Stapled Anterior Resection of the Rectum for Rectal Cancer – A 10-year Experience at a Tertiary Hospital in Southern Nigeria

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ABSTRACT

Background: Anterior resection is the surgical treatment of proximal and mid-rectal cancers. The procedure is technically challenging and anastomotic leak is a devastating complication. The use of stapling devices to achieve the colorectal anastomosis is desirable by many surgeons. The objective of the study was to describe the experience of stapled anterior resection of the rectum for rectal cancer at the University of Benin Teaching Hospital, a tertiary center in southern Nigeria in the past 10 years.
Methods: The case files of patients who had stapled anterior resection at the University of Benin Teaching Hospital from January, 2016 to December, 2015 were retrieved and relevant data entered into a proforma and presented in tables.
Results: Sixteen cases of stapled anterior resection were done; the records of 2 patients were incomplete. The median age of the 14 cases analyzed was 53 years with an age range of 28 to 72 years. The male to female ratio was 1:1. Alteration in bowel habit in favour of constipation was the most common presentation occurring in 11 patients (78.6%). Passage of blood per rectum was reported in 9 patients (64.3%). The distance of the tumour from the anal verge ranged from 7cm to 16cm. Histology was invasive adenocarcinoma in all the cases and the lungs and liver were the common sites of metastatic disease. Four patients (28.6%) had neo-adjuvant chemotherapy while all patients had adjuvant chemotherapy. Surgery was done in 100% of cases under combined spinal and epidural anaesthesia. Two patients (14.3%) had tumour recurrence necessitating abdominoperineal resection of the rectum and permanent colostomy. Another 2 patients (14.3%) had low output faecal fistula which healed following non-operative treatment. Average duration of hospital stay was 11.8 days.
Conclusion: stapled anterior resection is a safe procedure for the treatment of proximal rectal cancer

Keywords: stapled anterior resection, constipation, anaesthesia, rectal tumour, abdominoperineal resection.

INTRODUCTION

Colorectal cancer is the 3rd most common cancer globally and the commonest malignancy affecting the gastrointestinal tract. (Granados-Romero et al., 2017) The morbidity and mortality due to colorectal cancer is increasing in low-income countries such as Nigeria (Mármol et al., 2017). Cancer of the rectum accounts for over one-third of colorectal cancer cases. Treatment of rectal cancer is multidisciplinary and multimodal and depends on the stage of the disease. (Stintzing, 2014)

The standard surgical treatment of rectal cancer is anterior resection of the rectum and it is the most common indication for the procedure (Mármol et al.,2017) It involves excision of the rectosigmoid alongside total mesorectal excision to minimize the chances of local recurrence, followed by a colorectal anastomosis. Traditionally, the colorectal anastomosis was hand sewn which was technically challenging due to the narrow pelvis with consequent increased risk of anastomotic leak. Anastomotic leak is a devastating complication of anterior resection of the rectum and increases morbidity and mortality (Kawada et al.,2016; Redmond et al., 1993) Other common complications of the procedure include haemorrhage, surgical site infection, ureteric and bladder injuries, stenosis and local recurrence. (Shavalov et al., 2025) The introduction of the circular stapling device to facilitate the colorectal anastomosis revolutionalised the practice of colorectal surgery. Much lower anastomoses are now done with confidence and less technical difficulty. (Varma et al., 1990)

Stapling devices provide uniform compression and accuracy in staple placement, thus standardizing the anastomosis while ensuring significant reduction in operation time. Stapled anterior resection allows surgeons carry out safe and tension-free anastomosis in the depth of the narrow pelvis. (Ravitch, 1984) These factors contribute to a reduction in the incidence of anastomotic leak, a devastating complication of anterior resection of the rectum. The risk of intraoperative spillage of faeces is low in stapled anterior resection because the gut lumen is sealed prior to its division thus reducing the surgical site infection rate. (Varma et al., 1990) Much lower anastomosis can now be safely done, thus reducing the need for abdomino-perineal resections and permanent colostomy. Stapled anterior resection is fast gaining acceptance in developed countries; however, cost has remained a major factor limiting widespread acceptance in low-income countries.

