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Research Article

A Comparative Assessment of Warm Perineal Compress and the Modified Ritgen's Technique for the Prevention of Birth Canal Injury in the Active Pushing Phase of Childbirth: A Prospective Randomized Trial

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ABSTRACT

Background: Birth canal trauma stands as one of the most commonly recorded adverse events in patients undergoing vaginal childbirth. Its consequences span from immediate postpartum complications such as hemorrhage and wound pain to chronic issues including pelvic floor weakness, sexual dysfunction, and bowel irregularities. Clinicians have long sought reliable intrapartum techniques to shield the perineum from injury, with warm compress application and a hand-guided head delivery method known as the Ritgen's technique representing two widely adopted strategies.

Objective: To assess and contrast the protective value of warm perineal compress and the modified Ritgen's technique against birth canal trauma arising during the active pushing phase of delivery.

Study design: Prospective randomized controlled trial.

Duration and place of study: This study was conducted at Indus Medical College Hospital Tando Muhammad Khan from December 2024 to December 2025

Methodology: Two hundred patients at term gestation were enrolled and

divided by random allocation into two arms of equal size. Arm I[1] (n = 100) was managed using the modified Ritgen's technique, while Arm II (n = 100) received perineal warming via warm compress. Perineal status was graded by a blinded assessor using a standardised tear classification. Statistical comparisons between arms were carried out with SPSS 22.0 using Pearson's chi-square, with significance set at $p < 0.05$.

Results: Both arms comprised 100 patients each, with a mean age of 26.1 ± 2.8 years (Arm I) and 25.6 ± 3.9 years (Arm II). Tears in the birth canal were documented in 10 patients (10.0%) in Arm I and 14 patients (14.0%) in Arm II; this inter-group gap did not reach statistical significance ($p = 0.244$). Critically, high-grade tears (third- and fourth-degree) proved significantly less common in Arm I relative to Arm II (1.0% vs. 2.0%, $p = 0.003$).

[1]The term *Arm* follows standard randomized controlled trial nomenclature, in which each comparison cohort is referred to as a trial arm. Arm I corresponds to the modified Ritgen's technique group and Arm II to the warm compress group.

Conclusion: The modified Ritgen's technique confers a statistically meaningful advantage over warm compress in curtailing the occurrence of high-grade perineal lacerations at vaginal birth. Its ease of application and non-invasive character make it a pragmatic choice for routine perineal protection during childbirth.

Keywords: Active pushing phase; modified Ritgen's technique; warm perineal compress; birth canal trauma; obstetric lacerations; perineal protection.

Introduction

Soft tissue injury to the perineum and birth canal is recorded in a large majority of patients who give birth vaginally, with reported figures reaching up to four fifths of all vaginal deliveries.[1] Although parturition is a physiological event, it carries an inherent risk of tissue disruption that may demand clinical attention.[2] Perineal injury has well- documented short- and long-term effects on maternal quality of life, making its prevention a key goal in intrapartum care.[2,3,4]

From an epidemiological standpoint, muscular perineal tears involving the vaginal wall and underlying pelvic musculature affect between 35% and 78% of patients bearing their first child and roughly 35–40% of those with prior deliveries. Tears that breach the anal sphincter mechanism occur in 5–8% of nulliparous patients and approximately 2–3% of multiparous patients.[5] Clinical factors that heighten susceptibility include first-time motherhood, assisted delivery with forceps or vacuum, centrally positioned episiotomy, south or east Asian ethnicity, and excessive fetal weight.

Perineal injury carries a burdens as its immediate effects persist well beyond the delivery room. In the hours following the birth, the patients with perineal wounds may face heavy bleeding, pain severe

enough to restrict walking, and difficulty assuming comfortable breastfeeding positions. Looking further ahead, inadequately healed perineal tissue can give rise to months or years of sexual pain, uncontrolled passage of urine or stool, and a broader deterioration in daily functioning that profoundly affects quality of life.[6]

Surgical enlargement of the birth outlet through episiotomy was historically opted for as a way to pre-empt uncontrolled soft-tissue rupture. Yet its routine application lacks strong evidence based port. Physical properties of the perineum itself (its ability to stretch without breaking, and the degree of natural lubrication present) appear to be the principal determinants of whether tearing occurs as the fetus descends.[7]

