Close rectal dissection in benign diseases of the rectum: A review

D.M. Nally [a,*], D.O. Kavanagh [a], D.C. Winter [b]

[a] Department of Surgical Affairs, Royal College of Surgeons of Ireland, 121 St. Stephen's Green, Dublin 2, Ireland
[b] Department of Colorectal Disease, St. Vincent's University Hospital, Elm Park, Dublin 4, Ireland

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ABSTRACT

Purpose: Total mesorectal excision (TME) is the gold standard resectional strategy for rectal cancer to minimize loco-regional recurrence and optimize oncological outcomes. This plane is described by many as 'bloodless' but it does contain important pelvic neural plexuses and dissection may be close to the ureters and major vascular structures, particularly in inflammatory conditions of the distal colon and rectum. In such benign diseases a more conservative excision, so-called close rectal dissection, has been advocated to minimize damage to these structures.

Methods: A review of the literature was conducted to document the evolution of this procedure. Contemporary literature was interrogated to ascertain how this approach is adopted in minimally invasive surgery. Post-operative outcomes are compared to those from TME surgery.

Results: From early descriptions in 1956, this procedure has been adapted for use in laparoscopic surgery. It may be particularly useful in trans-anal mesorectal surgery. Reported benefits include reduced nerve injury and pelvic sepsis. However, this must be balanced against risks of mesorectal bleeding, rectal injury, and ongoing inflammation from the retained mesorectum.

Conclusion: Rectal surgery in inflammatory conditions is technically challenging. Close rectal dissection is an alternate approach available to colorectal surgeons in these cases to minimize pelvic morbidity and optimize postoperative outcomes.

Introduction

The mesorectum is the peritoneal investment of the upper rectum, which forms an envelope surrounding the rectum, loose areolar tissue, blood vessels, lymph vessels, lymph nodes and autonomic nerves.[1] The concept of Total Mesorectal Excision (TME), to improve oncological outcomes was first described by Heald in 1979.[2] TME involves precise, sharp dissection between the visceral and parietal layers of the endopelvic fascia which ensures a comprehensive, *en bloc* removal of the perirectal areolar tissue, including lymphatic, and vascular/perineural tumor deposits along with the primary rectal cancer[3] Thus, it counteracts the downward spread of tumour cells within the mesorectum which contributes to local recurrence.[4] This approach has been consistently shown to yield more favourable oncological outcomes, thereby resulting in the endorsement of TME as the standard of care for mid and lower rectal cancers within the framework of multimodal care.[3]

In the setting of benign diseases, however (e.g. inflammatory bowel disease (IBD), complicated diverticular disease or prophylactic surgery for familial adenosis polyposis (FAP) where there is no concern regarding malignancy[5]) an oncological TME is not essential. Nonetheless, many surgeons still adopt TME due to its considered benefits: The plane can be clearly defined; the procedure is considered 'bloodless' and it is a standardised approach.[6] However, during pelvic dissection to achieve TME, autonomic nerves are susceptible to injury, risking post-operative urinary and sexual dysfunction. Possible sites of nerve injury are outlined in Table 1. In a series

* *Corresponding author*. Department of Surgical Affairs, 2nd Floor, Royal College of Surgeons of Ireland, 121 St. Stephen's Green, Dublin 2, Ireland.
E-mail addresses: deirdrenally@rcsi.com (D.M. Nally), darakavanagh@rcsi.com (D.O. Kavanagh), des.winter@gmail.com (D.C. Winter).
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Table 1 – Mechanism of Autonomic Nerve Injury during Proctectomy based on Keating et al.[41]

Location	Mechanism	Avoidance
On Aorta during ligation of IMA	Sympathetic fibres of pre-aortic plexus get included in the IMA pedicle	sharp dissection under direct vision with either diathermy or scissors to separate the sympathetic fibres from the IMA
At Pelvic Brim	Injury to sympathetic fibres as they pass medial to ureter and tangentially to lateral edge of mesorectum.	Adequate traction and counter traction keeping hypogastric nerves in view.
During perineal dissection	Damage to parasympathetic fibres if pre-sacral fascia stripped off sacrum	Deemed to be uncommon in current practice
During lateral pelvic wall dissection	IHP damage seen particularly where radical lateral pelvic sidewall lymphadenectomy performed	Less common in conventional rectal dissection
At base of prostate during anterior rectal dissection	Cavernosal fibres are vulnerable as they pass anterolateral to rectum en route to the corpora	Care to preserve the neurovascular bundles related to the posterolateral aspect of the prostate particularly at the 2 and 10 o'clock positions. Division of Denonvilliers' fascia proximal to the base of the prostate avoids damage to the cavernosal fibres.

