Regional variations in management of rectal cancer in France

Jean-Marc PHELIP (1, 9), Guy LAUNOY (2), Marc COLONNA (3), Pascale GROSCLAUDE (4), Michel VELTEN (5), Arlette DANZON (6), Nicole RAVERDY (7), Brigitte TRETARRE (8), Anne-Marie BOUVIER (1), Jean FAIVRE (1)


SUMMARY

Background — Population-based registries provide excellent data for drawing an accurate picture of disease management practices. The purpose of this study was to determine whether diagnostic and therapeutic management practices for rectal cancer vary in different geographic regions of France.

Methods — Data issued from nine cancer registries covering 11% of the French population. The files of 683 patients with a rectal cancer diagnosed in 1995 were selected for analysis.

Results — Colonoscopy was performed in a mean of 91.6% of patients (range: 80.9%-98.2%) (P = 0.01). The practice of colonoscopy concomitantly with barium enema varied greatly, ranging from 1.9%-57.7% of patients (P < 0.001). Pretherapeutic work-up practices were significantly different depending on the region with respect to: abdominal CT scans (13.4%-69.2%), thoracic CT scans (0.9%-13.2%) and tumor markers (46.8%-80.8%). There were no significant differences between geographic regions concerning rate of resection, use of colostomy, or tumor stage at diagnosis. Administration of adjuvant radiotherapy (mean, 46.8%; range: 21.6%-70%; P < 0.001) and adjuvant chemotherapy (mean, 24.1%; range: 10.3%-40.6%; P < 0.05) varied significantly between regions.

Conclusion — Diagnostic practices and administration of adjuvant treatments vary significantly between geographic regions in France. The recommendations of the French consensus guidelines are only partially adhered to. Practitioners and healthcare authorities should be aware of these differences in order to provide more harmonious patient care.

The full text of this article is available in English, free of charge, on the Web on: www.e2med.com/gcb.
also detailed in the guidelines. Preoperative adjuvant radiotherapy is indicated for stage T3 and T4 tumors. It has proven efficacy superior to postoperative radiotherapy [4]. The guidelines also clearly state that without proof of efficacy in terms of survival, adjuvant chemotherapy should not be prescribed for rectal cancer outside therapeutic trials [5]. If compatible with the patient’s general status, palliative chemotherapy is recommended when potentially curative treatment is not possible. Fragmentary data from population studies suggest that knowledge of these guidelines is not optimal. Little work has been published on geographical differences in management practices. The main purpose of this study was to determine whether diagnostic and therapeutic management practices for rectal cancer vary in different geographic regions of France.

Patients and methods

Study population

This study included all patients with a diagnosis of cancer of the rectum established in 1995 and recorded in nine regional cancer registries in France. According to the 1990 census, the population of the nine administrative districts concerned was: Bas-Rhin (930 000), Calvados (618 000), Côte-d’Or (494 000), Doubs (485 000), Hérault (795 000), Isère (970 000), Saône-et-Loire (559 000), Somme (548 000), Tarn (343 000). The survey was conducted within the framework of the FRANCIIM network of cancer registries which represents 11% of the French population. Cancer of the rectum was defined in accordance with the International classification of Disease for Oncology (ICD-O-2) coding system 10th revision [6]. Code C29 concerns cancers developed less than 15 cm from the anal margin. A total of 683 cases of cancer of the rectum in 417 men (61.1%) and 266 women (38.9%) were identified; 38.8% of the patients (n = 265) were aged over 75 years at diagnosis.

Data collected

In addition to the data recorded in the registries, this study required a survey of gastroenterologists, oncologists and surgeons who had provided care for these patients in order to detail the circumstances of diagnosis, preoperative work-up, tumor stage at diagnosis, and treatment administered.

The following data were collected: patient age, gender, residence, diagnostic investigations (colonoscopy, barium enema, both, other explorations), preoperative work-up (ultrasound, chest x-ray, tumor markers, transrectal ultrasound or rectal endoscopic ultrasound, abdominal CT scan, thoracic CT scan, other explorations), treatment modalities.

