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Review Article

Organ preservation in rectal cancer: review of contemporary management

Christina Fleming[1], Véronique Vendrely[2], Eric Rullier[1] and Quentin Denost[1,*]

[1]Department of Colorectal Surgery, CHU de Bordeaux, Bordeaux, France
[2]Department of Radiotherapy, CHU de Bordeaux, Bordeaux, France

*Correspondence to: Quentin Denost, Department of Colorectal Surgery, Centre Medicochirurgical Magellan, 33600 Pessac, France (e-mail: quentin.denost@chu-bordeaux.fr)

Abstract

Background: Organ preservation as a successful management for rectal cancer is an evolving field. Refinement of neoadjuvant therapies and extended interval to response assessment has improved tumour downstaging and cCR rates.

Methods: This was a narrative review of the current evidence for all aspects of organ preservation in rectal cancer management, together with a review of the future direction of this field.

Results: Patients can be selected for organ preservation opportunistically, based on an unexpectedly good tumour response, or selectively, based on baseline tumour characteristics that predict organ preservation as a viable treatment strategy. Escalation in oncological therapy and increasing the time interval from completion of neaodjuvant therapy to tumour assessment may further increase tumour downstaging and complete response rates. The addition of local excision to oncological therapy can further improve organ preservation rates. Cancer outcomes in organ preservation are comparable to those of total mesorectal excision, with low regrowth rates reported in patients who achieve a complete response to neoadjuvant therapy.

Successful organ preservation aims to achieve non-inferior oncological outcomes together with improved functionality and survivorship. Future research should establish consensus of follow-up protocols, and define criteria for oncological and functional success to facilitate patient-centred decision-making.

Conclusion: Modern neoadjuvant therapy for rectal cancer and increasing the interval to tumour response increases the number of patients who can be managed successfully with organ preservation in rectal cancer, both as an opportunistic event and as a planned treatment strategy.

Introduction

The adoption of total mesorectal excision (TME) has standardized rectal cancer surgery and improved oncological outcomes[1,2]. In locally advanced disease, neoadjuvant chemoradiotherapy (NACRT) has further improved oncological benefit[3,4]. Although these strategies result in good 5-year disease-free survival rates, they are associated with significant morbidity[5,6], in particular, long-term permanent bowel, urinary, and sexual dysfunction[7–10].

The overarching aim of organ preservation in rectal cancer management is to avoid or minimize the morbidity associated with oncological resection, while not compromising oncological outcomes. Achieving a cCR following neoadjuvant therapy for rectal cancer offers an opportunity to balance oncological outcomes with quality of life and functional outcomes. As patients with rectal cancer have improving survival outcomes, survivorship becomes even more important. The increasing incidence of rectal cancer diagnoses in younger adult patients further calls for consideration of strategies to improve not just survival but also survivorship[11–13].

Recent advances in total neoadjuvant treatment (TNT), and induction and consolidation chemotherapy, have led to higher rates of cCR[14,15] than traditional NACRT. The emergence of immunotherapy in microsatellite instability (MSI) could potentially further improve cCR rates[16,17]. These oncological improvements, coupled with better radiological assessment to assess tumour response, make organ preservation in rectal cancer a viable option for more patients. Although recent publications have shown promising results from both a watch-and-wait (WW) strategy in patients with a complete response and local excision in those with a subcomplete response at low oncological risk, some challenges remain before widespread adoption of rectal preservation in clinical practice can be realized[18–20]. Currently, the most significant challenges are optimizing the tumour response through improvement in neoadjuvant therapy strategies, and achieving consensus on the best interval and method of response assessment and surveillance to ensure that optimum cCR rates can be achieved. Optimizing patient selection is also important, with both selective and opportunistic methods emerging. A selective approach usually involves patient selection based on a diagnosis of early rectal cancer, whereby the aim of treatment from the outset is to achieve a cCR to avoid the consequences of surgery. An opportunistic approach to patient selection involves considering organ preservation as a treatment strategy following neoadjuvant therapy where the tumour response has been better than expected. In this review, the authors discuss the rationale for organ preservation, strategies to increase tumour response, evolving practice, and future perspectives.

Rationale for organ preservation

A number of clinical trials are currently evaluating organ preservation strategies in rectal cancer. Such management

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strategies include active surveillance in the form of WW or local excision of tumour scar after NACRT or TNT. In the early 2000s, Habr-Gama and colleagues[21] were the first to implement and report on opportunistic WW surveillance (selection of patients only according to tumour response, without taking into account the initial tumour status) for patients with a cCR after NACRT. Following this, two randomized trials, AGOSOG[22] and GRECCAR 2[18], validated organ preservation in the management of rectal cancer. However, they focused on a selective approach (preselection of patients for organ conservation according to the initial tumour rather than depending solely on tumour response) and included local excision, that is tumorectomy for non-complete responders.

