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Hands-On or Ritgen Maneuver: Which Technique Truly Protects Perineum?

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ABSTRACT

Background & Objective: Perineal rupture is the most frequent complication of vaginal delivery and significantly contributes to maternal morbidity, particularly through postpartum hemorrhage. Hands-on perineal support and Ritgen maneuver are commonly applied techniques to minimize perineal trauma; however, there is limited evidence comparing their effects on rupture severity. This study was conducted with aim to compare the degree of perineal rupture between Hands-on and Ritgen maneuver and to identify maternal and neonatal factors associated with increased severity.

Materials & Methods: This cross-sectional analytic observational study was conducted on women undergoing spontaneous vaginal delivery at two hospitals in Makassar. Eligible participants were women with singleton term pregnancies in cephalic presentation who delivered without episiotomy or instrumental assistance. Participants were categorized according to the perineal support technique. Maternal demographic factors, neonatal anthropometrics, and perineal rupture degree were recorded and analyzed using bivariate and multivariate testing. P<0.05 was considered significant.

Results: A total of 105 participants were included, with 44 undergoing Ritgen maneuver and 61 receiving Hands-on support. Second-degree rupture was the most common finding in both groups, with no significant difference in distribution (44.2% vs 55.8%; P=0.113). Neonatal birth weight, length, and head circumference were also comparable. Multivariate analysis identified parity as the strongest predictor of rupture severity, with primiparous women exhibiting a markedly higher risk of moderate-to-severe rupture (OR 12.16; 95% CI 3.33-44.35; P<0.001).

Conclusion: Hands-on and Ritgen maneuver yield similar perineal outcomes. Parity is the predominant determinant of rupture severity, suggesting that maternal obstetric factors play a more substantial role than the perineal support technique selected.

Keywords: Delivery, Obstetric maneuvers, Parity, Perineum

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1. Introduction

Perineal rupture occurs in approximately 80% of women during vaginal delivery and is more frequently observed in primiparas than in multiparas **(1)**. It represents one of the most common complications of childbirth and significantly contributes to maternal morbidity, particularly through postpartum hemorrhage, which remains a leading cause of maternal death in Indonesia **(2,3)**.

Anatomically, perineal rupture refers to tissue injury that occurs during vaginal birth and ranges in severity according to standardized classifications. The four-degree classification includes: first-degree injury involving the vaginal mucosa or perineal skin; second-degree injury involving perineal muscles without anal sphincter involvement; third-degree injury involving partial or complete disruption of the external and/or internal anal sphincter; and fourth-degree injury involving extension into the anorectal mucosa **(4)**.

Perineal integrity is influenced by tissue elasticity, which depends on collagen and elastin composition. Poor skin elasticity has been identified as a risk factor for perineal rupture, consistent with the structural composition of perineal tissue, which comprises smooth muscle (14%), skeletal muscle (16%), collagen (23%), elastin (7%), and adipose cells (6%) **(5-7)**. Reduced elastin and fibrillin content, along with connective tissue alterations, may compromise stretch capacity and contribute to rupture **(7)**.

A wide range of maternal, fetal, and intrapartum factors influence the occurrence of perineal rupture, including maternal age, body mass index, educational status, hereditary factors, gestational age, epidural analgesia, oxytocin stimulation, duration of active labor and second stage, maternal birthing position, and delivery techniques **(8,9)**. Delivery techniques such as perineal massage, warm compresses, Hands-on or Hands-off approaches, Ritgen's maneuver, spontaneous or delayed pushing, and various birthing positions have been studied for their potential to reduce perineal trauma **(10)**. Hands-on support and Ritgen's maneuver are among the most commonly used perineal protection techniques and are associated with reductions in overall perineal trauma, lower severity of rupture, and decreased need for repair compared with Hands-off approaches **(11)**.

