

A Prospective Assessment of the Alterations in Serum Potassium Levels during Post Op Exploratory Laparotomy

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Abstract

Aim: The present study was conducted for assessing the alterations in serum potassium levels during post op exploratory laparotomy.

Methods: The present study was conducted in the department of general surgery of the Fort U Mediemergency Hospital, Patna, Bihar, India and it included assessment of alterations in serum potassium levels during postoperative exploratory laparotomy. A total of 60 subjects who underwent explorative laparotomy were enrolled in the present study.

Results: In the present study, a total of 60 patients who underwent exploratory laparotomy were included. Mean age of the patients was 58.4 years. 66.66 percent of the patients were males while the remaining were females.(Table 1) Mean potassium levels at Baseline (before starting of surgery), One day after surgery, Three days after surgery and Seven days after surgery were found to be 4.50 mEq/L, 5.60 mEq/L, 4.55 mEq/L and 4.40 mEq/L respectively. A significant reduction in the potassium levels during the initial postoperative phase was seen followed by a significant rise; thereby returning to normal value 1 week postoperatively.

Conclusion: We concluded that the significant rise in the potassium levels occur after exploratory laparotomy, followed by restoration to normal values by the end of first postoperative week.

Keywords: Potassium, exploratory, laparotomy, post-operative

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Introduction

With the increasing proportion of elderly in the Western world, there is a rise in patients needing surgical care including emergency abdominal surgery. [1,2] While acute abdominal surgery can be lifesaving,

it carries a considerable risk of postoperative morbidity and mortality. [3-6]

Sodium as a major extra cellular ion is of primary importance is reflecting changes

of water and electrolytes status in the body. [7] Postoperative hyponatremia and its relative complications can occur after any surgical procedure, particularly in elderly patients. The early symptoms can be mild which if not recognized on time, can progress to severe neurological manifestations and can even prove fatal to patients. The early warning is most of the time taken as normal post-operative sequelae resulting in increasing morbidity and mortality in patients with hyponatremia. The treatment is simple and in most cases, the early complications can be reversed by infusing sodium containing solutions. [8]

Numerous factors cause potassium disturbances after abdominal surgery, especially in critically ill patients receiving intensive care therapy, including insufficient potassium intake, excessive potassium discharge, hypermetabolism, concomitant acute kidney injury, and therapy related factors. [9-11] Continuous renal replacement therapy (CRRT) is one of the most important methods to maintain electrolyte homeostasis of critically ill patients with or without kidney injury. [12,13] One of the fundamental goals of the CRRT is to maintain blood potassium levels within a normal range. It is relatively easy to avoid hyperkalemia or hypokalemia, diagnosed according to the classical standard, in the clinical setting when patients are receiving CRRT. [14] However, regarding optimized treatment, maintaining reasonable blood potassium levels to support the postoperative recovery of gastrointestinal motility is the current concern for clinicians. Unfortunately, there are very few reports studying this crucial clinical problem, and the rational goal of blood potassium levels during CRRT remains unclear to date.

Post-operative potassium metabolism has long been the focus of research. Numerous studies have demonstrated that hypokalemia is an independent risk factor for post-operative complications. In

clinical settings, pre-existing hypokalemia is frequently detected via initial serum potassium measurement at hospital admission, which usually results in considerable delay of elective laparotomy. The etiology of hypokalemia is far beyond such common causes as insufficient intake or excessive discharge of potassium. Postoperative supplementary potassium has recently been demonstrated to accelerate the recovery of gastrointestinal function; however, supplementation is rarely given in the pre-hospital period. [15,16] Hence; the present study was conducted for assessing the alterations in serum potassium levels during post op exploratory laparotomy.

Materials & Methods

The present study was conducted in the department of general surgery of the Fort U Mediemergency Hospital, Patna, Bihar, India and it included assessment of alterations in serum potassium levels during postoperative exploratory laparotomy.

Methodology

A total of 60 subjects who underwent explorative laparotomy were enrolled in the present study. Hypertensive patients, diabetic patients and patients with history of any other systemic illness were excluded from the present study. Complete demographic and clinical details of all the patients were recorded. A Performa was made and all the relevant data of all the subjects was recorded. Physical and general examination of all the subjects was carried out. Collection of 2 cc of blood volume was done at preoperative time, one the day of surgery and on postoperative days of surgery.

Statistical analysis

All the samples were sent to laboratory where autoanalyzer was used for assessment of serum potassium levels. All the results were recorded in Microsoft

excel sheet and were analysed by SPSS software.