The rationale for exploring organ preservation proposed by investigators lay in avoidance of stomas and surgical morbidity while not compromising cancer outcomes. Surgical morbidity rates after TME are reported as high as 25–30 per cent[23]. Pelvic sepsis alone can occur in up to 20 per cent of patients depending on tumour level[5]. Although it is recognized that rectal resection itself can compromise short- and long-term bowel, urinary, and sexual function, the compounding impact of complications, particularly pelvic sepsis, on functional outcome is less well understood. NACRT can have a compounding effect on bowel function in combination with restorative resectional rectal cancer surgery[9]. Urinary dysfunction is reported in approximately 12 per cent and, although sexual dysfunction has been less comprehensively assessed and reported, recent studies[24,25] have documented that patient preferences for sexual positions, sexual activity, and body confidence are all altered significantly after colorectal and pelvic floor surgery. Furthermore, long-term stoma rates following surgical treatment of rectal cancer are greater than 20 per cent[26].

A further factor to consider in the context of surgical morbidity in rectal cancer is the global trend towards an increasing incidence of rectal cancer in young patients. It is estimated that over one in four of all rectal cancers diagnosed in 2030 will be in patients aged 50 years or less[27–29]. The treatment priorities for younger adult patients with rectal cancer may not fully overlap with those of older patient groups. Survival and cancer outcomes obviously take significant priority, but it is important to consider how the long-term sequelae of rectal resection may have a specific functional impact on younger patients, including bowel and urinary dysfunction, sexual dysfunction, and family planning. Neoadjuvant therapies can also influence these sequelae, but usually to a lesser degree. When suitable, organ preservation offers the opportunity of acceptable oncological outcome and minimized surgical sequelae for younger patients.

Evolving practice in organ preservation

Table 1 summarizes completed studies of organ preservation in rectal cancer. The development and reporting of an organ preservation approach for locally advanced rectal cancers (mrT3/T4) emerged from work in Sao Paulo[21], where patients were selected opportunistically based on tumour response and active WW surveillance was used. The favourable results from this WW work were further corroborated by Italian[30] and Dutch[31] phase II trials that included 63 and 55 patients respectively. Active WW surveillance in the setting of a cCR following NACRT has also been reported in several single-centre series over the past 10 years. Even though a tumour regrowth rate of up to 30 per cent has been reported in some series, the majority were surgically salvageable[32,33]. Survival in patients with a cCR managed by a WW strategy within an organ preservation programme appears to be equivalent to that of patients with a complete histological response after oncological resection in the form of TME. It should also be noted that most of these series are heterogeneous in terms of inclusion criteria for patient selection for WW, radiation dose received, sensitizing chemotherapy, and criteria and schedule for evaluating tumour response and monitoring protocols. Study outcomes were recently published together in an international multicentre registry study (International Watch & Wait Database, IWWD)[19].

The second organ preservation management strategy, involving local excision with a selective approach to patient selection, has been investigated and reported by the ACOSOG trial[22] in the USA, the GRECCAR 2[18] then GRECCAR 12[34] trials in France, and the STAR-TREC trial[35] which is currently in progress in the UK. The first multicentre study[22], undertaken in the USA, was a phase II trial that included 79 patients between 2006 and 2009 in 26 institutions. The selection criteria were patients with cT2 N0 tumours, diagnosed on endoanal ultrasound examination or MRI, with a maximum diameter of 4 cm, infiltrating less than 40 per cent of the circumference of the rectum, and located less than 8 cm from the anal margin. The only phase III study, the French GRECCAR 2 trial[18], included 186 patients from 15 institutions between 2007 and 2012, and compared local excision with TME in good responders. The inclusion criteria comprised: T2 or T3 tumours, of maximum size 4 cm, and located less than 8 cm from the anal margin, and N0 or N1 (maximum 3 nodes of maximum size 8 mm). The inclusion criteria for the UK STAR-TREC trial[35] are: cancers of the lower rectum mrT1–T3b, N0, absence of extramural venous invasion, with a supramillimetre predictive circumferential margin. These combined study designs from the USA, France, and UK support a selective approach for an organ preservation programme for low and mid rectal cancers that are mrT2–3, with a long axis smaller than 4 cm, but consensus on N status suitability for inclusion is still debated: mrN0 or mrN1 (no more than 3 lymph nodes of maximum size 8 mm).

The Dutch Colorectal Cancer Group[31,36] also conducted a prospective, multicentre study (CARTS) to explore the feasibility of local excision after NACRT in patients with cT1–3 N0 lower rectal cancer. Similar to the approach proposed in GRECCAR 2, patients with a significant tumour response (ycT0–2) 8–10 weeks after CRT were eligible for local excision, which included full-thickness rectal wall excision. When histological examination revealed insufficient downstaging (ypT2–3), patients proceeded to TME within 4–6 weeks after local excision. Patients with a poor response at clinical assessment (ycT3–4) were scheduled to undergo TME 8–10 weeks after NACRT. The data from these two studies that evaluated the combination of a selective approach to patient selection and local excision demonstrated that organ preservation is possible in approximately 60 per cent of patients who meet the inclusion criteria. The tumour stage, the protocol for evaluating tumour response, and the patient monitoring schedule are relatively consistent between these two studies. Conversely, the use of radiosensitizing chemotherapy, the schedule for evaluating tumour response, and the role of endocavitary radiotherapy were standardised. The ongoing STAR-TREC trial (NCT02945566)[35] is exploring the value of integrating both WW and local excision, depending on the degree of response after neoadjuvant therapy in patients with early-stage disease (cT1–T3b N0) in an organ preservation programme. This trial therefore opens the door to the possibility of tailored treatment,