The Hands-on technique involves applying one hand to control fetal head expulsion while the other supports the perineum; however, excessive manual pressure may cause perineal ischemia and increase the risk of third- or fourth-degree tears **(12,13)**. Ritgen's maneuver, performed by applying controlled upward pressure to the perineum while guiding the fetal head into extension, is not associated with increased rates of severe perineal lacerations, though it may be linked with higher rates of second-degree lacerations **(14,15)**. Despite widespread clinical use of both techniques, no prior study has directly compared the severity of perineal rupture between Hands-on support and Ritgen's maneuver. Therefore, the present study was conducted with aim to compare the degree of perineal rupture between Hands-on and Ritgen maneuver and to identify maternal and neonatal factors associated with increased severity.

2. Materials and Methods

This analytic observational study with cross-sectional design was conducted at Siti Fatimah and Sitti Khadijah Hospitals in Makassar, Indonesia. Data collection was carried out from August to September 2025 following approval from institutional authorities and ethical committees. The study population consisted of all women in labor at the participating hospitals. Samples were selected using purposive sampling, including all eligible women who met the inclusion criteria until the required sample size (a required minimum of 41 participants per group) was achieved. Inclusion criteria was spontaneous vaginal delivery, first or second pregnancy, singleton term pregnancy in cephalic presentation, and willingness to participate as indicated by signed informed consent. Exclusion criteria was suspected macrosomia (based on either Estimated Fetal Weight (EFW) or neonatal birth weight≥4000 g), breech presentation, occiput malposition or shoulder dystocia, emergency cesarean delivery, instrument-assisted vaginal delivery, and episiotomy.

A total of 105 women met the eligibility criteria and were included in the analysis, comprising 44 women in the Ritgen's maneuver group and 61 women in the Hands-on group. The choice of perineal support technique was reflected from the routine preference of the attending birth attendant at the time of crowning. Following delivery, perineal rupture was assessed and neonatal anthropometric measurements, including head circumference, birth weight, and body length, were recorded by the research team of obstetrics and gynecology residents.

Eligible participants were enrolled consecutively. After informed consent, maternal demographic and obstetric data were obtained. Both groups received routine prenatal care following the same institutional protocol. Standard obstetric preparation was performed, including hand hygiene and personal protective equipment. Patients were positioned on their back with their hips and knees flexed (lithotomy position). Perineal support was applied using either the Hands-on technique or Ritgen's maneuver during the second stage of labor when the fetal head reached Hodge level IV in occiput anterior position. All delivery ward staff assisting the births had undergone standardized training on the correct performance of both the Hands-on technique and Ritgen's maneuver to ensure uniform application. No warm compresses or other perineal interventions were applied before crowning, ensuring comparable intrapartum management. Following delivery, the perineum was examined to classify rupture severity, and neonatal anthropometric measurements (head circumference, birth weight, and body length) were recorded.

All data were entered into Excel and subsequently analyzed using IBM SPSS Statistics software for Macintosh, Version 30.0 (IBM Corp., Armonk, NY, USA). Univariate analysis was used to describe maternal characteristics, neonatal parameters, and the distribution of perineal rupture. Bivariate analysis using the chi-square test was performed to evaluate the associations between predictor variables and rupture degree, with a significance threshold of $p < 0.05$. Variables with clinical relevance were included in multivariate logistic regression to identify independent predictors of rupture severity.

3. Results

The mean maternal age did not differ significantly between the Ritgen (26.98±5.15 years) and Hands-on groups (26.64±5.10 years; P=0.740) (Table 1). Most participants in both groups belonged to a lower socioeconomic status (65.9% in Ritgen vs 63.9% in Hands-on; P=0.834). A majority had completed senior high school education (59.1% in Ritgen vs 68.9% in Hands-on; P=0.089).

Parity distribution was similar between the two groups, with primigravidas comprising 47.7% in the Ritgen group and 45.9% in the Hands-on group, while

multigravidas accounted for 52.3% and 54.1%, respectively (P=1.000). Mean Body Mass Index (BMI) was also comparable between the two groups (26.64±5.15 vs 25.89±5.01 kg/m²; P=0.455). Overall, the baseline characteristics of participants were homogeneous.

Both groups were dominated by second-degree ruptures, with slightly higher frequency in the Hands-on group (43 vs 34 cases) (Figure 1). The Hands-on technique resulted in a higher proportion of intact perineum (18% vs 4.5%), but also yielded one case of third-degree rupture, which did not occur in the Ritgen group. First-degree ruptures were more frequent in the Ritgen group (8 vs 6 cases). However, the overall distribution of rupture severity did not differ significantly between the two groups.

