

Impact of Perineal Trauma on Early Postpartum Maternal Outcomes Following Vaginal Delivery: A Prospective Observational Study**Dona Saha¹, Prativa Bala², Soumitra Halder³**¹Associate Professor, Department of Anatomy, Barasat Government Medical College & Hospital, West Bengal, India²Consultant, Gynaecologist & Obstetrician, Kolkata, West Bengal, India³Assistant Professor, Department of Radio-Diagnosis, Jhargram Government Medical College, West Bengal, India

Received: 01-04-2026 / Revised: 25-05-2026 / Accepted: 12-06-2026

Corresponding Author: Dr. Dona Saha

Conflict of interest: Nil

Abstract**Background:** Perineal trauma is one of the most common complications of vaginal delivery and contributes substantially to early postpartum maternal morbidity. Identification of associated risk factors and maternal outcomes is essential for improving obstetric care and reducing childbirth-related complications.**Methods:** A hospital-based prospective observational study was conducted in the Department of Obstetrics and Gynaecology, Midnapore Medical College and Hospital, West Bengal, India, from 1 August 2020 to 31 July 2021. A total of 270 women with singleton term pregnancies undergoing vaginal delivery were enrolled consecutively. Perineal trauma was classified according to the standard grading system, and maternal demographic, obstetric, fetal, and intrapartum characteristics were recorded. Early postpartum maternal outcomes were assessed until hospital discharge.**Results:** Perineal trauma occurred in 89.63% of women, with second-degree tears being the most common (54.82%). Severe perineal trauma was significantly associated with maternal age >30 years, primiparity, BMI ≥ 25 kg/m², gestational age >39 weeks, previous perineal trauma, fewer antenatal visits, shorter perineal length, fetal macrosomia, larger fetal head circumference, prolonged labour, operative vaginal delivery, and labour augmentation ($p < 0.05$). Women with severe trauma experienced significantly higher rates of postpartum haemorrhage and prolonged hospital stay. Perineal pain (23.70%) was the most frequent postpartum morbidity.**Conclusion:** Perineal trauma remains highly prevalent following vaginal delivery and is associated with significant early postpartum maternal morbidity.**Keywords:** Perineal trauma; Vaginal delivery; Postpartum maternal outcomes; Obstetric anal sphincter injury; Maternal morbidity; Risk factors; Perineal tears; Prospective observational study.**DOI:** 10.25258/ijcpr.18.6.417

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Perineal trauma is one of the most common maternal complications associated with vaginal childbirth and remains a significant contributor to postpartum maternal morbidity worldwide. It encompasses spontaneous perineal tears and episiotomy-related injuries sustained during vaginal delivery, with severity ranging from superficial, first-degree lacerations involving only the vaginal mucosa or perineal skin to fourth-degree tears extending through the anal sphincter complex and rectal mucosa. The prevalence of perineal trauma varies across populations, obstetric practices, parity, and mode of vaginal delivery; however, approximately 70–90% of women experience some degree of perineal injury following vaginal birth, while only a

minority retain an intact perineum after delivery [1,2].

The clinical significance of perineal trauma extends beyond the immediate childbirth period. Although minor tears generally heal without major sequelae, moderate and severe injuries may result in substantial maternal morbidity during the early postpartum period. Common complications include perineal pain, wound infection, hematoma formation, wound dehiscence, urinary retention, delayed ambulation, impaired maternal mobility, dyspareunia, and difficulties in breastfeeding and newborn care [3,4]. These complications adversely affect maternal quality of life, delay functional recovery, and may interfere with mother–infant bonding during the critical postnatal period.

Furthermore, severe perineal trauma, particularly obstetric anal sphincter injuries (OASIS), has been associated with long-term complications including fecal and flatus incontinence, urinary incontinence, chronic pelvic floor dysfunction, persistent perineal pain, dyspareunia, and psychological distress [5].

The severity and incidence of perineal trauma are influenced by several maternal, fetal, and obstetric factors. Primiparity, prolonged second stage of labour, instrumental vaginal delivery, fetal macrosomia, occiput posterior position, shoulder dystocia, induction of labour, midline episiotomy, and advanced maternal age have consistently been identified as important determinants of severe perineal injury [2,6]. Recognition of these risk factors is essential for implementing preventive strategies and optimizing intrapartum management to reduce maternal morbidity.

Despite considerable advances in obstetric care, perineal trauma continues to impose a substantial healthcare burden. Women experiencing significant perineal injuries frequently require prolonged hospitalization, additional analgesic requirements, repeated clinical follow-up, antibiotic therapy, and, in some cases, secondary surgical repair. These complications increase healthcare costs while negatively influencing physical, emotional, and social well-being during the postpartum period [4,7]. Recent evidence has also highlighted that childbirth-related perineal trauma may adversely affect maternal mental health by contributing to postpartum anxiety, depressive symptoms, impaired body image, and reduced sexual function, emphasizing the multidimensional consequences of these injuries [1].

Early postpartum maternal outcomes represent an important yet relatively underexplored aspect of perineal trauma. Most published studies have focused primarily on the incidence, classification, prevention, and long-term sequelae of obstetric anal sphincter injuries, whereas comparatively fewer prospective observational studies have comprehensively evaluated immediate postpartum maternal outcomes across the full spectrum of perineal trauma. Assessment of early outcomes—including pain severity, mobility, urinary function, wound healing, requirement for analgesia, breastfeeding comfort, duration of hospital stay, and maternal satisfaction—is essential because these parameters directly influence postpartum recovery and subsequent maternal health [3,8].

