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Original Research

Effect of prewarming on post-operative hypothermia in patients > 60 years of age undergoing cystoscopy procedures lasting < 1 hour under spinal anesthesia

[1]Dr. Aatman Raina, [2]Dr. Pooja Meena, [3]Dr. Anil Gupta, [4]Dr. Yogesh Kumar Aggarwal

[1]Junior Resident, [2,4]Assistant Professor, [3]Professor, Dept Of Anesthesiology, National Institute Of Medical Science And Research, Jaipur (NIMS), India

Corresponding Author
Dr. Yogesh Kumar Aggarwal
Assistant Professor, Dept Of Anesthesiology, National Institute Of Medical Science And Research, Jaipur (NIMS), India

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ABSTRACT

Background: Postoperative hypothermia is a common complication in elderly patients undergoing surgical procedures, particularly under spinal anesthesia. It can lead to adverse outcomes such as shivering, hemodynamic instability, and delayed recovery. Prewarming, a simple intervention involving external heat application before surgery, has shown potential in mitigating hypothermia and improving patient outcomes.This study aimed to evaluate the effectiveness of prewarming in preventing postoperative hypothermia and related complications in patients aged over 60 years undergoing shortduration cystoscopy procedures under spinal anesthesia.

Materials & Methods: A comparative cross-sectional, double-blind study was conducted on 62 patients, evenly divided into two groups: Group A (non-prewarming) and Group B (prewarming). Prewarming involved the use of forced-air warming devices set at 43°C for 30 minutes preoperatively. Core body temperature, hemodynamic parameters, shivering grades, and patient satisfaction were assessed intraoperatively and postoperatively. Statistical analyses were performed to evaluate the differences between the groups.

Results: Group B exhibited significantly better thermal stability, with higher core body temperatures maintained throughout the perioperative period. The incidence of shivering was markedly lower in the prewarming group (0%) compared to Group A (83.9%), with a statistically significant difference ($p < 0.001$). Prewarming also contributed to improved hemodynamic stability, reflected in consistent blood pressure and heart rate readings. Furthermore, patients in Group B reported higher satisfaction scores due to reduced discomfort and faster recovery.

Conclusion: Prewarming effectively prevents postoperative hypothermia, enhances thermal stability, and reduces the incidence of complications such as shivering in elderly patients undergoing cystoscopy under spinal anesthesia. It is a safe, cost-effective intervention that improves perioperative care and patient satisfaction. Routine adoption of prewarming protocols is recommended for elderly surgical populations to optimize outcomes.

Keywords: Cystoscopy, hypothermia, Prewarming

Introduction

Cystoscopy is a medical procedure that allows a urologist to visually examine the interior of the bladder and the urethra using a cystoscope, a thin, tube-like instrument equipped with a light and a camera. It is a common diagnostic and therapeutic procedure in urology, used to investigate and manage various conditions affecting the lower urinary tract.[1]

Postoperative hypothermia, defined as a core temperature below 36°C, is common in older adults undergoing surgery due to age-related changes and impaired thermoregulation.[2] Maintaining normothermia is vital to prevent complications like cardiac issues, infections, delayed healing, and extended hospital stays.[3]Hypothermia occurs due to anesthesia impairing thermoregulation, cold operating room environments, and room-temperature IV fluids. Older adults are particularly vulnerable due to reduced subcutaneous fat, impaired vasoconstriction, and diminished shivering responses.[4]

Prewarming, the application of external heat before surgery, has emerged as a preventive measure against perioperative hypothermia. It aims to reduce heat loss during anesthesia induction and minimize the

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temperature gradient between the patient's core and peripheral compartments.[5] This intervention has been shown to improve thermal comfort, enhance perioperative hemodynamic stability, and reduce the incidence of hypothermia in various surgical populations.[6]The present study aimed to evaluate the effectiveness of prewarming in preventing postoperative hypothermia and related complications in patients aged over 60 years undergoing shortduration cystoscopy procedures under spinal anesthesia.

Materials & Methods

A total of 62 patients were enrolled in the study, with 31 patients in each group. The inclusion criteria included patients aged above 60 years, with ASA grade I, II & III, undergoing cystoscopy procedures lasting<1 hour under spinal anesthesia.

