



CLINICAL STUDY ON SERUM ELECTROLYTE LEVEL CHANGES IN OPERATED CASES OF ILEOSTOMY

General Surgery

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ABSTRACT

Maintenance of normal fluid-electrolyte balance is desirable for maintenance of homeostasis. Electrolyte imbalance may be intra or extracellular among which serum electrolyte are readily measured. Their loss through skin, kidney and bowel has been studied, but less is known about their excretion through artificially created stoma of the bowel. In this study, we estimated serum sodium and potassium on post-operative day 3, 7 and 10. Study was conducted on 50 patients admitted in department of Surgery, Mahatma Gandhi Medical college and hospital, Jaipur (Rajasthan) India who undergone ileostomy creation. It was observed that stoma output in patients undergone ileostomy with resection of bowel was higher on post-operative day 7 as compared to post-operative day 3. Serum sodium and potassium level showed significant decrease on post-operative day 3, so they should be closely monitored for electrolyte derangement and resuscitated aggressively in early post-operative periods.

KEYWORDS

INTRODUCTION

Maintenance of normal fluid electrolyte balance is desirable for maintenance of homeostasis. Electrolyte imbalance may be intra or extracellular among which serum electrolyte are readily measured. Usually an excess loss of fluid and/ or electrolytes occurs through GIT, respiration, skin, kidney and other process of elimination like vomiting, fistulas, third space sequestration and surgically created ileostomy and colostomy. The amount and electrolyte changes of the ileostomy output depends upon site of ileostomy, duration after ileostomy formation, and amount and content of oral intake. Stoma output is highly significant in patients having ileostomy with partial resection of ileum and least with colostomy. When the amount of stoma output is around 500 ml or less, it is low volume stoma. When the volume of stoma output is 1 litre, it is a high volume stoma. Patients with high stoma output are prone to salt and water depletion, especially when there is association with resection of significant length of ileum.

Potassium is the main intracellular and sodium is the main extracellular ion. Sodium is the predominant molecule that controls water movement in and out of the vascular system and is vital for homeostasis and the action potential in the body. Small changes in the serum reflect large intracellular changes that may cause significant morbidity and mortality.

In our study we estimated serum sodium (Na⁺) and potassium (K⁺) level in ileostomy patient on post-operative day 3, 7 and 10.

II. AIMS AND OBJECTIVES

To evaluate the serum electrolyte changes in operated cases of ileostomy on post-operative day 3rd, 7th and 10th.

III. MATERIALS AND METHODS

It is a randomised prospective observational study of fluid and electrolyte changes in ileostomy cases-

- Study area: Department of General Surgery of Mahatma Gandhi Medical College and Hospital, Jaipur, Rajasthan, India.
- Study population-Patients who are admitted in surgical ward of Mahatma Gandhi Medical College and Hospital, Jaipur and operated on, in which ileostomy is done with or without partial resection of ileum.
- Study period- July 2022- January 2023
- Sample size- 50 consecutive patients following inclusion and exclusion criteria
- Sample design-Patients who are admitted to the MGMC&H and undergone ileostomy and colostomy.

Inclusion Criteria-

- All patients undergoing ileostomy construction with or without resection of bowel and have follow up for 1-1½ months.
- No sex bar.
- No age bar.
- Patients with written informed consent.

Exclusion Criteria-

- Patient who refused to consent.
 - Known co-morbidities as example renal or respiratory failure.
 - End stage liver disease.
 - Age group less than 12 years.
- Study design- Prospective randomized observational study.
 - Study technique- 50 patients admitted in the Surgery department of MGMC&H and undergone ileostomy creation during the study period of 6 months were included in this study randomly after taking proper consent and counselling and evaluated clinically by amount of stoma output and special investigation (serum electrolytes: sodium, potassium).

Serum electrolyte changes were estimated in patients undergone ileostomy on postoperative day 3, 7 and 10 and these data are statistically evaluated.

