Extra-Pelvic Colo-Anal Pulls Through As an Alternative Techniques to Abdominoperineal in Low and Ultra Low Rectal Cancer in Hadhramout National Cancer Center

Salah Ahmed Binziad1, MD, Waleed K. Kaleem2, MD, Adnan A. Bakarman3, MD. and Saeed Ahmed Binbisher4, MD.

1Assistants Professor of Surgical Oncology, Department of Surgery, College of Medicine, Hadhramout University, Mukalla, Hadhramout, Yemen. (HUCOM)
2Assistants Professor of Clinical Oncology, Department of Internal medicine, Faculty of Medicine, Hadhramout University, Mukalla, Hadhramout, Yemen.
3Assistants Professor of Hematological Oncology, Department of Internal Medicine, Faculty of Medicine, Hadhramout University, Mukalla, Hadhramout, Yemen.
4Professor of General Surgery, Department of Surgery, College of Medicine, Hadhramout University, Mukalla, Hadhramout, Yemen. (HUCOM)
Corresponding Author E-mail:binziadoncos@gmail.com

Abstract
Objective: All patient with med, low and ultralow rectal tumors are wary from permanent colostomy after radical resection of distal rectal tumor, but the recognition of shorter safe distal resection margins, neoadjuvant chemoradiotherapy and the application of the technique of intersphincteric resection (ISR) have led to the prospect of restorative surgery for patients with distally situated tumor’s.

Aim of study: This prospective study was designed to evaluate the safety and efficacy of the coloanal pull through in adult with sphincter preservation or coloanal anastomosis as alternative methods for abdominoperineal procedure to avoid permanent colostomy and to improve post-operative quality of life.

Method: A prospective study of 45 patient of Hadhramout National Cancer Center at Iben Sena Central Hospital and Al-Burj Consultant Hospital in Mukalla, Yemen from 2011 to 2018 was performed to identify feasibility of coloanal pull through in adult patient(s) as an alternative method of coloanal anastomosis. This study was reporting outcomes following coloanal pull through for mid, low and very low rectal cancer. The outcomes of interest included short-term adverse
events, functional and sexual results, postoperative quality of life and oncologic outcomes.

**Results:** Forty five patients were included, Operative mortality following CAP (coloanal pull through) was none and anastomotic leak rate was also none. Total stump ischemia, anastomosis dehiscence in 3 patients, were managed by redo operation on the 5th, 7th and 10th day respectively. Partial stump ischemia and partial anastomotic dehiscence occurred in two patients on the 4th & 7th day, who were managed by conservative methods. Recto-vaginal fistula occurred in two patients, one was due to a stitch and the second was after posterior pelvic exenteration. Adhesive intestinal obstruction occurred in one patient 7 months later, who was managed by exploration and adhesolysis. Stenosis occurred in three patients, and they were managed by dilatation under anesthesia. Deep venous thrombosis (DVT) was observed in one patient and was treated medically. The pooled rate of local recurrence was 8.8% (4 patients, 1.3, 1.5, 1.9 and 2yrs respectively.) with an average 5-year survival of 85.6%. Functional outcomes and quality of life may be improved with time progress. The use of chemoradiotherapy can offer benefits in terms of oncologic result, but at the cost of worse functional outcomes.

**Conclusion:** Careful case selection and counseling are required if satisfactory results are to be achieved. Coloanal pull through as an alternative technique to CAA (coloanal anastomosis) in middle and low rectal cancer after TME (total mesorectal resection) seems to be a safe and efficient with sphincter-preserving that provides effective procedure with acceptable oncologic and functional results to treat patients with middle or low rectal cancer while avoiding a prophylactic, diverting stoma with satisfactory function, quality of life is excellent and dramatic decrease of the cost.

**Keywords:** Coloanal, abdominoperineal, ultra-low rectal cancer, intersphincteric resection.

**Abbreviations:** CAP; (Coloanal pull through), CAA; (Coloanal anastomosis), TME; (Total mesorectal excision), ISR (Inter sphincteric resection), APR; (The abdominoperineal resection) SP; (Sphincter preservation).

**Introduction**

Annually, approximately 39,670 patients are diagnosed with rectal cancer in the United States [1]. Surgical resection is the cornerstone of curative treatment. Superficially invasive, small cancers may be effectively managed with limited surgical procedures, such as local excision. However, the majority of patients have more deeply invasive tumors that require more extensive surgery, such as low anterior or abdominoperineal resection. Others present with locally advanced tumors that are adherent or fixed to adjoining structures such as the sacrum, pelvic
sidewalls, prostate, or bladder. The surgical and oncologic management of these patients varies greatly depending upon stage and location within the rectum [2, 3].

