



Improved Utilization of Resources as an Improvement of Outcome: the Effect of Multidisciplinary Team for Rectal Cancer in a District Hospital

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Abstract

Aim: Today, treatment decisions about patients with rectal cancer are increasingly made within the context of a Multi-Disciplinary Team (MDT) meeting. The outcomes of rectal cancer patients before and after the era of multi-disciplinary team was analyzed and compared in this paper. The purpose of the present study is to evaluate the value of discussing rectal cancer patients in a multi-disciplinary team.

Methods: All rectal cancer patients diagnosed and treated in 2014-2015 in the General Surgery Division of the “Carlo Urbani” hospital in Jesi (AN, Italy) were included. According to the national guidelines, neoadjuvant chemo-radiotherapy should be administered to many rectal cancer patients.

Results: Sixty-five patients were included in this study: thirty patients in 2014 (pre-MDT) and thirty-five patients in 2015. Improvements in the pathologic stage were seen in a rather big portion of patients after the introduction of the MDT meetings, thanks to the increased adoption of the neoadjuvant chemo-radiotherapy.

Conclusion: The vast majority of rectal MDT decisions were implemented and when decisions changed, it mostly related to patient factors that had not been taken into account. Analysis of the implementation of team decisions is an informative process in order to monitor the quality of MDT decision-making.

Keywords: Rectal cancer; Multi-disciplinary team; Patient outcomes; Clinical stage; Pathological stage

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Introduction

Rectal cancer represents a significant health care problem in terms of incidence, management complexity, and use of resources. Rectal cancer can have different patterns of presentation at diagnosis, which greatly influences both the prognosis and treatment choices. Treatment strategies vary depending on the level of the tumor, extension through the rectal wall in the mesorectum, presence of involved nodes inside and outside the mesorectum, presence of perforation, histological type and grade, and presence of distant metastases. The treatment of rectal cancer is extremely complex. The anatomy of the rectum presents a unique challenge and strict planes of dissection must be maintained to increase chances of healing. Basically, the management of rectal cancer has been changing over the past few decades, which has led to significant reductions in rates of local recurrence, increase in disease-free and overall survival, and reduction in permanent stoma rates [1]. However, surgical therapy is one aspect only of rectal cancer care. Treatment decision making for rectal cancer is challenging because of the inherent tradeoffs between effectiveness in terms of local recurrence and survival and functional outcomes in terms of bowel and sexual function [2-4]. This is further complicated by an increase in the number and type of available options for surgical treatment, as well as by changing paradigms for treatment based on response to preoperative chemoradiotherapy. Further complications are due to the importance of accurate preoperative staging, because under staging may result in primary surgery without neoadjuvant therapy, leading to increased risk of local recurrence, whereas over staging may lead to unnecessary radiotherapy and chemotherapy with poorer functional outcomes [5]. These various strategies in different combinations are aimed at improvement in care standards, improving quality of life with better local control and fewer complications, and improving survival. These decisions require communication between the surgeon, the pathologist, the radiologist, the medical oncologist,

Table 1: Analysis of demographic variables.

	Pre-MDT 2014 N = 30 (%)	MDT 2015 N = 35 (%)	P value
Age at diagnosis (mean)	70.8	70.3	0.43
Female	15 (50.0)	19 (54.3)	0.3647
BMI	23.9	24.1	0.3829
Comorbidities	21 (70.0)	25 (71.4)	0.4508
ASA score	1.70	1.68	0.4713
Clinical stage			
0	1 (3.3)	1 (2.9)	0.463
I	5 (16.7)	11 (31.4)	0.0851
II	12 (40.0)	6 (17.1)	0.01983
III	8 (26.7)	10 (28.6)	0.4323
IV	4 (13.3)	7 (20.0)	0.2362
Pathological stage			
0	0 (0.0)	3 (8.6)	
I	9 (30.0)	15 (42.9)	0.1414
II	6 (20.0)	7 (20.0)	
III	9 (30.0)	3 (8.6)	0.01334
IV	6 (20.0)	7 (20.0)	

