Sphincter preservation in rectal cancer

Abstract
Sphincter preservation is a major goal in the treatment of rectal cancer. For selected patients with T1–2 disease, local excision followed by postoperative combined modality therapy is a reasonable alternative to an abdominopereineal resection. However, for patients with T3 disease, the local recurrence with this approach is approximately 25% and they are treated more effectively with preoperative combined modality therapy. In patients who undergo a prospective clinical assessment and are declared to require an abdominopereineal resection, preoperative radiation therapy, either alone or when combined with chemotherapy, allows approximately 80% to undergo a low anterior resection/coloanal anastomosis. The majority have good-to-excellent sphincter function. These conservative approaches may be an alternative to an abdominopereineal resection in selected patients.

Key words Rectal cancer · Sphincter preservation · Conservative management

Introduction
In patients with clinically resectable rectal cancer, there is increasing interest in the use of radiation therapy with the goal of sphincter preservation. A variety of treatment approaches have been employed and their selection depends on factors such as tumor histology, size, location, mobility, anatomic constraints, and the technical expertise of the surgeon and radiation oncologist. This review will examine two approaches: local excision and postoperative therapy for patients with T1–2 disease and for those with T3 disease, preoperative therapy followed by a coloanal anastomosis.

Local excision and postoperative therapy
Given the morbidity of standard surgery and the frequent need for adjuvant therapy for selected early (T1–2) rectal cancers, the alternative approach of local excision and postoperative therapy is reasonable. This organ-sparing technique is not a new concept. It has been used successfully in variety of other tumor sites such as breast cancer, soft tissue sarcomas, and head and neck cancer.

Local excision has been performed both pre- and post-radiation therapy. The advantage of performing a local excision prior to radiation therapy is that pathologic features such as margins, depth of bowel wall penetration, and histologic features can be identified. Knowledge of these details is useful in the development of selection criteria. Since pathologic details can be obscured by preoperative radiation therapy, the preferred approach is a local excision and, if needed, postoperative adjuvant therapy.

This section will examine the results of this approach, analyze the impact of selected clinicopathologic features, and identify the subset of patients in whom this treatment technique is most feasible.

There are a number of controversies in the treatment of rectal cancer with local excision and postoperative radiation therapy. For example, are the results comparable with those of standard surgery? Which clinicopathologic features are important? What are the functional results of this approach? And is there a role for chemotherapy? Although the data are limited, it is possible to address some of these issues.

The results of local excision and postoperative therapy depend on a number of factors such as the type of surgery (full thickness versus piecemeal excision) and clinicopathologic factors such as tumor size, T stage, grade, margins, and lymphatic vessel invasion. Selected series are summarized in Table 1. In most series, patients underwent a
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three series report 5-year actuarial data: Massachusetts General Hospital (MGH), 10 University of Florida, 2 and MSKCC. 9 In the MGH series, the 5-year actuarial local failure rate for the 20 patients treated with postoperative radiation therapy was 12%, and none of the 20 treated with combined modality therapy developed local failure. It should be emphasized that their series was limited to patients with T1 and T2 disease, whereas 21% of patients in the MSKCC series had T3 disease. In the University of Florida series, only patients with adverse pathologic features were selected to receive postoperative therapy. The 5-year actuarial local failure rate was 14% and following surgical salvage was 8%. In the MSKCC series, the 5-year actuarial local failure rate for the total patient group was 27%. This was higher in patients with positive compared with negative margins (35% vs 23%, respectively). In the subset of patients with T2 disease, the 5-year actuarial failure rate was 31%. The small number of patients precluded an analysis by margin status.

A full-thickness local excision is recommended, since patients who undergo a piecemeal excision usually have higher local failure rates. 10 However, in those patients who do undergo a full-thickness excision, the impact of positive margins is unclear. Most investigators would recommend that negative margins be obtained if technically feasible, and a re-excision performed if it does not compromise sphincter function. Otherwise, doses of >5040 cGy are probably necessary.