Second-degree rupture was the most common type in both groups (77.3% in Ritgen vs 70.5% in Hands-on) (Table 2). First-degree rupture occurred in 18.2% and 9.8% of cases, respectively, while non-rupture was more frequent in the Hands-on group (18% vs 4.5%). One third-degree rupture (1.6%) was observed only in the Hands-on group. Statistical analysis showed no significant difference in rupture distribution between the two groups (P=0.078).

Neonatal anthropometric characteristics were also comparable. Mean birth weight was 2976.1±383.7 g in the Ritgen group and 2862.4±324.2 g in the Hands-on group (P=0.052). Neonatal body length ranged from 44-51 cm in both groups (P=0.233), and head circumference ranged 30–35 cm in Ritgen vs 29-34 cm in Hands-on (P=0.473). No significant differences in fetal size were observed.

Parity demonstrated a significant association: moderate-to-severe rupture occurred more frequently in primigravidas (56.4%) compared with multigravidas (60.7%) (P<0.001) (Table 3). BMI did not differ significantly between mild and moderate-to-severe rupture groups (25.63±5.14 vs 26.41±5.04 kg/m²; P=0.491). Similarly, perineal support technique was not significantly associated with rupture severity (P=0.653).

Among neonatal parameters, birth weight (P=0.501) and head circumference (P=0.655) were not significantly different between the severity groups. However, neonatal body length showed a significant association, being higher in the moderate-to-severe rupture group (47.76±1.63 cm) compared with the mild rupture group (47.15±1.40 cm; P=0.044).

Parity emerged as the strongest predictor of rupture severity, with primigravidas exhibiting a 12-fold higher risk of moderate-to-severe rupture compared with multigravidas (OR 12.12; 95% CI 3.353-43.825; P<0.001) (Table 4). Other variables, including BMI (P=0.065), birth weight (P=0.534), neonatal length (P=0.051), and head circumference (P=0.248), were not independently significant. These findings indicate that rupture severity was more strongly influenced by maternal obstetric characteristics, particularly parity, than by the perineal support technique.

Table 1. Demographic characteristics of the study participants

Characteristics	Subjects Undergoing Vaginal Delivery		P-value
	Ritgen Manuever (n=44)	Hands-on Manuever (n=61)	
Age (year) (mean±SD)	26.98+5.15	26.64+5.10	0.740[a]
Socioeconomy			
Lower-Middle Class	29(65.9)	39(63.9)	0.834[b]
Upper Class	15(34.1)	22(36.1)	
Educational Level			
Elementary School	2(4.5)	0(0)	0.089[c]
Junior High School	6(13.6)	11(18.0)	
Senior High School	26(59.1)	42(68.9)	
Diplomat Degree	2(4.5)	0(0)	
Undergradute Degree	8(18.2)	8(13.1)	
Parity			
Primigravida	21(47.7)	28(45.9)	1.000[b]
Multigravida	23(52.3)	33(54.1)	
BMI (kg/m²) (mean±SD)	26.64+5.15	25.89+5.01	0.455[a]

Data are presented as frequencies (percentages) for ordinal variables and mean±SD for numerical variables; [a]Independent t-test for parametric numerical data with two groups; [b]Fisher's exact test for categorical data with two groups; [c]Pearson's chi-square test for categorical data with more than two groups

Table 2. **Birth outcomes according to perineal support technique**

Characteristics	Subjects Undergoing Vaginal Delivery		P-value
	Ritgen Manuever (n=44)	Hands-on Manuever (n=61)	
Perineal Rupture Severity (n,%)			
No rupture	2(4.5)	11(18)	0.078[c]
1st Degree	8(18.2)	6(9.8)	
2nd Degree	34(77.3)	43(70.5)	
3rd Degree	0(0)	1(1.6)	
4th Degree	0(0)	0(0)	
Birth Length (gram) (mean±SD)	2976.1±383.7	2862.4±324.2	0.052[a]
Birth Weight (cm) (median (min-max))	48.00(44-51)	48.00(44-51)	0.233*
Head Circumference (cm) (median (min-max))	32.00(30-35)	32.00(29-34)	0.473*

Data are presented as frequencies (percentages) for ordinal variables and as mean ±SD for numerical variables; [a]Independent t-test for parametric numerical data with two groups, [b]Fisher's exact test for categorical data with two groups, [c]Pearson's chi-square test for categorical data with more than two groups. *P-values<0.05 were considered statistically significant.

