# 6 Endoscopic and Transanal Approaches for Acute Anal and Rectal Cancers

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## Introduction

In 1977, Morson et al. first described techniques regarding local excision of early distal rectal cancers at St. Mark's Hospital in London [1]. Prior to this novel idea, the standard for treatment of anorectal malignancy included a total mesorectal excision (TME) to assure best oncologic outcomes. Although the 5-year recurrence rates for TME are low (2–8%) [2, 3], TME are associated with significant morbidity leading surgeons to question whether there is a role for less invasive procedures, with reduced morbidity and comparable outcomes. Transanal options are generally reserved for early-stage tumors which, by definition, are not likely to present acutely with obstruction or uncontrolled hemorrhage. Still, proper staging may determine that the tumor is in an early stage.

There are multiple current options for local excision of anal and rectal tumors. The tenets of these procedures include full thickness excision of the tumor with appropriate circumferential margins and deep excision to the perirectal fat. Techniques such as transanal, transsphincteric, and transcoccygeal excision have evolved into more modern techniques that utilize similar surgical resections via the transanal approach. Transanal options can use modern optics included in laparoscopic and robotic equipment for better visualization and articulated instrumentation. Examples are transanal endoscopic microsurgery (TEM) and transanal minimally invasive surgery (TAMIS). Additionally, endoscopic instrumentation is also evolving quickly. Procedures include endoscopic mucosal resection (EMR) and endoscopic submucosal dissection (ESD), using endoscopic needle-knife technology. Platforms for natural orifice surgery, with superb visualization and articulating instrumentation, have been designed for delivery through long, flexible portals such as an endoscope. The use of all these techniques in early-stage rectal cancer has steadily increased in the United States within the past decade, and it is important for all modern surgeons to become aware of these contemporary options [4].

Although the focus of this chapter is on acute presentations of anal and rectal malignancies, the majority of the workup of these complicated pathologies is not usually performed in the acute setting. The procedures discussed, however, can be considered for use in acute issues such as bleeding and obstruction in select patients.

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## Preoperative Workup

Before utilizing either endoscopic or transanal techniques, it is imperative to ensure proper patient selection. The preoperative evaluation of patients who may be candidates for local excision does not vary from any other patient with anorectal malignancies. All should undergo preoperative physical exam, laboratory, and well-established protocols for staging workup. Knowing that local excision spares the lymphatic drainage of the rectum, it is important that dedicated rectal imaging is available (rectal MRI and ultrasound as described later) to select patients with no evidence of and low risk of lymphatic spread. A combination of these adjuncts as well as the histopathologic characteristics of the tumor is needed before proceeding with resection.

Focused exam relies on the surgeon's digital rectal examination (DRE) to determine size, mobility, and distance of anorectal lesions from the anal verge. Tumors greater than 4 cm and those involving more than 40% of rectal circumference are technically difficult to excise locally and should be excluded [5]. The mobility of the lesion is equally important. Anorectal tumors under consideration for local excision should be freely mobile on DRE as those that fixed are highly predictive of advanced disease [6]. Traditionally, lesions present in the distal rectum (6–8 cm) are reachable with TAE. However, with newer techniques such as TEM and TAMIS, lesions as far proximal as 15 cm from the anal verge can now be adequately removed.

The laboratory workup of a patient with an anorectal adenocarcinoma includes a preoperative carcinoembryonic antigen (CEA) level and re-review of the original biopsy. Concerning features on histopathologic evaluation, as in most cancers, include poor differentiation, lymphovascular invasion, and tumor budding or sprouting. Any of these findings suggest advanced malignancy with associated higher rates of nodal metastasis. In these cases, local excision alone can be ruled out [7, 8].

Imaging is important adjunct to selecting patients who would benefit from local excision of a rectal tumor. All patients should undergo CT imaging of the chest, abdomen, and pelvis for staging purposes. However, CT alone is not sufficient in quantifying the depth of invasion of a rectal tumor, which correlates well with chances of lymph node metastasis [9, 10]. Both rectal MRI and transrectal US can be used to determine the extent of rectal wall invasion and mesorectal lymph node status. While MRI is more sensitive at evaluating lymph node involvement and higher chance of metastasis, transrectal US is considered a useful adjunct in distinguishing T1 from T2 tumors [11, 12].