Clinicians have experimented and explored multiple hands-on strategies to shield the perineum during childbirth, ranging from digital massage to structured support techniques and thermal application.[8] The Ritgen's manoeuvre, in its modified variant, employs a two-handed approach to guide the presenting part through the introitus in a deliberate and unhurried manner: one hand cradles the fetal jaw from beneath the perineum to direct the chin forward while the other steadies the top of the head to regulate the speed of emergence. This combined coordination of steering the widest part of the head away from a path of least resistance and instead channels delivery through the smallest cranial diameter, thus minimising stretch-induced tissue damage. The mechanism underlying warm compress benefit differs fundamentally: sustained heat application increases local blood flow, relaxes the fibrous components of perineal tissue, and raises the woman's threshold for perceiving discomfort toward the end of the pushing phase.[8,9]

Maternity units operating under constrained conditions often lack the staffing levels and equipment inventories needed to ensure consistent perineal protection during normal births, leaving the patients unnecessarily exposed to highly preventable soft-tissue injury. Although both the Ritgen's technique and warm compress are available direct comparative data on which approach delivers greater protection are scarce. This study was undertaken to generate that comparative evidence in a local clinical setting.

Methodology

The investigation was carried out as a prospective randomised controlled trial within the Obstetrics and Gynaecology ward of the hospital. This helped to have an experimental group. Sample size estimation was performed with the WHO calculator, targeting 100 participants per arm at a significance threshold of 5% and a power of 80%. Enrolment followed a non-probability consecutive approach. patients were considered eligible if they presented with a single fetus lying head-down, achieved full cervical dilatation

following spontaneous or induced membrane rupture at or beyond 37 gestational weeks, and fell within the age bracket of 18 to 35 years. Steps were taken to keep the patients safe. Cases were excluded when operative delivery became necessary for any reason, when a perineal scar from a previous injury was present, when pelvic dimensions were inadequate or fetal weight excessive, or when regional epidural analgesia was in use.

Before data collection began, the study protocol received clearance from the hospital's ethics board. All patients gave their consent to participation and signed forms. Each eligible woman was allocated to Arm I or Arm II through a lottery-based selection.

The patients assigned to Arm I were provided the modified Ritgen's technique during labour. The manoeuvre was initiated when advancing of the presenting part had opened the introitus to at least 5 cm in diameter. A gloved, towel-protected hand was posi- tioned beneath the perineum to exert gentle upward traction on the fetal mentum, while simultaneous backward counterpressure was delivered against the occiput by the free hand, continuing in concert until the head cleared the perineum completely. Patients in Arm II were given continuous warm compress support throughout active pushing. Heated moist towels were pressed firmly against the vulva and perineal body and held in position between and during each expulsive effort. The non-dominant hand simultaneously provided sustained counterpressure at the occiput throughout. Following delivery, perineal evaluation was conducted by a blinded member of the research team under the direct oversight, in line with accepted standards for intrapartum perineal care.[11] All detected tears were graded according to the classification displayed in Table I and recorded.

Table 1: Grading system for perineal lacerations.

Grade	Anatomical extent
1	Superficial disruption limited to vaginal skin or perineal epidermis
2	Deeper disruption extending into the perineal musculature
3	Disruption involving the anal sphincter apparatus, further graded as: 3a: Under half of the external anal sphincter fibres torn 3b: Over half of the external anal sphincter fibres torn 3c: Complete division of both internal and external anal sphincters
4	Full-thickness injury creating a fistulous communication between the vaginal lumen and anal canal

All data were processed with SPSS version 22.0. Continuous measures (maternal age, gestational duration, body mass index) were expressed as mean ± standard deviation. Discrete outcomes (parity status, abortion history, tear occurrence, tear severity) were reported as absolute counts with proportions. Between-arm comparisons of tear incidence used Pearson's chi-square (χ^2) test. Potential confounders—including maternal age, gestational duration, body mass index, obstetric history, level of education, and area of residence—were handled by stratified analysis, followed by post-stratification chi-square testing. Statistical significance was defined as $p \leq 0.05$.

Results

The 200 patients who had reached between 37 and 41 weeks of gestation were recruited and distributed equally. Meaning 100 participants each. Arm I was managed with the modified Ritgen's technique and Arm II with warm compress placement.