For surgical treatment, potentially curative resection, palliative resection, deviation, and exploratory laparotomy were distinguished. The type of procedure used for excision was noted. Potentially curative surgery was defined as macroscopically complete resection without invasion of the surgical margins at histological examination. Sphincter-saving resection was distinguished together with influencing factors.

For non-surgical adjuvant or palliative treatment (chemotherapy, radiotherapy), stage at diagnosis as defined from all available data (pathology report, operative findings, results of search for extension) was noted. Tumors were classified according to the TNM system [7] using the following categories: local cancer limited to the wall (stage I or T1T2 N0M0), cancer invading the serosa or the perirectal fat (stage II or T3T4 N0M0), resected cancer with nodal metastasis (stage III or all T N1N2 M0), cancer with distant metastasis (stage IV or all T all N M1). Non-resectable tumors were grouped together with metastatic tumors and termed advanced cancer. Tumor type and localization were coded according to the ICD-O-2 coding system [6].

Statistical analysis

The chi-square test was used for univariate analysis of qualitative variables to identify differences between geographic regions in the preoperative work-up and therapeutic management. Multivariate analysis was performed with logistic regression to identify significant and independent variables linked with surgical resection, sphincter-saving surgery, and association of adjuvant treatment with surgery. Results were expressed as odds ratio (OR) with 95% confidence interval (CI95%). All logistic models were adjusted for age, gender, and administrative district of residence.

Results

Diagnosis

Colonoscopy was the only exploration performed in 72.6% of patients. Colonoscopy and barium enema were performed in 19.0%. Barium enema was the only exploration performed in 1.6% of patients. In 6.7% of patients neither colonoscopy nor barium enema were performed or the corresponding information was missing. The diagnostic strategy varied significantly between geographic regions (table I). The proportion of patients undergoing colonoscopy ranged from 80.9% to 98.2% (P = 0.01). Barium enema as the only pretherapeutic exploration was exceptional in all regions (0-2.9%). The proportion of patients undergoing both colonoscopy and barium enema varied significantly between regions (1.9%-57.7%; P < 0.01).

Pretherapeutic work-up

An abdominal pelvic CT scan was performed in 38.2% of patients (table II) with significant differences between regions (13.4-69.2%; P < 0.01). The proportion of patients undergoing abdominal pelvic CT was approximately 30% in three regions and approximately 45% in four regions. A CT scan was performed more often in patients with metastases (57.4%) than in those without metastasis (34.5%; P < 0.001). A thoracic scan was performed in 5.4% of patients, the proportion ranging from 0.9% to 13.2% (P < 0.05). Tumor markers were assayed in 60.9% of patients (46.8-80.8%; P < 0.0001). Transrectal endoscopic ultrasoundography was performed in 22.4% of patients with a similar proportion in seven of the nine districts; regional differences were not significant.

Table I. – Diagnostic work-up by administrative district (%).

Explorations diagnostiques par département (%).

<table>
<thead>
<tr>
<th>District</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>124</td>
<td>68</td>
<td>68</td>
<td>53</td>
<td>56</td>
<td>83</td>
<td>112</td>
<td>52</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>Colonoscopy alone</td>
<td>60.5</td>
<td>83.8</td>
<td>67.6</td>
<td>86.8</td>
<td>87.5</td>
<td>80.7</td>
<td>83</td>
<td>40.4</td>
<td>62.7</td>
<td>P &lt; 0.01</td>
</tr>
<tr>
<td>Colonoscopy + barium enema</td>
<td>29.8</td>
<td>8.8</td>
<td>13.2</td>
<td>1.9</td>
<td>5.4</td>
<td>13.3</td>
<td>15.2</td>
<td>57.7</td>
<td>23.9</td>
<td></td>
</tr>
<tr>
<td>Barium enema alone</td>
<td>2.4</td>
<td>2.9</td>
<td>2.9</td>
<td>0</td>
<td>0</td>
<td>1.2</td>
<td>0.9</td>
<td>1.9</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Neither or unknown</td>
<td>7.3</td>
<td>4.4</td>
<td>16.2</td>
<td>11.3</td>
<td>7.1</td>
<td>4.8</td>
<td>0.9</td>
<td>0</td>
<td>11.9</td>
<td></td>
</tr>
</tbody>
</table>

