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RESEARCH ARTICLE

A COMPARATIVE STUDY OF BIOCHEMICAL PARAMETERS AND ELECTROLYTES IN PATIENTS UNDERGOING MAJOR ABDOMINAL AND GYNAECOLOGICAL SURGERIES

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ABSTRACT

To compare Biochemical Parameters and Electrolytes in patients undergoing major abdominal & gynaecological surgeries. 60 patients of either gender of ASA grade I and II scheduled for abdominal & gynaecological surgeries in 9 months durations at AIIMS, Rishikesh were recruited for the study. Patients were divided into 2 groups. Group I was conventional ('traditional practice') intravenous fluid group in which balanced salt solution was given as 10 mL/kg bolus followed by 8 mL/kg/hour as infusion until the end of surgery. Group II was restrictive ('zero balance') intravenous fluid group in which balanced salt crystalloid at 5 mL/kg/hour as infusion was administered until the end of surgery. Parameters studied were weight, height, BMI, blood urea level, serum creatinine, serum cystatin C levels, serum sodium, serum potassium, serum chloride and eGFR level. Mean age of patients in group I was 47.7 years and in group II was 47.6 years. The mean weight was 54.7 Kgs in group I and 57. Kgs in group II. The mean height was 162.2 cms in group I and 162.6 cms in group II. The mean BMI was 15.1 kg/m2 in group I and 16.04 kg/m2 in group II. The difference found to be non- significant (P> 0.05). Restricted fluid therapy resulted in an increased risk of renal injury as depicted by higher increase in cystatin C levels and resultant fall in estimated GFR.

KEYWORDS

fluid therapy, cystatin C, abdominal, gynaecological surgeries

1. INTRODUCTION

Among various surgical procedures, gynaecological and abdominal surgeries are routinely employed. Nowadays, these procedures are performed with minimum patient discomfort, marked reduced complications with better hemodynamic stability (Semler et al., 2017). Other factors such as vasodilation resulting from anesthesia, hemorrhage and fluid accumulation in extravascular spaces and to improve tissue oxygen delivery and preserve urine output are of paramount importance (Chowdhury et al., 2012). In these patients, fluid replacement is essential to maintain hemodynamic stability. In this regard, intravenous (I.V.) fluid administration and introduction of medications are important one. Management of fluid during surgical procedure is a challenge (Chowdhury et al., 2014). It is found that intravenous fluid administration is performed with crystalloids. It is performed in connection to dehydration occurring preoperatively, instability of circulation with regional anaesthesia as well as general anaesthesia, insufficient supply of oxygen to tissues, needless blood transfusion and low urine output (Futier et al., 2010).

There are series of events in kidney to normalize plasma osmolality through water excretion as a response to fluid intake. When shifting to restricted fluid therapy, the urine produced by kidneys is more concentrated in nature in order to reduce availability of water (Cobo et al., 2011). As a result, kidney generates and keeps an osmotic gradient that becomes increasingly concentrated from the cortex to the medulla (Malbrain et al., 2015). The Henle's loops and collecting ducts of kidneys maintains its osmotic gradient and permits for reabsorption of the major part of H_2O that passes through the kidney (Yunos et al., 2012). Considering this we attempted present study to compare hemodynamic parameters in patients undergoing major abdominal & gynaecological surgeries.

2. METHODOLOGY

A sum total of 60 patients of either gender of ASA grade 1 and 2 scheduled for abdominal & gynaecological surgeries in 9 months durations at AIIMS, Rishikesh were selected for the study. All enrolled patients were informed in their vernacular language and a valid written consent was taken from all. Approval from the ethical committee was obtained. Patients were randomly allocated into 2 groups. Each containing 30 patients. Group 1 was conventional ('traditional practice') intravenous fluid group in which balanced salt solution was given as 10 mL/kg bolus followed by 8 mL/kg/hour as infusion until the end of surgery. Group 2 was restrictive ('zero balance') intravenous fluid group in which balanced salt crystalloid at 5 mL/kg/hour as infusion was administered until the end of surgery. Parameters studied were weight, height, BMI, blood urea level, serum creatinine, serum cystatin C levels, serum sodium, serum potassium, serum chloride and eGFR level. Results thus obtained were studied and compared in both groups. P value less than 0.05 was considered significant.

3. RESULTS

Table 1: Distribution of patients

Groups	Group 1	Group 2
Method	Conventional intravenous fluid group	Restrictive intravenous fluid group
M:F	9:21	15:15

There were 9 male and 21 females in group 1 and 15 males and females in group 2 (Table 1).