IHP: Inferior hypogastric plexus.

by Enker et al. of nerve-preserving, sphincter-preserving surgery for rectal cancer, sexual dysfunction was observed in 13% of patients.[7] This outcome can be compounded by an inflammatory phlegmon generated by an underlying benign disease process. This can obliterate normal anatomy and predispose to operative damage to important structures in an effort to find the elusive TME plane. Patients undergoing surgery in the context of benign disease are often younger than patients with rectal cancer. Although younger age has previously been demonstrated as protective of post-operative sexual function,[8] implications for post-operative quality of life (QoL) must be carefully considered.

For these reasons, some surgeons advocate close rectal dissection, in which excision proceeds through a non-anatomical peri-muscular plane, close to the muscularis propria of the rectum.[9] TME and close rectal dissection are compared in Figs. 1 and 2. Close rectal dissection has multiple other titles: perimuscular,[10] intramesorectal (IMR),[11] trans-mesorectal dissection[12] or mesorectal preservation.[6] This dissection plane has potential benefits in terms of preservation of nerve function. Pelvic sepsis may be minimised by curtailing anastomotic complications. The European Crohn's and Colitis Organization (ECCO) Evidence-Based Consensus on Surgery for Ulcerative Colitis agree that this strategy is reasonable and possibly advantageous in the absence of dysplasia or cancer.[13]

This paper considers the historical evolution and current status of close rectal dissection and reviews clinical outcomes reported in the literature. It analyses the benefits of close rectal dissection over TME in the context of benign diseases and forms part of the body of research which helps to guide the surgeon in individualising operative approaches depending on the disease process.

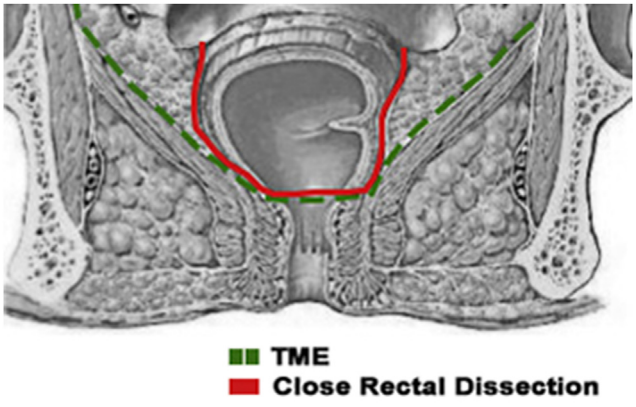

Fig. 1 – Coronal view comparing Close Rectal Dissection and Total Mesorectal Excision (TME).

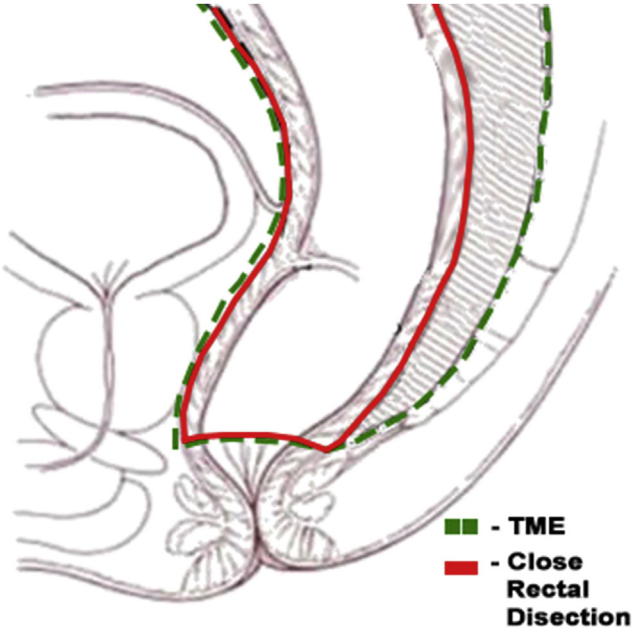

Fig. 2 – Sagittal view comparing Close Rectal Dissection and Total Mesorectal Excision (TME).