MDT: Multi-Disciplinary Team; ASA: American Society of Anaesthesiologists; BMI: Body Mass Index

and the radiation oncologist. Indeed, the establishment of a multi-disciplinary team to manage patients with rectal cancer attains just that. Further research has established the role of the pathologist and the radiologist in optimizing the multidisciplinary treatment of rectal cancer. Identification of tumor <1 mm from the circumferential resection margin proved to be a strong predictor of local recurrence, distant metastases, and survival, resulting in a new endpoint of rectal cancer treatment [6-9]. An optimal patient-tailored decision-making process requires adequate interdisciplinary communication and coordination. Hence, the complex treatment of rectal cancer requires a multidisciplinary approach [1,10-12]. To date, many studies have shown improvements in the standardization of care and an increased proportion of patients receiving this standard [13-15]. Incorporating MDT into practice has resulted in an increase in the utilization of rectal cancer focused imaging, such as pelvic magnetic resonance imaging for preoperative clinical staging [16-18], in the use of neoadjuvant chemo-radiotherapy [15,16,19] and in the accuracy and completeness of pathologic staging [16,19,20]. It is expected that immediate expert feedback from radiologists and pathologists will lead to improvements in the surgeon's ability to achieve complete (R0) resection in a higher proportion of patients. Increasing complexity of multi-disciplinary management has led to the widespread adoption of the multi-disciplinary team meeting as a forum to direct treatment and improve quality of care [21,18]. In the past, rectal cancer treatment was primarily, and almost exclusively, surgical [22]. In fact, the notion that a multi-disciplinary approach improves medical management of cancer patients is becoming more prevalent. Many experts argue that the multi-disciplinary team approach presents a new standard of care, leading to a modern trend towards centralized and specialized centres for cancer management. Meaningful advances in imaging, staging, surgery, radiotherapy, chemotherapy and a growing arsenal of targeted therapies have all positively contributed to this notion. However, this multimodal approach demands for more time and resources, effective ongoing

Table 2: Appropriate use of postoperative adjuvant chemo-radiation therapy decreased over the study period down to 37% of MDT group patients.

	Pre-MDT 2014 n= 30 (%)	MDT 2015 n = 35 (%)	P value
CEA	14 (46.67)	23 (65.71)	0.06113
Imaging			
EUS	5 (16.67)	9 (25.71)	0.1884
MRI	7 (23.33)	18 (51.43)	0.010
CT	27 (90.00)	34 (97.14)	0.1162
Colonoscopy	26 (86.67)	30 (85.71)	0.4555
Distance from anal verge (cm)	11.00	10.57	0.3715
Proper neoadjuvant	10 (33.33)	15 (42.86)	0.2156
Restaging after neo	8 (26.67)	12 (34.29)	0.2535
Proper adjuvant	12 (40.00)	13 (37.14)	
Type of resection			
1	13 (43.3)	15 (42.9)	
2	15 (50.0)	18 (51.4)	
3	2 (6.7)	2 (5.7)	

CEA: Carcinoembryonic Antigen; EUS: Endorectal Ultrasound; MRI: Magnetic Resonance Imaging; CT: Computed Tomography; 1: Laparoscopic Left Hemicolectomy; 2: Laparoscopic Anterior Rectum Resection; 3: Other (abdomino perineal resection, Hartmann resection)

