

Original Research Article

TO COMPARE THE VITALS IN CASES UNDER GENERAL ANAESTHESIA WITH FLUID REPLACEMENT USING DEXTROSE CONTAINING FLUIDS AND NONDEXTROSE CONTAINING FLUIDS

Dr. Rakhi Murarka¹ (Asst. Prof) & Dr. Achin Murarka² (Asst. Prof)

Dept. of Anesthesiology, Amaltas Institute of Medical Sciences, Dewas, M.P.¹

Dept. of Orthopaedics, Amaltas Institute of Medical Sciences, Dewas, M.P.²

Corresponding Author: Dr. Achin Murarka

Abstract

Background & Methods: The aim of the study is to compare the vitals in cases under General Anaesthesia with fluid replacement using dextrose containing fluids and nondextrose containing fluids. Patients were randomly allocated into two groups using a computer generated random number chart and sealed envelopes. Group R received 4ml/kg/hr of lactate Ringer's solution, whereas Group D received the same amount of 5% dextrose in 0.45% sodium chloride. Mean arterial Blood pressure, rate, and blood sugar were measured before the operation started, at 5 min, at 15 min, at 30 min, at 45 min, at 60 min, and just before the operation finished.

Results: The mean MAP in the preoperative level in the DNS group was 71.8 ± 5.68 , in the RL group it was 71.37 ± 5.17 . The comparison of mean MAP at the preoperative level among groups was found to be statistically not significant ($p > 0.05$), showing a comparable mean MAP among groups at preoperative level. The comparison among pairs - DNS-RL group was found to be statistically not significant ($p > 0.05$), showing a comparable mean MAP among pairs. The mean MAP at end of surgery in the DNS group was 71.6 ± 5.28 , in the RL group it was 86.83 ± 3.14 and. The comparison of mean MAP at end of surgery among groups was found to be statistically significant ($p < 0.05$), showing a varying mean MAP among groups at end of surgery. The comparison between the pair - DNS-RL group was found to be statistically significant ($p < 0.05$), showing a higher mean MAP in RL group.

Conclusion: Vitals (MAP) were stable in the patients who received Dextrose containing fluid probably because of the reason that they were fasting for >12 hours as well as nourishment was not proper which got improved after supplementation with dextrose containing fluid. DNS has advantage of both 5%- dextrose (to provide energy) and isotonic saline (to provide salt), so DNS is useful to supply major extracellular electrolyte and energy along with fluid to correct dehydration. But vitals were not stable in patients who received RL it may be due to prolonged fasting as well as nourishment was improper

Keywords: anaesthesia, dextrose, nondextrose & fluids.

Study Design: Comparative Study.

1. Introduction

Concern has been expressed that prolonged preoperative fasts can lead to occult hypoglycaemia and it has been recommended that dextrose-containing solutions be administered during surgery to prevent this[1]. This rationale has led to elective surgical

patients at our institution receiving 500 ml of intravenous 5% dextrose in 0.9% normal saline at the start of anaesthesia, followed by further fluid replacement with non-dextrose-containing crystalloids. However, this practice may not be justified, given the capacity for endogenous glucose production in a healthy adult². Coupled with the metabolic response to surgical stress, intravenous dextrose infusion may in fact cause significant hyperglycaemia^[2].

Selection of I.V. fluids, we need to know composition, pharmacological basis of commonly use iv fluids. Available IV fluids vary in their biological and physicochemical properties. Choice of fluid in clinical practice should be guided by an understanding of these differences^[3]. Hemorrheology, hemostasis, vascular integrity, inflammatory cell function, and the magnitude and duration of intravascular volume expansion are influenced to varying degrees by the different fluids^[4].

There are extensive clinical data describing the effects of different solutions on these variables. However, only very limited large-scale studies have been conducted to distinguish among effects of the different classes of fluid on patient outcomes, and the available data are inconclusive. Many of the effects of different fluid solutions are governed by their distribution within the physiological compartments of the body^[5].