Method

PubMed and Google Scholar searches were conducted using the search terms "close rectal dissection," "intramesorectal" and "mesorectal preservation." Full text, English language articles retrieved by these searches were reviewed. Historical and technical descriptions of the procedure were extracted from relevant papers. Contemporary literature was interrogated to ascertain how this approach is adopted in minimally invasive surgery. The outcomes of close rectal dissection were compared to those of TME.

Historical evolution

In 1956 Cooper et al. referred to close rectal dissection in one of the earliest descriptions stating "the inflammatory nature of the disease allows a more limited operation than is performed for malignancy. It is possible to make the dissection close to the rectal wall thus avoiding the nerves which supply the bladder and genitals."[14] Such a conservative approach for benign rectal surgery was also promoted in 1972 by Lee and Dowling.[15] These authors described a sequence where the perineal dissector mobilized the rectum anteriorly, just outside the muscle wall, in the peri-muscular plane, while the abdominal operator mobilized posteriorly, again, close to the rectum, to the level of the coccyx. Lateral dissection, performed from above, was deferred until anterior and posterior planes were complete. Infiltration of perirectal tissues with a weak adrenaline solution was used to separate tissues and provide a bloodless field such that dissection was performed under direct vision. Lyttle and Parks[16] suggested that the operative technique should be based on embryonic planes of fusion between visceral structures (rectum and anal canal) and the surrounding somatic tissues (skeletal muscles of the pelvic floor). Their approach is described in detail. In particular, careful dissection laterally to protect the nervi erigentes is encouraged, as is careful exploration of the plane between Denonvillier's fascia and the seminal vesicles anteriorly. The latter is pushed forward, away from the rectum and gentle blunt dissection pushes tissue adjacent to the vesicles laterally to minimize nerve damage. In 1972 Berry et al. adopted the peri-muscular technique for proctocolectomy and reported a series of 115 patients (UC 76%; Crohn's 23%, Indeterminate colitis <1%).[17] Similarly, Zeitels et al. adopted this technique in conjunction with intersphincteric dissection in 1977.[18] During the abdominal phase, they ligated the vessels close to the rectum, preserving as much presacral fat as possible and dividing the lateral ligaments close to the rectal wall.

Modern developments in Close rectal dissection and current status

Just as minimally invasive surgical approaches in oncological rectal surgery are developing, so too are they expanding for benign disease. Despite initial hesitancy, due to technical considerations,[19,20] laparoscopic surgery in IBD is coming to the fore, supported by a 2009 Cochrane review which found that laparoscopic surgery is feasible and safe in benign rectal disease.[21] Both approaches (TME or Close rectal dissection) have been described in laparoscopic IBD surgery: A 2004 Dutch trial, comparing hand-assisted laparoscopic and open surgery for restorative proctocolectomy and IPAA[22] used a conventional TME. In the LapConPouch Trial,[23] examining the same intervention, the dissection technique is standardized in the trial protocol as "TME only laterally, the distal dissection is carried out more proximal to the rectum to minimize nerve damage".[24] A technical paper on minimally invasive laparoscopic IPAA by Giudici et al., however, expresses a preference for close rectal dissection for proctectomy.[12]

Robotic surgery is also increasingly performed. The proposed benefits of 3 Dimensional-High Definition (3D-HD) views, and articulated/wristed instruments allow improved instrumentation when working within confined spaces, including the narrow pelvis for both benign and malignant conditions. It optimizes visualization of pelvic neural plexuses.[25,26] By extension, robotic surgery should facilitate close rectal dissection as described in open surgery above. The first robotic IBD procedures were reported by Pedazra et al.[27] and Miller et al.[28] in 2011 and 2012 respectively. The former define their dissection plane as follows: "A mesorectal plane was established … for preservation of pelvic autonomic nerves … dissection continued posteriorly to Waldeyer's fascia to the level of the levator ani muscles, laterally through the lateral stalks taking care to remain in the pararectal plane, and anteriorly through the rectovaginal septum (female) or Denonvillier's fascia (male).".[27] Miller states that patients undergoing completion excision of the rectum had an intrasphincteric proctectomy but the plane of dissection is not specified for patients undergoing IPAA.