We present our experience with stapled anterior resection since the procedure commenced at the University of Benin Teaching Hospital, a tertiary hospital in Benin City, Southern Nigeria.

The objective of the study was to describe our experience with the procedure of stapled anterior resection of the rectum at the University of Benin Teaching Hospital, southern Nigeria over the last 10 years.

MATERIALS AND METHODS

Study setting / Population: This study was a 10-year retrospective audit of all stapled anterior resections carried out between January 2016 to December, 2025 at the University of Benin Teaching Hospital (UBTH), a tertiary hospital located in Benin City, Edo State, Nigeria. Stapled anterior resection commenced in UBTH in 2015.

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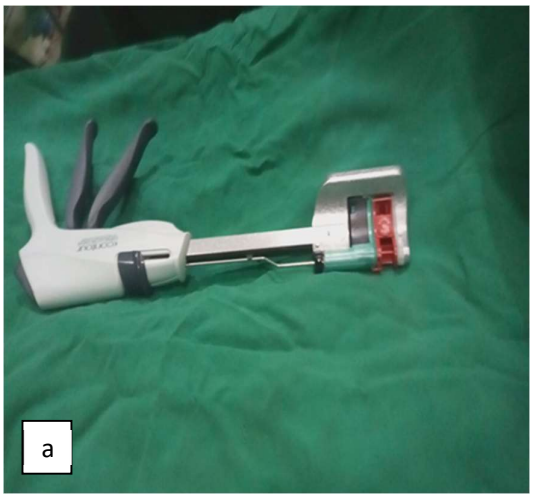
The audit was carried out in accordance with the World Medical Association Helsinki declaration.

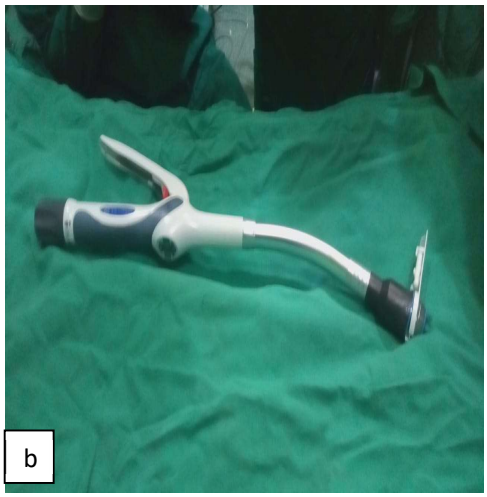
Study variable: The case files of patients who had stapled anterior resection at the University of Benin Teaching Hospital during the study period were retrieved from the medical records and relevant data including socio-demographic data, peri-operative variables and complications were obtained using a structured proforma.

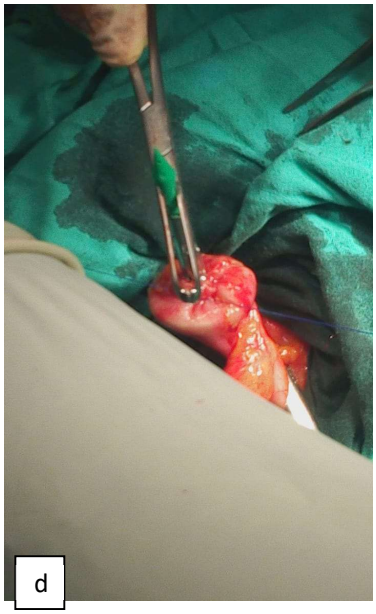
Description of Procedure: All the patients had bowel preparation and antibiotics prophylaxis according to protocol. One of the authors was the lead surgeon in all the cases. Anaesthesia was combined spinal and epidural anaesthesia. The patient was placed in the lithotomy position and a rectal examination was performed. Skin was prepared and draped, an infra-umbilical midline incision was made and developed into the peritoneal cavity. Intraperitoneal exploration was done and the tumour was assessed to confirm resectability.