Data such as name, age, gender etc. was recorded.Pre-anaesthetic check-up was done. Parameters such as core body temperature preoperatively and postoperatively, Heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, temperature, shivering, and any adverse events during the procedure was recorded.Shivering grade and satisfaction score was recorded. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table : I Baseline parameters

Variable	Value
Age,(Mean±SD)	68.68 ± 6.65
BMI,(Mean±SD)	25.56 ± 5.40
Gender,n(%)	
Male Female	51 (82.30)
Total	11 (17.70)
	70 (100)
Groups,n(%)	
Non-Prewarming(GroupA) Prewarming (Group B)	31 (50)
Total	31 (50)
	62 (100)
ASA, n (%)	
Grade I	18 (29.0)
Grade II	29 (46.8)
GradeIII	15 (24.2)

The mean age of the patients was 68.68 ± 6.65 years, and the mean BMI was 25.56 ± 5.40. Gender distribution showed that 82.3% of the participants were male, and 17.7% were female.Both groups had an equal number of participants, with 31 patients each. The American Society of Anesthesiologists (ASA) grades were distributed as 29.0% grade 1, 46.8% grade 2, and 24.2% grade 3.

Table: II Before Induction Haemodynamic Parameters in Patients between Both Groups

Variable(Mean±SD)	GroupA(n = 31)	GroupB(n = 31)	Total	p-value
SBP	133.77 ± 11.19	141.61 ± 8.67	137.69 ± 10.69	0.003
DBP	79.83 ± 9.01	81.61 ± 8.67	80.72 ± 8.82	0.43
MAP	97.77 ± 7.60	77.61 ± 8.67	87.69 ± 12.99	0.00
HR	83.67 ± 6.48	68.61 ± 8.69	76.14 ± 10.74	0.00
SPO2	97.74 ± 1.18	97.61 ± 6.19	97.67 ± 6.14	0.93
TEMP.	97.98 ± 0.99	93.61 ± 8.67	95.79 ± 6.50	0.007
RR	17.29 ± 0.93	15.61 ± 0.67	14.95 ± 6.15	0.40

Table II shows that before induction, group B had significantly higher systolic blood pressure (141.61 ± 8.67 mmHg vs. 133.77 ± 11.19 mmHg, p = 0.003). On the other hand, Group A demonstrated a significantly higher mean arterial pressure (97.77 ± 7.60 mmHg vs. 77.61 ± 8.67 mmHg, p = 0.00) and heart rate (83.67 ± 6.48 beats/min vs. 68.61 ± 8.69 beats/min, p = 0.00). Additionally, temperature was significantly higher in Group A compared to Group B (97.98 ± 0.99 vs. 93.61± 8.67, p = 0.007).The hemodynamic parameters before induction showed that Group B had more stable and favorable readings compared to Group A, with significant differences (p< 0.001). This indicates that prewarming helps maintain physiological stability before the administration of anesthesia, which is critical for patient safety during surgery.

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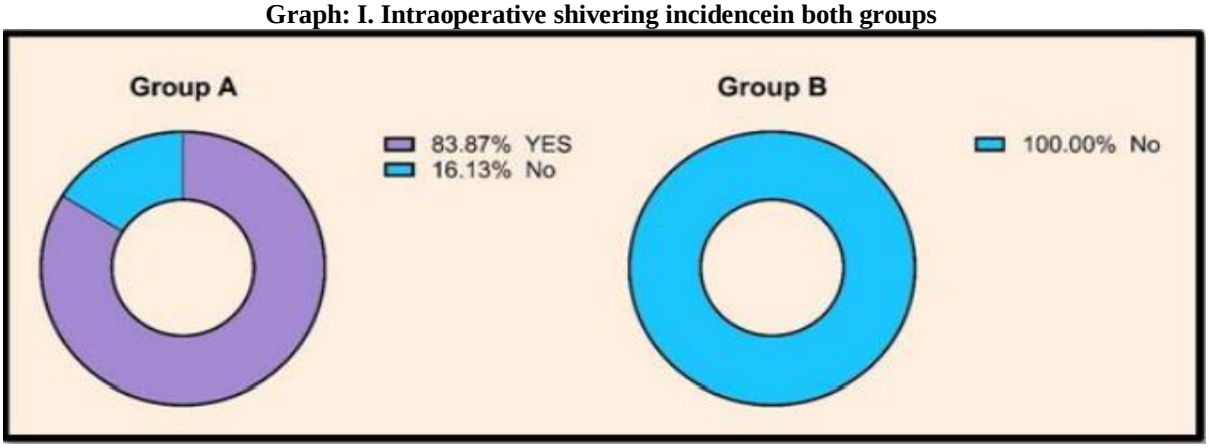
Table: III Post-Induction Haemodynamic Parameters in Patients between Both Groups