The ICF lies within cells and is the principal component of the cytosol/cytoplasm. The ICF makes up about 60 percent of the total water in the human body, and in an average-size adult male, the ICF accounts for about 25 liters (seven gallons) of fluid^[4]. This fluid volume tends to be very stable, because the amount of water in living cells is closely regulated. If the amount of water inside a cell falls to a value that is too low, the cytosol becomes too concentrated with solutes to carry on normal cellular activities; if too much water enters a cell, the cell may burst and be destroyed^[6].

2. Material and Methods

After written informed consent was obtained, we recruited 60 patients aged 18-60 year with ASA physical status I to II, who were scheduled for elective surgery at AIMS, Dewas, M.P. for 01 Year. Patients were excluded from study who opted for regional anesthesia, patients with known systemic disease like diabetes mellitus, renal or hepatic dysfunctions, patient on corticosteroid therapy; patients with cardiac condition like dysarrhythmias, patient on alfablockers and calcium channel blockers, body weight more than 120 kg, known allergy to drug under study. Patients were randomly allocated into two groups using a computer generated random number chart and sealed envelopes. Group R received 4ml/kg/hr of lactate Ringer's solution, whereas Group D received the same amount of 5% dextrose in 0.45% sodium chloride Mean arterial Blood pressure, rate, and blood sugar were measured before the operation started, at 5 min, at 15 min, at 30 min, at 45 min, at 60 min, and just before the operation finished.

Inclusion criteria

1. Age group 18yrs -55yrs
2. A.S.A Grade I and II
3. Patient posted for routine surgeries

Exclusion criteria

1. A.S.A Grade III, IV and V
2. Patient refusal
3. Liver and renal dysfunction

3. Result

Table No. 1: Comparison of mean age among groups

Parameter	Group	No.	Mean \pm SD	F value	P Value
Age	DNS 5% dextrose in .9% normal saline	30	31.13 \pm 10.75	2.104	0.125, NS
	Ringer Lactate	30	36.73 \pm 11.55		

The mean age in the DNS group was 31.13 \pm 10.75 years, in RL group it was 36.73 \pm 11.55. The comparison of mean age among groups was found to be statistically not significant ($p > 0.05$), showing that the mean age was comparable among groups.

Table No. 2: Comparison of mean MAP among groups at different time intervals

Parameter	Group	No.	Mean \pm SD	F value	P Value
Preoperative	DNS	30	31.13 \pm 10.75	2.104	0.125, NS
	RL	30	36.73 \pm 11.55		
At 5 minutes	DNS	30	71.8 \pm 5.68	0.115	0.891, NS
	RL	30	71.37 \pm 5.17		
At 10 minutes	DNS	30	71.17 \pm 5.26	3.703	0.029*
	RL	30	73.7 \pm 5.36		
At 15 minutes	DNS	30	71.03 \pm 4.75	27.851	0.000*
	RL	30	76 \pm 5.39		
At 30 minutes	DNS	30	71.53 \pm 4.83	72.551	0.000*
	RL	30	78.47 \pm 4.38		
At 45 minutes	DNS	30	71.6 \pm 5.63	96.998	0.000*

	RL	30	80.07±5.19		
At 60 minutes	DNS	30	71.5±4.69	177.442	0.000*
	RL	30	82.9±4.18		
At End of Surgery	DNS	30	71.6±5.28	405.816	0.000*
	RL	30	86.83 ± 3.14		

The mean MAP in the preoperative level in the DNS group was 71.8 ± 5.68 , in the RL group it was 71.37 ± 5.17 . The comparison of mean MAP at the preoperative level among groups was found to be statistically not significant ($p > 0.05$), showing a comparable mean MAP among groups at preoperative level. The comparison among pairs - DNS-RL group was found to be statistically not significant ($p > 0.05$), showing a comparable mean MAP among pairs.