Table 1 Summary of published studies of primary practice of organ preservation in rectal cancer that are referenced in this review, by date of publication

Reference	Study design and population	Patient selection	Treatment strategy	Surveillance strategy	Main findings
Habr-Gama *et al.*[37]	Retrospective cohort study	Opportunistic	NACRT Assessment at 10 weeks Reassessment at 6–8-week intervals until 'the achievement cCR or overt residual cancer'.	DRE, proctoscopy+/−biopsy, CEA: monthly in 1st year, 2 monthly in 2nd year, 6 monthly in 3rd year CT AP and CXR: 6 monthly	*n* = 49 Median interval to cCR 18.7 weeks 63.3% of cCR >16 weeks
Habr-Gama *et al.* (1)[38]	Retrospective cohort study	Selective T2 N0 M0 ≤ 7 cm from anal verge	NACRT *versus* extended NACRT (2 or 6 cycles of 5-FU-based chemotherapy)	DRE, rigid proctoscopy, CEA: every 6–10 weeks for 2 years, 3 monthly in 3rd year, 6 monthly thereafter Pelvic MRI or ERUS: every 6 months during 1st 2 years and yearly thereafter	*n* = 35 5-year surgery-free survival: 56% for standard NACRT, 78% for extended NACRT
Smith *et al.*[32]	Retrospective single-centre comparative cohort study, 2006–2015	Opportunistic	NACRT (majority) +/− induction or consolidation chemotherapy Chemotherapy only (2%)	DRE and endoscopy; MRI included after 2013: 3 monthly in 1st year, 4 monthly in 2nd year, 6 monthly to total 5 years	*n* = 113 5-year outcomes: Local regrowth *n* = 22 (91% curative salvage) DFS 75% OS 73%
Verseveld *et al.* (CARTS Study)[31]	Multicentre non-randomized single-arm phase II clinical trial, 2015–2019	Selective T1–3 N0 M0 and ypT0–1	NACRT Local exision > 2 mm margin	Clinical examination, DRE, rectoscopy and EAUS: 3 monthly for 3 years CT and MRI pelvis: 6 monthly	*n* = 55 5-year outcomes: Local recurrence 7.7% DFS 81.6% OS 82.8% HRQoL equal to baseline level LARS (in organ preservation)—major 50%, minor 28%, no LARS 22%
van der Valk *et al.* (IWWD)[19]	Multicentre registry cohort study	Opportunistic cT1–4 cN1–2 M1 cCR only (not subcomplete)	NACRT +/− chemotherapy +/− brachytherapy. Followed by WW and/or local excision	DRE, endoscopy Various imaging modalities according to each institution's policy	*n* = 880 cCR Median follow-up 3.3 (3.0–3.6) years Local regrowth: 25.2% (*n* = 213), 64% (*n* = 136) within 1 year, 88% (*n* = 188) within 2 years, 97% (*n* = 206) luminal
Creavin *et al.*[33]	Retrospective cohort study	Opportunistic	NACRT only cCR → WW sCR → local excision then WW	CEA, endoscopy, MRI: 3 monthly CT TAP: 6 monthly	Organ preservation rate at 2 years 91%
Rullier *et al.* (GRECCAR 2)[18]	Multicentre prospective, randomized, phase III trial	Selective cT2–3 N0–1 (≤3 nodes) Maximum initial size 4 cm Residual tumour size ≤2 cm	NACRT followed by local excision or TME at 12–14 weeks	DRE, MRI, EUAS, CT: 4 monthly	*n* = 145 analysed Composite outcome: death, recurrence, morbidity, and side-effects at 2 years Failed to demonstrate superiority of local excision over TME
Garcia-Aguilar *et al.* (ACOSOG Z6041)[22]	Multicentre single-arm phase II trial	Selective cT2 N0 <4 cm within 8 cm of anal verge, non-fixed	NACRT and local excision 4–8 weeks after NACRT (1-cm margin)	DRE, proctoscopy, and ERUS: 4 monthly for 3 years, 6 monthly for 2 years	*n* = 76 Median follow-up 56 months Distant metastases 6% (*n* = 5) Local recurrence 4% (*n* = 3) 3 year outcomes: DFS 88% OS 95%
Pucciarelli *et al.*[30]	Multicentre sequential 2-stage phase II study	Selective T3, 11 cm from anal verge T2, requiring APR and ypT0–1	NACRT and local excision (5-mm margin)	DRE, proctoscopy, EAUS, CEA: 3 monthly for 2 years, 6 monthly for subsequent 3 years	*n*= 43 ypT0–1 3-year outcomes: Local recurrence 3.1% DFS 91% OS 91.5%

(continued)