IV. RESULTS

Table 1 reveals that the maximum number of patients were in 25-49 years age group i.e 29

Age(years)	No. of patients
<25	9
25-49	29
50-80	12
Total	50

Table 2 reveals that male patients were affected more.

Sex	No. of patients
Male	35
Female	15
Total	50

Table 3: Case distribution according to diagnosis

Diagnosis	No. of Cases	Percentage
1. Perforation peritonitis	30	60%
a) Enteric fever	20	66.6%
b) Tubercular perforation	3	10%
c) Acute appendicitis with ileal/cecal perforation	2	6%
d) Blunt trauma abdomen	1	3.3%
e) Non specific	4	3.33%
2. Intestinal obstruction	20	40%
a) Malignancy	4	20%
b) Sigmoid volvulus	4	20%
c) Tubercular stricture	2	10%
d) Adhesion	3	15%
e) Band	2	10%
f) Internal hernia	2	10%
g) Ileocaecal volvulus	1	5%
h) Mesenteric ischemia	1	5%
I) Foreign body	1	5%

Table 3: The majority of patients who underwent ileostomy were of perforation peritonitis 30(60%), enteric fever being the most common cause.

20 patients presented with intestinal obstruction, out of these 4 cases had malignancy, 2 cases had tubercular stricture and 3 had adhesion and 2 had band and 2 had internal hernia and 1 case of ileocecal volvulus and 1 case of mesenteric ischemia and 1 case of foreign body.

Table 4: Post-operative stoma output (in ml)

Post operative day	All ileostomy patients	Ileostomy + no resection of small intestine	Ileostomy + resection of small intestine
3rd day	440 (N=40)	380 (N=30)	510 (N=10)
7th day	540 (N=45)	470 (N=30)	650 (N=15)

Table 4: The average daily quantity of stoma output in all patients on 3rd post-operative day was 440ml and on the 7th post-operative day the amount was 540ml.

The average stoma output in patients having no resection of small bowel was 380 ml and 470 ml on the 3rd and 7th post-operative day respectively.

The average stoma output in patients with resection of small bowel was 510ml and 650ml on the 3rd and 7th postoperative days respectively.

Stoma output of patients without any resection of small intestine shows a significant lower amount on the 3rd post operative day ($p<0.05$) and a highly significant lower amount on the 7th post operative day ($p<0.001$).

Table 5: Distribution according to the stoma output (ml) and procedure done-

Operation Procedure	Day 3			Day 7		
	<500	500-1000	>1000	<500	500-1000	>1000
All Ileostomy	10/04 (%)	18/36(N)	0	24/48(N)	20/22(N)	0
Ileostomy with no resection of small bowel	22/44 (%)	4/12(N)	0	20/40(N)	8/24(N)	0
Ileostomy with resection of small bowel	10/20 (%)	13/24(N)	0	4/8(N)	14/20(N)	0

Table 6: Comparison of serum sodium (mmol/lit.) in ileostomy patient-

Patient group		3 rd post-operative day	7 th post-operative day	10 th post-operative day
All Ileostomy patients	Stomy	132.84	134.80	135.36
	with resection of bowel	129.18	132.27	135.36
Ileostomy +No resection of bowel	Small	135.71	136.78	140.71
	Small			

Table7: Comparison of serum potassium (mmol/lit) in ileostomy patient-

Patient group		3 rd post-operative day	7 th post-operative day	10 th post-operative day
All Ileostomy patient		3.26	3.36	3.38
	Ileostomy with resection of small bowel	2.88	3.09	3.09
Ileostomy with no resection of small bowel		3.55	3.58	3.62

Table5: A lower reading of Stoma output was found in patients on post-operative day 3 irrespective of bowel resection.

Table 6 : The value of serum sodium ranges 132-137mmol/L on post-operative day 3, 134-137mmol/l on post-operative day 7 and 137-145mmol/l on post-operative day 10, lowered value found on post-operative day 3.

Table 7: The value of serum potassium ranges 3.1-3.6 on post-operative day 3, 3.3 to 3.6 on post-operative day 7 and 3.3 to 3.8 on post-operative day 10, lowered value found on post-operative day 3.