Proctoscopy and colonoscopy are crucial in the workup of patient with a newly diagnosed rectal lesion. Proctoscopy allows the surgeon to assess the tumor size, distance, and relationship to the circumference of the rectum. This is especially useful in patients with more proximal lesions unable to be evaluated with DRE and anoscopy. It also may aid in biopsy or rebiopsy of the lesion. If the rectal lesion was found prior to endoscopy, it is important, if technically feasible, to perform a colonoscopy to rule out synchronous lesions. It is equally important that the area of concern is tattooed for future localization.

## Treatment

The early options for local excision of rectal tumors include transanal, transcoccygeal, and transsphincteric. In addition to endoscopic methods, we will discuss the most common transanal procedures to excise rectal tumors. It is also important to note that these procedures can be used for multiple other pathologies to include biopsy of undiagnosed rectal masses, high-grade dysplasia, and unresectable polyps. Distal submucosal masses such as carcinoid tumors and gastrointestinal stromal tumors (GIST) may also be amenable to a transanal approach. The tenants of a transanal approach are the same for most lesions: full thickness excision of the entire specimen with at least 1 cm margin of benign tissue circumferentially.

The preoperative preparation for transanal excision (TAE) and transanal minimally invasive surgery (TAMIS) is similar. Full mechanical bowel preparation versus rectal irrigation alone depends significantly on the bowel habits of the patient scheduled to undergo TAE. Patients with known history of constipation and straining should undergo full mechanical bowel preparation of the surgeon's preference to allow for proper visualization and also to avoid postoperative straining. In patients with normal bowel habits, single-dose enema therapy the night prior to the procedure will most likely suffice. However, in TAMIS, a more thorough bowel preparation is utilized. Typically, these patients have more proximal tumors, so a full mechanical and antibiotic bowel preparation is indicated for multiple reasons. First, this will minimize intraoperative contamination if peritoneal violation occurs during resection. Second, full preparation permits the surgeon to transition a more traditional resection and anastomosis if the lesion is deemed locally unresectable. Third, visualization is especially crucial for more proximal tumors, and proper bowel preparation is extremely beneficial. Options for mechanical bowel preparation will vary by practice, but a common preparation includes polyethylene glycol mixed with electrolyte sports drink along with antibiotics (neomycin and metronidazole). On table rectal irrigation is also helpful using a bulb syringe with warm irrigation.

Patients should receive a dose of preoperative antibiotics prior to incision (within 1 hour). Many of these procedures can be performed under local anesthesia and moderate sedation given their short duration. Most patients undergoing local excision of a rectal tumor will be positioned in high lithotomy, which should be adequate for most locations. However, anterior rectal lesions in high lithotomy are usually the most difficult to visualize. Prone jackknife positioning can be helpful in these situations placing the lesion in the most dependent location. Once positioning is secured to include taping apart of buttocks, perianal and pudendal nerve blocks can be utilized to relax the anal sphincter during the procedure and provide postoperative pain control. Headlamps are especially useful in TAE to maximize visualization.

## Transanal Excision (TAE)

TAE utilizes anoscopes (Hill-Ferguson) (Fig. 6.1) and/or self-retaining retractors (Lone Star) with hooks to aid in visualization. The anus is serially dilated prior to placement of retraction. Once the lesion is identified, the circumferential margins are marked with monopolar surgical electricity. Some surgeons find that needle point monopolar energy and a combination of cut and coagulation settings reduce tissue retraction and distortion. An additional method that may be utilized to help bring the lesion into the field of view is placing distal sutures to help deliver the tissue into the working space. Once the margins are identified, surgical electricity and/or advanced energy devices are used to carry the dissection through the rectal wall to the level of the perirectal fat, which is visible once the tumor and surrounding benign tissue are lifted from the wound bed. Anterior lesions are at risk of vaginal perforation in females and prostate involvement in males. Special care should be taken in these specific situations during the full thickness resection. In the case of vaginal perforation, multilayer repair and/or Martius flap (biologic tissue interposition) can be performed at the time of the original resection.

Once the tumor is mobilized and removed from the rectum, it is oriented appropriately using straight pins and a corkboard (Fig. 6.2) and

**Fig. 6.1** Ferguson anoscope set (CSA-2000) by CS Surgical Inc. (Slidell, LA) provides varying lengths and diameters for access. The soft bevel allows for the lesion to fall into view for resection