Table 1 (continued)

Reference	Study design and population	Patient selection	Treatment strategy	Surveillance strategy	Main findings
Maas *et al.*[39]	Prospective cohort study	Opportunistic	NACRT	MRI, CT TAP, and colonoscopy: annually DRE, MRI, endoscopy, CT TAP	$n = 21$ 2-year outcomes: DFS 93% OS 91%
Habr-Gama *et al.*[21]	Prospective cohort study	Opportunistic T1–4 N1–2 M0	NACRT Assessment at 8 weeks	DRE, proctoscopy +/− biopsy, CEA: monthly in 1st year, 2 monthly in 2nd year, 6 monthly in 3rd year CT AP and CXR: 6 monthly	cCR 26.8% ($n = 71$) for entire cohort 5-year outcomes: Local recurrence $n = 2$ DFS 92% OS 100%

NACRT, neoadjuvant chemoradiotherapy; DRE, digital rectal examination; CEA, carcinoembryonic antigen; TAP, thorax, abdomen, and pelvis; CXR, chest X-ray; 5-FU, 5-fluoroacil; ERUS, endorectal ultrasonography; DFS, disease-free survival; OS, overall survival; EAUS, endonal ultrasonography; HRQoL, health-related quality of life; LARS, low anterior resection syndrome; WW, watch and wait; sCR, subcomplete response; TME, total mesorectal excision; APR, abdominoperineal resection.

with WW used for complete responders, and local excision for subcomplete responders, who can progress to WW post excision.

Strategies to optimize tumour response

Different approaches have been suggested to optimize the tumour response: increasing the interval between NACRT and tumour assessment and surgery, intensifying the type and sequence of chemotherapy administration, and intensifying radiotherapy. Some are also hopeful that neoadjuvant immunotherapy will also be realized in the near future. The timing of reassessment and surgery after NACRT was investigated in the GRECCAR 6 randomized trial[40], which compared surgery at 7 and 11 weeks after the end of treatment with conventional NACRT (50 Gy and Xeloda®, Genentech, CA, USA). The rate of complete histological response (ypT0), which was the primary endpoint of this study, was not significantly increased by prolonging the interval before operating (17 *versus* 15 per cent). The absence of a significant difference between the two groups in GRECCAR 6 can be explained at least partially by the small difference in time between 7 and 11 weeks. A subsequent meta-analysis[41], which included 26 studies (4 RCTs) and 25 445 patients, concluded that an interval of at least 8 weeks from completion of NACRT resulted in improved ypCR and tumour downstaging compared with less than 8 weeks.

Recently published data on subcomplete responders after NACRT showed that 90 per cent of patients experienced a cCR with additional reassessment instead of immediate radical surgery[42]. Therefore, patients with minor digital rectal examination or endoscopic irregularities, with an excellent radiological response (tumour regression grade ymrTRG1–2), may benefit from additional time and reassessment after an interval of 6–8 weeks, especially as late surgery under these conditions does not appear to have an adverse effect on the oncological results[19]. Following this concept, the Brazilian team[37] continues with tumour reassessment over an interval of 6 months after NACRT to allow an increased opportunity to meet the criteria for a complete response in the event of an improving response on both early assessment of response and based on serial assessment at 6–8-week intervals. In the authors' institution, following completion of NACRT, tumour response is monitored actively at 8-week intervals up to 6 months following completion of NACRT to allow the maximum potential for organ preservation. With this strategy, organ preservation rates of 85 per cent can be achieved at 2 years.

Evaluation of newer treatment regimens, including increasing the dose of radiotherapy and the introduction of consolidation chemotherapy, has also led to increased complete tumour response rates[38,43]. There may also be a future role for neoadjuvant immunotherapy. To date, the role of immune checkpoint inhibitors in colorectal cancer has been limited to chemotherapy-resistant tumours that are mismatch repair (MMR)-deficient (or MSI)[44]. However, recent findings of high complete response rates in early-stage colonic cancer following combination immunotherapy (in both MMR-deficient and -proficient tumours) suggest a potential future role in rectal cancer, to further optimize cCR rates[17].

Neoadjuvant chemotherapy is established as an effective therapy for increasing cCR rates. The results of two randomized phase III trials investigating TNT in locally advanced rectal cancer (PRODIGE 23[14] and RAPIDO[15]) have consistently shown better results in the short term and long term with TNT compared with standard neoadjuvant therapy with long-course chemoradiotherapy (CRT) or short-course radiotherapy. These trial results have provided new high-level evidence to endorse TNT as a management option in the stage II–III rectal cancer treatment algorithm. The complete response rate in these two trials was 28 per cent for initially locally advanced tumours. The GRECCAR 4 trial[45] evaluated the feasibility of an adapted NACRT approach according to the tumour response to induction chemotherapy (4 cycles of FOLFIRINOX (folinic acid, 5-fluorouracil, irinotecan, oxaliplatin)) to obtain a minimum R0 resection rate of 90 per cent in the four arms of the study. The good responders (reduction in tumour volume at least 75 per cent) were randomized to receive immediate surgery or standard NACRT (Cap 50: irradiation of 50 Gy and 1600 mg/m^2 capecitabine orally daily) followed by surgery, and the poor responders were randomized to Cap 50 or intensive NACRT (Cap 60, irradiation 60 Gy, arm D) before surgery. It is interesting to note that, in this study, the combined complete and subcomplete response rates in patients who received induction FOLFIRINOX by Cap 50 were 68.4 per cent in the group of good responders *versus* 17.3 per cent among bad responders. These results highlight the role that induction chemotherapy could have in the selection of patients for whom organ preservation could be proposed after NACRT.

