

**Early complications and associated risk factors of colostomy reversal at
St. Paul's Millennium Medical College, Addis Ababa, Ethiopia, 2020.**



By: Musse Ahmed (MD, General surgery resident)

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St. Paul's Millennium Medical College, Addis Ababa, Ethiopia, 2020.**



Advisors:

Dr Engida Abebe (MD, Associate professor of General Surgery, Renal transplant surgeon)

Dr Befikadu Lemu (MD, Associate professor of General surgery)

Dr Ewunat G/Hana (MPH, PhD)

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List of abbreviations

DM- diabetes mellitus

HTN – Hypertension

SPHMMC- St. Paul hospital millennium medical collage

IRB- Institutional review board

RVI – retroviral infection

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Abstract

Introduction: Colostomy creation is a lifesaving procedure performed in the settings of complicated colonic volvulus, colonic trauma and obstructing colonic cancer etc. When temporary, it needs to be reversed to restore normal colonic function. Collected information is lacking regarding the outcomes of colostomy reversal in Ethiopia.

Objective: It was to determine the early post-operative complications and associated risk factors of patients who underwent colostomy reversal at St. Paul's Millennium Medical College, SPHMMC, Addis Ababa, Ethiopia, 2020.

Methodology: A retrospective review of all patients who underwent colostomy reversal from September 2016 to August 2019 at St. Paul's Hospital Millennium Medical College (SPHMMC) was conducted from February 4- May 30, 2020. Both qualitative and quantitative data was collected using a structured data extraction format and analyzed using SPSS 25. Results was presented in tables, figures and statements.

Results A total of eighty-three patients who underwent colostomy reversal were identified during the four-year period. The majority of patients were male 56 (67.5%) with mean age 42.08 years (SD – 18.18). Hartman's and loop colostomy were the types of colostomies performed 61 (73.5%) and 22 (26.5%) respectively. Nearly three fourth of the patients, 74 (89.2%), their colostomies were reversed after 12 weeks and Only a quarter of the patients got their colostomies closed between 6-12 weeks. The total number of complications seen were 20(24.1%). The most common complication was wound infection developed in 10 patients, followed by wound dehiscence in 3 patients, anastomotic leak and venous thromboembolism occurred in 2 patients each. One patient who was initially operated for gangrenous sigmoid volvulus and later underwent Hartman's colostomy reversal developed pulmonary embolism had died, making the overall mortality rate 1.2%.

Conclusion

Restoration of intestinal continuity was associated with significant morbidity however the vast majority of this were superficial surgical site infection which was easily managed. Therefore, colostomy reversal in our setup has a good overall surgical outcome with 1.2% mortality.

Chapter 1

1.1 Introduction

Colostomy creation is a lifesaving procedure performed in the settings of complicated colonic volvulus, colonic trauma, obstructed or perforated colonic cancer, complications after primary colonic anastomosis and complicated diverticular disease. When temporary, it needs to be reversed to restore normal colonic function¹.

Hartman's procedure is first described in the early 1920s by the French surgeon that named the procedure and was initially performed for left side colonic cancer to decrease the mortality associated with the anastomotic leakage. It remains a common operation mainly in the emergency settings when primary anastomosis is unfeasible, mainly in hemodynamically unstable patients due to sepsis and multiorgan dysfunctions where the patient requires a window period for subsiding of associated inflammatory processes².

There was a dogma towards the adoption of primary repair or resection with primary anastomosis which demonstrated decreased morbidity and mortality in civilian colorectal trauma after the world war 2 but in the past decades numerous patients with destructive colorectal and severe perineal injuries have undergone the formation of life saving role of fecal diversion colostomy to combat associated injuries³.

Many studies have proven that restoration of intestinal continuity is associated with multifactorial and high level of morbidity and mortality inherent to the patient factors such as age, distal stump and comorbidities and to the surgical techniques. In recent studies colostomy reversal of patients with combat associated trauma have shown higher complication rate in end colostomy reversal than loop colostomy takedown. The timing of subsequent colostomy reversal remains widely varied and the optimal timing remains unknown⁴.

Comprehensive analyses which are essential to guide preoperative patient counselling, preparation and to have reduction in morbidity and mortality are lacking to identify the predictors of postoperative complications and outcomes in patients who are undergoing colostomy reversal^{3, 5}.