The inferior mesenteric vein was ligated prior to the colorectal dissection. The splenic flexure was first mobilized, then the rectum and its mesentery were mobilized completely. The anterior rectal wall below the tumour was then cleared of all excess fibrous tissue and fat. The dissection was continued on to the lateral and posterior walls of the rectum so that a short segment of rectum (approximately 2 cm) was completely denuded down to the seromuscular layer in preparation for stapling. A curved cutting stapler was used to divide the rectum distal to the site of the tumour (after placing stay sutures bilaterally on the distal bowel). The colon was then divided between a crushing and non-crushing intestinal clamp proximal to the tumour. The anvil of the circular stapler was inserted into the proximal colon and secured tightly with a purse-string whip stitch of 2/0 polypropylene. The anus was dilated and the appropriate circular stapler cartridge was inserted anally. Its spike was passed through the centre of the staple line or as close as possible to it and attached to the anvil. Before closure of the instrument, care was taken to avoid excessive upward traction on the rectal stump by the perineal

operator and also to avoid interposition of peri-rectal soft tissue between the bowel ends. The stapling device was closed, until the indicator fell within the green range, and then fired. The instrument was subsequently opened and the two stay sutures of 2/0 polypropylene were used to lift the anastomosis over the anvil, thus facilitating the extraction of the instrument. The integrity of the anastomosis was tested by instilling normal saline into the pelvis and subsequent air insufflation into the rectum using a 50ml syringe, to check for air leakage that require reinforcement with interrupted absorbable sutures. The absence of bubbles confirmed air tight anastomosis. The bowel doughnuts removed by the circular stapler during anastomosis were also inspected for completeness. An improvised rectal tube was inserted anally and carefully guided across the site of the anastomosis. An improvised drain fashioned by creating multiple fenestrations on a urine drainage bag was placed in the pelvis and anchored to skin. Abdominal wound was closed in layers and sterile dressing applied. Wound was inspected between 3 to 5 postoperative day, rectal tube was removed and oral intake commenced when bowel activity commenced, drain was removed when effluent was scanty and stitches were removed when there was satisfactory wound healing. Anastomotic leak was defined clinically as a breakdown in the stapled anastomosis resulting in clinical signs of peritonitis or septic shock such that the patient required laparotomy or occurrence of faecal fistula.







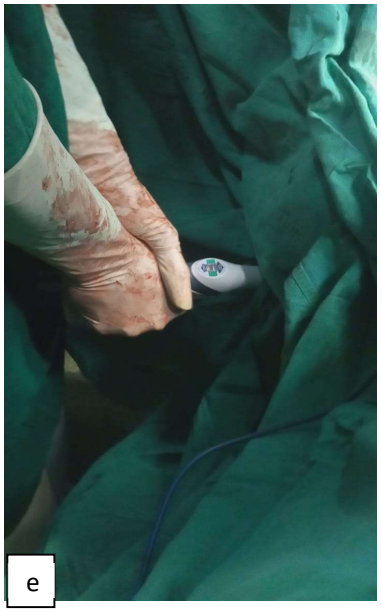


Figure 1a, b, c, d and e: curved cutting stapler, circular stapler, curved cutting stapler dividing the rectum distal to the tumour, anvil secured in the proximal colon with a 2/0 polypropylene purse string, circular stapler being deployed per rectum