International organizations advocate careful assessment, prompt recognition, appropriate repair, and standardized postnatal follow-up of perineal injuries to minimize maternal complications. The recommendations of the World Health Organization emphasize evidence-based intrapartum practices that reduce unnecessary obstetric interventions

while promoting a positive childbirth experience. Similarly, the Royal College of Obstetricians and Gynaecologists recommends systematic examination of the birth canal following every vaginal delivery, accurate classification of perineal tears, timely repair by adequately trained clinicians, and structured, postpartum follow-up, particularly for women sustaining obstetric anal sphincter injuries [5,9]. In low- and middle-income countries, including India, evidence regarding the impact of different grades of perineal trauma on early postpartum maternal outcomes remains limited. Variations in obstetric practices, episiotomy rates, availability of skilled birth attendants, and postpartum care protocols may influence maternal recovery and complication rates. Consequently, locally generated prospective data are essential to guide evidence-based clinical practice, improve maternal care pathways, and develop preventive strategies tailored to regional healthcare settings. Therefore, the present prospective observational study was undertaken to evaluate the impact of perineal trauma on early postpartum maternal outcomes following vaginal delivery.

By systematically assessing maternal recovery during the immediate postpartum period and correlating outcomes with the severity of perineal trauma, this study aims to generate clinically relevant evidence that may facilitate early identification of women at increased risk of postpartum complications, optimize postnatal management, and ultimately improve maternal health outcomes following vaginal birth.

Materials and Methods

Study Design: A hospital-based prospective observational study was conducted to evaluate the impact of perineal trauma on early postpartum maternal outcomes following vaginal delivery. A prospective observational design was considered appropriate because it allowed systematic assessment of maternal outcomes after childbirth without influencing routine obstetric management. Women were enrolled consecutively during the study period and followed from admission in labour until discharge from the hospital.

Study Setting: The study was carried out in the Department of Obstetrics and Gynaecology, Midnapore Medical College and Hospital, Midnapore, West Bengal, India. This tertiary care teaching hospital serves as a major referral centre for urban and rural populations and conducts a high volume of vaginal deliveries annually. The institution provides comprehensive emergency obstetric and neonatal services, making it an appropriate setting for evaluating perineal trauma and its associated maternal outcomes.

Study Duration: The study was conducted over a period of 12 months, from 1 August 2020 to 31 July 2021.

Study Population: The study population comprised women with singleton term pregnancies who were admitted to the Department of Obstetrics and Gynaecology after the onset of labour pain and subsequently underwent vaginal delivery during the study period. Eligible participants were recruited consecutively after obtaining written informed consent. Maternal demographic characteristics, obstetric history, intrapartum events, degree of perineal trauma, and postpartum maternal outcomes were recorded prospectively using a structured case record form designed specifically for the study.

Sample Size: The required sample size was calculated to estimate the incidence of perineal trauma with adequate statistical precision using the standard formula for estimating a single population proportion:

where:

- n = required sample size
- Z = standard normal deviate corresponding to a 95% confidence interval (1.96)
- P = anticipated prevalence of perineal trauma based on previous literature
- d = absolute precision.

Based on the expected prevalence and allowable error, the minimum calculated sample size was 270 women. Consecutive eligible participants were recruited until the required sample size was achieved.

Inclusion Criteria: Women fulfilling all of the following criteria were included:

- Singleton pregnancy.
- Gestational age of 37 completed weeks or more.
- Cephalic presentation.
- No previous perineal scar.
- No known neurological abnormality affecting pelvic floor, urinary, or bowel function.
- Spontaneous vaginal delivery.
- Willingness to participate and provide written informed consent.

Exclusion Criteria: Women with any of the following conditions were excluded:

- Elective or emergency caesarean section.
- Multiple pregnancy.
- Malpresentation.
- Preterm delivery (<37 completed weeks).
- Previous third- or fourth-degree perineal tear.
- Previous anal sphincter surgery.
- Known anorectal pathology or neurological disorders affecting bowel function.
- Women unwilling to participate.

Data Collection: Following enrolment, baseline maternal characteristics including age, parity, body mass index, gestational age, booking status, educational status, socioeconomic status, and relevant obstetric history were recorded. Labour and delivery were monitored according to institutional protocols. Details regarding induction or augmentation of labour, duration of first and second stages of labour, use of analgesia, episiotomy, instrumental vaginal delivery, fetal presentation, birth weight, fetal head circumference, shoulder dystocia, and neonatal outcomes were documented prospectively. Immediately after delivery, a thorough examination of the birth canal, cervix, vagina, vulva, and perineum was performed under adequate illumination by the attending obstetrician. Perineal trauma was classified according to the standard classification recommended by the Royal College of Obstetricians and Gynaecologists into first-, second-, third-, and fourth-degree tears. Episiotomy was recorded separately. Women were subsequently followed throughout the early postpartum period until hospital discharge for assessment of maternal outcomes.

Primary Outcome: The primary outcome was the occurrence and severity of perineal trauma following vaginal delivery.

Secondary Outcomes: Early postpartum maternal outcomes assessed included:

- Perineal pain.
- Requirement for analgesics.
- Perineal oedema.
- Wound infection.
- Wound gaping or dehiscence.
- Perineal hematoma.
- Urinary retention.
- Difficulty in ambulation.
- Difficulty in sitting.
- Breastfeeding discomfort related to perineal pain.
- Duration of hospital stay.
- Requirement for additional surgical intervention, if any.

Maternal outcomes were evaluated through clinical examination and review of inpatient records before discharge.

