composite adverse neonatal outcome between planned vaginal and elective cesarean delivery [12,15].

A meta-analysis of 27 observational and intervention studies conducted by Berhan, et al. reported decreased perinatal morbidity and mortality in the cesarean delivery groups. However, authors concluded that the absolute risk of vaginal breech delivery was low and recommended individualized decision-making regarding the mode of delivery in a term breech fetuses [8].

Similar results were provided by a population- based study conducted in Norway with 520,047 term-born singletons which examined risk of neonatal morbidity and cerebral palsy according to the mode of delivery. Vaginal breech delivery and planned cesarean breech delivery were associated with 2.4 fold and 1.6 fold increased risk for neonatal mortality, respectively, compared to vaginal cephalic delivery [23]. Yet, authors concluded that regardless of mode of delivery, the prevalence rates for all adverse outcomes associated with vaginal and cesarean birth were of similar extent. Therefore, vaginal delivery is suggested as an option for women with a fetus in breech

presentation, for selected cases and if competent obstetric care is afforded [23].

In light of these results, the most recent guidelines consider vaginal birth a rational option, if strict pre-selection criteria are met, including supervision by an experienced obstetrician. ACOG, RCOG and SOGC support cesarean section offered to high-risk patients or patients that decline ECV or vaginal breech birth [5,6,25].

Also, several studies support a trial of labor and vaginal breech birth offered to women that are at low risk of complications from vaginal breech birth while providing intensive monitoring of the progress of labor by skilled provider [26,27].

Otherwise, it is vital for clinicians to maintain sufficient delivery skills for management of breech labor because of situations such as out-of-hospital delivery and undiagnosed/unplanned vaginal breech in advanced labor.

Present study showed that elective and emergent C-section in the short term resulted with increased maternal postpartum morbidities. Although, urinary tract infection, blood loss  $> 1000$  ml, blood transfusion, puerperal infections and uterine tamponade had higher prevalence among cesarean delivery groups, the difference was statistically insignificant. Other studies reported similar results revealing no significant differences between the maternal morbidity and mode of delivery. Toivonen E, et al. reported higher risk of postpartum hemorrhage and need for transfusion in planned cesarean group compared to the planned vaginal delivery, which the current study also reports [28].

The Dutch Maternal Mortality Committee evaluated maternal mortality after elective cesarean for breech presentations and found four maternal deaths or 6.9% of the total direct maternal mortality after elective C-section for term singleton breech presentation [29].

Cesarean delivery has several implications for future pregnancies including repeat cesarean birth, rupture of the scarred uterus, increased risk of any surgical morbidity, severe maternal morbidity, hemorrhage and coagulopathy that complicates placenta accreta spectrum [30]. Therefore when counselling women, increased risk of acute morbidity and complications during subsequent pregnancies should be emphasized.

In the present study, elective cesarean delivery was less likely performed in multiparous women (OR=0.350, 95% CI: 0.189-0.651,  $p < 0.001$ ). This is explained by the fact that a trial of labor and vaginal breech birth is offered in our setting primarily to multiparous women with low risk of labor and low risk of delivery-related complications. In agreement with other studies elective cesarean birth was associated with significantly lower odds of any fetal complications (OR=0.085, 95% CI: 0.027-0.270,  $p < 0.0001$ ) [24].

Although, successful vaginal breech delivery is more likely in multiparous women, we found that emergent cesarean section had almost three times higher probability

in multiparous patients (OR=2.726, CI:1.615-4.603; p<0.0001) and was associated with increased maternal complications (OR=1.803, CI: 1.020-3.185, p=0.042) than the planned elective cesarean section. Our findings are comparable to other studies and a meta-analysis in which emergency cesarean section showed significantly more maternal and fetal complications compared to elective cesarean section [31].

Also, increased likelihood of fetal complications in emergent cesarean group vs. vaginal group is related to obstetric indications including fetal distress, cord prolapse, failure to progress and prolonged second stage of labor. Emergency cesarean section during second stage of labor is associated with fetal complications, which the current study also reports [31].

Overall, our results indicate that elective cesarean section in breech births improved short-term neonatal outcomes without significant increase of short-term maternal complications or morbidity. The ongoing debate surrounding the management of breech presentation is likely to continue although there is a general agreement that patient preferences, providers skills, risks and benefits of each approach should be taken into account in order to make rational decisions for the route of delivery [5].

Society of Obstetricians and Gynecologists of Kosovo (SOGK) should provide national clinical guidelines and written protocol for patient selection and labor management of the breech presentation at term.

## STRENGTHS AND LIMITATIONS

This study provides initial baseline data important for counselling women and for informed decisions regarding the mode of delivery for term breech presentation at the Clinic for Obstetrics and Gynecology, Kosovo. Main strength of the present study is outcomes for women categorized eligible for vaginal breech birth at low risk of delivery-related complications. The major limitation of the current study is retrospective design, small sample size and being a single center study. Another limitation is that this study was not designed to evaluate the impact of mode of delivery on long-term morbidity of the infants.

## CONCLUSION

Elective cesarean birth for term-breech infants is associated with a clinically significant decrease in neonatal morbidity and mortality and with insignificant increase in short-term maternal morbidity, compared with planned vaginal birth.

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