

Low energy contact X-ray brachytherapy (the Papillon technique) for early stage rectal cancer

Interventional procedures guidance

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Your responsibility

This guidance represents the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take this guidance fully into account, and specifically any special arrangements relating to the introduction of new interventional procedures. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

All problems (adverse events) related to a medicine or medical device used for treatment or in a procedure should be reported to the Medicines and Healthcare products Regulatory Agency using the [Yellow Card Scheme](#).

Commissioners and/or providers have a responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties. Providers should ensure that governance structures are in place to review, authorise and monitor the introduction of new devices and procedures.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

1 Recommendations

- 1.1 In patients for whom surgery is not considered suitable, current evidence on the efficacy and safety of low-energy contact X-ray brachytherapy (CXB; the Papillon technique) for early-stage rectal cancer is adequate to support the use of this procedure, provided that normal arrangements are in place for clinical governance, consent and audit.
- 1.2 In patients for whom surgery is considered suitable, but who choose not to have an operation, the evidence on safety is adequate but the evidence on efficacy is inadequate. Therefore this procedure should only be used for these patients with special arrangements for clinical governance, consent and audit or research.
- 1.3 Clinicians wishing to do low-energy CXB in patients for whom surgery is considered suitable, but who choose not to have an operation, should take the following actions:
 - Inform the clinical governance leads in their NHS trusts.
 - Ensure that patients and their carers understand the alternative options for treatment and the uncertainty about this procedure's efficacy and provide them with clear written information. In addition, the use of NICE's information for the public is recommended.
- 1.4 Patient selection should be done by a colorectal cancer multidisciplinary team, including a clinical oncologist and a colorectal surgeon with expertise in local

excision techniques.

- 1.5 Clinicians should enter details about all patients having low-energy CXB for early-stage rectal cancer onto the [contact X-ray brachytherapy database](#). Clinical outcomes should also be reviewed locally.
- 1.6 NICE encourages further research into low-energy CXB for early-stage rectal cancer. Research should clearly describe details of patient selection and treatment intent. It should document adjunctive treatments and subsequent procedures. Outcomes should include local recurrence, survival, disease-free survival and quality of life. NICE may update the guidance on publication of further evidence.

2 Indications and current treatments

- 2.1 Rectal cancer is a common form of bowel cancer. The likelihood of developing it rises sharply with age. Symptoms include rectal bleeding and change in bowel habit, although the early stages may be asymptomatic.
- 2.2 Surgery is the main treatment for patients with rectal cancer who are treated with curative intent. It involves resection of the affected part of the rectum and the mesorectum. The anal sphincter is preserved whenever possible; a colostomy is formed when this is not possible.
- 2.3 In some patients, radiotherapy or chemotherapy or both are used before, during or after surgery to decrease the chances of local recurrence and metastatic disease. Radiotherapy may take the form of external-beam radiotherapy (EBRT) or radioisotope brachytherapy. EBRT uses radiation from outside the body, which is focused on the cancer and surrounding lymph nodes. Radioisotope brachytherapy involves inserting radioactive pellets or seeds directly into the tumour (interstitial brachytherapy), or placing an endorectal treatment applicator near the tumour to deliver radiation from within the rectum (endorectal high dose rate brachytherapy).

3 The procedure

- 3.1 Low-energy contact X-ray brachytherapy (CXB; the Papillon technique) aims to improve local control or cure rectal cancer. The procedure involves inserting an X-ray tube through the anus and placing it in close contact with the tumour, to kill cancer cells and reduce the size of the tumour.
- 3.2 Low-energy CXB for rectal cancer is usually delivered in a day-care setting. The patient is given an enema before treatment, to clear the bowel. With the patient in a knee-to-chest, prone jack-knife or supine position, local anaesthesia and glyceryl trinitrate are applied to the anal sphincter to numb the area and relax the sphincter muscles. A sigmoidoscope is inserted to check the size and position of the tumour. A rigid endorectal treatment applicator is then inserted and placed in contact with the tumour. A contact X-ray tube is introduced into the applicator and treatment begins. The tube emits low-energy X-rays that only penetrate a few millimetres. This minimises damage to deeper tissues that are not involved in the cancer. If the tumour does not respond to low-energy CXB, or recurs after treatment, surgery may be performed.

4 Efficacy

This section describes efficacy outcomes from the published literature that the Committee considered as part of the evidence about this procedure. For more detailed information on the evidence, see the [interventional procedure overview](#).

