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Original Research Paper

Anaesthesiology

A COMPARATIVE STUDY OF RINGER LACTATE AND HYDROXYETHYL STARCH AS A PRELOADING FLUID FOR PREVENTION OF HYPOTENSION FOLLOWING SUBARACHNOID BLOCK IN ABDOMINAL HYSTERECTOMY.

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KEYWORDS :

INRODUCTION:
Regional anaesthesia has been the preferred technique in majority of patients coming for abdominal hysterectomy. Its advantage revolved around its simplicity of administration, its reliability of action and its minimal side effects. Subarachnoid block offers rapid onset of action and good surgical anaesthesia. Hypotension occurs usually due to autonomic blockade which is two segments higher than the sensory block after administration of spinal anaesthesia. Hence volume preloading has been recommended for prevention of spinal – induced hypotension in this situation.

NEED FOR STUDY :
This study was conducted to compare the efficacy of crystalloid to colloid preloading in reducing the incidence and severity of spinal induced hypotension

AIM:
The aim of my study was to assess the safety and efficacy of colloid (hydroxyethyl starch) over crystalloid (ringer's lactate) preloading in preventing hypotension following spinal anaesthesia.

OBJECTIVES:
1. To assess if the preloading is beneficial in preventing the adverse haemodynamic changes in abdominal hysterectomy under spinal anaesthesia.
2. To find out the better preloading fluid between colloids and crystalloids.
3. To assess the requirement of vasopressors.

METHODS :
TYPE AND DESIGN OF STUDY :
Randomized prospective study

STUDY POPULATION :
The study population included 60 patients undergoing elective abdominal hysterectomy under spinal anesthesia during november 2018 – August 2019 .

STUDY LOCATION :
MVJ Medical College and Research Hospital

ETHICAL CLEARANCE : Obtained

INCLUSION CRITERIA:
1. Patients undergoing abdominal hystrectomy.
2. Patients belonging to ASA I &II.
3. Patients belonging to age group 18-60years.

EXCLUSIVE CRITERIA:
1. Patients refusing spinal anaesthesia.
2. Patients with cardiac disorders.
3. Patients with skin or soft tissue infection at the site of needle entry and coagulopathy.
4. Any Contraindications to spinal anaesthesia .

SAMPLE SIZE :
With a confidence interval of 90% , and p value of <0.1, the sample size for the current study was calculated to be 60 , with a population of 30 in each group.

METHODOLOGY :
60 patients of ASA I and II posted for Abdominal Hysterectomy are considered for the study after permission from hospital Ethical committee and written informed consent is obtained from every patient. Patients with cardiac disorders, skin or soft tissue infection at the site of needle entry ,coagulopathy and refusing spinal anaesthesia or with any other contraind ications for spinal anaesthesia were excluded from the study . Routine pre-anaesthetic evaluation was done. Relevant investigations were done.

On arrival into operation theatre patients were placed in supine position. Baseline hemodynamic parameters will be noted in both groups.IV line is secured using IV cannula 18G and fixed. Patients were randomly divided into 2 groups of 30 each. Group A – will receive ringer lactate 10ml/kg in 20 minutes before giving SAB. Group B – will receive hydroxyethyl starch, 5ml/kg in 20 minutes, before giving SAB. Immediately after preloading ,under aseptic precautions patients in both groups received 0.5% Bupivacaine (heavy) 3 ml in lateral position at L2-L3 / L3-L4 space for Subarachnoid block. Patients were turned supine and ringers lactate infusion is started .Oxygen was given by facemask at the rate of 4-5L/min. Following spinal anaesthesia mean arterial pressure were recorded at following intervals - 1, 5, 10, 15, 30, 45, 60, 90 minutes and 3 hours after spinal anaesthesia. Rescue medications were recorded if used.

If the systolic blood pressure goes below 30% of the baseline it is taken as hypotension Hypotension was treated with rapid IV fluid infusion and inj. Ephedrine, 6 mg IV. Blood loss was replaced with crystalloids and blood transfusion as required. Patients were observed for nausea, vomiting, rigors, and allergic reaction. Urine output, total fluid requirement and blood loss were recorded at the end of surgery and patients were observed for 1 hour in recovery room postoperatively and PR, NIBP, SPO2 were recorded.

