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Original Article

Wide Variation in the Use of Radiotherapy in the Management of Surgically Treated Rectal Cancer Across the English National Health Service

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Abstract

Aims: Radiotherapy is an important treatment modality in the multidisciplinary management of rectal cancer. It is delivered both in the neoadjuvant setting and postoperatively, but, although it reduces local recurrence, it does not influence overall survival and increases the risk of long-term complications. This has led to a variety of international practice patterns. These variations can have a significant effect on commissioning, but also future clinical research. This study explores its use within the large English National Health Service (NHS).

Materials and methods: Information on all individuals diagnosed with a surgically treated rectal cancer between April 2009 and December 2010 were extracted from the Radiotherapy Dataset linked to the National Cancer Data Repository. Individuals were grouped into those receiving no radiotherapy, short-course radiotherapy with immediate surgery (SCRT-I), short-course radiotherapy with delayed surgery (SCRT-D), long-course chemoradiotherapy (LCCRT), other radiotherapy (ORT) and postoperative radiotherapy (PORT). Patterns of use were then investigated.

Results: The study consisted of 9201 individuals; 4585 (49.3%) received some form of radiotherapy. SCRT-I was used in 12.1%, SCRT-D in 1.2%, LCCRT in 29.5%, ORT in 4.7% and PORT in 2.3%. Radiotherapy was used more commonly in men and in those receiving an abdominoperineal excision and less commonly in the elderly and those with comorbidity. Significant and substantial variations were also seen in its use across all the multidisciplinary teams managing this disease.

Conclusion: Despite the same evidence base, wide variation exists in both the use of and type of radiotherapy delivered in the management of rectal cancer across the English NHS. Prospective population-based collection of local recurrence and patient-reported early and late toxicity information is required to further improve patient selection for preoperative radiotherapy.

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Key words: Radiotherapy; rectal cancer; surgery

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Introduction

Radiotherapy is an established treatment modality in the multidisciplinary management of rectal cancer. In the 1990s, phase III trials reported reduced local recurrence and improved overall survival using a combination of post-operative chemotherapy and concurrent chemoradiation (CRT). Subsequently, randomised trials, mainly in Europe, showed a reduction in local recurrence with the preoperative addition of either a 1 week short course of radiotherapy or the addition of concurrent chemotherapy to a 5 week course of preoperative radiotherapy [1].

Two recently reported phase III trials have confirmed a halving of the rate of local recurrence when a 1 week short course of radiotherapy was added to surgical resection [2,3]. Two phase III trials reported reduced local recurrence when preoperative CRT was compared with long-course radiotherapy alone [4,5]. Local recurrence, acute and late toxicity were reduced when preoperative CRT was compared with postoperative CRT [6,7]. The combined results led to a major shift towards the use of preoperative radiotherapy in the form of short-course and CRT schedules. In parallel, improved surgical technique using total mesorectal excision led to low reported rates of local recurrence with surgery alone [8]. This finding was confirmed in the Medical Research Council CR07 trial, where the best planes of surgical excision resulted in the lowest rates of local recurrence [9].

Although preoperative radiotherapy can reduce the risk of local recurrence, it can also increase the risk of long-term side-effects when added to surgical resection [10–13]. These long-term side-effects seem to be similar whether preoperative short-course radiotherapy or CRT is used [14,15].

In the National Health Service (NHS) of England, weekly multidisciplinary team (MDT) meetings take place to review the clinical and radiological staging of all rectal cancer patients. Pelvic magnetic resonance imaging (MRI) is routinely used to determine the use of preoperative and postoperative radiotherapy in management, further increasing the complexity of decision making. International evidence suggests there is significant variation in the use of radiotherapy in the management of rectal cancer [16–20], but, unlike the UK, many countries do not routinely use MRI for pelvic staging, which may explain in part the variation observed. Little is known about the patterns of radiotherapy use in England.

This study explored the use of radiotherapy in surgically treated rectal cancer at a population level using the first available data from the national Radiotherapy Dataset (RTDS) [21]. These data are extracted and collated from all NHS linear accelerators. When combined with the information in the National Cancer Data Repository (NCDR) [22] these data enable patterns of management to be investigated [23–25] across the English NHS.

Materials and Methods

All individuals diagnosed with a first primary rectal cancer between 1 April 2009 and 31 December 2010 and

who underwent a major resection for the disease within the English NHS were identified (using standard algorithms) [24,26] within the linked cancer registry and Hospital Episode Statistics (HES) component of the NCDR [22]. Information on age, gender, Dukes' stage of disease at diagnosis, tumour site, socioeconomic status (based on Index of Multiple Deprivation (IMD) income quintile) and survival were taken from the cancer registry component of the resource, whereas information on the type of surgery and hospital MDT of surgical management was taken from the HES component. A Charlson comorbidity score [27] was also derived for each individual based on the diagnostic reasons (excluding cancer) for any hospital admissions recorded in HES in the year before diagnosis (excluding any admission spanning the date of diagnosis). The cancer component of the score was then derived from the cancer registry information and combined with the hospital admission scores. Higher scores indicate greater comorbid disease and patients were grouped into Charlson score categories of 0, 1, 2 and ≥ 3 .

To investigate patterns of use of radiotherapy, any records for this cohort of individuals within the RTDS (now also available in the NCDR) were identified. The RTDS contains information on every episode of radiotherapy delivered, but the dataset does not consistently capture whether the intent of the dose delivered was adjuvant, radical or palliative. In addition, the disease coding within the resources varies between centres and total attendances are captured rather than intended fractionation patterns. An individual may also have multiple summary RTDS records that overlap the same time period and seem to relate to the same episode of radiotherapy being delivered. An algorithm was therefore developed to identify neoadjuvant or adjuvant treatment records from the resource among all other episodes of radiotherapy administered to this rectal cancer population. First, only episodes of radiotherapy that the RTDS stated had been used to treat colorectal (ICD10 [28] C18–20), anal (C21) or an unspecified digestive cancer (C78, C80, D01 and D37) and occurred within a year of the date of surgery for each individual in the cohort were deemed eligible. If individuals had multiple episodes of radiotherapy delivered in overlapping time periods then the episode that recorded the highest number of attendances was retained, but the individual was flagged so that these multiple episodes were acknowledged. Individuals were then allocated to one of five groups based on the standard rectal radiotherapy regimens used in England and the total number of attendances they made to a radiotherapy centre. Those for whom there was no link to the RTDS were deemed to have received no neoadjuvant or adjuvant radiotherapy. Those who had attended a radiotherapy centre five times before surgery and for whom the time between the start of radiotherapy and surgery was 35 days or less were allocated to a short-course radiotherapy and immediate surgery category (SCRT-I). Those meeting the same attendance criteria, but where the interval between radiotherapy and surgery was greater than 35 days, were allocated to the short-course radiotherapy and delayed surgery category (SCRT-D). Those who attended for

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