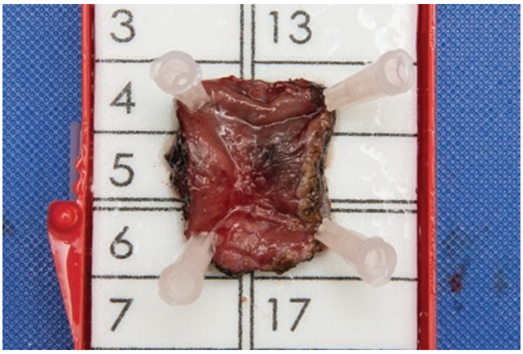


**Fig. 6.2** After excision, the full-thickness specimen is pinned to a corkboard and oriented to the patient's anatomy and laterality on the pathology slip by using the numbers on the board (i.e., 4, right proximal; 14, left proximal; 6, right distal; 16, left distal). We show an example of an adenocarcinoma arising in a polyp that was incompletely excised by snare polypectomy. We did a TAE centering the tattoo and residual polyp and resecting it full thickness, en bloc with a 1 cm border of benign tissue around it

passed off the table as specimen. After copious irrigation (depending on the size of the defect), the area can be closed with absorbable sutures. Smaller and more distal wounds can be left to heal by secondary intention. A proctoscope should then be employed to assess the patency of the lumen after closure.

## Transanal Endoscopic Microsurgery (TEM)

TEM employs a rigid, beveled proctoscope. The procedure works best when the patients are positioned so that the lesion is in a dependent position, and the bevel of the proctoscope holds up the opposite bowel wall (Fig. 6.3). In this way, visualization is optimized.

## Transanal Minimally Invasive Surgery (TAMIS)

In this nuanced procedure, the patient is first positioned in high lithotomy position, and TAMIS is usually utilized in more proximal lesions that cannot be reached via TAE (Fig. 6.4). TAMIS employs the use of a single-port access portal that is placed through the anus into the distal rectum,


**Fig. 6.3** The TEM proctoscope [Richard Wolff Medical Instruments – Vernon Hills, IL] allows for three-dimensional viewing via the operating microscope or for two-dimensional viewing via the fiber-optic video cable. The patient is placed in the left lateral decubitus position with his legs extended to allow for the operator (Dr. Lee E. Smith) to sit comfortably

**Fig. 6.4** TAMIS approach using a Olympus TriPort [Olympus Corporation of the Americas Center Valley, PA]. The patient is placed in lithotomy, and laparoscopic instrumentation is used by the operator (Dr. Anjali S. Kumar)

to allow laparoscopic instruments to be passed through sealed trocars. Carbon dioxide pneumoinsufflation is achieved with airtight seal on the ports allowing the rectum to expand and provide adequate visualization with a laparoscopic camera or flexible endoscope. The tenets of resection are similar to those in TAE. Using laparoscopic instruments and hook monopolar energy, the first step is to identify the lesion and mark 1 cm grossly benign margins circumferentially. Using a combination of cut and coagulation settings, the tissue is taken full thickness through the rectal wall. Given the lack of retraction on the rectal wall, the specimen has a higher chance of curling. This can be avoided by not completing the full thickness dissection distally until the proximal margin is created and carried back laterally to the initial incision. Again, advanced energy devices can be considered for added hemostasis. Often a continuous flow of carbon dioxide is required to allow for procedural suctioning and to minimize rectal bellowing. The specimen can then be oriented appropriately to ensure correct margins are identified.

Once the specimen has been removed, the wound is irrigated with a laparoscopic suction-irrigator device. Care is taken to provide a watertight closure using absorbable suture. Some surgeons advocate for barbed absorbable suture that allows for easy approximation but often has to be completely removed if misthrows are made. It is also imperative to avoid narrowing the rectal lumen during this process. Once the wound is closed, a rigid and flexible proctoscope should be used to check for bowel lumen patency, adequacy of closure, and possible peritoneal violation.

If the patient is placed in lithotomy for TEM or TAMIS, there may be an opportunity to perform a pneumoinsufflation leak test by inserting laparoscopic instrumentation via the anterior abdominal wall (Fig. 6.5). End-tidal carbon dioxide monitoring should be checked frequently by the anesthesia team, and minute ventilation adjusted appropriately.