Statistical analysis was performed using ANOVA and chi square test

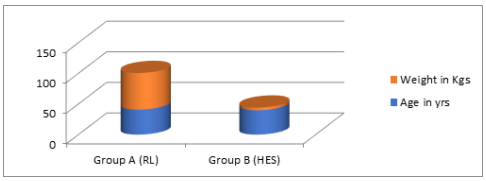
RESULTS:

Table 1 : Demographic characteristics (mean)

Variables	Group A (RL)	Group B (HES)
Age in Yrs	40.8	39.7
Weight in Kg	59.8	57.3

There was no significant difference between two groups before the surgery in regards to mean age and weight.

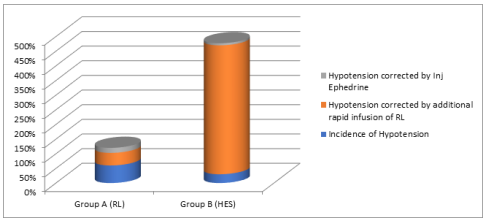
Level of sensory block attained in the both the groups was ≥ T6 and hence was comparable. At the end of surgery level of block was ≤ T8 and was comparable.



Both groups pre-induction blood pressure is noted and is almost similar. However the incidence of hypotension was higher in group A (RL) compared to group B (HES) (60 % vs 30%). (Table 3)

Table 2: Hypotensive episodes and their management

	Group A (RL)	Group B (HES)	p value
Incidence of hypotension	18(60%)	9 (30%)	Not significant
Hypotension corrected by additional rapid infusion of Ringer's lactate	13(43%)	7 (23%)	Not significant
Hypotension corrected by Injection Ephedrine	5(17%)	2 (7%)	p< 0.01



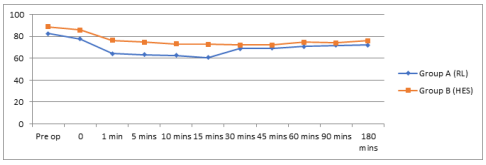


Table : Mean blood pressure (mm of Hg)

Time	Group R	Group H	p value
Pre op	82.57±10.88	88.97 ± 6.80	0.194
0	77.90 ± 8.85	86.05 ±9.38	**0.005**
1 mins	64.47±13.26	76.32±12.39	**0.047**
5 mins	63.20±10.97	74.82±10.15	**0.042**
10 mins	62.70±10.54	73.30±10.53	0.059
15 mins	60.62 ±11.07	72.85±10.97	**0.037**
30 mins	68.97 ±9.90	72.32 ±9.19	0.186
45 mins	69.35 ±8.99	72.12 ±8.42	0.735
60 mins	70.77 ±7.36	74.82 ±8.69	0.759
90 mins	71.90 ±6.68	74.17 ±7.80	0.525
180 mins	72.12 ±6.80	76.02 ±7.43	0.549

The mean arterial pressure was compared among the two groups at the pre-set time intervals for this study. The differences among the two groups were statistically significant at 0 min (p =0.005) , 1 min (p =0.047), 5 min (p = 0.042), & 15 min (p =0.037).

DISCUSSION :

Sympathetic denervation occurs during spinal anaesthesia. In spinal anaesthesia the severity of hypotension depends on the degree of sympathetic blockade. In spinal anesthesia, hypotension is defined as a fall in systolic blood pressure by 30% of the baseline.

Various measures have been tried for prevention of hypotension induced by spinal anesthesia.

1) Preloading
2) Leg compression by inflatable splint
3) Prophylactic use of vasopressors.

All measures have their own limitations. Volume preloading is an effective technique to prevent hypotension induced by spinal anesthesia. Different crystalloid and colloid have been used as preloading fluid for prevention of hypotension induced by spinal anesthesia. In this study this character has been studied by giving Ringer lactate and HES as preloading fluid before giving spinal anesthesia.

We had selected Ringer's lactate as preloading fluid because it is most physiological fluid, its osmolality is similar to plasma and most of the authors have selected it in their studies as preloading fluid . Hydroxyethyl starch (HES) is extensively during resuscitation in polytrauma, critically ill patients in intensive care settings, vascular and orthopedic surgery and in burns and sepsis patients. Its use is contraindicated in patient's with renal failure and in those with known sensitivity to the drug. The incidence of anaphylactic reactions to hydroxyethyl starch is much less than with gelatins and dextrans (0.006%, 0.038% and 0.008% respectively).[7] In terms of cost, performance and low incidence of side effects 6% HES is an adequate alternative to 5% albumin. For the above reasons, we chose 6% HES as our study fluid.