Therefore, the aim of this study is to present the early complications and associated risk factors of patients who underwent colostomy reversal, the timing of reversal, the risk factors associated with the complication of the colostomy reversal procedure at St. Paul hospital in Addis Ababa, Ethiopia, over a four-year period.

1.2 Statement of the problem

Patients living with colostomy go through a lot of difficult scenarios associated with their clinical conditions and managing them can be very challenging.

Despite this challenge's reversal of bowel continuity in a patient with colostomy is one the challenging procedure to undertake and there are no adequate data regarding the outcomes and the predictors of the risk factors associated with post-operative complications.

Therefore, appropriate evidence based preoperative patient evaluation, optimization of these patients for the colostomy reversal and also the timing of colostomy reversal is widely variable due to the lack of national or established standard guidelines. This even sounds better in the third world countries who have limited health care coverage.

This study identifies the complications and associated many factors that can have detrimental effects on the outcome of the re-establishing bowel continuity and can be used as a baseline for future improvement of patient care.

1.3 Significance of the study

This study assessed the early complications and risk factors associated with morbidity and mortality in patients who are undergoing restoration of bowel continuity for a variety of diseases.

This study can provide local data to the scientific community on the complications and associated factors of colostomy reversal among surgical patients.

This study can also be a base for further studies and in developing guidelines for perioperative evaluation of patients for whom colostomy reversal is intended to be performed so as to improve patient outcome.

Chapter 2

Literature review

In a study done in Sao Paulo, Brazil by Fonseca and his colleagues has found that the majority of patients who had undergone colostomy reversal were male accounting 53.8%, with an average age of 52 years. Similar finding was reported by study conducted in Tikur Anbessa Hospital in which the majority of patients were male accounting for 82.8% and in their 4th and 5th decade of life. This result was supported by Johnston et al who also reported that older age was independently associated with postoperative complications^{1, 3, 4}.

In the study done in Tikur Anbessa Hospital by Abebe and his colleagues found that the most commonly performed colostomy type was Hartman's colostomy followed by loop colostomy and comparable findings had been reported by Fonseca and his colleagues. It was reported that the majority of colostomy reversal procedures were performed using two layered hand sewn anastomotic techniques in 82.8% and one layered hand sewn closure in 17.2%^{1,4}.

In a study done in national military medical center, Nashville by Johnston et al found that a shorter interval between colostomy creation and reversal was independently associated with reduction in complications and suggested that 3-6 months' time has the lowest complication rate. In addition, this was also reported by Resio BJ that earlier colostomy reversal was associated with improved outcomes and colostomy reversal is safe within 3 months.

In contrast to the above findings Yin et al found that early closure of colostomy in less than 109 days was an independent risk factor for the development of complications which was 6.3 times in these patients and this is supported by findings from Tikur Anbessa hospital in which the morbidity rate of colostomy reversal performed within 4 months was higher compared to the late colostomy reversal after 24 weeks^{1, 2, 3, 6}.

It was also reported by Johnson and his colleagues that patients with severe perineal injury that required colostomy for fecal diversion had been independently associated with increased rate of postoperative complications following colostomy reversal whereas in contrast to this findings Berne JD had found that 55% of patients with colonic injuries were significant predictors of morbidity after colostomy closure^{3, 7}.

In a study done by Berne JD and his colleagues had found that longer operative time greater than 2 hours and higher intraoperative blood loss greater than 450 cc was significantly associated postoperative complications. This was also reported by Fonseca and his colleagues that longer operative time and the necessity for transfusion were significantly associated with higher postoperative complications^{4, 7}.

It was also reported by Khan S and his colleagues that patients with significantly longer hospital stay that is greater than 12 days had experienced higher rate of postoperative complication and this was shared by Lin FL and his colleagues that predictors of complications after colostomy reversal include longer hospital stay of greater than 15 days ^{5, 8}.

In a study done in university clinical Centre Maribor, Slovenia by Krebs B and his colleagues have found that the most common postoperative complications following colostomy reversal were postoperative ileus (12%) and wound infection (5%). In contrast to these findings Mealy and his colleagues found that 40% of patients developed obstruction at the anastomotic site, 24% of patients developed pelvic sepsis and 16% of the patients had wound infections which is comparable with the findings by Abebe and his colleagues from Tikur Anbessa Hospital that anastomotic leak and wound infections were the most common complications each accounting 23.5% ^{1, 9, 10}.