Recently, surgical techniques for sparing rectal function after radical resection of lower rectal cancer have improved significantly by advanced technology including double stapling devices, anastomotic devices and improved surgical skills in the patients with rectal cancer. However, there are about 20%-30% patients with low rectal cancer who require permanent colostomy 1-5.

The abdominoperineal resection (APR), which is a widely accepted surgical procedure for patients with low rectal cancer, has provided an increased chance of sparing the residual rectum function and satisfying patients with a good quality of life after surgery. Sphincter preservation (SP) and the maintenance of fecal continence have long been of interest and concern to colorectal surgeons [4, 5, 6].

Total mesorectal excision (TME), described by Heald in 1982 [7], has been increasingly used by clinicians. This has increased the rate of SP for more patients with low-lying rectal cancer, even in those with very low-lying cancer [8]. TME is considered to be the primary procedure for doing a radical resection for middle and lower third rectal cancer [9, 10].

The concept of specimen orientated surgery has led to effective management of rectal cancers with low levels of local recurrence [11]. These developments have resulted in constant refinements of the concept of what represents a safe distal resection margin following the excision of rectal cancer [12]. Which some consider be as low as 1 cm in certain circumstances [13].

In tandem with this, the importance of quality of life outcomes for rectal cancer patients is increasingly recognized, with several studies suggesting that quality of life and sexual activity are impaired by the presence of a permanent colostomy following abdominoperineal excision (APER) [14]. Single stage transanal Soave pull-through procedure (TSPP) represents an improvement in the sense of minimal invasive surgery for Hirschsprung’s disease (HD) [15]. It has been rapidly popularized in many centers since it was published by De la Torre-Mondragon in 1998 [16].

**Patients and Methods**

A total of Forty-five patient (27 males and 18 females), their ages ranged from 22 to 65 years old with distal, low or ultra-low cancer rectum with proven tissue diagnosis of rectal cancer, who underwent an a rectal resection with total mesorectal excision with sphincter preservation and hand-sewn coloanal pull
through anastomosis, whom treated at Hadhramout National Cancer Center, Iben Sena Central Hospital and Alburj Consultant hospital in Mukalla, Hadhramout, Yemen, Surgical department between October 2011 and December 2018.

**Exclusion Criteria:** Stage T4 tumors, involvement Ano-rectal ring or levator ani muscle and incontinent patients.

Tumor assessment: by
- Digital rectal examination
- MSCT.
- Proctoscopy.

**Operative Technique**

We performed conventional radical surgery of total anorectum and sigmoid resection with high resection of the inferior mesenteric artery, in which the artery is divided at its origin and the left colic artery before it gives the ascending and descending branches, preserving the arterial arcade to the distal colon. D2 lymph-node dissection, total mesorectal excision, and autonomic nerve preservation.

The perineal approach was taken with circumferential incision of the rectal mucosa just proximal to the dentate line then continue toward anal verge (mucosectomy). After specimen removal, the sigmoid colon was pulled down with colonic stump 5-7cm distal to anal ring, and a coloanal anastomosis was done. The anastomosis was performed by using manual hand-sewn suturing with 3-0 vicryl, 1-2 ampoule.

The sutures were placed between the colon and the anoderm, 6-8 stitches. The abdominal part of the procedure is completed by peritonization of the pelvic floor by suturing the lateral peritoneal reflections to the serosa of the dragged colon, Closure of the paracolic gutter.

Suction drain in the para-rectal space. Operative time ranged from 1.5 to 3 hrs, with declining curve with progressing of the learning curve. Hospital stay ranged from 5 to 10 days, except in complicated cases which have an average of 19 days.

Care of the pulled stump is simple by keeping it wet and clean by saline wash and Vaseline gauze, Application of antiseptic cream twice daily. Stump trimming is performed after 2 weeks, (the patient is readmitted for one day).
Figure 1. Mobilization of the rectum

Figure 2. Arrow sees preservation of splanchnic nerve and pelvis after resection

Figure 3. Mucosal resection of rectum below dentate line
Figure 4. Specimen after removal and stump colon

Figure 5. Stump of the colon throw anal ring

Figure 6. Stump trimming after 2 weeks suture line of coloanal anastomosis after trimming
Adjuvant Therapy
If the depth of tumor invasion was T3 upon preoperative evaluation, we selectively treated the patients with pre-operative chemo-radiotherapy (CCRT). The CCRT was as follow: 5FU, 325 mg/m², and leucovorin, 20 mg/m², were given as intravenous infusions in 500 ml of saline over 6 hours on days 1-5 and 29-33.