- 4.1 In a randomised controlled trial of 88 patients treated by both low-energy contact X-ray brachytherapy (CXB) and external-beam radiotherapy (EBRT; n=45) or EBRT alone (n=43), overall actuarial survival rates (Kaplan–Meier estimates) were 55% and 56% respectively, at 10-year follow-up (p=0.85). In the same study, disease-free survival rates were 53% and 54% respectively, at 10-year follow-up (p=0.99). In a case series of 101 patients treated by low-energy CXB with or without interstitial brachytherapy boost, overall actuarial survival rates (Kaplan–Meier estimates) were 83% and 63% at 5 and 8 years respectively. In the same study, disease-specific survival rates were 94% and 89% at 5 and 8 years respectively. Actuarial survival rates for patients with stage T1 and T2 tumours

- were 68% and 55% respectively, at 8-year follow-up ($p=0.73$). Disease-specific survival rates for patients with stage T1 and T2 tumours were 91% and 86% respectively, at 8-year follow-up ($p=0.82$).
- 4.2 In a case series of 97 patients treated by low-energy CXB with or without interstitial brachytherapy boost, a complete response (no definition provided) was reported in 85% (82/97) of patients at a median follow-up of 39 days. In a case series of 63 patients treated by low-energy CXB followed by EBRT and interstitial brachytherapy boost, a complete clinical response (no definition provided) was reported in 92% (58/63) of patients at 2-month follow-up.
- 4.3 In the randomised controlled trial of 88 patients treated by low-energy CXB and EBRT ($n=45$) or EBRT alone ($n=43$), actuarial local recurrence rates (Kaplan–Meier estimates) were 10% and 15% respectively, at 10-year follow-up ($p=0.69$). Distant recurrence was reported in 27% (12/45) of patients in the low-energy CXB and EBRT group and 26% (11/43) of patients in the EBRT-alone group at 10-year follow-up (no p value reported).
- 4.4 In the randomised controlled trial of 88 patients treated by low-energy CXB and EBRT ($n=45$) or EBRT alone ($n=43$) all patients had surgery (either sphincter-saving procedures or abdominoperineal resections) after initial treatment. Sphincter-saving procedures were possible in 76% (34/45) of patients in the low-energy CXB and EBRT group and 44% (19/43) of patients in the EBRT-alone group (no p values reported). Abdominoperineal resections were needed in 24% (11/45) of patients in the low-energy CXB and EBRT group and 56% (24/43) of patients in the EBRT-alone group (no p values reported). In the same study, the actuarial colostomy rates (Kaplan–Meier estimates) were 29% in the low-energy CXB and EBRT group and 63% in the EBRT-alone group at 10-year follow-up ($p<0.001$).
- 4.5 In a case series of 312 patients treated by low-energy CXB and interstitial brachytherapy boost, a permanent colostomy was needed in 3% (8/312) of patients.
- 4.6 Specialist advisers listed the following key efficacy outcomes: overall survival, disease-free survival, clinical response, local control rates, loco-regional and distant recurrence rates, avoiding a permanent stoma, quality of life, as well as

bowel, urinary and sexual function.

5 Safety

This section describes safety outcomes from the published literature that the Committee considered as part of the evidence about this procedure. For more detailed information on the evidence, see the [interventional procedure overview](#).

- 5.1 Rectal bleeding was reported in 38.1% (24/63) of patients, 6 months after treatment, in a case series of 63 patients treated by low-energy contact X-ray brachytherapy (CXB) followed by external-beam radiotherapy (EBRT) and interstitial brachytherapy boost. Bleeding lasted for up to 3 years. Patients were treated by medication or argon plasma coagulation. Only 1 patient needed occasional blood transfusions.
- 5.2 Authors reported that 'grade 2 rectal necrosis' occurred in 19% (12/63) of patients, at a median of 7 months after treatment, in the case series of 63 patients treated by low-energy CXB followed by EBRT and interstitial brachytherapy boost. Details about the type of grading system for rectal necrosis were not provided. Authors stated that some patients had rectal necrosis which was accompanied by urgency and minor soiling. They highlighted that necrosis healed within 3 to 6 months in all patients.
- 5.3 Ulceration of the rectal mucosa was reported in 27% (27/101) of patients, at a median follow-up of 4 months, in a case series of 101 patients treated by low-energy CXB with or without interstitial brachytherapy boost. Ulceration healed in all these patients with no late sequelae.
- 5.4 Slight proctitis was reported in 10% (32/312) of patients in a case series of 312 patients treated by low-energy CXB and interstitial brachytherapy boost. The timing of occurrence was not reported.
- 5.5 Moderate tenesmus, urgency of bowel movement or diarrhoea was reported in 15% (15/101) of patients, during the course of treatment, in the case series of 101 patients treated by low-energy CXB with or without interstitial brachytherapy boost.

- 5.6 In addition to safety outcomes reported in the literature, specialist advisers are asked about anecdotal adverse events (events which they have heard about) and about theoretical adverse events (events which they think might possibly occur, even if they have never done so). For this procedure, specialist advisers listed the following anecdotal adverse events: bowel perforation, rectal stenosis, recto-vaginal fistula formation, incontinence. They considered that the following were theoretical adverse events: stricture formation, fistula formation, rectal perforation.

6 Committee comments

- 6.1 The Committee noted recent and continuing changes in patterns of treatment for early-stage colorectal cancer.
- 6.2 The Committee noted that low-energy contact X-ray brachytherapy for early-stage rectal cancer is currently available in only a few specialist centres in the UK.

7 Further information

NICE has produced information on this procedure for patients and carers ([information for the public](#)). It explains the nature of the procedure and the guidance issued by NICE, and has been written with patient consent in mind.

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Endorsing organisation

This guidance has been endorsed by [Healthcare Improvement Scotland](#).