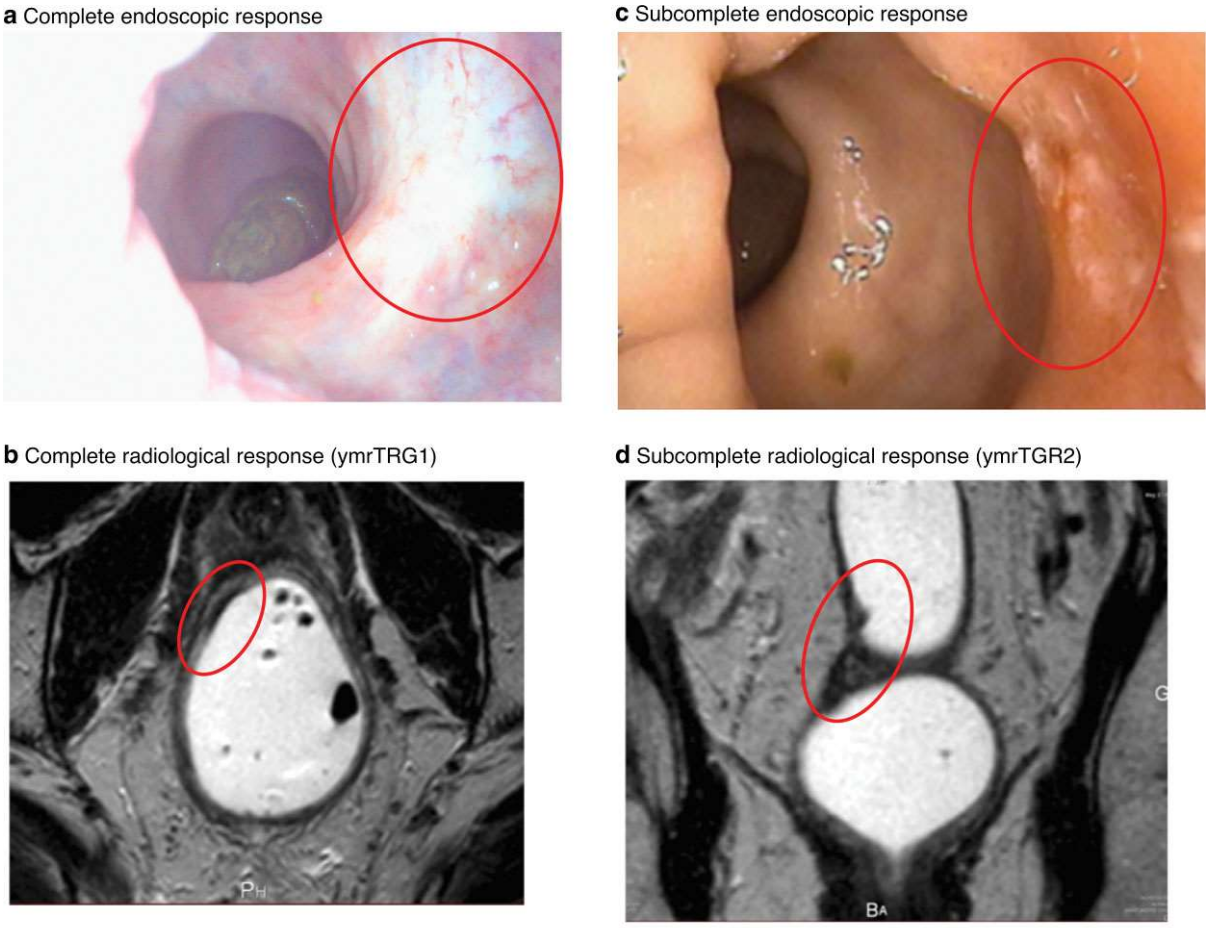

Fig. 1 Endoscopic and MRI findings of subcomplete and complete response in rectal cancer

a Complete endoscopic response, **b** subcomplete endoscopic response, **c** complete radiological response (ymrTRG1), and **d** subcomplete radiological response (ymrTRG2). Red circles delineate previous tumour site in **a** and **b** and remnant tumour site in **c** and **d**.