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Surgery

Resection of the primary tumor was performed in 604 patients (88.4%). There was no significant difference between the nine districts (table III). At multivariate analysis, age, and presence of distant metastases were independently correlated with resection of the primary tumor. The rate of resection in patients aged over 75 years was four-fold lower than in younger patients. The rate of resection in patients with distant metastases was three-fold lower than in patients without metastasis (table IV).

Abdominoperineal amputation was performed in 27.3% of patients who underwent tumor resection (table III) with significant differences between districts at univariate analysis (\( P < 0.01 \)). The rate of amputation was less than 20% in two districts and approximately 40% in two others. The proportion of patients undergoing resection without laparotomy (transrectal resection or endoscopic resection) also varied between districts accounting for 14.2% of all resections (3.4-21.8%; \( P < 0.0 \)). The proportion of patients undergoing anterior resection or proctectomy with anastomosis did not vary significantly between districts (table III).

A definitive stoma was fashioned in 36.1% of patients undergoing tumor resection. At multivariate analysis, presence of a definitive stoma was more frequent in patients aged over 75 years than in younger patients (OR 1.72; \( P < 0.01 \)) (table V). Tumor stage was correlated with sphincter-saving resection: the rate of definitive stoma in patients with wall invasion or metastasis was nearly twice that observed in patients with tumors limited to the wall. Gender and district of residence were not correlated with definitive stoma. Among the 79 patients who did not undergo tumor resection, 21.5% had a definitive stoma and by-pass procedure.

Radiotherapy

Adjuvant radiotherapy was performed in 46.8% of patients who underwent tumor resection for non-metastatic disease. Differences between districts were significant (\( P < 0.001 \)) (table VI). The rate of adjuvant radiotherapy in two districts (21.6%) was very different from the mean rate: 21.6% and 70%. When radiotherapy was administered, a preoperative protocol was used for 72.4% of patients (54.2-92.9%) and a postoperative protocol for 27.6% (7.1-45.8% (\( P < 0.01 \)) (figure 1).

Multivariate analysis identified two variables significantly linked to administration of adjuvant radiotherapy: patient age, and residence (table VII). Patients aged over 75 years were given adjuvant radiotherapy half as often as younger patients. Major geographical differences were observed: the rate of adjuvant radiotherapy was 4 times the overall average in one district and one-third of the overall average in another.

Chemotherapy

The proportion of patients given chemotherapy is presented in table VI. Regional variations were significant (\( P < 0.005 \)). The proportion of patients receiving chemotherapy was age-dependent. Adjuvant chemotherapy was administered in 33.2% of patients aged less than 75 years who underwent potentially curative tumor resection (\( n = 310 \)) and in 4.5% of patients aged over 75 years (\( n = 154 \)). For patients aged less than 75 years,

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**Table II.** Pretherapeutic work-up by administrative district (%). Explorations prêthérapiques par département (%).