Table 3. **Factors associated with perineal rupture severity**

Variable Factors	Subjects Undergoing Vaginal Delivery		P-value
	No or Mild Rupture (0–I) (n=28)	Moderate-Severe Rupture (II–III) (n=77)	
Parity			
Primigravida	5(18.5)	44(56.4)	<0.001[b]*
Multigravida	22(81.5)	34(43.6)	
IMT (kg/m^2)	25.63+5.14	26.41+5.04	0.491[a]
Perineal Support Technique			
Ritgen	10(37.0)	34(43.6)	0.653[b]
Hands-on	17(63.0)	44(56.4)	
Birth Weight (gram)	2870.41+412.11	2923.83+332.14	0.501[a]
Birth Length (cm)	47.15+1.40	47.76+1.63	0.044[a]*
Head Circumference (cm)	31.96+1.28	32.09+1.26	0.655[a]

Data are presented as frequencies (percentages) for ordinal variables and as mean±SD for numerical variables; [a]Independent t-test for parametric numerical data with two groups; [b]Fisher's exact test for categorical data with two groups; *P-values<0.05 were considered statistically significant.

Table 4. Multivariate analysis of the factors influencing perineal rupture severity

Variable Factors	OR (Exp[B])	95% CI	P-value
BMI (kg/m^2)	1.09	0.994-1.212	0.065
Birth Weight (gram)	1.00	0.999-1.003	0.534
Birth Length (cm)	1.60	0.999-2.562	0.051
Head Circumference (cm)	0.74	0.447-1.231	0.248
Parity (Primigravida vs Multigravida)	12.12	3.353-43.825	<0.001

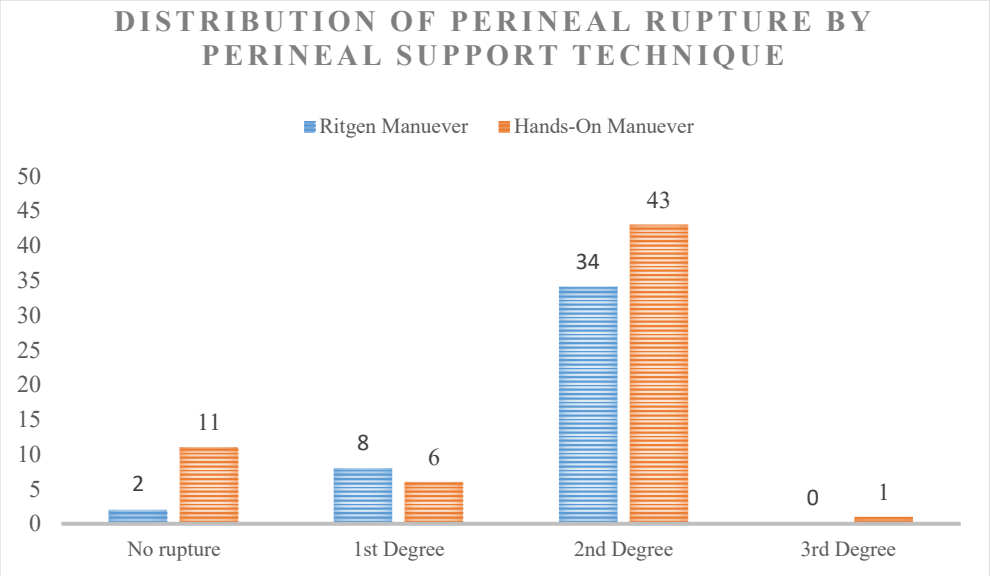


Figure 1. Distribution of Perineal Rupture by Perineal Support Technique

4. Discussion

The purpose of the present study was to compare the severity of perineal rupture between Hands-on and Ritgen maneuver. The findings demonstrated that both perineal support techniques yielded similar outcomes, with second-degree rupture being the most common in both groups. Further analysis showed that parity was the most influential factor determining rupture severity, with primigravidas more likely to experience moderate-to-severe rupture compared with multigravidas. These results indicate that maternal obstetric characteristics, particularly parity, play a greater role in perineal outcomes than the choice of support technique. Additionally, neonatal body length was associated with rupture severity, suggesting that longer infants confer a higher risk of more severe perineal injury.