The GRECCAR 12 trial[34] (recruitment closed in June 2020) evaluated the potential benefit of intensifying neoadjuvant chemotherapy to increase the number of patients suitable for an organ preservation programme. According to the same inclusion criteria as GRECCAR 2, patients were randomized between four cycles of FOLFIRINOX plus CRT (50 Gy and capecitabine) and CRT alone. Good responders, as assessed by MRI (size no larger than 2 cm and TRG1–3), underwent local excision and only those who had ypT2 and N1 disease on imaging proceeded to TME. The primary endpoint was organ preservation rate at 1 year, with assumptions of 60 per cent in the standard arm and 80 per cent in the arm with induction chemotherapy. The aim of GRECCAR 12 was to maintain subcomplete responders as suitable for organ preservation and increase their potential for a complete response. The results are expected in 2023.

Increasing radiation intensity has also been explored. Appelt and colleagues[46] showed a highly significant dose–response relationship with radiation doses of 50.4–70 Gy in patients with locally advanced rectal cancer. This dose range is higher than the range commonly used for rectal cancers, and the authors concluded that it would be of interest for WW protocols to increase cCR rates. In a subsequent study of CRT in patients with T2–T3 N0–N1 cancer considered for a WW strategy, Appelt and colleagues[47] delivered 60 Gy to the tumour, 50 Gy to the lymph nodes, and an additional 5 Gy in endorectal brachytherapy. A remarkable 78 per cent of patients had a cCR 6 weeks after completion of treatment. About one-third of patients had early-stage rectal cancer, which may have contributed to the high response rate. The side-effects of increasing radiation intensity also need to be considered. The European OPERA randomized trial[48] evaluated the effect of increasing the dose of radiotherapy by contact radiotherapy in organ preservation strategies, by comparing external-beam radiochemotherapy of 45 Gy plus tumour boost of 9 Gy with the same radiochemotherapy plus contact—90 Gy therapy in three fractions. The inclusion criteria were T2–T3b cancers of the lower rectum, with a maximum size of 5 cm. The main endpoint was organ preservation at 3 years. In June 2020, the independent oversight committee undertook an interim analysis of the data, and concluded that the results in the contact radiotherapy arm were promising. It was recommended to stop recruitment of patients and to wait for 3-year follow-up to publish the oncological data and to present the total tolerance to mesorectal excision performed after high-dose irradiation.

Evaluation of tumour response

Assessing tumour response following NACRT in rectal cancer should include clinical examination, MRI, and endoscopic assessment[19,36,49]. Evaluation of the response on MRI is carried out using T2-weighted and diffusion sequences. This

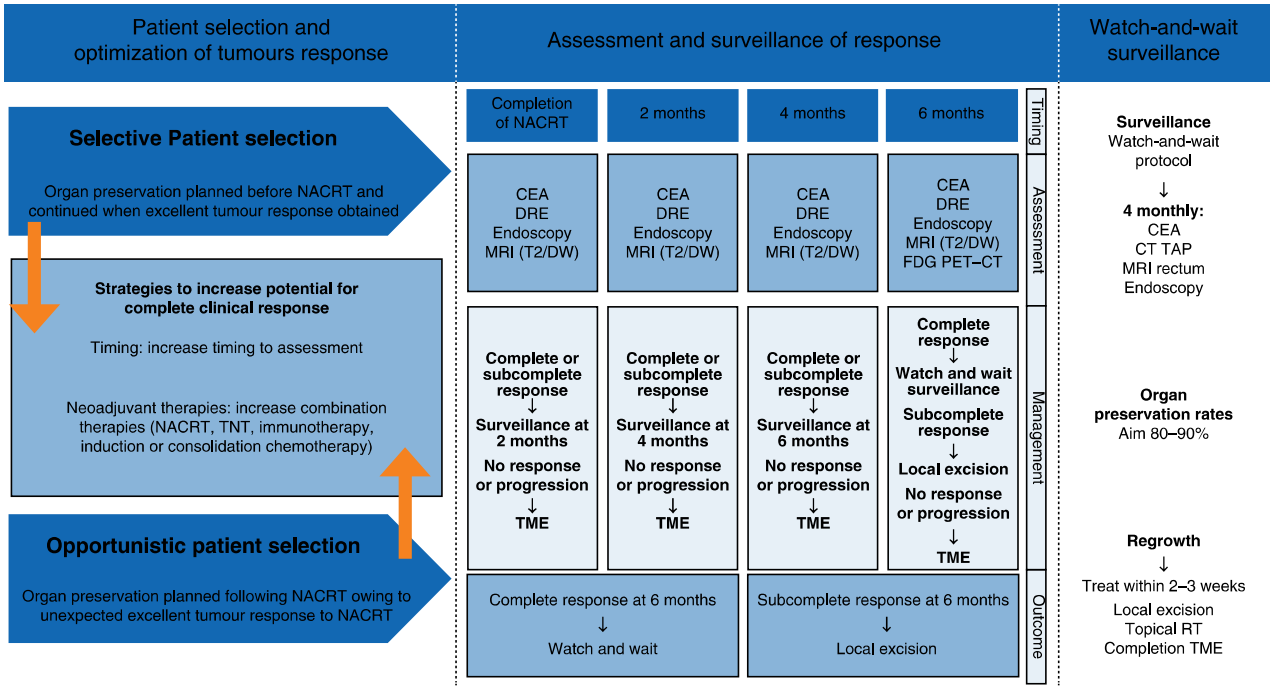

Fig. 2 Summary of proposed patient selection methods, strategies to optimise tumour response to increase organ preservation rates in rectal cancer and definitive management options