Variable(Mean±SD)	Group A(n = 31)	Group B(n = 31)	Total	p-value
SBP	130.19 ± 13.04	136.16 ± 9.11	133.18 ± 11.56	0.041
DBP	78.10 ± 8.90	81.61 ± 8.67	79.85 ± 8.90	0.121
MAP	96.19 ± 9.41	71.61 ± 8.67	83.90 ± 15.30	<0.001
HR	85.61 ± 6.15	62.16 ± 9.11	73.89 ± 14.11	<0.001
SPO2	97.55 ± 0.96	98.13 ± 8.24	97.84 ± 5.82	0.698
TEMP.	97.84 ± 1.10	93.61 ± 8.67	95.73 ± 6.49	0.009
RR	14.52 ± 2.50	15.61 ± 8.67	15.06 ± 6.12	0.485

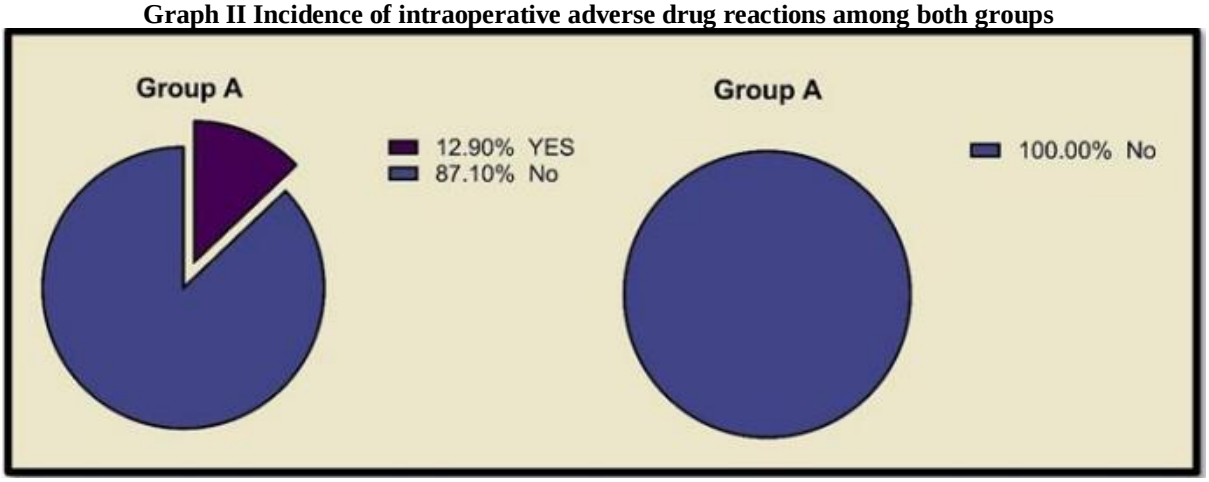
Diastolic blood pressure (79.83 ± 9.01 mmHg vs. 81.61 ± 8.67 mmHg, p = 0.43),SpO2 (97.74 ± 1.18% vs. 97.61 ± 6.19%, p = 0.93), and respiratory rate (17.29 ± 0.93 vs. 15.61± 0.67, p = 0.40) were comparable between the two groups, with no significant differences observed.

Graph: I. Intraoperative shivering incidencein both groups



The incidence of intraoperative shivering was significantly lower in group B (0%) compared to group A(83.9%),with a p-value<0.001.This indicates that prewarming is highly effective in preventing shivering, which can caused is comfort and complications during surgery.

Graph II Incidence of intraoperative adverse drug reactions among both groups



We found that theincidenceofadversedrugreactionswassignificantlylowerinGroupB(0%)comparedto Group A (12.9%), with a p-value of 0.039. This suggests that prewarming might reduce the risk of ADRs, potentially by stabilizing the patient's condition and reducing the need for additional medications.

Table IV Post-Operative Satisfaction incidence among Both Groups

Variable		Group A(n = 31)	Group B(n = 31)	Total(n=62)	p-value
Satisfaction Score,n(%)	UnbearablyCold	31 (100)	0 (0)	31 (50)	<0.001
	Neutral	0 (0)	31 (100)	31 (50)	

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Group B (with prewarming) demonstrates significant advantages over Group A (without prewarming). Group B shows better stability in hemodynamic parameters, lower incidence of shivering, fewer adverse reactions, and higher patient satisfaction.

