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Conservative and Curative Management of Rectal Adenocarcinomas by Local Radiotherapy Alone

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Two hundred patients with well-differentiated adenocarcinomas of the rectum stages T1, T2 (113 T1, 87 T2) were accrued in two French institutions (Lyon-Sud and Dijon). Treatment consisted of intracavitary 50 kV X-rays (90–120 Gy in 3–4 fractions and 4–6 weeks). A 20–30 Gy interstitial brachytherapy boost was given after 2–3 fractions when a limited infiltration of the rectal wall was present. Local failure occurred in 4.4% of T1, 19.5% of T2; nodal failure in 0.9% of T1, 9.2% of T2. Ultimate local control after salvage of failures is 94.5%. A functional sphincter was preserved in 95% of patients with local control.

Key words: rectal adenocarcinoma contact radiotherapy, brachytherapy, curative, sphincter preservation
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INTRODUCTION

CURATIVE POSSIBILITIES of radiotherapy alone in selected rectal adenocarcinomas remain widely underestimated despite well-documented evidence [1–9]. Historical reasons include the old-fashioned belief of radiation resistance of adenocarcinomas, and/or an experience limited to the use of radiotherapy as an adjuvant or palliative treatment. Some favourable conditions are necessary to develop a strategy of curative management of rectal adenocarcinomas with radiotherapy alone.

- (1) Good co-operation between the proctologist, surgeon and radiation oncologist involved in the decision processes before and during radiotherapy.
- (2) Access to modern diagnostic investigations (especially transrectal ultrasonography) for proper selection of patients.
- (3) Experience with the specific techniques of radiotherapy involved in this strategy: intracavitary contact radiotherapy (ICRT), interstitial brachytherapy (IBT) and external irradiation (XRT).

TECHNIQUES OF RADIOTHERAPY

Intracavitary contact radiotherapy (ICRT)

ICRT consists of low orthovoltage X-ray therapy (50 kV, 0.5–1 mm Al filtration). The therapeutic range of this beam is limited by a steep fall-off of dose with depth (50% at 5 mm, 25% at 10 mm). This allows the delivery of large doses per fraction (approximately 3000 cGy) and the gradual destruction of exophytic tumours “layer per layer” in a few fractions (3–4 fractions over a 4–6 week overall treatment time). This treatment is ambulatory and feasible in most properly selected patients with carcinoma in the low and mid-rectum. Local anaesthesia of the anal sphincter is necessary in less than 10% of patients.

Interstitial brachytherapy (IBT)

¹⁹²Iridium wires are used. Empty metallic needles are inserted submucosally into the base of the tumour, either transrectally, or more often via the perineum under general anaesthesia (or rachianaesthesia) and fluoroscopic control. ¹⁹²Iridium wires are later inserted into the guide needles with a length consistent with the chosen target volume. The recommended dose is approximately 1000 cGy per day calculated at a distance of 0.5 cm from the central plane of the implant.

PATIENTS AND METHODS

This study focuses on a homogeneous group of 200 patients treated only with localised radiotherapy methods (ACRT and IBT). Patients who had received external irradiation were excluded. These patients were accrued in two institutions (Centre Georges-François Leclerc of Dijon, and University Hospital of Lyon-Sud, France) over a 23-year period (1970–1993).

Criteria for selection of patients and treatment parameters were similar in both institutions. This series only contains T1 and T2 patients. The following definitions were adopted:

- T1: less than 3 cm, superficial exophytic, no infiltration;
- T2: larger than 3 cm and/or with impaired mobility (tethered, not fixed);

T3: deep fixation regardless of size.

Since 1987, transrectal ultrasonography has been used and patients were staged accordingly.

UST1 for tumours confined to the submucosa without interruption of the middle hyperechoic layer;

UST2 for tumours confined to the muscle layer (without interruption of the outer hyperechoic layer);

UST3 for tumours invading the entire rectal wall (interruption of the outer hyperechoic layer).

Transrectal ultrasonography also allows the detection of the presence of lymph nodes. Obviously patients selected in this series had no suspicious lymph nodes detected either by finger examination or by ultrasonography when this investigation

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Table 1. *T stage distribution per institution*

T1, T2 adenocarcinomas of the rectum treated by local radiotherapy only: X-ray contact +/- brachytherapy			
	Dijon	Lyon-Sud	All
T1	48	65	113
T2	51	36	87
Total	99	101	200

Table 2. *Local and nodal failures*

	Local failures			Nodal failures		
	Dijon	Lyon-Sud	All	Dijon	Lyon-Sud	All
T1	4/48	1/65	5/113 (4.4%)	1/48	0/65	1/113 (0.9%)
T2	10/51	7/36	17/87 (19.5%)	1/51	7/36	8/87 (9.2%)

was performed. Indications of ICRT include purely exophytic tumours of the lower and mid-rectum less than 3 cm in diameter in which there are no perirectal nodes on clinical and diagnostic investigations. Treatment consists of ICRT alone (9000–12 000 cGy in 3–4 fractions).