CEA, carcinoembryonic antigen; DRE, digital rectal examination; DW, diffusion-weighted; FDG, fluorodeoxyglucose; NACRT, neoadjuvant chemoradiotherapy; RT, radiotherapy; TAP, thorax, abomen, and pelvis; TME, total mesorectal excision; TNT, total neoaduvant therapy.

combination provides reasonable diagnostic accuracy for detection of a complete or subcomplete response[50]. Different criteria are used to define complete and subcomplete tumour responses. The Amsterdam/Maastricht[39] criteria appear to perform best for assessment of tumour response following NACRT[51]. In these criteria, cCR is defined by: absence of palpable tumour, no residual tumour material visualized or 'whitish' scar with small telangiectasias visible on rectal examination and rectoscopy (*Fig. 1a*); and reduction in size of the lesion with residual fibrosis only (signal limited on the diffusion sequence), sometimes associated with thickening of the rectal wall owing to oedema, and no evidence lymph node disease (TRG1) on MRI (*Fig. 1b*); endoscopic biopsy is not recommended, especially if the clinical, endoscopic, and radiological criteria of cCR are met. A subclinical response is defined by: the presence of small and soft irregularities, which may include a residual ulcer, small mucosal nodules or raised mucosa, with a slight persistent erythema of the scar, on rectal examination and rectoscopy (Fig. 1c); and evident downstaging with residual fibrosis, but heterogeneous or irregular appearance of the diffusion signal (TRG2) on MRI (Fig. 1d); endoscopic biopsy is not mandatory to define the subcomplete response if clinical, endoscopic, and radiological findings of a subcomplete response are concordant.

The definition of subcomplete response requires consideration of tumour regression of lymph node disease and the presence of morphological features associated with node positivity (round border, irregular and heterogeneous signal) with a diameter of 5 mm or more. Local excision can be used in patients with a subcomplete response, both for diagnostic and therapeutic purposes[22,36], although this approach can be associated with increased morbidity if additional TME is required[18,52].

The role of functional imaging in organ preservation, in the form of [^{18}F]fluorodeoxyglucose (FDG) PET–CT, remains to be defined and seems to lie more in the identification of non-responders who are not candidates for organ preservation than in the identification of patients with a complete response[53,54]. So far, [^{18}F]FDG PET–CT has not demonstrated adequate precision for safe selection of patients suitable for organ preservation strategies.

Defining success in organ preservation

Based on the above options for patient selection, strategies to optimize tumour response, and methods of tumour assessment for monitoring response to maximize organ preservation potential, an outline of a response surveillance programme is proposed in (*Fig. 2*).

It is clear from established studies that success in organ preservation programmes has been emphasized in terms of organ preservation rates and acceptable disease-free survival. Revisiting the overarching aim of organ preservation, the aim is to balance oncological and functional outcomes for rectal patients with cancer. However, little has been reported on patient perception of organ preservation in rectal cancer. This is disappointing considering that one of the key aims of organ preservation is to offer improved quality of life; assessing this benefit using patient-reported outcome measures is critical. An organ preservation approach can increase neoadjuvant therapies required by patients and increase patient contact with healthcare services owing to increased surveillance requirements. Acceptance of escalation of NACRT and induction or consolidation chemotherapy regimens, and acceptance of the need for close follow-up examinations, by the patient is crucial for an organ preservation strategy to be successful. Furthermore, patients must clearly understand the risk and rates of local regrowth during this process and balance this against the risk of resectional surgery.

In addition, little is known about patient acceptance of organ preservation, what the real treatment priorities are for patients, and patient experience of both the shared decision-making process of organ preservation as a treatment strategy and the practicalities of an organ preservation programme. In a 2019 study, Gani and colleagues[55] sought to explore these issues. Questionnaires were completed by 49 patients diagnosed with rectal cancer awaiting multimodal treatment, of whom 83 per cent reported that they would consider an active WW surveillance strategy acceptable upon achieving a cCR. The vast majority were prepared to accept a 25 per cent 2-year regrowth rate and an intensive follow-up protocol (94 and 96 per cent of patients respectively). Equivalent cure rates were a prerequisite for entry into WW for 55 per cent of patients. From this study, it is clear that patients do consider organ preservation acceptable given the potential benefits it can provide weighed against the potential limitations. However, as data on organ preservation are continually emerging with complex crossover in patient selection, treatment strategies and surveillance plans, examining how this information can be communicated to patients needs to be prioritized, studied, and validated. For ongoing and future research on organ preservation in rectal cancer, it is essential to integrate patient-reported outcomes to enhance shared decision-making in therapeutic choice and selection into an organ preservation programme. The results of the UK-based, National Institute for Health Research-funded PrefCoRe study[56], which aims to quantify and implement patient preferences for the treatment of high-risk rectal cancer, including preferences for organ preservation, are awaited.