coordination between multiple specialties and can thus present formidable organizational challenges in a population where time can influence outcomes. There is some evidence that the introduction of rectal cancer MDT has improved outcomes for patients, but assessing the actual impact of MDT meetings is difficult, due to concurrent improvements in care brought in over time [19]. Ensuring that high quality treatment decisions are made requires discussion between experts in pathological and radiological data, information about patient related factors such as comorbid health status and patient treatment preferences and an effective decision-making process [23]. Rectal cancer treatment has become multi-disciplinary in nature involving at least surgeons, radiologists, radiotherapists, pathologists, and medical oncologists. This interconnection should commence at the time of the initial diagnosis. The preoperative handling of rectal cancer patients affects local recurrence and survival, and very often postoperative therapy schemes cannot compensate for any mistakes during the initial decision making. A multi-disciplinary team can provide tailor-made treatment options for any given rectal cancer patient. Treatment out of the context of a MDT currently varies according to local dogma, facilities, and resources. In our hospital, before January 2015 patients with primary rectal cancer were initially examined by the surgeon who would assess the patient and make referrals at their discretion. There was no mandatory or formal review of the preoperative assessment or formal discussion of the patient among the surgeon, radiologist, radiation oncologist, and medical oncologist. For the reasons stated above, our institution decided to set up a multi-disciplinary team to discuss every case of rectal cancer. The objective of this study is to evaluate the improvements on rectal cancer treatments outcomes after the introduction of the MDT meetings.

Materials and Methods

Design of the study

In our health institute, weekly multi-disciplinary team conferences were initiated in January 2015. Patients with newly diagnosed rectal

cancer being treated in our institution between January 1, 2015, and December 31, 2015, were presented at a specific rectal cancer multi-disciplinary team. Patients were identified by the treating surgeon. Patient identifiers were forwarded to the multi-disciplinary team coordinator, who was responsible for drafting and distributing the patient list at each multi-disciplinary team meeting. To the purpose of this study, only patients with primary rectal cancer were included. Then, the data from rectal cancer patients since year 2014 were evaluated, before the adoption of multi-disciplinary team and since the year 2015 after the adoption of meeting. Multi-disciplinary team meetings were held every week and attended by surgeons, radiologists, radiation and medical oncologists and key nursing personnel treating patients hired at our center. A chair facilitated the work of the multi-disciplinary team and the treating physicians presented the clinical history, physical and endoscopic findings, and imaging results for each patient. After this, the treating physician indicated his/her proposed treatment plan. Complete datasets regarding demographics, tumor stage, treatment, and outcomes based on pathology after operation were obtained. During an MDT discussion patient history, clinical and psychological condition, co-morbidity, modes of work-up, clinical staging, and optimal treatment strategies were discussed. These weekly meetings were used for discussion of proper patient management, concurrently, among all appropriate disciplines. A database was created to include each patient's workup, treatments to date, and for recommendations by each specialty. We analyzed 30 patients associated to the year 2014 and 35 patients associated to the year 2015. "Demographic variables" consisted of age at diagnosis, sex, body mass index, comorbidities, American Society of Anesthesiologists physical status classification system (ASA score), clinical stage and pathological stage. Other analyzed variables included baseline carcinoembryonic antigen (CEA), the type of imaging, use of neoadjuvant chemo-radiation, restaging following neoadjuvant therapy, distance from the anal verge, operation type and use of adjuvant chemo-radiation. "Outcome variables" consisted in a comparison for each group between clinical and pathological stage.

Statistical analysis

Statistical analysis included Student t test of parametric variables and chi-square test of proportions.

Results

There were 65 patients included in this study entered into the rectal MDT meetings at General Surgery Division of "Carlo Urbani" Hospital, Jesi, Ancona, Italy. These patients were split in MDT group (2015, no.35) and pre-MDT group (2014, no.30). Demographic data and their analysis are included in Table 1. The average age at diagnosis did not significantly differ between groups, as well as the variable "sex". Comorbidities such as diabetes, coronary artery disease, congestive heart failure, body mass index, and American Society of Anesthesiologists physical status classification system did not differ significantly between groups. Preoperative clinical stages were similar between groups, except for that of clinical stage II, which was lower in the MDT group and statistically significant. Postoperative pathological stage did not differ between groups, except for that of clinical stage III, which was lower in the MDT group and statistically significant. Patients often arrive at our institution having completed their treatment, waiting for surgical operation only. The MDT did not exist before 2015. Baseline preoperative CEA measurement steadily increased, but did not reach significance. Colonoscopy and CT were

Table 3: As far as the outcomes we cannot verify the local and distant recurrence because of the short follow-up of the 2 groups. But we can see (Table 3) that thanks to the multi-disciplinary team and the increased use of the neoadjuvant therapy, a statistically significant difference in reduction of the stage between the clinical and pathological stage in the patients of the MDT group was verified, that did not apply to the patients of the pre-MDT group.