Definition of Perineal Trauma: Perineal trauma was categorized according to internationally accepted definitions:

- **First-degree tear:** Injury involving only the vaginal epithelium and/or perineal skin.
- **Second-degree tear:** Injury involving the vaginal epithelium and perineal skin and extending into the perineal muscles, without involvement of the anal sphincter complex. Episiotomy was included under second-degree perineal trauma because the incision involves

the vaginal mucosa, perineal skin, and perineal muscles.

- **Third-degree tear:** Injury involving the external and/or internal anal sphincter.
- **Fourth-degree tear:** Injury extending through the anal sphincter into the rectal mucosa.

Episiotomy was defined as a surgically created incision of the perineum to facilitate vaginal birth and was analysed separately from spontaneous tears.

Ethical Considerations: The study protocol was reviewed and approved by the Institutional Ethics Committee of Midnapore Medical College and Hospital before commencement of participant recruitment. Written informed consent was obtained from all eligible women prior to enrolment. Confidentiality of participant information was maintained throughout the study, and all procedures were conducted in accordance with the ethical principles of the Declaration of Helsinki.

Statistical Analysis: Data were entered into Microsoft Excel and analysed using Statistical Package for the Social Sciences (SPSS) software, version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were tested for normality using the Shapiro–Wilk test. Normally distributed variables were expressed as mean $\pm$ standard deviation (SD), whereas non-normally distributed variables were presented as median with interquartile range (IQR). Categorical variables were summarized as frequencies and percentages. Associations between categorical variables were assessed using the Chi-square test or Fisher's exact test, as appropriate. Continuous variables were compared using the independent-samples t-test for

normally distributed data and the Mann–Whitney U test for skewed distributions.

Variables demonstrating statistical significance in univariate analysis or considered clinically relevant were entered into multivariable logistic regression models to identify independent predictors of adverse early postpartum maternal outcomes. Adjusted odds ratios (AORs) with corresponding 95% confidence intervals (CIs) were calculated. All statistical tests were two-tailed, and a p-value <0.05 was considered statistically significant.

Results

A total of 270 women with singleton term pregnancies who underwent vaginal delivery were enrolled in this prospective observational study. Perineal trauma occurred in 242 women (89.63%), whereas 28 women (10.37%) had an intact perineum. Second-degree perineal trauma was the most common injury (54.82%), followed by first-degree tears (21.48%), third-degree tears (11.85%), and fourth-degree tears (1.48%). Women who sustained severe perineal trauma differed significantly from those with no or mild trauma with respect to maternal age, parity, gestational age, body mass index, antenatal care, perineal length, previous history of perineal trauma, fetal head position, fetal birth weight, fetal head circumference, onset and augmentation of labour, duration of labour, and mode of delivery. Conversely, religion, residential status, induction of labour, postpartum urinary retention, postpartum infection, and neonatal outcomes such as Apgar scores and ventilatory support were not significantly associated with the degree of perineal trauma.

Table 1: Distribution of perineal trauma among study participants (N=270)

Degree of perineal trauma	n	%
No perineal trauma	28	10.37
First-degree tear	58	21.48
Second-degree tear	148	54.82
Third-degree tear	32	11.85
Fourth-degree tear	4	1.48

Table 1 Overall, 89.63% of women sustained some degree of perineal trauma following vaginal delivery. Second-degree tears represented more than half of all injuries and were the predominant pattern observed in the study population.

Table 2: Maternal characteristics associated with severity of perineal trauma

Variable	Significant association	P value
Maternal age	Yes	0.007
Marital status	Yes	0.042
Booking status	Yes	0.033
Parity	Yes	0.024
BMI	Yes	0.009
Gestational age	Highly significant	<0.00001
Previous perineal trauma	Yes	0.015
ANC visits	Highly significant	0.0004
Pregnancy interval	Highly significant	0.00018
Perineal length	Highly significant	0.000073

Table 2 Severe perineal trauma occurred significantly more frequently among women aged >30 years, primiparous women, overweight mothers, women with gestation beyond 39 weeks, fewer antenatal visits, shorter pregnancy intervals, previous perineal trauma, and shorter perineal length.

Table 3: Obstetric and fetal factors associated with severe perineal trauma

Variable	P value
Persistent occipito-posterior position	0.00002
Birth weight ≥ 3.5 kg	<0.00001
Head circumference >35 cm	<0.00001
Onset of labour	<0.00001
Precipitate labour	<0.00001
Duration of first stage ≥ 8 hours	0.023
Duration of second stage >60 min	0.007
Mode of delivery	<0.00001
Augmentation of labour	<0.00001
Ritgen manoeuvre	0.0056

Table 3 Persistent occipito-posterior position, fetalmacrosomia, larger fetal head circumference, prolonged labour, operative vaginal delivery, and augmentation of labour were strongly associated with severe perineal trauma, whereas the use of Ritgen manoeuvre demonstrated a protective association.

Table 4: Early postpartum maternal complications according to severity of perineal trauma

Complication	No trauma (%)	Mild trauma (%)	Severe trauma (%)	P value
Postpartum haemorrhage	3.57	0.97	27.78	0.0016
Urinary retention	7.14	4.85	16.67	0.994
Postpartum infection	3.57	1.46	5.56	0.87
Hospital stay >4 days	17.86	15.53	30.56	0.036

Table 4 Women with severe perineal trauma experienced substantially higher rates of postpartum haemorrhage and prolonged hospitalization. Postpartum urinary retention and infection occurred more frequently among women with severe trauma but did not reach statistical significance.