<table>
<thead>
<tr>
<th>District</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>124</td>
<td>68</td>
<td>68</td>
<td>53</td>
<td>56</td>
<td>83</td>
<td>112</td>
<td>52</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>Abdominal CT scan</td>
<td>32.3</td>
<td>30.9</td>
<td>45.6</td>
<td>47.2</td>
<td>44.6</td>
<td>44.6</td>
<td>33</td>
<td>69.2</td>
<td>13.4</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Thoracic CT scan</td>
<td>5.6</td>
<td>5.9</td>
<td>7.4</td>
<td>13.2</td>
<td>1.8</td>
<td>6</td>
<td>0.9</td>
<td>11.5</td>
<td>1.5</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Carcinoembryonic antigen</td>
<td>46.8</td>
<td>50</td>
<td>51.5</td>
<td>73.6</td>
<td>71.4</td>
<td>73.5</td>
<td>65.2</td>
<td>80.8</td>
<td>50.7</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Transrectal endoscopic ultrasonography</td>
<td>20.2</td>
<td>19.1</td>
<td>23.5</td>
<td>20.8</td>
<td>33.9</td>
<td>16.9</td>
<td>25</td>
<td>23.1</td>
<td>22.4</td>
<td>NS</td>
</tr>
</tbody>
</table>

CT: computed tomography; NS: not significant.

**Table III.** Surgical treatments (%) by administrative district. Traitements chirurgicaux (%) par département.

<table>
<thead>
<tr>
<th>District</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>P</th>
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<tbody>
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<td>Number of patients</td>
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<td>68</td>
<td>68</td>
<td>53</td>
<td>56</td>
<td>83</td>
<td>112</td>
<td>52</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>Resection yes</td>
<td>88.7</td>
<td>80.9</td>
<td>86.8</td>
<td>84.3</td>
<td>87.5</td>
<td>95.2</td>
<td>90.2</td>
<td>80.8</td>
<td>88.1</td>
<td></td>
</tr>
<tr>
<td>Number of patients*</td>
<td>110</td>
<td>55</td>
<td>59</td>
<td>50</td>
<td>49</td>
<td>79</td>
<td>101</td>
<td>42</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Type of resection*</td>
<td>Abdomino-perineal amputation</td>
<td>18.2</td>
<td>32.7</td>
<td>39</td>
<td>26</td>
<td>22.4</td>
<td>21.5</td>
<td>33.7</td>
<td>42.9</td>
<td>18.6</td>
</tr>
<tr>
<td>Anterior resection</td>
<td>55.5</td>
<td>43.6</td>
<td>49.2</td>
<td>50</td>
<td>55.1</td>
<td>48.1</td>
<td>47.5</td>
<td>52.4</td>
<td>59.3</td>
<td></td>
</tr>
<tr>
<td>Resection without laparotomy</td>
<td>21.8</td>
<td>18.2</td>
<td>3.4</td>
<td>6</td>
<td>18.4</td>
<td>13.9</td>
<td>13.9</td>
<td>4.8</td>
<td>18.6</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>4.5</td>
<td>5.5</td>
<td>8.5</td>
<td>18</td>
<td>4.1</td>
<td>16.5</td>
<td>5</td>
<td>0</td>
<td>3.4</td>
<td></td>
</tr>
<tr>
<td>Number of patients*</td>
<td>110</td>
<td>55</td>
<td>59</td>
<td>50</td>
<td>49</td>
<td>79</td>
<td>101</td>
<td>42</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Colostomy* no</td>
<td>50.9</td>
<td>58.2</td>
<td>49.2</td>
<td>60</td>
<td>67.3</td>
<td>65.9</td>
<td>52.5</td>
<td>31</td>
<td>49.2</td>
<td></td>
</tr>
<tr>
<td>Temporary</td>
<td>16.4</td>
<td>1.8</td>
<td>10.2</td>
<td>10</td>
<td>4.1</td>
<td>2</td>
<td>6.9</td>
<td>19</td>
<td>15.3</td>
<td>NS</td>
</tr>
<tr>
<td>Definitive</td>
<td>32.7</td>
<td>40</td>
<td>40.7</td>
<td>30</td>
<td>30.6</td>
<td>29.1</td>
<td>40.6</td>
<td>50</td>
<td>35.6</td>
<td></td>
</tr>
</tbody>
</table>

*Among 604 resected patients.