Pre-MDT group			
	Clinical Stage	Pathological Stage	P value
Stage 0-I-II	18 (60.00)	15 (50.00)	0.2181
Stage III-IV	12 (40.00)	15 (50.00)	0.2181
MDT group			
	Clinical Stage	Pathological Stage	P value
Stage 0-I-II	18 (51.42)	25 (71.43)	0.04275*
Stage III-IV	17 (48.58)	10 (28.57)	0.04275*

high for both groups. Statistically significant increases were seen in the use of MRI but not for endoscopic rectal ultrasound to evaluate the depth of invasion. Complete metastatic imaging with CT to include imaging of the chest steadily increased. The majority of patients in the pre-MDT group included abdomen and pelvis imaging, but not chest. Proper neoadjuvant therapy was noticed to increase over time as did post-therapy preoperative restaging with MRI but they was no statistically significant difference. Appropriate use of postoperative adjuvant chemo-radiation therapy decreased over the study period down to 37% of MDT group patients (Table 2). Laparoscopic anterior rectum resection was performed in 18 patients in the MDT group and in 15 patients in the pre-MDT group.

Discussion

The multi-disciplinary team consists of primary team members that include colorectal surgeons, radiologist, pathologist, oncologist, meeting coordinator, and clinical nurse specialists. Other specialists such as gastroenterologist, hepatobiliary surgeons, interventional radiologist, clinical geneticist, stoma nurse, thoracic surgeon, dietician, social worker, and research nurse are usually peripherally involved. The meetings should occur weekly and be set up by the team coordinator. Case notes, patient data, diagnostic data, staging, and pathologic information should also be available during the meeting. The cases to be discussed should include any new patient with diagnosis of rectal cancer, all patients who have undergone resection of a rectal cancer, patients newly identified with recurrent or metastatic disease, and any other rectal cancer patients that members of the team feel should be discussed. The clinical history and imaging data in these patients are reviewed during meetings. A radiologist reviews imaging with the team with particular focus on operative planning. Also, histopathologic data are reviewed and in many cases help to monitor the quality of surgery. Review of the raw data serves to educate all members, gets all members well versed on staging issues, and promotes the overall assessment and analysis of a case. Postoperative cases are reviewed and the pathology is discussed. In regard to rectal cancer, the pathologist provides valuable insight into quality of total mesorectal excision which is reviewed grossly and histologically. This can lead to an improvement in surgical technique. The multi-disciplinary team accumulates information and opinions so that management of decisions can be made on patient treatment. It allows individualization of patient care so that care can be tailored for any particular patient. Another key element of the multi-disciplinary team is capturing the data on a database so that internal audits can be performed to monitor outcomes. Improved coordination of care