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Table 2: Comparison of parameters			
Groups	**Group 1**	**Group 2**	**P value**
Age (years)	47.7	47.6	>0.05
Weight (Kgs)	54.7	57.1	>0.05
Height (cm)	162.2	162.6	>0.05
BMI (kg/m2)	15.1	16.04	>0.05

Mean age of patients in group 1 was 47.7 years and in group 2 was 47.6 years. The mean weight was 54.7 Kgs in group 1 and 57. Kgs in group 2. The mean height was 162.2 cms in group 1 and 162.6 cms in group 2. The mean BMI was 15.1 kg/m2 in group I and 16.04 kg/m2 in group 2. The difference found to be non- significant (P> 0.05) (Table 2, graph 1).

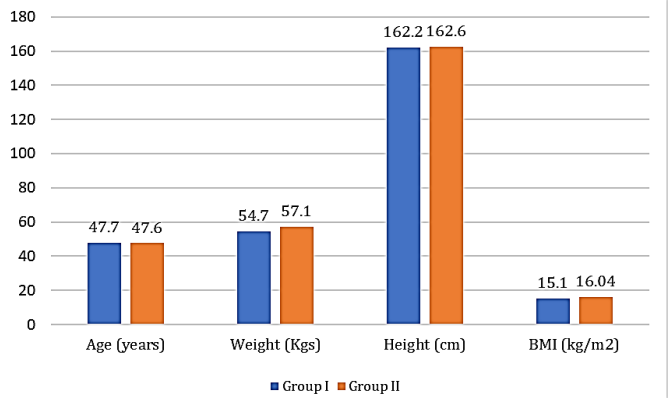
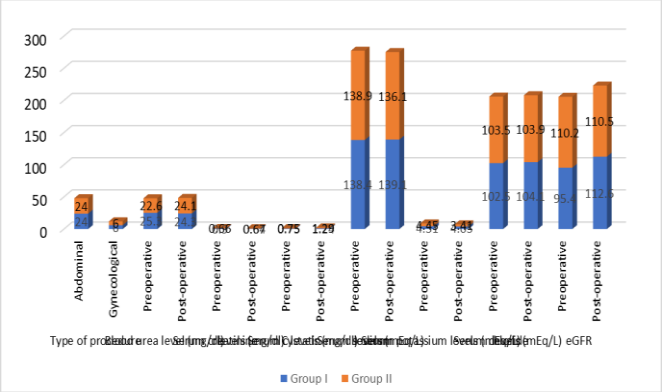


Table 3: Other parameters				
Parameters	**Variables**	**Group 1**	**Group 2**	**P value**
Type of procedure	Abdominal	24	24	>0.05
	Gynecological	6	6	
Blood urea level (mg/dl)	Preoperative	25.3	22.6	>0.05
	Post-operative	24.3	24.1	
Serum creatinine levels (mg/dl)	Preoperative	0.90	0.66	>0.05
	Post-operative	0.64	0.67	
Serum cystatin C levels (mg/dl)	Preoperative	0.75	0.75	<0.05
	Post-operative	1.24	1.29	
Serum sodium levels (mEq/L)	Preoperative	138.4	138.9	>0.05
	Post-operative	139.1	136.1	
Serum potassium levels (mEq/L)	Preoperative	4.31	4.45	<0.05
	Post-operative	4.05	3.41	
Serum chloride levels (mEq/L)	Preoperative	102.5	103.5	>0.05
	Post-operative	104.1	103.9	
eGFR	Preoperative	95.4	110.2	<0.05
	Post-operative	112.6	110.5	

Type of procedure was abdominal seen in 24 in both groups and gynecological in 6 in both groups. Preoperative blood urea level was 25.3 mg/dl in group 1 and 22.6 mg/dl in group 2 and post-operative 24.3 mg/dl in group 1 and 24.1 mg/dl in group 2. Preoperative serum creatinine levels was 0.90 mg/dl in group 1 and 0.66 mg/dl in group 2 and post-operative 0.64 mg/dl in group 1 and 0.66 mg/dl in group 2. Preoperative serum cystatin C levels was 0.75 mg/dl in group 1 and 0.75 mg/dl in group 2 and post-operative 1.24 mg/dl in group 1 and 1.29 mg/dl in group 2. Preoperative serum sodium levels was 138.4 mEq/L in group 1 and 1.38.9 mEq/L in group 2 and post-operative 139.1 mEq/L in group 1 and 136.1 mEq/L in group 2. Preoperative serum potassium levels was 4.31 mEq/L in group 1 and 4.45 mEq/L in group 2 and post-operative 4.5 mEq/L in group 1 and 3.39 mEq/L in group 2. Preoperative serum chloride levels was 102.5 mEq/L in group 1 and 103.5 mEq/L in group 2 and post-operative 104.1 mEq/L in group 1 and 103.9 mEq/L in group 2. Preoperative eGFR levels was 95.4 in group 1 and 110.2 in group 2 and post-operative 112.6 in group 1 and 110.5 in group 2 (Table 3, graph 2).