The first Transanal TME (taTME), for rectal cancer was reported in 2010.[29] A review of 573 cases found that, compared to the laparoscopic approach, taTME achieves comparable technical success with acceptable oncologic and perioperative outcomes.[30] This approach has been extended to benign disease with case series of transanal ileal pouch-anal anastomosis (ta-IPAA) appearing in the literature.[30,31] A modified TaTME, performed with close rectal excision, might be advantageous: In addition to avoiding the ureters, damage to the vulnerable urethra (a distinctive concern of TaTME surgery[32,33] which occurs in approximately 0.7% of cases[34]) may be less likely during mobilization. Conversely, completing a rendez-vous with laparoscopic proximal dissection might present challenges. In their technical paper on completion proctectomy, de Buck van Overstraeten et al.[35] describe a transanal, transmural incision followed by transanal close rectal dissection through an access platform. One limitation of close rectal dissection at laparoscopy, poor visibility in the pelvis due to the narrow space left after this type of dissection, is conceded. This generates a challenge in docking an anvil on the shaft of the circular stapler in the pelvis under direct vision to perform a single stapled anastomosis. A solution is suggested: mounting a catheter on the anvil enables traction on the pouch towards the pelvis which eases the approximation of the pouch towards the rectal cuff.[35]

Advantages

Studies which evaluate the outcomes of Close Rectal Dissection are tabulated in Table 2. There are a number of proposed advantages.

1. Nerve function

The cited incidence of nerve injury associated with TME varies widely; this nerve injury contributes to urinary, bowel and sexual dysfunction.[36,37] Attalallah et al. performed a prospective study examining sexual dysfunction in 187 patients (117 male, 70 female) before and six months after TME for malignant rectal lesions. The median age of all patients was 63 (range 26–85); menopausal status of female participants was not disclosed. Rates of Sexual dysfunction (consisting of erectile dysfunction (ED) in men and vaginal dryness/dyspareunia in women) were assessed by validated questionnaires. Moderate or severe sexual dysfunction increased from baseline 4%–41% and from 53% to 77% in male and female patients respectively.[38] With respect to benign disease, Michelassi et al. report the outcomes of 50 patients (24 male, 26 female) undergoing hand-sewn IPAA. 22% of females developed dyspareunia. No males developed impotence, but 19% reported retrograde ejaculation.[39]

Acar et al. performed microscopic cadaveric surgical dissection to identify crucial points where autonomic nerves are vulnerable during proctectomy: the origin of the inferior mesenteric artery, in front of the promontory, the side walls of the pelvis and the posterolateral corners of the prostate close to the anterior rectal wall.[40] In a review of sexual function after rectal excision, Keating suggests that close rectal dissection is particularly beneficial anteriorly and laterally as it reduces the risk of damage to cavernosal fibres anterior to the distal rectum and minimizes dissection at pelvic side walls, hence protecting fibres of the hypogastric nerves and sympathetic nervous plexus.[41] Applying theory to operative surgical practice, Kartheuser et al. report urogenital outcomes for a series of 171 patients undergoing an IPAA with mucosectomy for FAP; of which, 163 had dissection performed close to the serosa.[42] Of these, two patients (1.7%) had transient postoperative dysuria and urinary retention. One (0.6%) had transient impotence which resolved completely. No patients reported retrograde ejaculation, nor were there any genital or sexual disorders observed in female patients.

However, despite this sound anatomical rationale for reduced nerve injury, this may not always be clinically relevant in terms of patient-perceived functional outcomes, as demonstrated in two observational studies: Lindsey et al. conducted a prospective cohort study of male patients undergoing surgery for IBD to evaluate the protective effects of close rectal dissection on sexual function.[43] With an 81% survey response rate (156 participants), there was no statistical difference in the rate of complete (2.2% vs.4.5%, $p = 0.67$) or partial (13.5% vs.13.3%, $p = 0.99$) impotence between close rectal dissection and TME.