Perineal trauma remains a major obstetric concern due to its association with short- and long-term morbidity, including chronic pain, sexual dysfunction, and fecal incontinence **(16)**. In this study, no significant difference was observed in rupture severity between Ritgen's maneuver and the Hands-on technique, consistent with previous findings reporting that Ritgen does not consistently reduce rates of severe rupture and may increase postpartum pain **(15-17)**. Our results also showed that neonatal body length was more strongly related to rupture severity than the perineal technique applied. This aligns with the review by Zang et al., 2023, which highlights that maternal and neonatal characteristics exert stronger influence on perineal outcomes than any single intrapartum intervention **(10)**.

Comparisons with existing literature revealed variability across studies. The Cochrane review by Aasheim et al., 2011 reported that a hands-off (poised) approach did not reduce severe rupture but decreased episiotomy rates **(14)**, whereas Califano et al., 2022 found that the hands-off method reduced first- and

second-degree tears and episiotomy when compared with Hands-on **(16)**. In our study, mild rupture was more common in the Ritgen group, while episiotomy rates did not differ significantly, indicating that variations in clinical practice and sample characteristics may account for divergent findings. A recent clinical trial by Akhmetzhanova et al., 2024 further supports this heterogeneity, demonstrating that avoiding routine episiotomy in primiparous women significantly reduced both the incidence and mean length of posterior perineal tears compared with episiotomy-assisted delivery. This underscores that episiotomy itself may influence perineal outcomes independently of the perineal support technique **(18)**.

Mechanistically, Ritgen's maneuver may reduce rupture risk by providing biomechanical control during fetal head extension, applying upward pressure on the posterior perineum while maintaining head flexion, so that the smaller suboccipitobregmatic diameter presents. Controlled, gradual extension allows collagen and elastin fibers of the perineum to undergo progressive stretching, minimizing abrupt strain that can precipitate tearing. Moreover, redirecting pressure vectors anteriorly along the natural curve of the birth canal reduces compression of key supporting structures such as the bulbospongiosus, transverse perineal muscles, and perineal body. Thus, Ritgen may offer physiologic protection of tissue integrity and microcirculation compared with uncontrolled head expulsion **(5,15,19)**.

Despite its theoretical benefits, Ritgen's maneuver remains controversial. A long-term observational study in Croatia by Habek et al., 2018 reported that a modified Ritgen technique reduced rupture incidence to <5% over several decades **(15)**. Conversely, a meta-analysis by Aquino et al., 2020 found no protective effect against severe rupture and reported increased postpartum pain among those assisted with Ritgen **(17)**. Differences in the reported findings may stem from heterogeneity in technique execution, provider experience, and outcome assessment methods. In the present study, Ritgen did not demonstrate superiority over Hands-on, aligning with meta-analytic evidence.

A recent study by Sarwar et al., 2025 comparing Ritgen with warm compresses found that the modified Ritgen maneuver reduced severe rupture, although total rupture rates were similar, underscoring that optimal perineal protection may require combining multiple strategies rather than relying on a single technique **(20)**. The absence of significant differences between Ritgen and Hands-on in our study may also reflect that our population represented predominantly low-risk deliveries, where adjunctive protective interventions (e.g., compresses or perineal massage) may exert a stronger effect. Furthermore, a systematic review by Amalia, 2024 reported that the hands-off technique provides better perineal protection than Hands-on, particularly in reducing episiotomy **(21)**. The lack of significant differences in our findings may be attributed to limited sample size, reducing statistical power to detect small effect differences, consistent with recommendations for larger-scale studies.