RESULTS

Of the 16 cases of stapled anterior resections done, the records of 2 patients were not complete, thus, they were excluded from the study. The median age of the 14 cases analyzed was 53 years with an age range of 28 to 72 years. The male to female ratio was 1:1. Alteration in bowel habit in favour of constipation was the most common presentation occurring in 11 patients (78.6%). Passage of blood per rectum was reported in 9 patients (64.3%). The distance of the tumour from the anal verge ranged from 7cm to 16cm. Histology was invasive adenocarcinoma in all the cases, 1 patient had metastatic deposits in the liver and lungs and another patient had cancer spread to the liver only. Four patients (28.6%) had neo-adjuvant chemotherapy on account of locally advanced or metastatic disease while all patients had adjuvant chemotherapy. Surgery was done in 100% of cases under combined spinal and epidural anaesthesia. Two patients (14.3%) who had locally advanced disease with incomplete meso-rectal excision had tumour recurrence necessitating abdominoperineal resection of the rectum and permanent colostomy within a 12-month follow up period. Another 2 patients (14.3%) had low output faecal fistula which healed following non-operative treatment while 1 patient (7.1%) had a pelvic collection from an infected hematoma which was drained percutaneously under ultrasound guidance. One patient had haematuria due to bladder contusion during dissection which resolved after a few days on admission. Average duration of hospital stay was 11.8 days.

Table 1: Presenting features of patients

No	Age (Years)	Sex	Presenting Complaint	Duration of Symptoms (Months)	Blood in Stool	Mucous in Stool	Tenesmus
1	66	Male	Constipation	1	Yes	Yes	Yes
2	28	Female	Constipation	12	Nil	Yes	Yes
3	53	Female	Constipation	3	Nil	Yes	Nil
4	38	Male	Passage of Loose Stool	6	Yes	Yes	Nil
5	34	Male	Constipation	6	Yes	Nil	Yes
6	55	Female	Constipation	4	Nil	Nil	Nil
7	53	Male	Blood In Stool	24	Yes	Yes	Nil
8	53	Male	Constipation	5	Nil	Yes	Yes
9	63	Female	Constipation	4	Nil	Yes	Yes
10	37	Female	Constipation	6	Yes	Nil	Yes
11	64	Male	Constipation	3	Yes	Yes	Yes
12	67	Male	Constipation	7	Yes	Yes	Nil
13	72	Female	Blood In Stool	12	Yes	Nil	Yes
14	51	Female	Constipation	4	Yes	Yes	Yes

DISCUSSION

Anterior resection of the rectum is the standard surgical treatment for proximal and mid-rectal cancers (Stintzing, 2014). The procedure has evolved over the years with the introduction of stapling devices to facilitate the colorectal anastomosis being a turning point in colorectal surgery. Stapled anterior resection is fast and allows for much lower anastomosis to be done with ease. (Ravitch,1984) However, the cost of stapling devices is a major factor militating against widespread acceptance of the procedure in low-income countries.

Of the 14 cases reviewed in this study, the median age was 53 years with an age range of 28 to 72 years. Granados-Romero et al. (2017) reported an age range for colorectal cancer of 65 to 74 years and Stintzing (2014) reported a median age of 70 years. This current study was carried out in a developing country with a predominantly young population accounting for the disparity in the peak age incidence. Rectal cancer was diagnosed in equal proportions in both genders. These findings are consistent with the findings of Irabor et al. (2009) who reported a peak age incidence of 44 years and near equal male/female ratio in colorectal cancer patients. Alteration in bowel habit in favour of constipation was the most common presentation occurring in 11 patients (78.6%). Zingeta et al. (2023) reported altered

bowel habit as the most common presentation of colorectal cancer occurring in 64.1% in that study. Other symptoms included blood or mucous in stool and tenesmus. Average duration of symptoms was 6.9 months with a range of 1 to 24 months. Delayed presentation remains a major challenge in developing countries largely due to poverty and ignorance.