Results

Table 1: Demographic distribution of patients

Sex	No. of patients = 60	Percentage
Males	40	66.66
Females	20	33.34
Age in years		
<40	8	13.33
41-50	12	20
51-60	15	25
>60	25	41.67
Area		
Rural	35	58.33
Urban	25	41.67

Table 2: Mean potassium levels

Parameter	Mean potassium levels
Baseline (before starting of surgery)	4.50 mEq/L
One day after surgery	5.60 mEq/L
Three days after surgery	4.55 mEq/L
Seven days after surgery	4.40 mEq/L

Table 3: Comparison of potassium levels

Group Versus Group		t-value	p- value
Baseline	One day after surgery	-1.750	0.00
	Three days after surgery	-1.455	0.002
	Seven days after surgery	-2.650	0.004
	Three days after surgery	-3.128	0.03
	Seven days after surgery	-1.480	0.00
Three days after surgery	Seven days after surgery	-2.740	0.62

In the present study, a total of 60 patients who underwent exploratory laparotomy were included. Mean age of the patients was 58.4 years. 66.66 percent of the patients were males while the remaining were females.(Table 1) Mean potassium levels at Baseline (before starting of surgery), One day after surgery, Three days after surgery and Seven days after surgery were found to be 4.50 mEq/L, 5.60

mEq/L, 4.55 mEq/L and 4.40 mEq/L respectively. A significant reduction in the potassium levels during the initial postoperative phase was seen followed by a significant rise; thereby returning to normal value 1 week postoperatively.

Discussion

Electrolyte homeostasis, particularly the blood potassium level, is crucial for normal gastrointestinal function.

Maintenance of blood potassium concentrations at a sufficient level is the cornerstone of stable transmembrane potential that permits normal muscle function, including gastrointestinal motility. [17] In the general population, the regular range for serum potassium levels is typically between 3.5 and 5.3 mmol/L, whereas the optimal range of potassium concentration in patients differs. For example, several studies indicated that a blood potassium level relatively higher than the normal blood potassium range was associated with low incidence of all-cause mortality in hemodialysis patients. [18-20]

Patients undergoing abdominal surgery develop episodes of impaired gastrointestinal motility and even postoperative ileus. Prolonged gastrointestinal paralysis after surgery may result in longer hospital stays and increased medical costs. Electrolyte homeostasis, particularly the blood potassium level, is very important for postoperative recovery of gastrointestinal function. Several studies suggested that hypokalemia was an independent risk factor for postoperative complications, including delayed recovery of gastrointestinal motility, while sufficient potassium supplementation might accelerate recovery of gastrointestinal function. [21,22]

In the present study, a total of 50 patients who underwent exploratory laparotomy were included. Mean age of the patients was 58.4 years. 66.66 percent of the patients were males while the remaining were females. Mean potassium levels at Baseline (before starting of surgery), One day after surgery, Three days after surgery and Seven days after surgery were found to be 4.50 mEq/L, 5.60 mEq/L, 4.55 mEq/L and 4.40 mEq/L respectively. A significant reduction in the potassium levels during the initial postoperative phase was seen followed by a significant rise; thereby returning to normal value 1

week postoperatively. Variable results have been reported in past literature in this context. Guanzhen Lu et al. evaluated the significance of pre-hospital and post-operative serum potassium level monitoring and hypokalemia intervention in laparotomy patients with hypokalemia. A total of 118 laparotomy patients with hypokalemia were randomly divided into an intervention group (N = 60) and a control group (N = 58). Average serum potassium levels at admission, time period of drinking, and time of first bowel sound after laparotomy differed significantly ($p < 0.001$) between the two groups. Average serum potassium levels, first time of defecation, urination, and ambulation at 24 h and 48 h post-operation differed significantly ($p < 0.05$) between the two groups. An optimal pathway of serum potassium monitoring not only saves limited ward space but also allows for early correction of hypokalemia in patients undergoing laparotomy. [16]

In the present study, a significant reduction in the potassium levels during the initial postoperative phase was seen followed by a significant rise; thereby returning to normal value 1 week postoperatively. Our results were in concordance with the results obtained by previous authors. Nausheen N et al. studied serum electrolyte changes in post-operative cases (patients undergoing Exploratory Laparotomy) and to study which serum electrolyte is markedly changed in post-operative patients. Their study showed significant changes in serum electrolyte in postoperative period. [23,24]

Conclusion

We concluded that the significant rise in the potassium levels occur after exploratory laparotomy, followed by restoration to normal values by the end of first postoperative week. A transient significant rise in the potassium levels occur after exploratory laparotomy, followed by restoration to normal values by the end of first postoperative week. The

study also emphasized that early recognition and identification of the early warnings of hypokalemia is necessary to avoid risk of development of associated adverse events.

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