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Original Research Article

Effect of Adrenaline v/s Vasopressin v/s Normal Saline on Intraoperative Blood Loss Used during Hydrodissection in Vaginal Hysterectomy: A Randomized Controlled Trial

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Abstract

Background: Vaginal hysterectomy (VH) is a cornerstone gynecological procedure prioritized for its minimized postoperative morbidity, reduced pain, and rapid convalescence. However, maintaining optimal intraoperative visualization remains a challenge due to vascularity during dissection. Hydrodissection with standard or vasoconstrictive agents is widely utilized to establish surgical planes and minimize bleeding.

Objectives: To evaluate and compare the quantitative efficacy and physiological impact of diluted adrenaline, diluted vasopressin, and plain normal saline infiltration during hydrodissection in elective vaginal hysterectomy.

Material and Method: A double-blind Randomized Controlled Trial (RCT) was conducted over 1 .5 years at the Rajendra Institute of Medical Sciences (RIMS), Ranchi, involving 69 women randomized into three equal groups (n=23 each). Group 1 received 40 mL of plain Normal Saline; Group 2 received 40 mL of diluted Adrenaline (1:1 20,000 in 1 % lignocaine); Group 3 received 40 mL of diluted Vasopressin (0.1 U/mL, total 4 U). Primary outcomes measured quantitative intraoperative blood loss using calibrated sponge weight differentials. Secondary outcomes included surgical ease of dissection, intraoperative hemodynamic trends, and postoperative complications.

Results: The mean intraoperative blood loss was significantly lower in the vasoconstrictor arms compared to the saline arm ($p < 0.05$). Group 2 (Adrenaline) and Group 3 (Vasopressin) provided superior surgical cleavage planes with reduced requirements for electrocautery. Hemodynamically, Group 3 (Vasopressin) exhibited a transient yet statistically significant spike in systolic blood pressure at 1 minute (1 25.39 ± 1 0.31 mmHg, p = 0.01 7), while Group 2 (Adrenaline) exhibited a significant increase in pulse rate at 5 minutes (94.43 ± 5.1 5 bpm, $p < 0.001$). All vital parameters normalized to baseline values within 5 minutes without clinical intervention.

Conclusion: Both diluted vasopressin and diluted adrenaline are highly effective pharmacological adjuncts for hydrodissection in vaginal hysterectomy. They substantially minimize intraoperative hemorrhage and enhance the clarity of surgical planes. The associated transient hemodynamic fluxes are brief and self-limiting, confirming safety profiles appropriate for elective clinical deployment when screening rules are strictly implemented.

Keywords: Vaginal Hysterectomy; Hydrodissection; Vasopressin; Adrenaline; Intraoperative Blood Loss; Hemodynamic Safety.

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Introduction

Vaginal hysterectomy stands as a definitive, anatomically elegant milestone within modern gynecological surgery. Termed a 'natural orifice surgery,' it provides distinct physiological advantages over standard abdominal approaches, including reduced incisional morbidity, decreased pain scores, abbreviated hospitalization, and swift return to daily activities.

Despite structural refinements, a major challenge in vaginal hysterectomy remains the vascular nature of the pelvic floor. Primary vascular contributions remain structurally un-ligated during early steps, exposing patients to persistent ooze that can obscure tissue morphology. Obscured surgical fields increase the risk of accidental visceral, ureteral, or bladder trauma.

Pharmacological hydrodissection—the infiltration of fluid vectors beneath the vaginal mucosa—addresses this problem. Infiltrating saline creates a physical buffer zone via mechanical hydraulic pressure. Adding vasoconstrictive solutions like adrenaline or vasopressin combines this mechanical clearance with structural microvascular constriction to achieve optimal surgical visibility. While adrenaline is widely accessible and utilized globally, vasopressin induces profound localized microvascular spasm and secondary contractions within uterine muscle walls.

However, systematic, head-to-head randomized trials comparing these two agents against basic normal saline are limited in the Indian context. This clinical investigation evaluates their comparative blood conservation metrics alongside localized surgical and systemic hemodynamic variables.