Severe hypotension is defined as mean arterial pressure (MAP) below 30% of base line value. [1]We defined hypotension as a decrease in mean blood pressure of 30% or more from the baseline value. We were not able to completely prevent spinal block induced hypotension by preloading with either 6% HES or Ringer Lactate. But patients who received 6% HES had a much lower incidence of hypotension (12%) as compared to those who received Ringer Lactate (68%). The incidence of hypotension in both the group is less than that reported by other authors' who have shown similar results. Patients who received 6% HES had significantly less number of hypotensive episodes requiring treatment with ephedrine as compared to the patients who had received Ringer Lactate. The first episode of hypotension occurred as early as 5 min after the subarachnoid block in the Ringer lactate group whereas the earliest hypotensive episode in the 6% HES group occurred 10 min after the subarachnoid block.

But in our study the incidence of hypotension between Group A and Group B were 60% vs 30%. Moreover the ephedrine requirements were more in Group A than Group B which was also statistically significant (p value <0.01).

In the study by Sheikh Imran et al 36.4% of patients in HES Group and 63.6% patients in RL Group needed rescue doses of Inj.mephentermine.(4)Hydroxyethyl starch remains longer in the intravascular compartment than any crystalloid solution and is also able to maintain greater colloid osmotic pressure in the maternal circulation. About 75% of any crystalloid given diffuses into the interstitial space and 2.5 to 3 times the volume of crystalloid is needed to achieve the same degree of plasma expansion. Extravascular redistribution of crysta

lloids may be so rapid that it may be impossible to infuse them fast enough to maintain the intravascular volume and avoid hypotension during spinal anaesthesia. We may have been able to reduce the incidence of hypotension by giving larger volumes of crystalloid solutions. But this would have required more time to preload and would have placed both parturient and foetus at a greater risk of fluid overload.

The patients in the 6% HES group required less intravenous fluid intraoperatively as compared to the Ringer Lactate group. There was no significant difference in the amount of fluids received postoperatively between the two groups. The study by Singh et al concluded that administering preload fluid had no beneficial effect in preventing hypotension after spinal anaesthesia. But from the observations in our study, it is clear that preloading with 6% Hydroxyethyl starch is superior to the standard preload to Ringer Lactate in preventing post spinal hypotension.

CONCLUSION:

From the observations in present study, it is concluded that :

1. 6% HES (colloid) is better in volume preloadingwith minimal haemodynamic changes compared to the Ringer Lactate (crystalloids).
2. There was increased requirement of vasopressors when Ringer Lactate (crystalloid) was used and requirement of vasopressors was more when preloading with RL compared to preloading with 6% HES.

REFERENCES :

1. Verma RK. Mishra LD. Nath SS.Efficacy of polygenic preloading in prevention of hypotension following CSEA.Indian J. Anaesthesia 2005;49(2):105-108.
2. Mercier F. Diemunsch.J.P. Bouthors ASD.et.al6% Hydroxyethyl starch (130/0.4) vs Ringer's lactate preloading before spinal anaesthesia for Caesarean delivery:the randomized, double-blind, multicentre CAESAR trial.British Journal of Anaesthesia 2014;113 (3): 459–67 .
3. Singh B, Singh AP,Bhardwaj A, Singh I. C Comparative study of preloading with ringer lactate v/s 6% hexa starch solutions to prevent hypotension following spinal anaesthesia in elective surgery. Int J Med and Dent Sci 2016;5(2):1178-1183.
4. Imran S .Padmanabha S. Rehman H . Sahoo A. A comparative study of preloading efficacy of ringers lactate v/s 6% heta starch solutions in preventing hypotension following spinal anaesthesia.IOSR-JDMS 2014;13(3):43-48.
5. Jalandhara B.Makwana JC .A comparative study of crystalloids and colloids as preloading in spinal anaesthesia for ptrevention of hypotension .GCSMC J MED SCI 2014;III(1) :48-52.
6. Yatish Bevinaguddaiah, Vinayak Seenappa Pujari, Tejesh CA, Manjunath AC. "Volume preloading prior to subarachnoid block: comparison between hetastarch (6%), polygelatin, ringer`s lactate solution". Journal of Evolution of Medical and Dental Sciences 2013; 2(47): 9220-9227.
7. Lund N. Anaphylactoid reactions to infusion of polygelatin. A study in pregnant women. Anaesth 1980;35(7):655-9.