At 5 minutes:

The mean MAP at 5 minutes in the DNS group was 71.17 ± 5.26 , in the RL group it was 73.7 ± 5.36 . The comparison of mean MAP at 5 minutes among groups was found to be statistically significant ($p < 0.05$), showing a varying mean MAP among groups at 5 minutes. The comparison among pairs - DNS-RL group was found to be statistically not significant ($p > 0.05$), showing a comparable mean MAP among pairs, showing a higher mean MAP in comparison to the DNS group.

At 15 minutes:

The mean MAP at 15 minutes in the DNS group was 71.03 ± 4.75 , in the RL group it was 76.0 ± 5.39 . The comparison of mean MAP at 15 minutes among groups was found to be statistically significant ($p < 0.05$), showing a varying mean MAP among groups at 15 minutes. The comparison between the pair - DNS-RL group was found to be statistically significant ($p < 0.05$), showing a higher mean MAP in RL group. Comparison between the pair RL-NS was found to be statistically significant ($p < 0.05$), showing a higher mean MAP in RL group.

At 30 minutes:

The mean MAP at 30 minutes in the DNS group was 71.53 ± 4.83 , in the RL group it was 78.47 ± 4.38 . The comparison of mean MAP at 30 minutes among groups was found to be statistically significant ($p < 0.05$), showing a varying mean MAP among groups at 30 minutes. The comparison between the pair - DNS-RL group was found to be statistically significant ($p < 0.05$), showing a higher mean MAP in RL group.

At 45 minutes:

The mean MAP at 45 minutes in the DNS group was 71.6 ± 5.63 , in the RL group it was 80.07 ± 5.19 . The comparison of mean MAP at 45 minutes among groups was found to be statistically significant ($p < 0.05$), showing a varying mean MAP among groups at 45 minutes. The comparison between the pair - DNS-RL group was found to be statistically significant ($p < 0.05$), showing a higher mean MAP in RL group.

At 60 minutes:

The mean MAP at 60 minutes in the DNS group was 71.5 ± 4.69 , in the RL group it was 82.9 ± 4.18 . The comparison of mean MAP at 60 minutes among groups was found to be statistically significant ($p < 0.05$), showing a varying mean MAP among groups at 60 minutes. The comparison between the pair - DNS-RL group was found to be statistically significant ($p < 0.05$), showing a higher mean MAP in RL group.

At the End of Surgery:

The mean MAP at end of surgery in the DNS group was 71.6 ± 5.28 , in the RL group it was 86.83 ± 3.14 and. The comparison of mean MAP at end of surgery among groups was found to be statistically significant ($p < 0.05$), showing a varying mean MAP among groups at end of surgery. The comparison between the pair - DNS-RL group was found to be statistically significant ($p < 0.05$), showing a higher mean MAP in RL group.

4. Discussion

Hiroko Fujino et al [7] (2014) also conducted a randomized controlled trial in Twenty-two patients of ASA grade I-II to investigate the effect of intra-operative administration of low-dose glucose on the post-operative insulin resistance. Concluded that Intra-operative small-dose of glucose administration may suppress ketogenesis and attenuate the post-operative insulin resistance without causing hyperglycemia.

Swamy M N et al. [8] (2001) conducted a randomized controlled trial in 52 neurosurgical patients, 32 patients received alternately 500 ml of 5% dextrose in normal saline and Ringer's lactate (DNS/RL Group) and 18 patients received alternately 500 ml of Ringer's lactate and normal saline (RL/NS Group). Blood glucose concentrations were determined at the end of each unit of fluid, until the patient received 4 units of fluid. They concluded that, the DNS/RL regimen maintains blood glucose levels within acceptable limits while avoiding the risk of hyperglycaemia. Withholding glucose completely, lowers blood glucose levels, but carries a risk of hypoglycaemia in some patients.

Mane AS et al [9](2017) conducted a randomized controlled trial in 26 patients divided randomly into two groups Group I receiving Normal Saline and Group II receiving RL. concluded that, Ringer Lactate was found to be superior to Normal saline for fluid resuscitation because Normal saline had vasodilator effects with the increase in serum potassium levels and risk of metabolic acidosis. Although there were no significant differences found in the clinical outcomes, duration of admission and hospitalization between patients resuscitated with Normal Saline and Lactate Ringer solution.