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Adjuvant chemotherapy was administered in 9.4% with stage I disease, 39.3% with stage II disease and 69.1% with stage III disease. The number of patients was too small to analyze regional differences by stage. Palliative chemotherapy was given in 27.8% of patients with a non-resected tumor or who had distant metastases (n = 194). Regional variations were not significant (table VI). None of the patients aged over 75 years was given palliative chemotherapy.

Stage at diagnosis

Tumor staging was: I: 30.4%, II: 21.4%, III: 20.5%, and IV (advanced disease defined as metastatic or non-resectable cancer): 24.0%. Differences between districts were not significant (table VIII).

Laparotomy was performed in the 518/604 patients who underwent tumor resection. Among these 518 patients, no nodes were examined in 8.5%, with a non-significant regional difference (range: 2.3%-14.6%) (P < 0.12). More than eight nodes were examined in 45.7% of patients. This proportion was in the 40-50% range for six districts, 31.3% for one district and in the 50-55% range for two districts (NS).

Discussion

These population data collected from nine administrative districts in France enable measurement of regional differences in clinical practices and deviations from consensus guidelines. These data also provide a means of determining clinical practices employed the year following publication of the guidelines. The conclusions of consensus conferences are widely diffused but over a short period. It would be reasonable to expect any impact to occur during the year following publication. The present work follows a similar survey of clinical practices in seven French administrative districts conducted in 1990 [8].

It is well established that colonoscopy is the examination of choice for exploration of the colon. Compliance with this recommendation is widespread with colonoscopy being performed in 92% of patients in 1995, a rate which reached 90% in the same districts. A lower rate was observed in only one district.

Table IV. – Factors associated with cancer resection in the total population. Multivariate analysis.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Modality</th>
<th>Adjusted OR*</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>&lt; 75 yrs</td>
<td>1</td>
<td>0.14-0.40</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td></td>
<td>≥ 75 yrs</td>
<td>0.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metastasis</td>
<td>no</td>
<td>1</td>
<td>0.21-0.65</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>yes</td>
<td>0.37</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OR: Odds-ratio; 95% CI: 95% confidence interval. Results adjusted for sex and administrative district.

Table V. – Factors associated with definitive colostomy among resected patients. Multivariate analysis.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Modality</th>
<th>Adjusted OR</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>&lt; 75 yrs</td>
<td>1</td>
<td></td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td></td>
<td>≥ 75 yrs</td>
<td>1.72</td>
<td>1.19-2.48</td>
<td></td>
</tr>
<tr>
<td>TNM stage</td>
<td>I</td>
<td>1</td>
<td></td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>2.48</td>
<td>1.53-4.03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>2.30</td>
<td>1.41-3.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>1.79</td>
<td>1.01-3.19</td>
<td></td>
</tr>
</tbody>
</table>

Results adjusted for sex and administrative district. OR: Odds-ratio; CI: 95% confidence interval.

Table VI. – Medical treatments (%) by administrative district.

<table>
<thead>
<tr>
<th>District</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients*</td>
<td>93</td>
<td>43</td>
<td>51</td>
<td>44</td>
<td>43</td>
<td>67</td>
<td>87</td>
<td>40</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>Adjuvant radiotherapy*</td>
<td>39.8</td>
<td>46.5</td>
<td>47.1</td>
<td>50</td>
<td>46.5</td>
<td>50.7</td>
<td>54</td>
<td>70</td>
<td>21.6</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Number of patients**</td>
<td>51</td>
<td>26</td>
<td>32</td>
<td>18</td>
<td>32</td>
<td>44</td>
<td>51</td>
<td>25</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Adjuvant chemotherapy**</td>
<td>23.5</td>
<td>15.4</td>
<td>56.3</td>
<td>22.2</td>
<td>31.3</td>
<td>43.2</td>
<td>33.3</td>
<td>36</td>
<td>32.3</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Number of patients***</td>
<td>38</td>
<td>26</td>
<td>20</td>
<td>12</td>
<td>14</td>
<td>21</td>
<td>29</td>
<td>16</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Palliative chemotherapy***</td>
<td>34.2</td>
<td>15.4</td>
<td>35</td>
<td>41.7</td>
<td>35.7</td>
<td>38.1</td>
<td>20.7</td>
<td>18.8</td>
<td>16.7</td>
<td>NS</td>
</tr>
</tbody>
</table>