Aims and Objectives

Primary Objective: To estimate, quantify, and compare the absolute intraoperative blood loss across cohorts receiving sub-mucosal infiltration of diluted adrenaline, diluted vasopressin, or plain normal saline during elective vaginal hysterectomy.

Secondary Objectives

1. To evaluate and compare the technical ease of tissue dissection and the comparative utilization frequency of electrocautery among the three investigative groups.
2. To document and monitor intraoperative vital sign patterns, specifically registering mean blood pressure and pulse rate indices at predefined increments (baseline pre-op, 1 minute, and 5 minutes post-infiltration).
3. To identify, map, and catalog acute intraoperative or delayed postoperative complications, tracking postoperative pain indices, febrile events, localized vault or wound hematomas, surgical line healing patterns, and short-term urinary tract symptoms across all arms.

Material and Methods

Study Design: This research was structured as a prospective, triple-arm, double-blind Randomized Controlled Trial (RCT).

Study Duration: The total operational timeline covered eighteen months (1 .5 years) following formal clearance from the Institutional Ethics Committee (IEC Reference Memo No. 343 IEC, RIMS, Dated 27.09.24). This comprised 3 months for literature review, 1 2 months for prospective data collection and processing, and 3 months for compilation and final manuscript execution.

Study Center: Department of Obstetrics and Gynaecology, Rajendra Institute of Medical Sciences (RIMS), Ranchi, Jharkhand, India.

Sample Size & Formula: Power analysis was performed using G*Power software based on reported indices where mean intraoperative blood loss metrics presented values of 21 .33 ± 7.4 mL for the vasopressin tier and 49.67 mL within the reference normal saline cohort. Applying a 95% confidence interval framework alongside an 80% statistical power threshold, the computed Cohen's d effect size was calculated at 0.528. This fixed a baseline requirement of 20 participants per structural block under standard one-way ANOVA parameters. Incorporating a conservative 1 0% structural buffer to protect against potential patient attrition or loss to follow-up, the final sample size was set at 23 subjects per arm, totaling 69 study participants.

The mathematical framework utilizing standard multi-group variance approximations is defined as:

$n =[2 * \sigma^2 *(Z_\alpha/2 + Z_\beta)^2]/\delta^2$

Inclusion Criteria: Patients aged between 40 and 65 years.

Exclusion Criteria: Emergent or non-elective hysterectomy procedures.

Intervention Plan: Following comprehensive pre-anesthetic confirmation, all sixty-nine selected patients were moved to the operative suite and placed under standardized regional neuraxial anesthesia.

The randomized treatment interventions were administered as follows:

- Group 1 (Normal Saline Group; n=23): Underwent hydrodissection utilizing 40 mL of

sterile, un-adulterated 0.9% Normal Saline solution infiltrated sub-mucosally around the cervix. Localized physical mucosal blanching was assessed visually before initial incision.

- Group 2 (Adrenaline Group; n=23): Received precise sub-mucosal infiltration utilizing a 40 mL volume containing diluted adrenaline at a 1 :1 20,000 concentration prepared within a 1 % lignocaine solution vector.
- Group 3 (Vasopressin Group; n=23): Received localized infiltration of diluted vasopressin at a concentration of 0.1 U/mL (20 units of vasopressin inside a 200 cc volume of standard 0.9% normal saline). A 40 mL aliquot of this prepared vector (yielding a cumulative dose of 4 U) was administered into sub-mucosal planes surrounding the cervix at the 2, 4, 8, and 1 0 o'clock locations.

Data Analysis: All collected demographic parameters, operative details, and post-procedural charts were entered into Microsoft Excel templates and processed through SPSS Version 21.

Proportions and percentages were applied to categorize qualitative variables.

Continuous parametric data evaluations across the three distinct interventional cohorts were performed using one-way ANOVA or Kruskal-Wallis tests where appropriate ($p < 0.05$). Quantitative blood volumes were measured using weight differentials of surgical sponges, assuming 1 gram equals 1 millilitre of blood volume.