Discussion

Hypothermia is a common perioperative complication, particularly in elderly patients, due to their impaired thermoregulatory mechanisms. During surgery, factors such as exposure to a cold operating room environment, administration of cold intravenous fluids, and the effects of anesthesia can disrupt the body's ability to maintain normothermia. This condition can lead to various adverse outcomes, including increased blood loss, higher infection rates, and prolonged hospital stays. These complications arise because hypothermia can impair coagulation, reduce immune function, and slow wound healing.[7]

Elderly patients are at an increased risk due to age-related physiological changes that affect their thermoregulatory responses. These include a decreased basal metabolic rate, reduced subcutaneous fat, and a diminished vasoconstrictive response. Moreover, the elderly often have comorbidities and may be on medications that further impair thermoregulation.[8]Prewarming has been suggested as an effective strategy to mitigate the risk of hypothermia. Prewarming involves elevating the patient's body temperature before surgery, typically using forced-air warming blankets. This practice helps to increase the body's thermal reserve, thereby reducing the extent of temperature drop during the perioperative period. By maintaining a higher core temperature before anesthesia induction, prewarming can help stabilize hemodynamic parameters and reduce the incidence of hypothermia-related complications.[9]

We found that before induction, group B had significantly higher systolic blood pressure (141.61 ± 8.67 mmHg vs. 133.77 ± 11.19 mmHg, p = 0.003). On the other hand, Group A demonstrated a significantly higher mean arterial pressure (97.77 ± 7.60 mmHg vs. 77.61 ± 8.67 mmHg, p = 0.00) and heart rate (83.67 ± 6.48 beats/min vs. 68.61 ± 8.69 beats/min, p = 0.00). Additionally, temperature was significantly higher in Group A compared to Group B (97.98 ± 0.99 vs. 93.61± 8.67, p = 0.007).The hemodynamic parameters before induction showed that Group B had more stable and favourable readings compared to Group A, with significant differences (p< 0.001). This indicates that prewarming helps maintain physiological stability before the administration of anesthesia, which is critical for patient safety during surgery.Chang W et al[10]conducted a robust randomized controlled trial investigating the efficacy of preoperative warming in pediatric patients scheduled for appendectomy. The study aimed to address the critical issue of perioperative hypothermia, a common and potentially harmful occurrence during surgery, especially in children. Perioperative hypothermia can lead to various complications such as increased blood loss, higher infection rates, and prolonged hospital stays. Recognizing these risks, the researchers focused on whether a tailored preoperative warming protocol could mitigate these adverse outcomes.

Diastolic blood pressure (79.83 ± 9.01 mmHg vs. 81.61 ± 8.67 mmHg, p = 0.43),SpO2 (97.74 ± 1.18% vs. 97.61 ± 6.19%, p = 0.93), and respiratory rate (17.29 ± 0.93 vs. 15.61± 0.67, p = 0.40) were comparable between the two groups, with no significant differences observed.We observed that the incidence of intraoperative shivering was significantly lower in group B (0%)compared to groupA(83.9%).Thisindicatesthatprewarmingis highlyeffectiveinpreventingshivering,whichcancaused iscomfortandcomplicationsduring surgery.We found that theincidenceofadversedrugreactionswassignificantlylo werinGroupB(0%)comparedto Group A (12.9%). This suggests that prewarming might reduce the risk of ADRs, potentially by stabilizing the patient's condition and reducing the need for additional medications.Lei Z et al[11]conducted a comprehensive randomized trial aimed at assessing the efficacy of preoperative forced-air warming in preventing hypothermia among patients undergoing neurosurgical procedures. Participants were randomly assigned to receive either standard care or preoperative forced-air warming for a specified duration before anesthesia induction. The primary outcome measure was the maintenance of intraoperative core body temperature. Secondary outcomes included the incidence of postoperative complications associated with hypothermia and patient recovery metrics. Results from the study indicated that patients in the preoperative warming group maintained significantly higher intraoperative temperatures compared to the control group. This improvement in temperature regulation was associated with a reduction in hypothermia-related complications. The authors concluded that prewarming is an effective strategy to enhance temperature stability during neurosurgery, thereby improving patient outcomes.

We found that group B (with prewarming) demonstrates significant advantages over Group A (without prewarming). Group B shows better stability in hemodynamic parameters, lower incidence of shivering, fewer adverse reactions, and higher patient satisfaction.Jin H et al[12]conducted a rigorous prospective study aimed at evaluating the effects of prewarming on both maternal and neonatal outcomes in women scheduled for elective cesarean sections.These results underscore the potential of preoperative warming strategies to enhance maternal and neonatal care during cesarean sections. The study advocates for the integration of prewarming protocols

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into obstetric anesthesia practices, highlighting its role in improving patient comfort and neonatal outcomes. The shortcoming of the study is small sample size.

Conclusion

Authors found that Prewarming effectively prevents postoperative hypothermia, enhances thermal stability, and reduces the incidence of complications such as shivering in elderly patients undergoing cystoscopy under spinal anesthesia. It is a safe, cost-effective intervention that improves perioperative care and patient satisfaction. Routine adoption of prewarming protocols is recommended for elderly surgical populations to optimize outcomes.

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