* Curative tumor resection without distant metastasis (n = 519); ** Curative resection without distant metastasis age < 75 years (n = 310); *** Non-resected tumors and/or metastatic disease (n = 194).
Barium enema was infrequent (1.6% of all patients), but regional differences were significant (1.9%-57.7%). The rate of barium enema appears to be too high in at least three districts. The consensus conference did not recommend barium enema for patients with strictures because of the poor diagnostic yield [2]. If the preoperative colonoscopic exploration is incomplete, postoperative colonoscopy should be programmed three to six months after surgery [9].

Abdominal pelvic CT was not recommended as a routine pretherapeutic examination. A scan may be indicated if the ultrasound examination is insufficient in patients with liver metastases or to provide further precision on locoregional extension of a large rectal tumor inaccessible to transrectal endoscopic ultrasonography. Use of CT scan varied greatly between districts. Clinicians should be more aware of the indications in order to achieve more harmonious patient care. The same is true for thoracic CT. The consensus conference also recommended assay of tumor markers. Here again, regional practices varied. In four districts, CEA level was known for one-half of the patients while in the other districts assay results were available for 70% of patients. The consensus conference on cancer of the colon, held in 1998, did not recommend CEA assay as a routine practice because of lack of impact on therapeutic decision making [10]. Although transrectal ultrasonography had not reached its full development at the time of the consensus conference, this examination is now considered indispensable to evaluate tumor extension in the depth of the rectal wall [11]; results determine the indication for preoperative radiotherapy.

Resection remains the principal treatment for cancer of the rectum. The overall rate of resection (88.4%) increased in comparison with the 1990 figure (78.4%) [8]. Regional differences were not significant. The rate of resection did not appear to be optimal since nearly 90% of the tumors were resectable. Unsurprisingly, patient age and presence of distant metastases at diagnosis decreased the probability of resection.

The proportion of patients undergoing sphincter-saving resection increased over the last twenty years. The sphincter was preserved in two-thirds of the patients in 1995 and in one-half in 1990 [8]. Conservative surgery is less feasible for advanced tumors. Voluminous tumors invading the full thickness of the rectal wall required mutilating surgery in twice as many patients. The choice of a definitive colostomy was less frequent in patients with distant metastases. The rate in these patients was similar to that in patients with small tumors limited to the rectal wall, an expression of the desire to achieve less mutilating resection for patients with disseminated disease. After adjusting for tumor stage and age, there were no regional differences concerning creation of a definitive colostomy.

The use of adjuvant radiotherapy was variable. Routine practices complied only partially with the consensus recommendations, and with wide differences between districts. Preoperative radiotherapy is indicated if the tumor invades the entire wall [12]. It is difficult to ascertain the exact number of patients who, in district.

### Table VII
Factors associated with administration of adjuvant radiotherapy in patients without distant metastasis who underwent tumor resection. Multivariate analysis.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Modality</th>
<th>Adjusted OR</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 75 yrs</td>
<td>1</td>
<td>1</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>≥ 75 yrs</td>
<td>0.47</td>
<td>0.32–0.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>District</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>&lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1.20</td>
<td>0.56–2.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1.28</td>
<td>0.63–2.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1.58</td>
<td>0.72–3.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1.15</td>
<td>0.53–2.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1.44</td>
<td>0.75–2.79</td>
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<td></td>
</tr>
<tr>
<td>7</td>
<td>1.66</td>
<td>0.90–3.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4.04</td>
<td>1.67–9.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>0.36</td>
<td>0.16–0.84</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results adjusted for sex and administrative district. OR: Odds-ratio; 95% CI: 95% confidence interval.