Table 5: Maternal morbidity during the early postpartum period

Maternal morbidity	Frequency (%)
Perineal pain	23.70
Pelvic pain	12.59
Flatus incontinence	10.00
Urinary incontinence	6.67
Hemorrhoids	5.56
Fecal incontinence	1.85
Ano-/rectovaginal fistula	1.11

Table 5 Perineal pain was the predominant postpartum morbidity, affecting nearly one-quarter of women, followed by pelvic pain and flatus incontinence. Severe anorectal complications were uncommon.

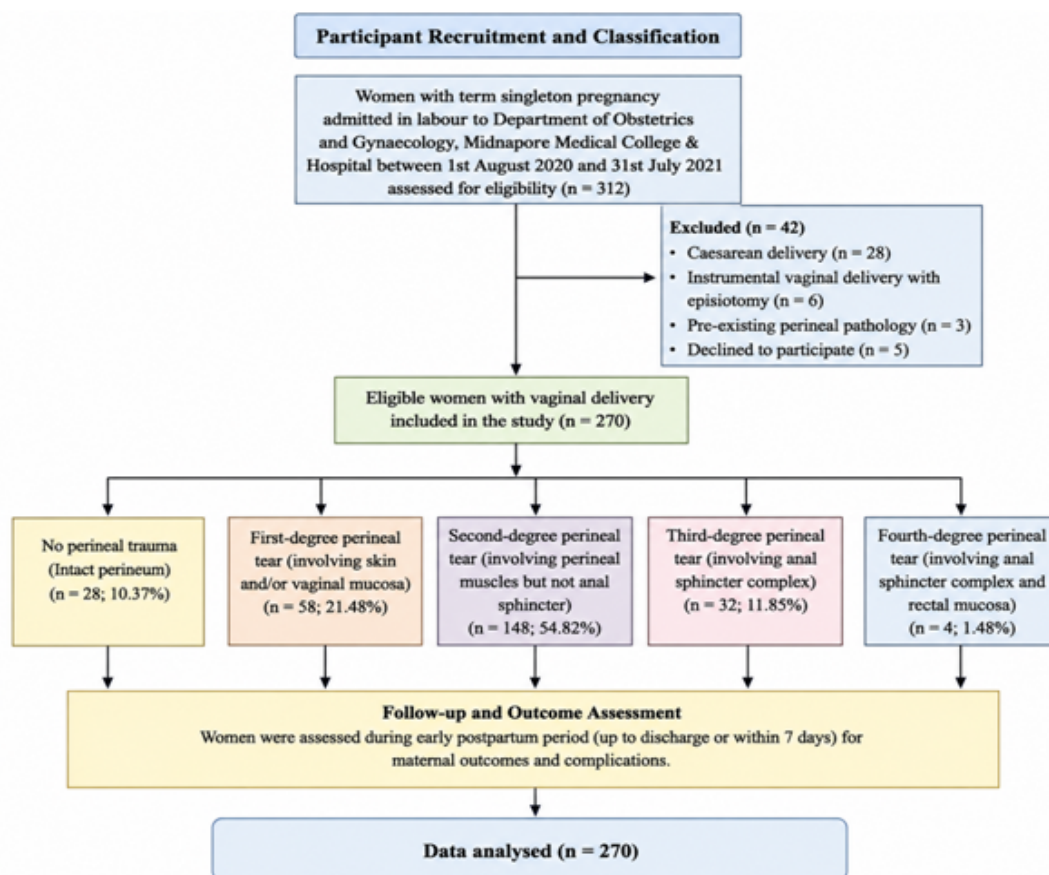


Figure 1: Flow diagram illustrating participant recruitment and classification of the study population

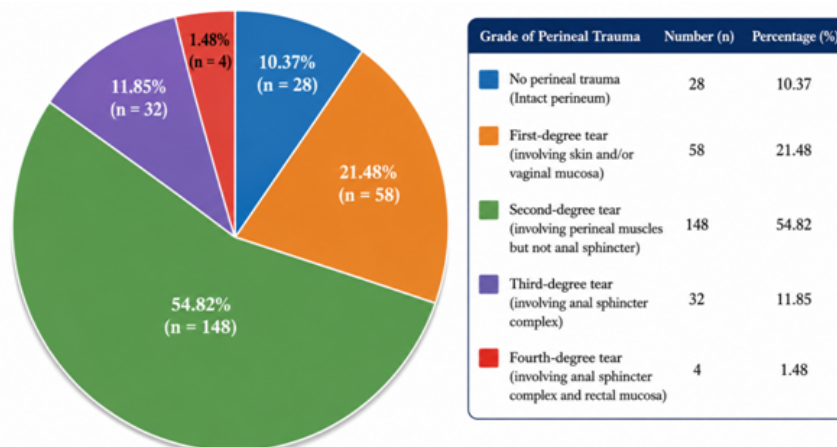


Figure 2: Distribution of different grades of perineal trauma following vaginal delivery

Figure 2 illustrates the distribution of perineal trauma among the 270 women included in the study following vaginal delivery. Overall, 89.63% of women sustained some degree of perineal trauma, while only 10.37% (n = 28) had an intact perineum. Second-degree perineal tears were the most frequently observed injury, occurring in 148 women (54.82%), followed by first-degree tears in 58 women (21.48%).

Third-degree tears were identified in 32 women (11.85%), whereas fourth-degree tears, representing the most severe obstetric anal sphincter injuries,

were relatively uncommon and occurred in 4 women (1.48%).