In a study done Dublin, Ireland by Mealy and his colleagues have reported that Hartman's closures were more frequently associated with advanced colorectal cancers and 45.7% had associated complications during reversal when compared to the non-Hartman's closures 27.8%. In contrast to this in the study conducted in Tikur Anbessa Hospital the classical Hartman's closure was associated with gangrenous sigmoid volvulus in 36.1% followed by colonic cancer and colonic trauma accounting for 36.1% and 29% respectively ^{1, 9}.

It is also reported by EC Zarnescu et al that 41.4% of patients had medical comorbidities among which 14.9% had multiple comorbidities. The most frequent comorbidities were hypertension (25%) and diabetes mellitus (10.7%) which were significantly associated with postoperative complications. In support to the above findings regarding the risk of developing postoperative complications in Diabetic patients it was reported by Goret NE et al that 66.7% of patients who had DM developed surgical site infections, evisceration and anastomotic leakage^{11, 12}.

Chapter 3

3.1 Objectives

3.1.1 General objectives

Determine the early post-operative complications and associated risk factors among patients who underwent colostomy reversal at St. Paul's Millennium Medical College, SPHMMC, Addis Ababa, Ethiopia, 2020.

3.1.2 Specific objectives

To determine timing of colostomy reversal

To determine factors affecting outcomes of colostomy reversal

To determine postoperative complications after colostomy reversal

To determine the indication and rate of Relaparotomy

Chapter 4

Methods and materials

4.1. Study area

The study was conducted at St. Paul's Hospital Millennium Medical College (SPHMMC), which is located in Addis Ababa, Ethiopia. St. Paul's Hospital is the second biggest hospital in Addis Ababa which serves as a referral center for patients from Addis Ababa and all over the country with regular catchment of 5 million people. SPHMMC is located in the north west of Addis Ababa. On average it provides health service for 16000 inpatients and 200,000 outpatients. On average 5000 surgeries are performed annually. It is also a teaching hospital for both under graduate and post graduate students.

4.2 Study Design and period

Retrospective review of all patients who underwent colostomy reversal from September, 2016 to August; 2019 years was conducted from February to October of 2020.

4.3 Source Population

The source population were all surgical patients admitted to St. Paul hospital from September 2016- August 2019

4.4 Study Population

The study population included all patients who underwent colostomy reversal from September 2015- August 2019.

4.5 Inclusion and Exclusion criteria

Inclusion criteria

All adult patients admitted and operated for colostomy reversal within the time interval of the study period was included in the study.

Exclusion criteria

Pediatric patients (below age of 15 years)

4.6 Study Variables

4.6.1 Independent variables

- ✓ Age
- ✓ Sex
- ✓ Indication for the colostomy
- ✓ Comorbidities
- ✓ Timing of colostomy reversal
- ✓ Operating surgeon status

4.6.2 Dependent Variables

- ✓ Post-operative complications of colostomy reversal

4.7 Operational Definitions

Early complication means complication that occurs after the surgery until one-month period.

4.8 Data collection methods

Data collection

Study subjects was identified; from Operation theatre logbook and list was compiled. Then data extraction format having the specified data variables was prepared, tested and used to collect data from patient's charts.

Data collectors

The principal investigator of the study trained five medical interns to collect the data. Principal investigator supervised the data collection process.

Quality control

Data extraction formats which were having inconsistent, incomplete data and those that couldn't be completely filled with the available information on the patients' chart was deferred from analysis.

Data was cleaned, coded, entered and analyzed using SPSS Version 20.

4.9 Ethical Considerations

Written permission to conduct the study was obtained from SPHMMC IRB. Data was used for this research only and patients were de-identified.

4.10 Plan for Data Dissemination

The final result of this study will be distributed in written reports to the respective units who were involved in the care and management of stoma patients. The final paper will also be published in reputable journal.

Chapter 5

Results

A total of eighty-three patients underwent with colostomy closure in the four-years period. The majority of patients were male 56 (67.5%) making Male to female ratio 2:1. The age of patients ranged from 16 to 78 years with a mean of 42.08 years (SD- 18.18 years) and the most common age group was the third decade of life.

The majority of the patients who had undergone colostomy reversal procedure 66 (79.5%) came from areas outside of Addis Ababa.

Table 1. socio-demographic characteristics of patients who underwent colostomy reversal in St. Paul hospital, Addis Ababa, Ethiopia.