Unfortunately, there are few series which report functional results using a prospective scale. The MSKCC analyzed the results using the Memorial Sloan Kettering Cancer Center sphincter function scale. Sphincter function was good-to-excellent in 94% of patients with an intact sphincter. In the

### Table 1. Local excision plus postoperative therapy: Crude local recurrence by T stage; selected series

<table>
<thead>
<tr>
<th>Series</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Florida 7</td>
<td>–</td>
<td>0% (0/21)</td>
<td>–</td>
<td>11% (5/45)</td>
</tr>
<tr>
<td>New England Deaconess 3</td>
<td>–</td>
<td>0% (0/16)</td>
<td>–</td>
<td>0% (0/21)</td>
</tr>
<tr>
<td>MD Anderson 4</td>
<td>0% (0/16)</td>
<td>7% (1/15)</td>
<td>20% (3/15)</td>
<td>9% (4/46)</td>
</tr>
<tr>
<td>MGH 5</td>
<td>10% (1/10)</td>
<td>18% (2/11)</td>
<td>33% (1/3)</td>
<td>17% (4/24)</td>
</tr>
<tr>
<td>Catholic University 6</td>
<td>11% (1/9)</td>
<td>17% (2/12)</td>
<td>–</td>
<td>14% (3/21)</td>
</tr>
<tr>
<td>Fox Chase 7</td>
<td>50% (1/2)</td>
<td>13% (2/15)</td>
<td>25% (1/4)</td>
<td>19% (4/21)</td>
</tr>
<tr>
<td>CALGB 8</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>2% (2/113)</td>
</tr>
<tr>
<td>MSKCC 9</td>
<td>0% (0/6)</td>
<td>24% (6/25)</td>
<td>25% (2/8)</td>
<td>21% (8/39)</td>
</tr>
<tr>
<td>Total</td>
<td>7% (3/43)</td>
<td>13% (13/99)</td>
<td>23% (7/30)</td>
<td>9% (30/330)</td>
</tr>
</tbody>
</table>

Analysis is limited to the subset of patients who underwent a local excision (regardless of type of excision or margin status) and were selected to receive postoperative radiation therapy with or without chemotherapy.

a Includes 60 patients with T1 disease who underwent local excision alone.

b Data were not reported by T stage.

MGH, Massachusetts General Hospital; CALGB, Cancer and Leukemia Group B; MSKCC, Memorial Sloan-Kettering Cancer Center.

local excision, followed in 4–6 weeks by 4500–5000 cGy to the whole pelvis. Some patients received 500 cGy preoperatively, and a postoperative boost with either external beam or brachytherapy, and a limited number received 5 fluorouracil (FU). The 5-year actuarial survival in selected series ranges from 70% to 81%. 5–7

Since few of the published series have numbers adequate for performing a meaningful multivariate analysis, it is difficult to determine the influence of these selected clinicopathologic features on one another. Therefore, until more complete data are available, a patient should not be excluded from treatment with local excision and radiation therapy based solely upon these clinicopathologic features.

### Local failure

As seen in Table 1, when the data are combined from selected series, there is an increase in crude local failure with extension of tumor through the bowel wall; T1: 7%, T2: 13%, and T3: 23%. It should be emphasized that most series include some patients who have undergone suboptimal surgery, such as a piecemeal excision, or patients who have positive or unassessable margins.

Patients are able to successfully undergo salvage following a local recurrence. In the Memorial Sloan-Kettering Cancer Center (MSKCC) experience, of the eight patients who developed local failure, five underwent a salvage abdominoperineal resection (APR) and remained locally controlled. 9 Therefore, 36 of the 39 patients (92%) were ultimately locally controlled. Similar results were reported from the New England Deaconess Hospital, where three of four local recurrences were salvaged with an APR. 3

Actuarial analysis is an alternative method of determining the risk of local failure. The actuarial method, which accounts for the different length of follow-up for each patient, offers the most accurate method of risk analysis. Only three series report 5-year actuarial data: Massachusetts General Hospital (MGH), 10 University of Florida, 2 and MSKCC. 9 In the MGH series, the 5-year actuarial local failure rate for the 20 patients treated with postoperative radiation therapy was 12%, and none of the 20 treated with combined modality therapy developed local failure. It should be emphasized that their series was limited to patients with T1 and T2 disease, whereas 21% of patients in the MSKCC series had T3 disease. In the University of Florida series, only patients with adverse pathologic features were selected to receive postoperative therapy. The 5-year actuarial local failure rate was 14% and following surgical salvage was 8%. In the MSKCC series, the 5-year actuarial local failure rate for the total patient group was 27%. This was higher in patients with positive compared with negative margins (35% vs 23%, respectively). In the subset of patients with T2 disease, the 5-year actuarial failure rate was 31%. The small number of patients precluded an analysis by margin status.

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### Sphincter function

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