and the opportunity to assess each patient from many viewpoints are immediate benefits of a multi-disciplinary team. Multi-disciplinary teams are typically associated with institutions with subspecialist surgeons treating higher volumes of colorectal cancer patients. There is growing evidence that high-volume colorectal cancer centers with experienced subspecialty-trained surgeons have improved mortality and have higher sphincter preservation rates [11,24-28]. Receiving critiques or comments from experts in other fields can help surgeon self-appraisal, specifically in reference to surgical margin review. Audits of adequacy of total mesorectal excision with gross and histopathologic review of the specimen can lead to improved surgical technique [11,24]. Lately, an audit about the use of multi-disciplinary team recommendations in Yorkshire, England, found out improved survival in colon cancer patients treated with team recommendations, and a trend toward increased survival in those with rectal cancer [19]. In multi-disciplinary team managed patients with rectal cancer, there was an increased use of preoperative radiation and higher rates of anterior resection. In our study, these decisions that changed after any meetings were mainly due to patient co-morbidity that rendered the recommended treatment as inappropriate or as not possible. Other multi-disciplinary team decisions changed because they were unacceptable to the patient. The high rate of implementation of multidisciplinary team decisions recorded in this study suggests that the colorectal multi-disciplinary team is an effective forum for making management decisions that are acceptable to patients and can be implemented. In this study, all the multi-disciplinary team decisions that changed after a meeting resulted in final treatments that were more conservative than originally planned. This highlights the need for up to date information about the patient's general health and preferences to be available for the multi-disciplinary team meeting. Such information might include relevant cardio respiratory or psychosocial details. Information about patients' preferences may also be difficult to discuss routinely at meetings, either because patients may not have particularly treatment wishes or because patients' views frequently evolve during the process of diagnosis and treatment [29]. Whichever means is used to include more information about patient related factors into multi-disciplinary team meetings, it is likely to require investment, and evidence suggests that when patients are consulted about the treatment decision, compliance is likely to be better [30,31]. For other cancers sites, it has been found out that MDT meetings are useful in improving staging accuracy [32]. Recently a study has shown that innovation in healthcare teams may reflect excellence because it may mean that teams adapt to a changing environment and increasing workload [33]. Others have shown that frequent and voluntary interactions between team members increased opinion sharing and ideas [23]. These are useful outcomes and it suggested that by monitoring implementation of MDT decisions and studying reasons why decisions change also provides useful clinical feedback to teams. This process may also be a useful measure to peer review the quality of MDT decision-making. This study suggests that there is a need to develop pragmatic methods to allow the better inclusion of information about co-morbidities and patient choice within MDT meetings. If this could be achieved, it may lead to optimal treatment decisions that can be subsequently implemented.

Multidisciplinary treatment of rectal cancer consists of accurate imaging, meticulous surgery, and wise use of chemo-radiotherapy. These elements are interconnected. Recently, Heald [34] proposed a 6-stage process for the management of rectal cancer after establishing its diagnosis and excluding systemic disease. In the first stage, pelvic

MRI is performed, which provides the essential elements for the preoperative decision making for rectal cancer. In the next stage, the MDT discusses the patient's case and the overall treatment plan is formed. In stage 3, preoperative chemo-radiotherapy is administered, when indicated. Selection for preoperative chemo-radiotherapy principally is according to preoperative MRI. In the fourth stage, a detailed precise surgical procedure is performed according to TME concept. In stage 5, pathologic audit of the specimen is performed postoperatively. Finally, the case is evaluated thoroughly within the MDT and decisions regarding postoperative treatment are made along with surgical audit and feedback from the pathologists. The MDT is responsible for choosing the tailor-made management for all patients with rectal cancer and has to set up an algorithm for the treatment of rectal cancer that is the backbone for any preoperative decision making for colorectal cancer. The aim of the MDT is to improve results and to offer state-of-the-art treatment. We consider MDT discussion obligatory for all patients with rectal cancer.

The contribution of a MDT includes increased application of neoadjuvant chemotherapy, careful patients election for primary tumor resection (decreased surgical mortality rate), and increased resection of metastatic lesions in the liver. MDT could not only increase the communication between surgeons, oncologists, radiologists, and pathologists, which undoubtedly increased the tumor resection rate, but also simultaneously decrease the number of unnecessary surgeries and the surgical mortality, thanks to more careful patient selection [35,36]. The evolution in the management of rectal cancer in our center reflects international best practice and has allowed us to examine the effect of multi-disciplinary management of rectal cancer.

Conclusion

Multi-disciplinary team care of patients with rectal cancer has been shown to improve process and oncologic outcomes. The process requires full commitment from all involved in the care of rectal cancer patients. To sum up, a multi-disciplinary approach can assist in providing seamless coordination of care and is crucial to achieving improved outcomes. Our responsibility as colorectal surgeons treating rectal cancer patients is to understand and coordinate the wide variety of modalities available to optimize survival, minimize morbidity, and maximize quality of life for those with this strict disease. It should become the standard of care in the future.

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