Clinically, our findings emphasize that technical maneuvers alone are insufficient determinants of perineal outcomes. Factors such as parity, birth length, birth weight, head circumference, maternal position, and provider experience play substantial roles. Evidence suggests that adjunctive techniques such as perineal massage and warm compresses yield more consistent protective effects compared with either Ritgen or Hands-on approaches. Thus, modern obstetric practice should integrate technical skill with holistic, multimodal perineal protection strategies, particularly in resource-limited settings where simple interventions may be more feasible **(10)**.

Overall, this study reinforces the evidence that Ritgen's maneuver and the Hands-on technique do not differ significantly in their effects on perineal rupture severity. Given that outcomes are comparable but Ritgen requires greater technical skill and precision, Hands-on may be more suitable for routine clinical practice due to its simplicity and ease of application. However, accumulated literature suggests that optimal perineal protection requires a multimodal approach that accounts for maternal and neonatal characteristics as well as the birth attendant's experience. Future research should employ larger multicenter randomized controlled trials to more definitively assess the relative effectiveness of perineal protection techniques.

A strength of this study is the inclusion of combined maternal and neonatal parameters (age, parity, BMI, head circumference, birth weight, and birth length) providing a multifactorial assessment of perineal rupture risk. Limitations of the present study include the cross-sectional design, which prevents determining causality, and the single-region sampling, which may limit generalizability to populations with different obstetric characteristics. Variation in provider skill using Hands-on or Ritgen also could not be fully objectively standardized, introducing potential bias. Also, postpartum perineal pain was not assessed in this study, which limits evaluation of functional postpartum outcomes.

In addition, several sources of bias must be considered. First, operator-dependent bias may occur because differences in experience, manual technique, and consistency in applying Hands-on or Ritgen can influence perineal distension and rupture outcomes. Second, measurement bias is possible in assessing rupture degree, which relies on clinical observation; although standardized assessment was used, inter-observer variability may persist. Third, confounding factors, such as second-stage duration, maternal position, perineal elasticity, and perineal length, were not directly measured, though these may influence the relationship between support technique and rupture severity. Awareness of these biases underscores the need for more controlled study designs.

Future research should involve large, multicenter randomized trials with standardized technique training to minimize operator variability and improve generalizability of the results obtained in the present study. Additionally, studies exploring combined perineal protection methods, such as Ritgen with warm compresses or perineal massage, could help clarify the potential benefits of multimodal approaches in reducing severe perineal trauma and long-term morbidity.

5. Conclusion

This study demonstrated that Ritgen's maneuver and the Hands-on technique result in comparable perineal outcomes, with second-degree rupture being the most common finding in both groups. No significant differences were observed between the two techniques in rupture severity. Given the similar outcomes but greater technical complexity of Ritgen's maneuver, the Hands-on approach may be more suitable for routine clinical practice due to its simplicity, ease of application, and equivalent effectiveness.

Most neonatal size parameters, including birth weight and head circumference, did not significantly influence the differences observed between the two groups, although neonatal length showed an association with perineal rupture. Maternal factors were more influential than neonatal characteristics or perineal support technique. Primiparous women exhibited a substantially higher risk of moderate-to-severe rupture compared with multiparous women. These findings suggest that perineal rupture severity is predominantly shaped by maternal obstetric conditions, while the choice of perineal support method can be tailored to clinician preference and the clinical context of delivery.

6. Declarations

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Ethical Considerations

The study received ethical approval from the Health Research Ethics Committee, Faculty of Medicine, Hasanuddin University, and the RSPTN UH–RSWS Ethics Committee (Ethical code: 573/UN4.6.4.5.31/PP36/2025). Written informed consent was obtained from all participants.

Authors' Contributions

P.E.G. conceptualized and designed the study, collected the data, conducted the analysis, and drafted the initial manuscript. I.A.F., I.B., and F.H. contributed to the study design, manuscript writing, and critical revisions. F.H. also assisted with data analysis and manuscript evaluation. E.H. and D.L. supported the writing process and provided substantial critical revisions to the final manuscript. All authors have read and approved the final version for publication.

Conflict of Interest

The authors declare no conflict of interest.

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