Conclusion

As response rates to neoadjuvant therapies improve, the role of organ preservation in the successful management of rectal cancer is evolving. An organ preservation programme can involve both an opportunistic and selective approach to patient selection, and both active WW surveillance and local excisional management depending on tumour response. Modern neoadjuvant therapies and the inclusion of TNT improve tumour response and there may be a future role for immunotherapy. Ensuring that response assessment strategies are optimized to accurately report tumour response is essential, and consensus on timing of assessment is required. Organ preservation is an important treatment strategy that should be offered as part of a comprehensive high-volume rectal cancer practice. Looking forward, it should be a considered treatment option for suitable patients with rectal cancer, whether delivered at an institutional, regional or national level. The increasing incidence of rectal cancer diagnoses in younger adults highlights the importance of both oncological and functional outcomes in survivorship. It is critical that patients are supported to share in the decision-making process regarding organ preservation.

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European Colorectal Congress

28 November – 1 December 2022, St.Gallen, Switzerland

Monday, 28 November 2022

09.50
Opening and welcome
Jochen Lange, St.Gallen, CH

10.00
It is leaking! Approaches to salvaging an anastomosis
Willem Bemelman, Amsterdam, NL

10.30
Predictive and diagnostic markers of anastomotic leak
Andre D'Hoore, Leuven, BE

11.00
SATELLITE SYMPOSIUM
ETHICON

11.45
Of microbes and men – the unspoken story of anastomotic leakage
James Kinross, London, UK

12.15
LUNCH

13.45
Operative techniques to reduce anastomotic recurrence in Crohn's disease
Laura Hancock, Manchester, UK

14.15
Innovative approaches in the treatment of complex Crohn Diseases perianal fistula
Christianne Buskens, Amsterdam, NL

14.45
To divert or not to divert in Crohn surgery – technical aspects and patient factors
Pär Myrelid, Linköping, SE

15.15
COFFEE BREAK

15.45
Appendiceal neoplasia – when to opt for a minimal approach, when and how to go for a maximal treatment
Tom Cecil, Basingstoke, Hampshire, UK

16.15
SATELLITE SYMPOSIUM
Medtronic
Further, Together

17.00
Outcomes of modern induction therapies and Wait and Watch strategies, Hope or Hype
Antonino Spinelli, Milano, IT

17.30
EAES Presidential Lecture - Use of ICG in colorectal surgery: beyond bowel perfusion
Salvador Morales-Conde, Sevilla, ES

18.00
Get-Together with your colleagues
Industrial Exhibition

Tuesday, 29 November 2022

9.00
CONSULTANT'S CORNER
Michel Adamina, Winterthur, CH

10.30
COFFEE BREAK

11.00
SATELLITE SYMPOSIUM
INTUITIVE

11.45
Trends in colorectal oncology and clinical insights for the near future
Rob Glynne-Jones, London, UK

12.15
LUNCH

13.45
VIDEO SESSION

14.15
SATELLITE SYMPOSIUM
BD

15.00
COFFEE BREAK

15.30
The unsolved issue of TME: open, robotic, transanal, or laparoscopic – shining light on evidence and practice
Des Winter, Dublin, IE
Jim Khan, London, UK
Brendan Moran, Basingstoke, UK

16.30
SATELLITE SYMPOSIUM
Takeda

17.15
Lars Pahlman lecture
Søren Laurberg, Aarhus, DK

Thursday, 1 December 2022
Masterclass in Colorectal Surgery
Proctology Day

Wednesday, 30 November 2022

9.00
Advanced risk stratification in colorectal cancer – choosing wisely surgery and adjuvant therapy
Philip Quirke, Leeds, UK

09.30
Predictors for Postoperative Complications and Mortality
Ronan O'Connell, Dublin, IE

10.00
Segmental colectomy versus extended colectomy for complex cancer
Quentin Denost, Bordeaux, FR

10.30
COFFEE BREAK

11.00
Incidental cancer in polyp - completion surgery or endoscopy treatment alone?
Laura Beyer-Berjot, Marseille, FR

11.30
SATELLITE SYMPOSIUM
EVOLUZIONE DISPOSITIVI MEDICI

12.00
Less is more – pushing the boundaries of full-thickness rectal resection
Xavier Serra-Aracil, Barcelona, ES

12.30
LUNCH

14.00
Management of intestinal neuroendocrine neoplasia
Frédéric Ris, Geneva, CH

14.30
Poster Presentation & Best Poster Award
Michel Adamina, Winterthur, CH

15.00
SATELLITE SYMPOSIUM
OLYMPUS

15.45
COFFEE BREAK

16.15
Reoperative pelvic floor surgery – dealing with perineal hernia, reoperations, and complex reconstructions
Guillaume Meurette, Nantes, FR

16.45
Salvage strategies for rectal neoplasia
Roel Hompes, Amsterdam, NL

17.15
Beyond TME – technique and results of pelvic exenteration and sacrectomy
Paris Tekkis, London, UK

19.30
FESTIVE EVENING

Information & Registration **www.colorectalsurgery.eu**