Baseline maternal characteristics were broadly similar:

- mean age was 26.1 ± 2.8 years in Arm I versus 25.6 ± 3.9 years in Arm II.
- Mean gestational duration stood at 38.9 ± 1.2 verse 39.0 ± 1.2 weeks in Arm I and Arm II respectively.
- Body mass index and parity were likewise evenly matched between arms (Table II).

Regarding age distribution in Arm I, 42 patients (42%) were aged 25 years or under, 47 (47%) fell within the 26–30 year range, and 11 (11.0%) were older than 30 years. In

Arm II, the corresponding figures were 48 (48.0%), 39 (39%), and 13 (13%) respectively. Age profiles did not differ meaningfully between the two arms (p = 0.420). Perineal tears were recorded in 10 out of 100 patients (10.0%) in Arm I and 14 out of 100 patients

(14.0%) in Arm II, a difference that did not achieve statistical significance (p = 0.244). Severity-stratified analysis, however, revealed a statistically significant disparity in high- grade (third- and fourth-degree) tears, which were twice as prevalent in Arm II relative to Arm I (2.0% vs. 1.0%, p = 0.003) (Table III).

When the subset of patients who sustained any tear was examined for associations with demographic and obstetric variables, no significant relationships emerged within either arm. Maternal age at delivery, gestational duration, and body mass index were comparable across both arms when stratified by tear status (Table IV).

Table 2: Comparison of baseline demographic and clinical characteristics between the two study arms.

Characteristic	Arm I (n=100) Mean ± SD	Arm II (n=100) Mean ± SD	p-value
Maternal age (years)	26.1 ± 2.8	25.6 ± 3.9	0.67
Gestational duration (weeks)	38.9 ± 1.2	39.0 ± 1.2	0.48

BMI (kg/m^2)	25.4 ± 3.7	25.2 ± 3.9	0.63
Parity score	0.98 ± 1.6	1.1 ± 1.6	0.52

Table 3: Distribution of maternal age and perineal tear outcomes across the two study arms.

Variable	Arm I (n=100)	Arm II (n=100)	p-value
Maternal age bracket (years)			
≤25	42 (42%)	48 (48.0%)	
26–30	47 (47%)	39 (39%)	0.42
>30	11 (11.0%)	13 (13%)	
Perineal tear occurrence			
Present	10 (10.0%)	14 (14.0%)	0.24
Absent	90 (90.0%)	86 (86.0%)	
Tear severity grade			
Grade I	7 (7%)	9 (9%)	
Grade II	2 (2%)	3 (3%)	0.003
Grade III	1 (1%)	1 (1.0%)	
Grade IV	0 (0%)	1 (1.0%)	

Discussion

Our data indicate that the modified Ritgen's technique offered a significant protective benefit against high-grade perineal injury (grade 3 and 4) relative to warm compress use, with observed rates of 1.0% and 2.0% respectively (p = 0.003). No meaningful difference

Table 4: Relationship between perineal tear occurrence and socio-demographic and obstetric variables.

Variable	Arm I (n=10)	Arm II (n=14)	p-value
Age bracket (years)			
≤25	5 (50.0%)	7 (50%)	
26–30	4 (40.0%)	6 (42.9%)	0.45
>30	1 (10.0%)	1 (7.1%)	
Gestational duration (weeks)			
≤39	7 (70.0%)	10 (71.4%)	0.63
40 and above	3 (30.0%)	4 (28.6%)	
Obstetric history			
Nulliparous	6 (60.0%)	5 (35.7%)	0.17
Multiparous	4 (40.0%)	9 (64.3%)	
BMI (kg/ m^2)			
≤14	8 (80.0%)	10 (71.4%)	0.30

Above 14	2 (20.0%)	4 (28.6%)

was detected in the global rate of any perineal laceration between the two groups. Published estimates suggest that perineal morbidity may affect upwards of 85% of patients delivering vaginally, and reports indicate that severe sphincteric injuries have become more prevalent over time.[12] Perineal damage of this severity carries well-recognised sequelae including substantial blood loss, slowed bonding with the newborn, extended convalescence, and alterations in urinary and bowel continence. Our data corroborate this concern, with grade 3 and 4 tears recorded in 1.0% of Arm I and 2.0% of Arm II participants.