Characteristics	Frequency (83)	Percentage (100%)
Age		
15-20	11	13.3
21-30	19	22.9
31-40	16	19.3
41-50	10	12
51-60	14	16.9
61-70	7	8.4
71-80	6	7.2
Sex		
Male	56	67.5
Female	27	32.5
Marital status		
Single	25	30.1
Married	57	68.7

Divorced	1	1.2
Residence		
Outside Addis Ababa	66	79.5
Addis Ababa	17	20.5

The most common indication for colostomy creation was gangrenous sigmoid volvulus 33(39.8%), followed by colonic trauma 20 (24.1%) and malignant left side obstruction. Hartman's and loop colostomy were performed 61 (73.5%) and 22 (26.5%) in patients who have undergone colostomy reversal respectively.

Nearly three fourth of the patients, 74 (89.2%), their colostomies were reversed after 12 weeks and Only a quarter of the patients got their colostomies closed between 6-12 weeks. About 14 (16.9%) had a short distal stump which required extensive distal colonic mobilizations to have tension free anastomosis during colostomy reversal procedure.

Table 2. Indication, location and type of colostomies done in patients who undergone colostomy reversal in St. Paul hospital, Addis Ababa, Ethiopia.

Indication for colostomy	Frequency (83)	Percentage (100%)
Non trauma		
Gangrenous sigmoid	33	39.8
Colonic tumor	10	12
Ileosigmoid knotting	8	9.6
Perineal wound	6	7.2
Anastomotic leak from sigmoid colon resection	5	6
Trauma	21	25.3

Site of colostomy		
Sigmoid colon	77	92.8
Transverse colon	6	7.2

The majority, 48 (57.8%) of the colostomy reversal procedures were performed by residents under training on supervision of an attendee. The rest 35 (42.2%) were performed by consultant surgeons. The colostomy reversal procedure was done frequently by using the double layer hand sewn anastomotic method in 76 (91.6%) and single-layer hand sewn techniques 5 (6%).

All patients who underwent colostomy reversal had both mechanical and chemical colonic preparation prior to the surgery. majority of cases 80 (96.4%) had adequate colonic preparation that didn't make the colonic anastomosis soiled with fecal matter whereas in remaining 3 (3.6%) of patients the colonic preparation wasn't adequate which made the procedure uneasy.

Only 7 (9.4%) of patients had underlying comorbid illness which includes Hypertension 3 (3.6%), retroviral infection 2 (2.4%) and hypoalbuminemia in 2 (2.4%) of patients. Only 1 (1.2%) patient required intraoperative blood transfusion of 2 units of whole blood.

Overall postoperative hospital stay ranged from 3-32 days (mean 9.58 days+/- 5.4 days) and mean overall surgical time was 129.6 min +/- 48.18 min. There is statistically significant difference in average length of postoperative hospital stay with those who complicated 4.5 days longer hospital stay than those without complication with (p-value 0.002).

There was a total of 20 patients were seen with complications. The most common complications were wound infection that occurred in 10 (50%) patients, followed by wound dehiscence in 3 patients, anastomotic leak and venous thromboembolism occurred in 2 patients each.

About 6 patients had undergone relaparotomy with an intraoperative finding of complete wound dehiscence in 3 patients for whom lavage plus retention suture done, 2 patients had anastomotic leaks with subsequent end colostomies and 1 patient had hematoma collection for whom lavage and retention suture was done.

One patient who was initially operated for gangrenous sigmoid volvulus and later underwent Hartman's colostomy reversal developed pulmonary embolism had died, making the overall mortality rate 1.2%.

Table 3. Complications seen in patients who undergone colostomy reversal in St. Paul hospital, Addis Ababa, Ethiopia

Variables: complication	Frequency	Percentage
Wound infection	10	50
Wound dehiscence	3	15
Anastomotic leak	2	10
Pneumonia	2	10
VTE	2	10
Hematoma collection	1	5

Chapter 6

Discussion

The mean age of patients in this study was 42.08 +/- 18.18 years with male predominance of 67.5% which is lower compared to the findings by Fonseca et al in Sao Paulo, Brazil which is 52.48 years and 53.8% respectively. The majority, 79.5% of patients who came for colostomy reversal came outside of Addis Ababa which is comparable with the study by Abebe et al in Tikur Anbessa hospital which is 63.5% ^{1,4}.

The most common indication for colostomy creation was gangrenous sigmoid volvulus followed by colonic cancer which is comparable findings with study in Tikur Anbessa hospital but in contrast to other studies where colonic tumor was the leading indication for colostomy formation. Up to three fourth of patients who were admitted for colostomy reversal had Hartman's procedure and consequently have left sided colostomies which is comparable with the findings of other authors ^{1,4,9,14}.