The radiotherapy was delivered in the afternoon, after infusion of chemotherapeutic agents, with a total dose of 50.4 Gry in 28 fractions. A radical resection was performed after four weeks. In patients with histologically-proven lymph node (stage III) involvement, adjuvant chemotherapy with 5-fluorouracil and leucovorin was applied for duration of six months. No radiotherapy was done after surgery.

Assessment of Efficacy and Complications
The effect of the operation was evaluated with regard to anal incontinence, local recurrence, and disease-free survival (DFS). Anal incontinence was evaluated by using a questionnaire at six months after surgery. Incontinence was scored by using Kirwan’s classification: 1, no incontinence; 2, incontinence of flatus and liquids; 3, occasional incontinence of solids; 4, frequent incontinence of solids; 5, incontinence requiring a colostomy.

We grouped Kirwan’s grade 1 and grade 2 as tolerable, and others as intolerable. Urinary voiding difficulty was defined as chronic urinary retention with residual urine in spite of three days training, and in such cases, it was necessary to consult with the Urology Department. Sexual dysfunction in male under the age of 70 was evaluated with direct questions and answers six months postoperatively.

Follow-up examinations were performed with digital examinations and anoscopy every month for 12 months. Local recurrence was defined as recurrence around the anastomosis and the pelvic floor. Colonoscopy and Abdominopelvic CT were done three and six months after surgery, and then annually or more frequently in cases of abnormal symptoms or findings.

Statistics and Survival
Statistical analyses were performed with chi-squared tests and Student’s t-test, whenever appropriate, to compare the categorical variables between the groups.

The disease-free survival curves were calculated by using the Kaplan-Meier method. The difference between the in survivals curves was measured using log-rank tests. Statistical significance was defined as P<0.05.
Results

Patient Demographics and Characteristics

Forty five patients were analyzed. The mean age was 43, Males were more than females, two patients were lost to follow-up after hospital discharge.

Table 1. Illustrate total number of cases 45 (27 males and 18 females), age ranging from 22 to 65 years

<table>
<thead>
<tr>
<th>Sex</th>
<th>&lt;40</th>
<th>40-60</th>
<th>&gt;60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>27</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>25</td>
<td>14</td>
</tr>
</tbody>
</table>

Operative procedures were rectal and sigmoid resection with Colo-anal pull through and hand-sewn anastomosis in 45 patients. The mean of the distal resection margin from 1-4cm.

Table 2. Illustrated macroscopic rectal tumor and Distance from anal average

<table>
<thead>
<tr>
<th>Gross pathology</th>
<th>Distance from anal verge</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4-7 cm</td>
<td>8-10</td>
</tr>
<tr>
<td>Annular mass</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Ulcerating mass</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Polyploid</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>22</td>
</tr>
</tbody>
</table>

The thin body stature frequently made it easy to access to the pelvic floor for the sphincter-saving operation. Post-operative assessment of the specimens and lymph node status reveal the following:

Table 3. Type of Histopathology tumor type and Grading

<table>
<thead>
<tr>
<th>Histopathology</th>
<th>Well diff.</th>
<th>Moderate diff.</th>
<th>Poor diff.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adenocarcinoma</td>
<td>17</td>
<td>14</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>Mucoid</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Signet ring</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Mucinous</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4. Illustrate Lymph node metastases

<table>
<thead>
<tr>
<th>Site</th>
<th>L.N. Status</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pararectal</td>
<td>39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iliac</td>
<td>14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Functional Outcome and Fecal Incontinence after Surgery**
At 6 months after the surgery, the patients suffered intolerable anal incontinence (Kirwan’s grade (>2) 44.4 % (12/27) of the males had intolerable anal incontinence, which was significantly more than 16.6% (3/18) for females (P <0.005).

We aggressively followed up the cases of total intersphincteric resection (total ISR). Of nine cases, five cases gradually recovered continence six months after surgery and remaining 4 cases after 12 months.

**Follow-up and recurrence**
The median follow-up was 24.0 and 23.5 months. The local recurrence rate after operations was 8.8 % (4/45). The sites of local recurrence were the lateral pelvic wall (1), the line of anastomosis (3). During the intensive follow-up, we successfully performed completion abdominoperineal and pelvic colostomy in two cases.