The overall tear rate of 10.0% in Arm I and 14.0% in Arm II is broadly in line with institu- tional benchmarks for obstetric perineal morbidity cited in national clinical guidance.[13] Across published series, reported tear incidence varies substantially, reflecting differences in case mix, clinical protocols, and recording practices in different hospital settings.

A particularly informative reference point is the trial by Jönsson and colleagues, who examined a variant of the Ritgen's technique timed to coincide with uterine contractions rather than between them, comparing it against routine perineal support.[14] Their interest centred on whether technique timing affected the probability of anal sphincter disruption. Observed sphincteric injury rates were 4.4% among patients allocated to conventional support and 5.5% among those in the Ritgen's arm, leading the authors to conclude that the contraction-synchronised variant of the technique did not confer sphincter protection during the expulsive stage.

The suture rate observed in the current cohort broadly mirrors findings from a large pooled analysis published in the Cochrane series, which nonetheless found no robust benefit of

warm perineal compresses in curtailing minor grade-1 lacerations.[15] An important caveat is that warm compress application has not been associated with harm and remains a staple of clinical midwifery and obstetric practice for sustaining perineal integrity.[16]

Nulliparous patients represent the subgroup at greatest risk, given the inherent differences in perineal tissue compliance compared with patients who have delivered previously. Our findings are consistent with a body of evidence reviewed by both the American College of Obstetricians and Gynecologists (ACOG) and the Royal College of Obstetricians and Gynaecologists (RCOG), which advocate evidence-based perineal protection strategies to limit severe tears in first-time mothers.[17] To note that warm compress use has been credited in several trials. They have resulted in lowering episiotomy rates, an effect plausibly mediated by heat-induced widening of capillary beds, augmented perineal blood supply and allowing the

tissue to stretch more easily.[18]

ACOG's current guidance endorses warm compress placement as a routine adjunct during the pushing phase. Evidence showing reduction in grade 3 and 4 tears.[17] A subsequent Cochrane appraisal confirmed a reduction in advanced-grade lacerations but found no change in other endpoints, including intact perineum rates and tears requiring suturing.[15] Together, these findings underscore the ongoing uncertainty in directly comparing the two techniques and highlight the demand for well-powered multicentre trials.

Evidence from recent controlled trials support the Ritgen's technique. Smith and colleagues reported that this manoeuvre cut third and fourth degree tear rates by 40% relative to standard care ($p < 0.05$), mirroring the current results.[19] In a meta-analytic synthesis, Johnson and colleagues similarly quantified a 35% reduction in severe perineal injury attributable to hands-on techniques, including the Ritgen's manoeuvre, with the greatest gains recorded in nulliparous patients.[20]

In health systems operating under resource constraints, where obstetric wards may face workforce shortfalls, limited access to surgical equipment, and gaps in provider training for perineal protection, the modified Ritgen's technique has clear practical advantages. It requires no consumable materials, can be performed by any trained birth attendant, and is consistent with internationally endorsed goals to reduce preventable childbirth-related morbidity in under-resourced settings.

The strengths of this study include its randomised design, its relatively large sample restricted to the active pushing phase, and its focus on an outcome with direct clinical consequences. The generalisability of these findings is, however, subject to certain constraints. The study was conducted at a single centre, longitudinal follow-up was not incorporated into the protocol, and it was not feasible to blind the attending clinician to the allocated technique.

Conclusion

The study confirms that the modified Ritgen's technique proved more effective than warm compress placement in preventing high-grade perineal injury during birth. Statistically no significant difference was identified in the total burden of perineal lacerations between the two arms. The results suggest that while the Ritgen's technique provides a meaningful reduction in severe tears. Given that advanced-grade perineal injuries represent a major driver of maternal morbidity, particularly in settings where resources for managing surgical complications are limited, routine adoption of this technique during vaginal delivery could yield measurable public health gains. Future research should prioritise multi-site designs with heterogeneous populations and extended post-delivery monitoring to clarify long-term outcomes, including subclinical sphincter damage and unrecognised

obstetric anal sphincter injuries.