Graph II



4. Discussion

According to estimate, about 310 million patients undergo major surgery all over the world. These includes abdominal surgery, gynaecological, renal, limb surgeries etc (Mybursh and Mythen, 2013; Padhi et al., 2013). The importance of intravenous fluid administration has increased in the past few years (Langer et al., 2018; Malbrain et al. 2018). The use of perioperative intravenous fluids to correct for preoperative fasting and other fluid deficits is of great importance (Van Regenmortel et al., 2017; Perner et al., 2012). We attempted present study to compare hemodynamic parameters in patients undergoing major abdominal & gynaecological surgeries. In our study we classified 60 patients into 2 groups of 30 each. Group I was conventional intravenous fluid group and group II was restrictive intravenous fluid group. There were 9 male and 21 females in group I and 15 males and females in group 2. Some researchers in their study on 107 patients compared intraoperative fluid management in patients who received high and low amounts of Ringer lactate solution (Matot et al., 2012). It was found that low urine outputs were seen in the high-volume group as compared to low-volume group. Low-volume group had significantly less complications as compared to high-volume group.

The results of the study suggested that the common practice to administer intraoperative fluids in response to low urine output should be reconsidered. We found that the mean age of patients in group 1 was 47.7 years and in group 2 was 47.6 years. The mean weight was 54.7 Kgs in group 1 and 57. Kgs in group 2. The mean height was 162.2 cms in group I and 162.6 cms in group 2. The mean BMI was 15.1 kg/m2 in group I and 16.04 kg/m2 in group II. A group researchers conducted a study on 240 patients undergoing elective gastrointestinal surgery (Kalyan et al., 2013). 121 patients received restricted regimen and 119 liberal regimens. Both groups exhibited non- significant difference in complications. The mean hospital stay was 8 days in the controls and 8 days in restricted fluids group.

There was difference in weight change, serum sodium, osmolality and

urine: serum osmolality ratio between the group. It was observed in our study that type of procedure was abdominal seen in 24 in both groups and gynecological in 6 in both groups. Preoperative blood urea level was 25.3 mg/dl in group 1 and 22.6 mg/dl in group 2 and post-operative 24.3 mg/dl in group 1 and 24.1 mg/dl in group 2. Preoperative serum creatinine levels was 0.90 mg/dl in group 1 and 0.66 mg/dl in group 2 and post-operative 0.64 mg/dl in group 1 and 0.66 mg/dl in group 2. Preoperative serum cystatin C levels was 0.75 mg/dl in group 1 and 0.75 mg/dl in group 2 and post-operative 1.24 mg/dl in group 1 and 1.29 mg/dl in group 2. Gao et al[16] in their study on 179 patients received either restricted fluid regimen and the standard fluid regimen (Gao et al., 2012). There were fewer postoperative complications in restricted therapy than standard therapy group. They also noted that better preserved cellular immunological function correlated with a reduced perioperative complications rate.

We observed that mean preoperative serum sodium levels was 138.4 mEq/L in group 1 and 1.38.9 mEq/L in group 2 and post-operative 139.1 mEq/L in group I and 136.1 mEq/L in group 2. Preoperative serum potassium levels was 4.31 mEq/L in group 1 and 4.45 mEq/L in group 2 and post-operative 4.5 mEq/L in group 1 and 3.39 mEq/L in group 2. Preoperative serum chloride levels was 102.5 mEq/L in group 1 and 103.5 mEq/L in group 2 and post-operative 104.1 mEq/L in group 1 and 103.9 mEq/L in group 2. Preoperative eGFR levels was 95.4 in group 1 and 110.2 in group 2 and post-operative 112.6 in group 1 and 110.5 in group 2. Abraham-Nordling in their study 79 patients received restrictive and 82 patients received standard intraoperative fluid therapy (Abraham-Nording et al., 2012). There were 39.2% complications in restricted group and 57.3% in standard group. Vasopressor's need was significantly higher in the restricted group (97%) as compared to standard group (80%).

5. Conclusion

Restricted fluid therapy resulted in an increased risk of renal injury as depicted by higher increase in cystatin C levels and resultant fall in estimated GFR.

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