The findings demonstrate that second-degree perineal trauma constituted the predominant form of obstetric perineal injury in this study population, whereas severe third- and fourth-degree tears accounted for 13.33% of all vaginal deliveries. These observations indicate that although most perineal injuries were of mild to moderate severity, a clinically important proportion of women sustained severe perineal trauma requiring specialized management and postpartum follow-up.

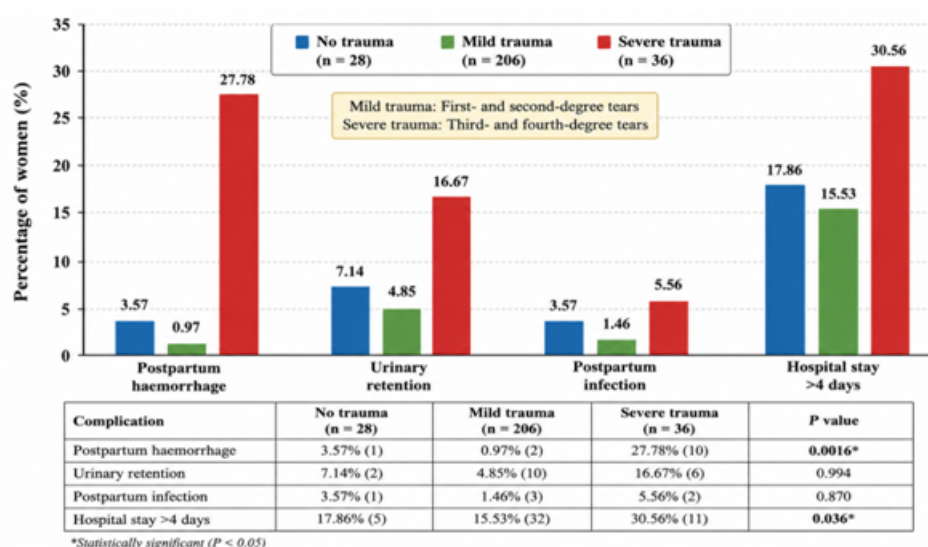


Figure 3: Early postpartum maternal complications according to severity of perineal trauma

Figure 3 illustrates the distribution of early postpartum maternal complications according to the severity of perineal trauma following vaginal delivery.

Women who sustained severe perineal trauma (third- and fourth-degree tears) experienced a substantially higher frequency of postpartum complications than those with mild or no perineal trauma. Postpartum haemorrhage was the most

frequent major complication among women with severe perineal trauma, occurring in 27.78%, compared with 3.57% in women without perineal trauma and 0.97% in those with mild trauma; this difference was statistically significant ($p = 0.0016$).

Similarly, prolonged hospital stay (>4 days) was significantly more common in the severe trauma group (30.56%) than in the no-trauma (17.86%) and mild-trauma (15.53%) groups ($p = 0.036$).

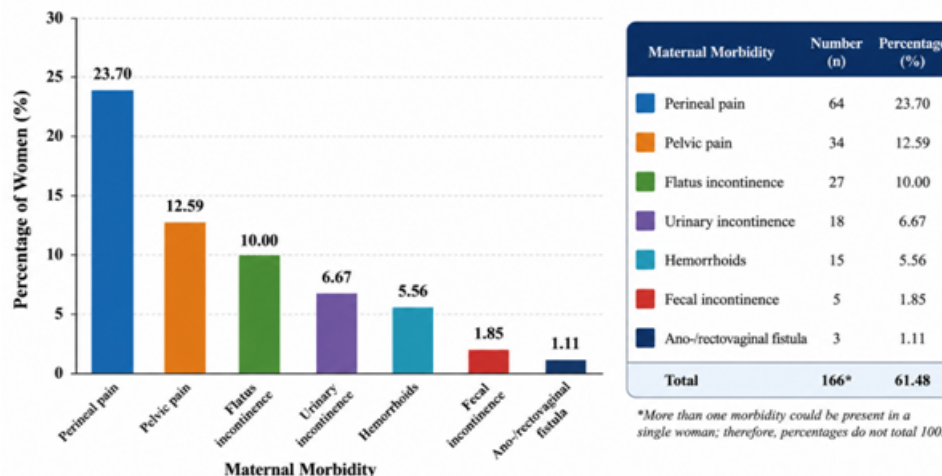


Figure 4: Frequency of postpartum maternal morbidities following vaginal delivery

Figure 4 illustrates the frequency distribution of postpartum maternal morbidities observed among women following vaginal delivery. Perineal pain was the most common postpartum morbidity, affecting 23.70% of women, followed by pelvic pain (12.59%) and flatus incontinence (10.00%). Less frequently reported morbidities included urinary incontinence (6.67%), hemorrhoids (5.56%), fecal incontinence (1.85%), and ano-/rectovaginal fistula (1.11%).

Discussion

The present prospective observational study evaluated the incidence of perineal trauma, associated maternal and obstetric risk factors, and early postpartum maternal outcomes among women undergoing vaginal delivery in a tertiary care hospital.

Nearly nine out of ten women sustained some degree of perineal trauma, with second-degree tears accounting for the largest proportion of injuries. Furthermore, maternal characteristics including age, parity, body mass index (BMI), gestational age, previous perineal trauma, antenatal care utilization,

pregnancy interval, and perineal length demonstrated significant associations with the severity of perineal trauma.