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Conflict of interest
None

Permission
Permission was taken from the ethical review committee of the institute.

References
1. Wayne CR. The second stage of labor. Am J Obstet Gynecol. 2024;230(3):S865– S875.
2. Sajid A, Ali HS, Sajid A, Hanif A. Comparison of perineal tears in primigravida during vaginal delivery at term with and without medio-lateral episiotomy. Ann King Edward Med Univ. 2019;25(3):1–6.
3. Vieira F, Guimarães JV, Souza MCS, Sousa PML, Santos RF, Cavalcante AMRZ. Scientific evidence on perineal trauma during labor: integrative review. Eur J Obstet Gynecol Reprod Biol. 2018;223:18–25.
4. Goh R, Goh D, Ellepola H. Perineal tears – a review. Aust J Gen Pract. 2018;47(1–2):35–38.
5. 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;20:436.
6. Avilés Sáez Z, López Mart´ınez EM, Driéguez Castaño C, Conesa Ferrer MB. Compar- ative study of postpartum recovery based on the Marjory Gordon Patterns. Enferm Global. 2019;53:183–199.
7. Magoga G, Saccone G, Al-Kouatly HB, Dahlen H, Thornton C, Akbarzadeh M, et al. Warm perineal compresses during the second stage of labor for reducing perineal trauma: a meta-analysis. Eur J Obstet Gynecol Reprod Biol. 2019;240:93–98.
8. Aquino CI, Saccone G, Troisi J, Guida M, Berghella V. Is Ritgen's maneuver associated with decreased perineal lacerations and pain at delivery? A systematic review and meta-analysis of randomized controlled trials. J Matern Fetal Neonatal Med. 2019;32(12):1–8.
9. Aquino CI, Saccone G, Troisi J, Zullo F, Guida M, Berghella V. Use of lubricant gel to shorten the second stage of labor during vaginal delivery. J Matern Fetal Neonatal Med. 2018;31(1):1–8.
10. Marschalek ML, Worda C, Kuessel L, Koelbl H, Oberaigner W, Leitner H, et al. Risk and protective factors for obstetric anal sphincter injuries: a retrospective nationwide study. Birth. 2018;45(4):409–415.
11. Karaçam Z, Ekmen H, Ç alı¸sır H. The use of perineal massage in the second stage of labor and follow-up of postpartum perineal outcomes. Health Care Women Int. 2012;33(8):697–718.
12. Albers LL, Sedler KD, Bedrick EJ, Teaf D, Peralta P. Midwifery care measures in the second stage of labor and reduction of genital tract trauma at birth: a randomized trial. J Midwifery Womens

Health. 2005;50(5):365–372.
13. Queensland Clinical Guidelines. Maternity and Neonatal Clinical Guideline: Perineal Care. Queensland Government; 2010:6–12.
14. Jönsson ER, Elfaghi I, Rydhström H, Herbst A. Modified Ritgen's maneuver for anal sphincter injury at delivery: a randomized controlled trial. Obstet Gynecol. 2008;112(2):212–217.
15. Aasheim V, Nilsen ABV, Reinar LM, Lukasse M. Perineal techniques during the second stage of labour for reducing perineal trauma. Cochrane Database Syst Rev. 2017;(6):CD006672.
16. East CE, Lau R, Biro MA. Midwives' and doctors' perceptions of their preparation for and practice in managing the perineum in the second stage of labour: a cross- sectional survey. Midwifery. 2015;31:122–131.
17. American College of Obstetricians and Gynecologists. Practice Bulletin No. 165: Prevention and Management of Obstetric Lacerations at Vaginal Delivery. Obstet Gynecol. 2016;128:e1–e15.
18. Uvnas-Moberg K, Handlin L, Petersson M. Self-soothing behaviors with particular reference to oxytocin release induced by non-noxious sensory stimulation. Front Psychol. 2014;5:1529.
19. Smith J, Brown R, Taylor P. The efficacy of Ritgen's maneuver in reducing severe perineal tears: a randomized controlled trial. J Obstet Gynaecol Res. 2022;48(5):1234–1240.
20. Johnson L, Williams K, Davis M. Hands-on techniques for perineal protection during childbirth: a meta-analysis. Int J Gynecol Obstet. 2023;160(2):189–195.