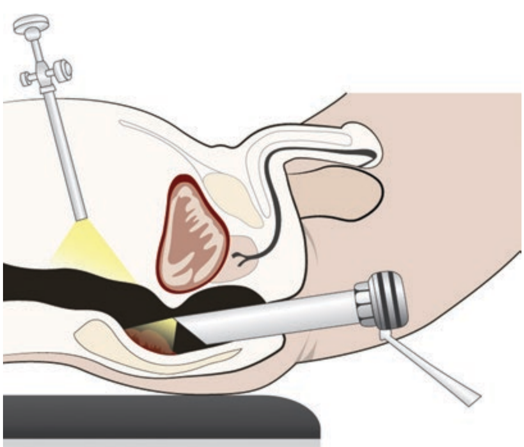

**Fig. 6.5** Cartoon illustration of TEM instrumentation for a posterior rectal lesion with concurrent transabdominal laparoscopic instrumentation

## Endoscopic Mucosal Resection (EMR)/ Endoscopic Submucosal Dissection (ESD)

Although performed primarily by therapeutic gastroenterologists, endoscopic mucosal resection and endoscopic submucosal dissection are additional procedures available for management of lesions confined to the mucosal and submucosal lesions throughout the gastrointestinal tract. Within the colon, these procedures are indicated for colorectal adenomatous lesions to early carcinomas. EMR is technically easier than ESD and is essentially a standard polypectomy using advanced devices. Both have broadened the opportunities available for endoscopic resection of colonic polyps that has expanded to even large, low risk polyps. Endoscopic resection is associated with quick recovery, decreased length of hospital stay, and lower costs [13]. This includes those with minimal submucosal invasion and no lymphovascular invasion, poor differentiation, tumor budding, or tumor free margin >1 mm [14]. Ultimately, the goals of resection are similar for EMR and ESD: complete tumor removal with negative microscopic margins (R0 margins).

Endoscopic mucosal resection is completed using a standard colonoscope and is best suited for flat or sessile polyps. The first step of the procedure is to completely visualize the lesion and delineate the margins or proposed resection before distorting the tissue. It is helpful to mark along the resected edges with monopolar energy as a guide. Once the resection is planned, the base of the polyp is injected with injectable solution (normal saline/ sodium hyaluronate) into the submucosal space, elevating the lesion. This allows the operator to snare the polyp while protecting the deeper space and rectal/colonic wall. The polyp can be removed in en bloc or in piecemeal fashion. Piecemeal resection is typically only indicated in low risk polyps, given the significant risk of recurrence versus en bloc removal [13]. However, it is useful in large, benign adenomas or in situations where carcinoma is present within the adenoma. It is important to note that the carcinomatous portion should never be cut into pieces and should be delivered entirely. Typically, en bloc resection is completed using standard snare and electrosurgical instrumentation. Variants of EMR include cap-assisted mucosectomy and ligation-assisted. As expected, the complications that are most often associated with EMR and ESD are bleeding and perforation.

ESD is an alternative to EMR that has been shown to have more reliable en bloc resection and lower recurrence rates than EMR [15]. However, ESD is also highly technical requiring advanced training and experience. Similar to EMR, the submucosal plane is developed with injectable fluid. ESD is performed using needle-type knife and electrosurgical energy to meticulously dissect the submucosal plane. This allows the operator to remove the specimen en bloc regardless of its size. Similar to EMR, there are multiple variants to ESD to include to a hybrid procedure to include the use of a snare.

## Robotic Surgical Approaches

Development of single platform portals for robotic surgical instrumentation entry poses an intriguing opportunity for future development. Three-dimensional visualization combined with articulated instrumentation will give the operator added advantage [16].

## Advanced Endoscopy

Argon plasma coagulation (APC) is an additional modality for use in patients for rectal bleeding. The majority of the literature describes APC for use in bleeding related to arteriovenous malformations (AVM) and radiation proctitis. A few reports cite success rate of 77–90% in bleeding AVMs making it a viable option especially after other options have failed [17, 18]. APC is also effective for treatment of hemorrhagic radiation proctitis where the rectal mucosal is friable and bleeding is often difficult to control without causing additional harm. Given the success of APC use in treatment of these challenging issues, it should be considered in acute anorectal bleeding.

Another endoscopic modality that may serve a role in acute rectal obstruction is colonic stenting. As with many of the previous procedures discussed, endoscopic stenting requires a practitioner trained in advanced endoscopy. Colorectal endoluminal stenting (CELS) was first described in 1991 for the treatment of colorectal neoplasms [19]. It's use has expanded for treatment of colorectal obstructions throughout the entirety of large bowel. A recent study evaluated the clinical use of self-expandable metal stents in malignant rectal obstruction to their use in left colonic obstruction and found that success rates were comparable [20]. Anorectal stenting of malignant obstruction should be considered as a reasonable option for acute obstruction.

## Conclusion

As described, there are multiple endoscopic and surgical options available for the local treatment of early-stage anorectal malignancies. After appropriate workup of the tumor, there are many factors that must be considered before proceeding including stage, location, feasibility, and equipment available for resection. These principles should guide the modern acute care surgeon to select the most appropriate and personalized approach.

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