Table 2: Pre-operative variables

No	Neo-Adjuvant Chemotherapy	Adjuvant Chemotherapy	Previous Surgery for Tumour	Metastasis	Histology
1	Yes	Yes	Left Hemicolectomy	Liver, Lungs	Invasive Adenocarcinoma
2	Yes	Yes	Nil	Nil	Invasive Adenocarcinoma
3	Nil	Yes	Nil	Nil	Invasive Adenocarcinoma
4	Nil	Yes	Nil	Nil	Invasive Adenocarcinoma
5	Nil	Yes	Nil	Nil	Mucinous Adenocarcinoma
6	Nil	Yes	Nil	Nil	Mucinous Adenocarcinoma
7	Nil	Yes	Nil	Nil	Invasive Adenocarcinoma
8	Yes	Yes	Nil	Liver	Invasive Adenocarcinoma
9	Nil	Yes	Nil	Nil	Invasive Adenocarcinoma
10	Nil	Yes	Nil	Nil	Invasive Adenocarcinoma
11	Nil	Yes	Nil	Nil	Invasive Adenocarcinoma
12	Nil	Yes	Nil	Nil	Invasive Adenocarcinoma
13	Nil	Yes	Nil	Nil	Invasive Adenocarcinoma
14	Yes	Yes	Nil	Nil	Invasive Adenocarcinoma

Table 3: Perioperative variables

No	Tumour Location	Procedure	Anaesthesia	Complications	Hospital Stay (Days)
1	7cm	Low Anterior Resection	Cse	Haematuria	11
2	9cm	Low Anterior Resection	Cse	Nil	10
3	10cm	Anterior Resection	Cse	Tumour Recurrence	9
4	15cm	Anterior Resection	Cse	Nil	12
5	8cm	Low Anterior Resection	Cse	Nil	14
6	16cm	Anterior Resection	Cse	Pelvic Collection	16
7	10cm	Anterior Resection	Cse	Nil	9
8	8cm	Low Anterior Resection	Cse	Tumour Recurrence	11
9	10cm	Anterior Resection	Cse	Nil	9
10	10cm	Anterior Resection	Cse	Nil	10
11	7cm	Low Anterior Resection	Cse	Faecal Fistula	18
12	14cm	Anterior Resection	Cse	Nil	10
13	8cm	Low Anterior Resection	Cse	Nil	9
14	7cm	Low Anterior Resection	Cse	Faecal Fistula	17

Cse – Combined Spinal and Epidural Anaesthesia

The tumour location ranged from 7cm to 16cm from the anal verge. The introduction of stapled anterior resection has reduced the need for abdominoperineal resection of the rectum as lower resections can be done with preservation of the sphincteric mechanism, thus obviating the psychological challenges associated with permanent colostomy (Fiorillo et al., 2025) The histologic subtype was adenocarcinoma in all the patients. Adenocarcinoma accounts for over 95% of all colorectal cancer histologic subtypes. (Agyemang-Yeboah et al, 2017) Distal anastomosis was more likely to be associated with increased risk of complications such as faecal fistula and haematuria as the procedure was more technically challenging. Anastomotic leak is a fatal complication of anterior resection often presenting as peritonitis or faecal fistula with associated

increased morbidity and mortality. (Kitaguchi et al., 2023) The 2 (14.3%) patients who developed faecal fistula following low anterior resection were low output fistulae which were managed non-operatively without the need for re-operation. None of the patients in the study had a temporary colostomy to protect the anastomosis as part of the procedure. Rather, a rectal tube was used for this purpose to good effect, as only 2 patients developed low output fistula in the study. The patient who developed haematuria due to bladder contusion had resolution of symptoms in the early post-operative period following adequate hydration. Two patients (14.3%) with locally advanced disease and incomplete meso-rectal excision had tumour recurrence within 12 months necessitating abdomino-perineal resection and permanent colostomy. No mortality was recorded in this study. The average duration of hospital stay was 11.8 days.

CONCLUSION

Low rectal resections and anastomosis are more technically challenging and are associated with increased risk of complications. The use of stapling device for colorectal anastomosis is fast and safe and allows for an easier procedure.

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