The overall incidence of perineal trauma in the present study was 89.63%, while only 10.37% of women had an intact perineum following vaginal birth. This finding is consistent with reports indicating that perineal trauma affects the majority of women undergoing vaginal delivery. A systematic review and meta-analysis by Aguiar et al. reported that more than 70% of women worldwide sustain some form of birth-related perineal trauma, although considerable geographical variation exists owing to differences in obstetric practice, episiotomy policies, and diagnostic accuracy [10]. Likewise, a recent multinational review by Man et al. concluded that obstetric perineal trauma remains one of the most frequent maternal birth injuries despite improvements in obstetric care and increasing implementation of preventive strategies [11]. The relatively higher incidence observed in the present study may reflect the tertiary referral nature of the institution, where a larger proportion of high-risk pregnancies and operative vaginal deliveries are managed.

Among the different grades of injury, second-degree perineal tears constituted the majority (54.82%), followed by first-degree tears (21.48%), whereas third- and fourth-degree tears together accounted for 13.33% of all vaginal deliveries. Similar distributions have been reported in population-based cohort studies from Europe and Australia, where second-degree tears represent the predominant form of obstetric perineal trauma, while obstetric anal sphincter injuries remain comparatively less frequent [12,13]. This predominance can be explained by the anatomical disruption of the superficial perineal muscles during vaginal birth, whereas extension into the anal sphincter complex generally requires additional mechanical stress generated by operative vaginal delivery, fetal macrosomia, prolonged labour, or malposition. Maternal age demonstrated a significant association with the severity of perineal trauma in the present study. Women older than 30 years experienced a higher proportion of severe tears than younger mothers. Similar observations have been reported in large cohort studies from Scotland and Scandinavia, where increasing maternal age independently increased the risk of obstetric anal sphincter injury [13,14]. Age-related reduction in collagen elasticity, decreased tissue compliance, and diminished regenerative capacity may contribute to impaired stretching of the perineal tissues during childbirth, thereby increasing susceptibility to severe lacerations. Parity also emerged as an important determinant of perineal injury. Primiparous women were significantly more likely to sustain severe perineal trauma than multiparous women, which

corroborates findings from several international studies [15,16]. The increased vulnerability of primigravid women is largely attributed to greater resistance of the perineal muscles and connective tissues during the first vaginal birth. In contrast, women with previous vaginal deliveries generally have greater tissue compliance resulting from prior stretching of the pelvic floor musculature, thereby reducing the likelihood of extensive lacerations.

The present study also demonstrated that women with BMI ≥ 25 kg/m² experienced significantly higher rates of severe perineal trauma. Although previous literature has reported conflicting observations regarding the relationship between maternal obesity and perineal injury, recent evidence suggests that overweight women are more likely to deliver macrosomic infants and experience prolonged labour, both of which indirectly increase the risk of severe perineal tears [17]. Similarly, gestational age beyond 39 weeks was significantly associated with increasing severity of trauma. Advanced gestation is frequently accompanied by progressive fetal growth, increased fetal head circumference, and greater birth weight, factors that collectively increase mechanical strain on the maternal perineum during vaginal birth.

Previous history of perineal trauma was another significant predictor identified in the present study. Women with prior perineal injury demonstrated a greater frequency of severe tears during subsequent deliveries. This finding is biologically plausible because healed scar tissue possesses reduced elasticity and altered collagen architecture, predisposing the perineum to recurrent injury during subsequent vaginal births. Comparable observations have been reported by Peppe et al., who demonstrated that previous obstetric anal sphincter injury substantially increases the risk of recurrent severe perineal trauma [18]. Adequate antenatal care appeared to confer a protective effect. Women attending four or more antenatal visits experienced significantly lower rates of severe trauma than women with inadequate prenatal care. Regular antenatal surveillance facilitates early identification of obstetric risk factors, timely referral of high-risk pregnancies, nutritional counselling, and appropriate intrapartum planning, thereby reducing adverse maternal outcomes. Similarly, shorter interpregnancy intervals (<2 years) were associated with significantly greater perineal trauma. Insufficient time for complete recovery of pelvic connective tissue and musculature after previous childbirth may reduce tissue resilience during subsequent deliveries, increasing susceptibility to obstetric lacerations.

Perineal length was among the strongest anatomical predictors identified in the present study. Women with a perineal body measuring less than 2.5 cm sustained significantly more severe tears than

women with longer perineal lengths. Numerous anatomical studies have similarly identified short perineal body length as an independent predictor of obstetric anal sphincter injury because the reduced distance between the vaginal introitus and anal verge provides less tissue available for gradual stretching during fetal head expulsion [19].

The present study demonstrated that several intrapartum and fetal factors significantly influenced the severity of perineal trauma. Persistent occipito-posterior fetal position, fetal birth weight ≥ 3.5 kg, fetal head circumference >35 cm, prolonged first and second stages of labour, operative vaginal delivery, induction and augmentation of labour were strongly associated with severe perineal trauma, whereas the use of the Ritgen manoeuvre appeared to have a protective effect. These findings are consistent with contemporary evidence indicating that the severity of perineal injury is largely determined by the interaction between fetal size, labour dynamics, and obstetric interventions.