Results & Table-Specific Discussions

Table 1: Demographic Age Distribution across Investigated Cohorts

Age Parameter	Group 1 (Saline)	Group 2 (Adrenaline)	Group 3 (Vasopressin)
40–50 Years	1 6 (69.57%)	9 (39.1 3%)	1 1 (47.83%)
51 –60 Years	4 (1 7.39%)	7 (30.43%)	6 (26.09%)
61 –70 Years	3 (1 3.04%)	7 (30.43%)	6 (26.09%)
Mean ± SD	50.60 ± 6.69	54.21 ± 8.25	52.39 ± 8.1 2
Statistical Value	P = 0.295	Not Significant	Comparable

Discussion of Table 1: Demographic balance is essential to validate that variations in secondary bleeding variables arise from the pharmacological interventions rather than age-related tissue friability or vascular density changes. The analysis confirms structural uniformity in age distribution across all active investigative blocks (p = 0.295).

Table 2: Chronological Comparison of Pulse Rate Metrics (bpm)

Assessment Phase	Group 1 (Saline)	Group 2 (Adrenaline)	Group 3 (Vasopressin)	P-value
Pre-operative Baseline	89.04 ± 5.48	89.21 ± 4.77	86.69 ± 4.88	0.204 (NS)
1 Minute Post-Infiltration	87.65 ± 6.05	89.82 ± 5.68	82.69 ± 4.49	0.0003 (S)
5 Minutes Post-Infiltration	84.52 ± 7.89	94.43 ± 5.1 5	78.1 7 ± 4.54	<0.0001 (S)

Discussion of Table 2: Pulse rate trends revealed divergent physiological patterns between vasoconstrictive drugs. Group 2 (Adrenaline) caused a progressive increase in mean pulse rate, peaking at 5 minutes post-infiltration (94.43 ± 5.1 5 bpm) due to systemic beta-adrenergic stimulation. Conversely, Group 3 (Vasopressin) caused a clear, statistically significant decrease in heart rate down to 78.1 7 ± 4.54 bpm at 5 minutes due to reflex bradycardia.

Table 3: Chronological Comparison of Systolic Blood Pressure Trends (mmHg)

Assessment Phase	Group 1 (Saline)	Group 2 (Adrenaline)	Group 3 (Vasopressin)	P-value
Pre-operative Baseline	1 1 9.56 ± 7.43	1 20.26 ± 8.42	1 22.43 ± 8.1 3	0.443 (NS)
1 Minute Post-Infiltration	1 1 7.39 ± 7.61	1 1 9.56 ± 7.05	1 25.39 ± 1 0.31	0.01 7 (S)
5 Minutes Post-Infiltration	1 1 5.56 ± 7.81	1 1 8.95 ± 8.44	1 20.1 7 ± 7.1 3	0.093 (NS)

Discussion of Table 3: Systolic blood pressure profiles show that sub-mucosal infiltration of vasopressin (Group 3) prompts an immediate, sharp vasoconstrictive response, resulting in a significant systolic spike (1 25.39 ± 1 0.31 mmHg) within 60 seconds. This vascular response is temporary and decreases back to baseline by 5 minutes.

Table 4: Comparison of patients of all three groups on basis of amount of blood loss

Group	Amount of blood loss (ml)			P value
	Mean	SD	Median	
Group 1	127.21	4.77	126	<0.0001 (S)
Group 2	54.39	4.38	54	
Group 3	59.6	11.8	55	

Discussion of Table 4:Above table depicts, mean blood loss was 127.21 ml in group 1, followed by 54.39 ml in group 2 and 59.6 ml years in group 3. There was a statistically significant difference between the groups.

Table 5: Comparison of patients of all three groups on basis of number of times cautery used

Group	No of times cautery used			P value
	Mean	SD	Median	
Group 1	4.34	0.83	4	<0.0001 (S)
Group 2	3.08	0.51	3	
Group 3	3.04	0.56	3	

Discussion of Table 5: Above table depicts, mean blood loss was 4.34 in group 1, followed by 3.08 in group 2 and 3.04 years in group 3. There was a statistically significant difference observed between the groups.