In another two cases, we could not perform a secondary operation because there was a distant metastasis when we detected local recurrence.
Figure 8. End result

Table 5. Postoperative Complications

<table>
<thead>
<tr>
<th>Type</th>
<th>No. and Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>Non</td>
</tr>
<tr>
<td>Total stump ischemia/</td>
<td>3 patients, managed by redo on the 5th, 7th &amp; 10th day.</td>
</tr>
<tr>
<td>anastomosis dehiscence</td>
<td></td>
</tr>
<tr>
<td>Partial stump ischemia/partial anastomosis</td>
<td>2 patients on the 4th &amp; 7th day, managed by conservation.</td>
</tr>
<tr>
<td>dehiscence</td>
<td></td>
</tr>
<tr>
<td>Recto-vaginal fistula</td>
<td>2 patients, one due to a stitch and the second after post. Pelvic exenteration.</td>
</tr>
<tr>
<td>Adhesive intestinal obstruction</td>
<td>1 pt. 7 months. After, managed by exploration and adhesolysis.</td>
</tr>
<tr>
<td>Stenosis</td>
<td>3 patients, managed by dilatation under anesthesia.</td>
</tr>
<tr>
<td>DVT</td>
<td>1 patient, medical treatment</td>
</tr>
<tr>
<td>Recurrence</td>
<td>4 patients, 1.3, 1.5, 1.9 &amp; 2ys. Respectively.</td>
</tr>
</tbody>
</table>

Discussion

Low rectal tumors are often treated with sphincter-preserving resection followed by coloanal anastomosis [17]. In the last few decades, the treatment of rectal cancer has changed dramatically. The value of sphincter-preserving surgery is the radical resection of the tumors of the distal rectum with preservation of the anal sphincter and genitor-urinary functions. A sphincter-preserving operation may be classified as a standard low anterior resection, low anterior resection with coloanal anastomosis, or low anterior resection with J-pouch colonic reservoir. A coloanal anastomosis is an extra pelvic anastomosis situated at the apex of the anal canal or lower in the anal canal at the dentate line [18].
Recognition of shorter, safe, distal resection margins and the application of coloanial pull throw technique have led to the prospect of restorative surgery for patients with distally-situated cancer of the rectum, and coloanal pull throwg surgery has no limitations, in that the anastomosis could be done at the surgical ring of anal canal. In our study, the number of Colo-anal pulls through cases was larger for males than for females.

Schiessel reported that the rate of long-term continence function for solid, liquid stool, and flatus was 86.3% after the operation, but we observed that only 65% of the patients with an intersphincteric resection had tolerable continence for solid stool at 6 months after surgery. With the other reports from East Asian countries, 72% of the patients recovered tolerable continence at 6 months after surgery [19, 20]. The degree of anal incontinence after surgery is so complex that it is not easy to apply the index developed by several authors [21, 22]. The details of continence, such as a description of leakage to gas, mucus, or liquid stool, episodes of minor incontinence, use of medical agents to influence bowel activity, and pad, were included in a questionnaire to provide a better picture of how continence was influenced by sphincter resection [23].

Bong Hwa Lee et al., followed-up with five patients who underwent a total resection of the internal sphincter, total ISR. Two of the five patients recovered continence, and could lead a normal life without a pad. Schiessel reported a 5.3% local recurrence in ISR patients. The pooled rate of local recurrence by collective review was 9.5% (range: 0-31%) [24]. Practice Parameters for the Management of Rectal Cancer’ of the American Society of Colorectal Surgeons described the minimum acceptable length of the distal margin as 1 cm. Margins more than 1 cm should be obtained with larger tumors for cancers of the distal rectum (5 cm from the anal verge) [25].

The range of distal resection margin for locally-recurrent Less than 1 cm. We might speculate possible cause of local recurrence was not the narrow distal resection margin, but a circumferential extension of tumor cells. This may suggest that alternative routes or spread in very low cancers may lead to inadequate resection by TME resection alone. The tumor's spread along the musculature of the hind gut beyond the dentate line could possibly explain the occasional involvement of lymph nodes outside the conventional mesorectum [26]. The pathology of the resection margin in the cases of recurrence in the vaginal wall were shown to be free of tumors. We could not rule out contamination of the tumor cell during the resection because the patients did not have preoperative radiation therapy in two cases of recurrence. Another possible cause was a chance of skip metastasis to the vaginal wall.
Conclusion
Extra-pelvic Colo-anal pull through as an alternative technique to CAA in middle and low rectal cancer after TME seems to be a safe and efficient with sphincter-preserving that provides effective procedure to treat patients with low or ultra-low rectal cancer while avoiding a prophylactic, diverting stoma give satisfactory function and quality of life is excellent. Peritonization of the pelvic floor and Closure of the paracolic gutter lead to a dramatic decrease in the incidence of post-operative intestinal obstruction due to internal herniation or adhesions.an acceptable complication rate, in the long-term outcome, in terms of disease-free survival.

References