Regarding the timing of colostomy reversal remains as one of the areas with an ongoing debate. Some believe early reconstruction is better and would possibly avoid distal stump atrophy others believe to restore intestinal continuity after the inflammatory conditions subsides and patients have better nutrition.

In this study about 89.2% of patients had undergone restoration of intestinal continuity after 12 weeks of colostomy creation which has similar finding with the study of national military medical center, Nashville by Johnson et al which showed interval period of 12-24 weeks. In addition to this Yin et al found that patients with colostomy reversal before 109 days have a higher rate of postoperative complications. In contrast to the above Resio BJ and his colleagues found that there is no difference in 90-day hospital mortality and major complications when comparing colostomy reversal earlier than 90 days and later reversal ^{3,4,6}.

The overall mean surgical time was 129.6 +/- 48.18 min which is significantly lower than the study done in Sao Paulo, Brazil and mean postoperative time hospital stay was 9.58 days which is lower than the study done in Tikur Anbessa hospital 13.9 days^{1,4}.

The total number of complications seen in this study was 20 (24.1%) which was comparable with a study done in Sao Paulo, Brazil 8 (20.5%) which was also similar with the study done in Tikur Anbessa Hospital 17 (19.5%). However, in our study majority of the patients who had complications were 10 wound site infections and only 2 patients had anastomotic leakage requiring relaparotomy with subsequent colostomies unlike the study in Brazil where the majority of patients had 7 anastomotic leakage requiring relaparotomy^{1,4}.

The overall mortality in this study was 1 (1.2%) which is comparable with the study done in Tikur Anbessa hospital 1 (1.1%) but lower than the study done in Sao Paulo, Brazil which was 3 (7.7%).

12. Conclusion

Restoration of intestinal continuity was associated with significant morbidity however the vast majority of this were superficial surgical site infection which was easily managed. Therefore, colostomy reversal in our setup has a good overall surgical outcome with 1.2% mortality.

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Annex III: Respondents Consent Form and Data Extraction Format / Questionnaires

Respondent's consent form

1: Individual Data Extraction Format / Questionnaire

Here under I, the data collector or researcher, have confirmed that the data filled below are consistent and full.

Name of data collector/researcher.....

Date.....

Signature.....

1. MRN/Code -----
2. Age in years-----
3. Sex 1. Male 2. Female
4. Address 1 Urban 2. Rural
5. Occupation(specify)-----
6. Marital status 1. Single 2. Married 3. Divorced

Related to the colostomy reversal

7. What was the indication for the colostomy? (specify)
8. What is the type of colostomy?
A. Loop B. Hartman C. Double barrel D. Spectacle
9. At what time interval the colostomy reversal made?
A. within 6 weeks B. 6-12 weeks C. after 12 weeks
10. What is the length of the distal stump?
A. Short B. Adequate
11. If short did it needs colonic mobilization?

A. Yes B. No
12. Who has performed the procedure?

A. Senior B. Resident

13. What was the type of anastomosis?

A. Two layer

B. One layer

14. What is the duration of operation during the reversal procedure? (Put in minutes-----)

C. Associated with patient factor

15. What was the length of preoperative hospital stay? (Put in days-----)

16. What was the length of postoperative hospital stay? (Put in days-----)

17. What underlying comorbid illness did the patient have?

A. DM B. HTN C. Asthma D. Hypoalbuminemia

18. Did the patient require transfusion?

A. Yes

B. No

19. If yes to Question No. 18, when was the transfusion made?

A. preoperative B. intraoperative C. postoperative

20. Did the patient have preoperative bowel preparation?

A. Yes

B. No

21. If yes to question No. 20, how was the adequacy of preparation from intraoperative description?

A. adequate B. not adequate

D. Regarding development of complications

22. Did the patient develop surgical site infection?

A. Yes

B. No

23. If yes, what type of surgical site infection?

A. Superficial

B. Deep

C. Organ space

24. Did the patient require Relaparotomy?

A Yes B. No

25. If yes, what is the intraoperative finding?

- A. wound dehiscence B. anastomotic leak C. anastomotic site narrowing
D. Hematoma collection

26. How was the overall, outcome of the patient?

- A. Died in the Hospital B. Discharged improved C. Referred to other hospital