Similarly, Hicks et al. executed a questionnaire-based study to compare patient-reported, bowel and sexual function outcomes following IPAA via intramesorectal excision (IME) or TME dissection in 201 patients with UC[11] Operative techniques for each patient were determined by surgeon preference. The response rate of 47% yielded 55 and 34 patients in IME and TME groups respectively. IME patients reported improved faecal continence (as measured by mean FISI, $p = 0.009$) but this statistical improvement in faecal continence did not translate into an overall improvement in faecal incontinence specific QoL (Fecal Incontinence Quality of Life Scales $P \geq 0.44$). Both patient groups fall within the moderate continence range.[44] For sexual function, there were no differences for either women (Female Sexual Function Instrument; $P \geq 0.20$) or men (International Index of Erectile Dysfunction; $P \geq 0.22$).

2. Sepsis:

Rates of anastomotic leak increased after the introduction of TME surgery.[45,46] These findings are used to justify the adoption of close rectal dissection over TME with respect to IPAA and hence pelvic sepsis: Rink et al.[6] reported a series of 131 patients who underwent a restorative proctocolectomy for chronic IBD with hand-sewn IPAA. The objective of the study was to determine the morbidity of the procedure. Rectal dissection was performed close to the bowel wall in all cases to preserve the mesorectal fat. Local septic complications were seen in 1.5% (2/131 patients): an anovaginal fistula presumed secondary to an anastomotic leak (overall leak rate 0.8%; 1/131) and a pelvic collection assumed to originate from an infected haematoma. Six of 94 patients with complete follow-up (6.4%) developed anal fistulas and abscesses more than 3 months after surgery. The authors were satisfied that the rate of other complications (pouch failure (7.6%), fistula (6.4%), and pouchitis (47.9%)), compare favourably with other reported series in the literature. These authors suggest that the low rate of septic complications are partially due to the preservation of mesorectal fat which partially covers staple lines and creates a funnel bed for the pouch. By reducing pelvic empty space, this configuration might serve to inhibit fluid or haematoma accumulation which predisposes to infection and hence affects pouch function. The European Crohn's and Colitis Organisation (ECCO) Guidelines also suggest that retained mesorectal fat allows for better pelvic filling and reduces the risk of a presacral sinus after an anastomotic leak.[13]

The prospective single-blind, randomised clinical trial by Bartels et al. of 59 patients undergoing IPAA, comparing TME and Close Rectal Dissection, provides further supportive evidence. In their close rectal technique, the superior rectal artery was not divided and dissection proceeded close to the muscular tube of the rectum leaving the mesorectum and mesorectal fat in situ. The primary outcome, pouch compliance at 12 months is not yet reported. However, at short-term follow up, close rectal dissection was associated with lower rates of severe complications (defined as Clavien-Dindo Grade III) ($P = 0{\cdot}027$) than TME in patients undergoing IPAA. There was a higher rate of anastomotic leak in the TME group 6/31 vs 2/28 but this was not statistically significant.[9] Similar to Rink et al.,[6] Bartels et al. assert that residual mesorectal fat serves to seal small posterior defects and eliminates dead space behind the pouch. They do, however, present a potential

Table 2 – Studies showing post-operative wound and sexual function outcomes after Close Rectal Dissection.