V. DISCUSSION

Stoma surgeries are the lifesaving procedures in emergency conditions and decreases the mortality in devastating situations.

The age of the patients in the study was in the range of 18-76 years, most of the patients in our study (58%) were in 25-49 years age group.

The majority of patients who underwent ileostomy were of perforation peritonitis 60%(enteric fever being the most common cause, followed by Tubercular and other causes) and intestinal obstruction (42%), and intestinal obstruction with peritonitis (20%). No cases of Crohns' disease and ulcerative colitis or diverticulitis were seen.

It is in contrast to the study of A.O. Wilson, where most of the patients were of Crohns' disease(mean age 41 years) and ulcerative colitis(mean age 38 years) who were operated for ileostomy[4].

In the study of Abbot, WE, most patients were elderly (above 70 years) and ostomies were created for cancer (33%), IBD (21%), diverticulitis (14.9%) and only 2.3% for perforative peritonitis. In our study, there were only 4 cases (8%) of malignancy and 24 (48%) cases were of the perforative peritonitis, which underwent stoma creation[5].

Quantity Of Daily Stoma Output In Postoperative Period:

In the previous studies the volume of daily ileostomy output was reported in the range of 200-500ml (Fowler DI 1959; Kanaghinis et al,1963; Kaplan SA et al,1962;)[6,7,10]. Low volume ileostomy was defined as daily output around 500 ml and high volume ileostomy as a daily volume of a liter or more, by Hill et al 1975[1].

The ileostomy output tended to be unusually profuse if additional ileal resection had to be performed (Hill et al 1975)[1].

In this study, the average stoma volume in ileostomy patients was 440ml on the post-operative day 3 and 540ml on the postoperative day 7.

In this study, the mean stoma output in patients having ileostomy with resection of bowel on the post-operative day 3 was 510ml and on the post-operative day 7 was 650ml, which was significantly higher than patients having ileostomy with no resection of the ileum($p<0.05$).

VI. CONCLUSION

The stoma output in patients having ileostomy was found to be higher on post-operative day 7 and was significantly higher in patients who had resection of bowel. The mean Serum sodium level was found to be low on post-operative day 3rd and 7th as compared to post-operative day 10 in patients group having all ileostomy patients and patients having ileostomy with resection of small bowel.

The mean Serum potassium level showed a significant decrease in patients with ileostomy, especially those having resection of bowel on post-operative day 3.

It can be concluded from this present study that assessment of electrolyte is necessary in early post-operative period.

REFERENCES

- [1] Hill GL, Goligher JC, Smith AH, Mair WS. Long term changes in total body water, total exchangeable sodium and total body potassium before and after ileostomy. Br J surg 1975; 62: 524-7
- [2] Dr Sankha Suvra Ganguly, Dr. Ashis Kumar Saha, Dr Sampurnanand Jha, Dr Supratim Bhattacharyya, Dr Shib Shankar Kuir, Dr. Chhanda Das. Evaluation of Changes in Serum Sodium and Potassium Following Ileostomy and Colostomy. IOSR Journal of Dental and Medical Sciences, Volume 13, Issue 7 Ver. II (July, 2014), PP 38-46
- [3] Gallagher ND, Harrison DD, Skyring AP. Fluid and electrolyte disturbances in patients with long established ileostomies. Gut 1962; 3: 219-223.
- [4] Chronic dehydration and sodium depletion in patients with established ileostomies. Kennedy HJ, Al-Dujaili EA, Edwards CR, Truelove SC. Water and electrolyte balance in subjects with a permanent ileostomy. Gut. 1983 Aug; 24(8):702-5
- [6] Haalboom JR, Poen H, Struyvenberg A, Akkermans LM, Endeman H, Roelofs JM. The effect of changes in dietary Sodium content on complaints and clinical parameters of volume depletion in patients with a permanent ileostomy. Z Gastroenterol. 1987 Mar; 25(3):168-74