Persistent occipito-posterior position was one of the strongest predictors of severe perineal trauma in the present study. Malposition of the fetal head increases the anteroposterior diameter presenting at the pelvic outlet, prolongs the second stage of labour, and often necessitates operative vaginal delivery. Consequently, excessive stretching of the perineal muscles and anal sphincter complex predisposes women to third- and fourth-degree tears. Similar findings have been reported in systematic reviews and large cohort studies, where occipito-posterior position independently increased the risk of obstetric anal sphincter injury (OASI) and severe perineal lacerations. These observations support careful intrapartum assessment of fetal position and timely obstetric intervention to minimize maternal birth trauma [19,20]. Fetal birth weight and head circumference also demonstrated highly significant associations with severe perineal trauma. Women delivering infants weighing ≥ 3.5 kg or with head circumference exceeding 35 cm experienced a substantially greater frequency of severe lacerations. These findings agree with those reported by Worede et al. and Pergialiotis et al., who identified fetal macrosomia as one of the strongest independent predictors of obstetric perineal injury [21,22]. Larger fetuses require greater distension of the vaginal outlet and perineal body, resulting in increased tissue tension and reduced capacity for gradual stretching during expulsion of the fetal head.

Labour characteristics also influenced the occurrence of severe trauma. Both prolonged active labour and an extended second stage were significantly associated with higher grades of perineal injury. Prolonged labour may result in progressive oedema, tissue ischemia, and reduced elasticity of the pelvic floor muscles, rendering the perineum more susceptible to extensive lacerations

during delivery. Conversely, precipitate labour may also increase the risk because rapid fetal descent provides insufficient time for gradual stretching of the perineal tissues. These mechanisms have been consistently described in previous obstetric studies evaluating predictors of obstetric anal sphincter injury [22,23].

Mode of delivery was another important determinant in the present study. Operative vaginal delivery, particularly vacuum- and forceps-assisted birth, was associated with significantly greater rates of severe perineal trauma than spontaneous vaginal delivery. Instrumental delivery increases the mechanical forces applied to the fetal head and maternal soft tissues, thereby increasing the likelihood of extension of perineal tears into the anal sphincter complex. Similar observations have been reported in international cohort studies and systematic reviews, where forceps delivery consistently demonstrated the highest risk of obstetric anal sphincter injury compared with spontaneous vaginal birth and vacuum extraction [20,24].

The present study further demonstrated that the Ritgen manoeuvre was associated with a lower frequency of severe perineal trauma. Controlled delivery of the fetal head using simultaneous perineal support may reduce excessive stretching of the perineal tissues by slowing crowning and distributing pressure more evenly across the perineum. Although previous studies have reported variable effectiveness of manual perineal protection, recent reviews suggest that correctly performed perineal support techniques may reduce severe obstetric anal sphincter injuries without increasing neonatal morbidity [25]. Women who underwent induction or augmentation of labour, particularly with oxytocin or prostaglandins, experienced significantly higher rates of severe perineal trauma. Labour augmentation is frequently performed in pregnancies complicated by dysfunctional labour, prolonged labour, or fetal compromise, conditions that themselves predispose to operative delivery and extensive perineal injury. Oxytocin-induced stronger uterine contractions may accelerate fetal descent before complete relaxation of the pelvic floor musculature, thereby increasing tissue strain during birth [21].

One of the principal objectives of the present study was to evaluate early postpartum maternal outcomes. Women sustaining severe perineal trauma experienced markedly higher frequencies of postpartum haemorrhage and prolonged hospital stay than women with mild or no perineal trauma. These findings are biologically plausible because extensive soft tissue disruption increases blood loss, prolongs surgical repair, and delays wound healing. Similar observations have been reported by Oliveira et al. and recent reviews evaluating maternal

outcomes following obstetric anal sphincter injuries [26].

Although postpartum urinary retention and infection were numerically higher among women with severe trauma, these differences did not achieve statistical significance, possibly because of the relatively small number of severe cases included in the study. Perineal pain emerged as the most common postpartum morbidity, followed by pelvic pain, flatus incontinence, urinary incontinence, and hemorrhoids. These findings reflect the considerable physical burden associated with childbirth-related perineal trauma. Pain during the immediate postpartum period may impair ambulation, breastfeeding, infant care, and maternal quality of life. Furthermore, pelvic floor dysfunction and anal continence disorders may persist long after childbirth, particularly among women sustaining third- and fourth-degree tears. Recent systematic reviews have highlighted that women with severe perineal trauma remain at increased risk of chronic pain, dyspareunia, anal incontinence, and impaired psychological well-being, emphasizing the importance of long-term follow-up and multidisciplinary postpartum care [27].

Overall, the findings of the present study reinforce the importance of early identification of women at increased risk of severe perineal trauma through comprehensive antenatal assessment and vigilant intrapartum monitoring. Appropriate labour management, judicious use of operative vaginal delivery, implementation of evidence-based perineal protection techniques, and meticulous postpartum evaluation may substantially reduce maternal morbidity and improve short- and long-term health outcomes following vaginal birth.

Conclusion

This prospective observational study demonstrated that perineal trauma remains a highly prevalent complication of vaginal delivery, affecting nearly nine out of ten women, with second-degree perineal tears representing the most common type of injury.

Although the majority of injuries were mild to moderate in severity, a clinically important proportion of women sustained severe third- and fourth-degree perineal trauma, emphasizing the continued burden of childbirth-related maternal morbidity in contemporary obstetric practice.

The study identified several independent maternal, fetal, and intrapartum factors associated with severe perineal trauma. Maternal age above 30 years, primiparity, overweight or obesity, gestational age beyond 39 weeks, previous perineal trauma, inadequate antenatal care, shorter interpregnancy interval, and shorter perineal length significantly increased the risk of severe perineal injury. In addition, persistent occipito-posterior fetal position,

fetalmacrosomia, larger fetal head circumference, prolonged labour, operative vaginal delivery, and augmentation of labour were strongly associated with higher grades of perineal trauma, whereas the use of the Ritgen manoeuvre appeared to provide a protective effect.