Study Year	N=	Close Rectal Dissection Group	Comparison	Outcomes
Fazio[55] **1980**	21	9 patients undergoing Intersphincteric resection *All IBD*	12 patients with rectal cancer *12 APR* *5 AR*	IBD Patients: Partial sexual dysfunction 11% APR: Sexual dysfunction 50% (Total in 16%) AR: Sexual dysfunction 40%
Berry[17] **1986**	115	115 had perimuscular dissection	None	Mortality 1.7% Transient Impotence <1% Perineal Wound Infection 25.7% Wound healed at discharge 75%
Bauer[10] **1986**	427	427 had Intersphincteric/perimuscular dissection *388 UC* *39 CD*	None	Mortality 0.46% Return to theatre 0.7% Non healing of perineal wound 1.8% SD: Permanent (0.25%) temporary (0.46%) impotence; Retrograde ejaculation 0.7%
Adam[47] **2000**	46	46 undergoing close rectal/ intersphincteric dissection *27 UC* *19 CD*	None	Primary Closure of Perineum 89% Uncomplicated Wound healing 80.4% Chronic sinus 10.5% of CD patients SD: Transient (2/25) permeant (1/25) Dyspareunia; Temporary impotence in 2/21 of males
Lindsey[43] **2001**	156	Number not stated, all IBD	Number not stated, all IBD	Close Rectal Dissection: Complete (2.2%) partial (13.5%) impotence TME: Complete (4.5%) partial (13.38) impotence
Rink[6] **2009**	131	131 patients undergoing IPAA *All IBD*	None	Local septic complications: 1.5% (1 leak; 1 abscess) Fistula: 6.4%
de Zeeuw[48] **2011**	10	10 patients undergoing IPAA *All UC*	None	Presacral abscess 10% No bladder or sexual dysfunction
Bremers[56] **2013**	10	Rectal stump resection via TEM *IBD 6* *Lynch 1* *Collagenous Colitis 1*	None	Presacral Abscess 10% Delayed healing of perineal wound 20% *Anastomotic leakage*
Liyanage[57] **2013**	12	TEMS Proctectomy using interphincteric and close rectal technique *9 IBD* *2 Rectal Adenoma* *1 radiation proctitis*	None	41% delayed wound healing 16% required drainage 8% colo-cutaneous fistula to perineum
Hicks[58] **2014**	201	119 patients intramesorectal proctectomy (IMP) + rectal Eversion *All UC*	82 TME All UC	Perioperative complications IMP 0.91 ± 0.12 vs. TME 1.35 ± 0.14; ($p = 0.02$) Infections: IMP 10.9% vs. TME 24.4%; ($p = 0.01$) Includes wound infection Total no. Of late complications: IMP 1.10 ± 0.10 vs. TME 10.7 ± 0.12 ($p = 0.48$) (Includes pouchitis, pouch failure, fistula, stricture) Leak: TME higher odds ratio than IMP: OR 3.09 [95% CI 1.06, 9.81; ($p = 0.04$)]
Hicks[11] **2014**	89	55 Intramesorectal Excision (IME) *All UC*	34 TME *All UC*	Women: Similar Overall Sexual Function Female Sexual Function Index (FSFI): IME 25.8 ± 1.9 vs. TME 24.0 ± 1.9 ($p = 0.52$) Scores on all FSFI sub-scales also similar between groups ($P > 0.2$). Men: No differences in sexual function overall International Index for Erectile Dysfunction (IIED): IME 7.30 ± 0.53 vs TME 6.75 ± 0.69 ($p = 0.54$) Scores on IIED survey subscales ($p > 0.22$).
Bartels[9] **2015**	59	28 Elective IPAA using Close Rectal Dissection	31 Elective IPAA using TME	Post-operative complications (Clavien Dindo >3): 2/28 for CRD vs 10/31 for TME ($p = 0.02$) 30-day anastomotic leak: CRD 7% (2 of 28) vs. TME 19% (6 of 31) ($p = 0{\cdot}259$) QoL at 12 months was similar in the two groups for all subscales

IBD: Inflammatory Bowel Disease; APR: Abdominoperineal Resection; AR: Anterior Resection; UC: Ulcerative Colitis; CD: Crohn's Disease; SD: Sexual Dysfunction; TME: Total Mesorectal Excision; IPAA: Ileal Pouch-Anal Anastomosis; TEMS: Transanal Endoscopic Microsurgery; IMP: Intramesorectal proctectomy; IME: Intramesorectal Excision; QoL: Quality of life.

disadvantage of this technique: It may modify proprioception as a new pouch distends and hence may alter awareness of pouch filling.