A randomized controlled trial in Twenty-two patients of ASA grade I-II, concluded that Intraoperative infusion of acetated Ringer solution containing glucose and ionized magnesium is beneficial because it reduces ketogenesis and maintains serum magnesium and no supplementation of glucose during surgery causes an increase in gluconeogenesis and a decrease of glycogenolysis due to the decrease of glycogen in patients. In addition, increase of lactate and pyruvate at the third measurement in the C group might reflect increase of metabolism of endogenous glucose produced by gluconeogenesis [10-11].

5. Conclusion

Vitals (MAP) were stable in the patients who received Dextrose containing fluid probably because of the reason that they were fasting for >12 hours as well as nourishment was not proper which got improved after supplementation with dextrose containing fluid. DNS has advantage of both 5%- dextrose (to provide energy) and isotonic saline (to provide salt), so DNS is useful to supply major extracellular electrolyte and energy along with fluid to correct dehydration. But vitals were not stable in patients who received RL it may be due to prolonged fasting as well as nourishment was improper

6. References

1. Jonathan H. Waters, Alexandru Gottlieb, Peter Schoenwald, Marc J. Popovich, Juraj Sprung, and David R. Nelson. Normal Saline Versus Lactated Ringer's Solution for Intraoperative Fluid Management in Patients Undergoing Abdominal Aortic Aneurysm Repair: An Outcome Study. *AnesthAnalg* 2001;93:817–22.
2. Chin KJ, Macachor J, Ong KC, Ong BC. A comparison of 5% dextrose in 0.9% Normal saline versus non-dextrose containing crystalloids as the initial intravenous replacement fluid in elective surgery. *Anaesth Intensive Care* 2006; 34:613-617.
3. Takeshi Yokoyama, Kunio Suwa, Fumiyasu Yamasaki, Reiko Yokoyama, Koichi Yamashita, Eva Selldén. Intraoperative infusion of acetated Ringer solution containing glucose and ionized magnesium reduces ketogenesis and maintains serum magnesium. *Asia Pac J Clin Nutr* 2008;17 (3):525-529.
4. Saringcarinkul A, Kotrawera K. Plasma glucose level in elective surgical patients administered with 5% dextrose in 0.45% NaCl in comparison with those receiving lactated Ringer's solution. *J Med Assoc Thai.* 2009 Sep;92(9):1178-83.
5. Khetarpal R, Chatrath V, Kaur J, Bala A, Singh H. Impact of different intravenous fluids on blood glucose levels in nondiabetic patients undergoing elective major noncardiac surgeries. *Anesth Essays Res* 2016;10:425-31.
6. Sümpelmann R, Mader T, Dennhardt N, Witt L, Eich C, Osthaus WA. A novel isotonic balanced electrolyte solution with 1% glucose for intraoperative fluid therapy in neonates: results of a prospective multicentre observational postauthorisation safety study (PASS). 2011 Nov;21(11):1114-8. doi: 10.1111/j.1460-9592.2011.03610.x. Epub 2011 May 13.
7. Swamy M N, Murthy H S, Rao G S. Intraoperative blood glucose levels in neurosurgical patients: an evaluation of two fluid regimens. *Neurol India* 2001;49:371.
8. D. Orbegozo Cortes, A. Rayo Bonor and J. L. Vincent. Isotonic crystalloid solutions: a structured review of the literature. *British Journal of Anaesthesia.* 2014;112(6):968–81.
9. Hiroko Fujino, Shoko Itoda, Kanako Esaki, Masanori Tsukamoto, Saori Sako, Kazuki Matsuo et al. Intra-operative administration of low-dose IV glucose attenuates post-operative insulin resistance. *Asia Pac J Clin Nutr* 2014;23(3):400-407.
10. Mane AS. Fluid resuscitation: ringer lactate versus normal saline-a clinical study. *International Journal of Contemporary Medical Research* 2017;4(11):2290-2293.