Table 6: Pre and post of hemoglobin status

Group	Haemoglobin		Mean difference	P value
	Pre op (Mean±SD)	Post op (Mean±SD)		
Group 1	10.95±0.63	9.37±0.45	1.583	<0.0001 (S)
Group 2	10.77±0.49	10.26±0.42	0.513	<0.0001 (S)
Group 3	10.53±0.56	10.01±0.56	0.517	<0.0001 (S)

Discussion of Table 5:As shown in the table, the haemoglobin from pre op to post op the mean difference 1.583 in group 1, followed by 0.513 in group 2 and 0.517 in group 3. There was a statistically significant difference in all group.

Discussion

This randomized clinical trial evaluated the efficacy and safety of hydrodissection techniques using different vasoconstrictive agents during vaginal hysterectomy at a tertiary healthcare facility. Maintaining visual clarity in the operative field is essential for safety during vaginal surgery. Our primary outcomes confirmed that adding either diluted adrenaline or diluted vasopressin to the hydrodissection fluid significantly reduced intraoperative blood loss compared to plain normal saline ($p < 0.05$). The chemical action of these agents constricts local microvasculature, supplementing the mechanical expansion of the tissue planes. This dual action creates a bloodless field that simplifies tissue cleavage and reduces the need for frequent electrocautery. Crucially, these hemodynamic shifts were transient and self-limiting. Both blood pressure and pulse rate readings across the vasoconstrictor arms returned to baseline values within 5 minutes without requiring pharmacological intervention. This recovery underscores the safety of both agents for routine clinical use, provided patients are screened to exclude cardiovascular contraindications and care is taken to avoid intravascular injection.

Limitations: Single-Center Focus: This trial was conducted exclusively at a single tertiary-care hospital, which may limit the direct extrapolation of these findings to diverse regional settings.

Conclusion

Sub-mucosal hydrodissection using either diluted vasopressin or diluted adrenaline significantly reduces intraoperative blood loss and improves tissue plane visualization during vaginal hysterectomy compared to plain normal saline. While both vasoconstrictors cause brief, characteristic hemodynamic shifts, these variations are transient and return to baseline within 5 minutes. Both agents are effective options for enhancing surgical safety and field clarity.

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References

1. Tripathi U, Aggarwal A, Aggarwal V. Effect of cervical vasopressin versus no cervical vasopressin on blood loss during vaginal hysterectomy. J Evol Med Dent Sci. 2015; 4: 6435-42.
2. Alkatout Ibrahim, Mettler Liselotte; hysterectomy: A comprehensive surgical approach. Springer; n.d.
3. Hurakadli Km, Pujari LL, G.P. A clinico-surgical outcome of vaginal hysterectomy with or without hydrodissection: A Quasi experimental study. Int J Report Contracept Gynaecol 2018.
4. P Bartos pppads. Adrenaline versus terlipressin: blood loss and cardiovascular side effects in vaginal part of laparoscopically –assisted vaginal hysterectomy or vaginal hysterectomy n.d.
5. Nimodia V., Jain S., Rajaram S., Tyagi A., Gupta B. Effect of diluted vasopressin vs saline on intraoperative blood loss during vagi nal hysterectomy –A Randomised controlled trial. Journal of clinical and diagnostic research

2021.https://doi.org/10.7860?jcdr/2021/49162.15064.

6. Singh A, Govil D. Hysterectomy in India: Spatial and multilevel analysis. Women's Health2021;17.https://doi.org/10.1177/17455065211017068.
7. Sharma D, Jhajharia N, Banerjee KP.A randomized interventional study on clinic-surgical outcome of vaginal hysterectomy with hydrodissection versus without hydrodissection. Int J Reprod Contracept Obstet Gynecol 2023; 12;12:2229-34
8. Prasad A. Singh M Role of Vasopressin in Vaginal Hysterectomy. J Adv Med Dent Scie Res 2019;7(2):145-147.
9. Singh P. Role of Cervical Vasopressin in Vaginal hysterectomy: A tertiary Care Level Centre Study. Int J Sci Stud