Adam et al. reported a case series of 46 patients undergoing rectal excision in the peri-muscular plane for IBD (27 patients with UC, 19 with Crohn's disease; 15/46 (33%) on oral steroids at the time of surgery).[47] The objective of this study was to establish the rates of perineal wound healing and infection with this technique and to compare it to that of wider excisions established in the literature. Primary healing, defined as healing without wound infection or discharge of any pus, was achieved in 80%; Delayed healing (slight perineal wound drainage only and complete wound healing by 3 months) occurred in 20%. Major wound breakdown (presence of persistent sepsis in a wound that had previously been closed, but with complete healing at 6 months) was seen in 8.7%; 4.3% had an unhealed perineal wound (persistent perineal sinus) after 6 months. They compare these results to the 2–45% and 0–36% reported incidence of failed primary perineal wound healing following a 'conventional' wide rectal excision in UC and Crohns Disease respectively.

Disadvantages of close rectal dissection

1. Bleeding

Historically, the perimuscular approach was considered time-consuming, especially posteriorly, due to the vascular nature of this area.[16,41] In contrast, during a TME, bleeding is minimized by controlling and dividing the inferior mesenteric artery at its aortic origin[16] and the avascular nature of the dissection plane. This perceived disadvantage of close rectal dissection is now overcome by modern haemostatic vessel sealing devices. In 2011 de Zeeuw et al. reported experience with close rectal dissection as part of IPAA for 10 patients with UC. The indication for surgery was severe colitis (6 patients) or mild to moderate colitis, refractory to medical treatment (4 patients).[48] The plane is described as "circular to the mesorectum in the non-anatomic perimuscular plane, thereby preserving the mesorectal fat layer just outside the rectum … because the mesorectal thickness is minimized to almost zero at the level of the pelvic floor the pouch-anal anastomosis is at the same level and identical to the anastomosis of the conventional IPAA procedure." Ligasure haemostatic device (Covidien, USA)™ was used. The authors suggest that, in contrast to older laborious close rectal dissections, modern versions are simplified and facilitated by new automated haemostatic devices (electro-thermal bipolar vessel sealer and ultrasound dissection) which allows for shorter operation times and minimizes blood loss (median 247 min and 425 mls respectively for this series). Similarly, Bartels used an ultrasonic device to overcome the increased potential for bleeding (UltraCision®; Johnson and Johnson Medical, USA).[9]

2. Less familiarity with the plane and potential to breach the rectal wall

Colorectal surgeons, experienced in oncological resections, are familiar with the anatomic TME plane.[6] They may be less accustomed to close rectal dissection, however, and proximity to the rectal wall means there is a higher chance of breaching the muscular layer with resulting faecal contamination. This occurred in 8 of 28 patients undergoing an intersphincteric proctectomy by Zeitel et al. Nonetheless, 7 of these healed at 1-year follow-up without complication.[18]

3. Concerns regarding leaving the mesentery in situ

It has been proposed that the mesentery in Crohns disease may contribute to the pathogenesis and severity of the disease, independent of, or in conjunction with, the luminal disease.[49] Experimental evidence suggests a pro-inflammatory role for the mesentery.[50,51] Furthermore, impaired fibroblast migration and function[52] may have implications for wound healing. Radical excision of the mesorectum may reduce disease activity.[53] This requires further elucidation within the setting of clinical trials. If these findings are confirmed, and applicable to colonic and small bowel mesentery, it may require a radical alteration in how we operate on patients with IBD. Buskens proposes an improved understanding of "mesenteric aberrancies is crucial to combine optimal resection with maximal tissue conservation".[54]

Conclusion

This review prompts colorectal surgeons to remain cognizant of applied anatomy in complex benign resections within the pelvis. In the era of minimally invasive surgery, as techniques evolve from open through laparoscopic to robotic approaches, sound anatomical and surgical principles must be respected to achieve optimal outcomes. Younger patients undergoing elective surgery for benign conditions are subject to longer-lasting consequences which can have a significant debilitating impact on quality of life. Close rectal dissection may minimize negative outcomes but requires further evaluation at molecular and clinical levels.

Authors contributions

All authors have made a substantial contribution to each part of this article and therefore share collective responsibility and responsibility for its content.

- DN: Literature review, preparation of first and subsequent draughts.
- DK: Conception and design, revision of first draught and writing of subsequent versions, final approval of the version to be submitted.
- DW: Review for important intellectual content, final approval of the version to be submitted.

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Conflicts of interest

None to declare.

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