References

1. Man R, Ismail KMK. Childbirth-related perineal trauma and its complications. *Obstet Gynaecol Reprod Med.* 2024;34(7):207-214.
2. Okeahialam NA, Obican SG, et al. The prevention of perineal trauma during vaginal birth. *Am J Obstet Gynecol.* 2024;230(2):111-123.
3. Kettle C, Dowswell T, Ismail KMK. Continuous and interrupted suturing techniques for repair of episiotomy or second-degree tears. *Cochrane Database Syst Rev.* 2012; (11): CD000947.
4. Pergialiotis V, Bellos I, Fanaki M, et al. Risk factors for severe perineal trauma during childbirth: a systematic review and meta-analysis. *Eur J Obstet Gynecol Reprod Biol.* 2020; 247:94-100.
5. Royal College of Obstetricians and Gynaecologists. The Management of Third- and Fourth-Degree Perineal Tears (Green-top Guideline No. 29). London: RCOG; 2015.
6. Smith LA, Price N, Simonite V, Burns EE. Incidence of and risk factors for perineal trauma: a prospective observational study. *BMC Pregnancy Childbirth.* 2013;13:59.
7. Frohlich J, Kettle C. Perineal care. *BMJ Clin Evid.* 2015;2015:1401.
8. Man R, Ismail KMK, et al. Complications after childbirth-related perineal trauma up to 12 months postpartum: a systematic review and meta-analysis. *Acta Obstet Gynecol Scand.* 2025.
9. World Health Organization. WHO recommendations: Intrapartum care for a positive childbirth experience. Geneva: World Health Organization; 2018.
10. Aguiar M, Farley A, Hope L, Amin A, Shah P, Manaseki-Holland S. Birth-related perineal trauma in low- and middle-income countries: a systematic review and meta-analysis. *PLoS One.* 2019;14(7):e0220130.
11. Man R, Morton V, Morris RK. Childbirth-related perineal trauma and its complications: prevalence, risk factors and management. *Obstet Gynaecol Reprod Med.* 2024;34(9):252-259.
12. Monteiro MVC, Pereira GMV, Aguiar RAP, Araujo Júnior E, Correia LL. Risk factors for severe obstetric perineal lacerations. *Int Urogynecol J.* 2016;27(1):61-67.
13. Woolner AMF, Ayansina D, Black M, et al. Predictive risk factors for obstetric anal

- sphincter injuries and severe perineal tears among primiparous women in Scotland. *BMC Pregnancy Childbirth*. 2019;19:304.
14. Sultan AH, Thakar R, Fenner DE, editors. *Perineal and Anal Sphincter Trauma*. London: Springer; 2009.
 15. Worede DT, Alemu S, et al. Risk factors of severe perineal lacerations among women undergoing vaginal delivery: a case-control study. *BMC Pregnancy Childbirth*. 2021; 21:642.
 16. Mathias G, Barageine JK, et al. Risk factors for perineal tears during vaginal delivery among Ugandan women: a case-control study. *BMC Pregnancy Childbirth*. 2021;21:565.
 17. Głocko P, Piekarska K, et al. Perspective on perinatal birth canal injuries: an analysis of risk factors, prevention, and management. *J Clin Med*. 2025;14(10):3583.
 18. Antonakou A, Papoutsis D, Henderson K, Qadri Z, Tapp A. The incidence of and risk factors for a repeat obstetric anal sphincter injury (OASIS) in the vaginal birth subsequent to a first episode of OASIS: a hospital-based cohort study. *Arch Gynecol Obstet*. 2017;295(5):1201-1209.
 19. Jansson MH, Franzén K, Hiyoshi A, Tegerstedt G, Dahlgren H, Nilsson K. Risk factors for perineal and vaginal tears in primiparous women – the prospective POPRACT cohort study. *BMC Pregnancy Childbirth*. 2020; 20:749.
 20. Laine K, Skjeldestad FE, Sandvik L, Staff AC. Incidence and risk factors for obstetric anal sphincter injuries after vaginal birth. *Acta Obstet Gynecol Scand*. 2012;91:876-881.
 21. Dahlen HG, Priddis H, Thornton C. Severe perineal trauma is rising, but let us not overreact. *Women Birth*. 2015;28:1-8.
 22. Harvey MA. Pelvic floor exercises during and after pregnancy: a systematic review. *J Obstet Gynaecol Can*. 2021;43:126-136.
 23. Kleprlikova H, Kalis V, Lucovnik M, Rusavy Z, Blaganje M. Manual perineal protection: the know-how and the know-why. *Acta Obstet Gynecol Scand*. 2024;103(3):281–289.
 24. Verma GL, Spalding JJ, Wilkinson MD, Hofmeyr GJ, Vannevel V. Instruments for assisted vaginal birth. *Cochrane Database Syst Rev*. 2021;9:CD005455.
 25. Oliveira LS, Brito LGO, Quintana SM, Duarte G, Marcolin AC. Perineal trauma and maternal and neonatal outcomes after vaginal birth: a cross-sectional study. *Rev Bras Ginecol Obstet*. 2014;36(12):548–554.
 26. Roper JC, Teixeira N, Payne J, et al. Evaluation and management of obstetric perineal lacerations. *Semin Colon Rectal Surg*. 2022;33:100884.
 27. Man R, Gurol-Urganci I, Cromwell DA, et al. Complications after childbirth-related perineal trauma up to 12 months postpartum: a systematic review and meta-analysis. *Acta Obstet Gynecol Scand*. 2025;104:1–18.