IBT is used as a boost dose (the amount of which depends upon the dose previously delivered with ICRT) for tumours with a slightly infiltrated base. These tumours can either be less than 3 cm (T1) or slightly larger (T2: 3–5 cm). Originally, the infiltrating component was evaluated after regression of the exophytic component after 2 fractions of ICRT. It is now performed before and during treatment with transrectal ultrasonography. Patients initially staged UST2 are boosted with an interstitial implant (IBT) of approximately 20–30 Gy in 2–3 days.

RESULTS

Table 1 shows the T stage distribution per institution. Local and nodal failures are displayed in Table 2. Only 4.4% of T1 relapsed compared with 19.5% in T2. Nodal failures occurred in one of 113 T1 (0.9%) versus 9.2% in T2. This very low percentage of nodal relapse in T1 confirms the reliability of clinical staging of superficial tumours. Metastatic failures occurred in 3.5% of T1 and 12.6% of T2. Salvage treatment of pelvic failures was attempted in 24 of 31 pelvic relapses and led to pelvic control in 20 of 24 patients needing salvage treatment. Table 3 describes the ultimate pelvic control and quality of life.

After salvage treatment, pelvic control was finally achieved in

Table 3. *Ultimate pelvic control and quality of life*

	Dijon	Lyon-Sud	All
Pelvic control	93/99	96/101	189/200 (94.5%)
Functional sphincter			
After salvage treatment	4/10	5/10	9/20
In all patients	87/99	92/101	179/200 (89.5%)

189 patients (94.5%). Nearly half (9/20) of the patients needing salvage treatment maintained a functional sphincter. A functional sphincter was maintained in 179/200 patients (89.5%), representing 95% of patients with pelvic control. No severe complications occurred. No colostomy was needed as a consequence of a side effect. Ten per cent of the patients reported occasional intermittent bleeding. Superficial asymptomatic ulcerations were observed in less than 5%, all with subsequent spontaneous healing. In most patients, atrophic changes of the mucosa with or without telangiectasia developed at the treatment site and were not associated with symptoms.

DISCUSSION

The first report of curative treatment of rectal adenocarcinoma with low-voltage X-ray therapy was made by Chaoul in 1936 [11]. However, it was not until the early 1970s that the value of this became apparent from the extensive experience of Papillon [1, 7, 10]. His merit was to define the proper selection of patients and to establish the treatment parameters of intracavitary techniques combining whenever necessary 50 kV contact X-rays with IBT. In his latest report [1], 312 patients treated from 1951 to 1984 (unlimited follow-up) presented with 4.5% local failures and 3.8% nodal failures. 5-year survival was 74%. Eight per cent of patients died from cancer. Several series using similar approaches confirm the results of Papillon. Sischy and associates [9, 12, 13, 14, 15, 16] have reported a 90% local control rate in 192 patients. Bramlet and colleagues with similar selection criteria in 129 patients [4], reported a 95% local control figure. Lavery and associates [17], in a smaller series (62 patients), observed an 18% local recurrence rate. Of interest, one-third of these recurrences occurred in ulcerated lesions that obviously were unlikely to be T1. Horiot and colleagues [3] analysed their material according to tumour size and infiltration. They demonstrated a significant correlation between tumour size and specific survival: 93% 5-year specific survival for tumours smaller than 3 cm versus 59% when larger than 3 cm. Similarly, specific survival was 86% with superficial tumours versus 66% with tethered lesions.

Comparison of intracavitary techniques with transanal surgical procedures is difficult since it is not always possible to compare tumour characteristics of patients treated with different methods. Biggers and colleagues [18] reported a 27% local recurrence rate in 234 patients treated with local excision (average tumour site 2.5 cm). Morson and colleagues [19, 20] observed only three local recurrences in 91 patients with tumours of less than 3 cm with free margins on the specimen, while 7 of 42 patients with dubious or incomplete margins relapsed locally. In a recent paper summarising the experience of the St Mark's Hospital, London, U.K. [21], the authors stress the prognostic significance of the tumour grading, death from cancer being respectively 2, 10, and 33% for well, moderately and poorly differentiated tumours. In practice, it would be impossible to launch a randomised trial comparing the merits of local excision, electrodestruction and radiotherapy intracavitary techniques. The arguments given for many years in favour of surgery included primarily the knowledge of the tumour extension on the pathology specimen. This advantage becomes less relevant with the increasing accuracy (specificity and sensitivity) of clinical staging, using digital examination and transrectal ultrasonography. The main arguments in favour of radiotherapy techniques are the simplicity of the treatment (a few ambulatory sessions lasting a few minutes each), the absence of severe sequelae, the quality of sphincter preservation and the absence

of technical limitations for most lesions located in the low and mid-rectum, including those located at the level of the peritoneal reflection.

CONCLUSION

Intracavitary radiotherapy techniques (X-ray contact therapy +/- IBT) provided a 94.5% ultimate pelvic control rate in 200 patients with T1 and selected T2 rectal adenocarcinomas. Functional sphincter was preserved in 95% of patients with pelvic control. Nowadays, transrectal ultrasound and clinical examination provide a safe evaluation of tumour extension and clinical stage allowing a proper selection of patients. Considerable experience (over 30 years) and the high quality of these results suggest greater use of intrarectal radiotherapy techniques in the curative management of small superficial mid and low rectal well-differentiated adenocarcinomas.

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