### Table VIII
Tumor stage at diagnosis (%) by administrative district.

<table>
<thead>
<tr>
<th>District</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cases</td>
<td>124</td>
<td>68</td>
<td>68</td>
<td>53</td>
<td>56</td>
<td>83</td>
<td>112</td>
<td>52</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>TNM stage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>30.6</td>
<td>25</td>
<td>19.1</td>
<td>32.1</td>
<td>44.6</td>
<td>36.1</td>
<td>30.4</td>
<td>23.1</td>
<td>31.3</td>
<td>0.16</td>
</tr>
<tr>
<td>II</td>
<td>22.6</td>
<td>22.1</td>
<td>25</td>
<td>22.6</td>
<td>12.5</td>
<td>14.5</td>
<td>22.3</td>
<td>25.0</td>
<td>25.4</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>16.9</td>
<td>14.7</td>
<td>29.4</td>
<td>15.1</td>
<td>16.1</td>
<td>28.9</td>
<td>23.2</td>
<td>21.2</td>
<td>16.4</td>
<td></td>
</tr>
<tr>
<td>advanced*</td>
<td>25</td>
<td>36.7</td>
<td>25.0</td>
<td>17.0</td>
<td>23.2</td>
<td>19.3</td>
<td>22.3</td>
<td>23.1</td>
<td>23.8</td>
<td></td>
</tr>
<tr>
<td>unknown</td>
<td>4.9</td>
<td>1.5</td>
<td>1.5</td>
<td>13.2</td>
<td>14.2</td>
<td>1.2</td>
<td>1.8</td>
<td>7.6</td>
<td>3.1</td>
<td></td>
</tr>
</tbody>
</table>

* Non-resectable tumors and/or distant metastases.

Better availability of transrectal ultrasonography and concerted medico-surgical decision-making should be helpful in improving these practices.
theory, had an indication for preoperative radiotherapy because transrectal ultrasonography was performed in only 20%. If extension into the wall is unknown, pretherapeutic radiotherapy should be administered [13]. The proportion of patients who had radiotherapy was low in most districts, particularly in patients aged over 75 years. Older age is not in itself a contraindication. Radiotherapy should be administered if compatible with the patient’s life expectancy. The moment of administration was also quite variable. Although the superior effect of preoperative radiotherapy has been demonstrated since 1990 [4], radiotherapy was delivered postoperatively in half of patients given radiotherapy in two districts in 1995. Conversely, in four other districts, radiotherapy was delivered postoperatively in less than 20% of patients given radiotherapy. These findings demonstrate that clinicians in certain regions became aware of the indications more rapidly than in others.

The practices observed for chemotherapy are much less in line with the consensus guidelines. Although proof of the efficacy of adjuvant chemotherapy in cancer of the rectum remains to be established, and despite the fact that the consensus guidelines advocated not prescribing chemotherapy outside the setting of clinical trials, a large proportion of patients with stage II disease were given chemotherapy. The proportion was even greater for stage III patients. This finding shows that there remains a confusion between resected colonic tumors with nodal invasion [10] and cancer of the rectum.

Our results pointed out that regional practices were similar for two important elements: the principal treatment and creation of a definitive colostomy. Practices were however different for the diagnostic and pretherapeutic work-ups and for administration of adjuvant treatments.

A certain number of insufficiencies persist despite well-established scientific evidence and publication of consensus guidelines. For patients, these inadequacies constitute a reduced chance of cure. For healthcare providers, they constitute unnecessary expenditures. The medical community and the healthcare authorities should be aware of these insufficiencies in order to offer patients optimal care. The observed regional disparities in patient care undoubtably result from insufficient diffusion of advances in medical science. A study of the healthcare network and referral practices should be conducted in each administrative district to determine the cause(s). The available data do not provide information on this point. Due to the large number of clinicians and institutions providing patient care in France, it could be hypothesized that the observed differences do not result from practices in any given center but rather from habitual regional practices. Finally, the present results emphasize the insufficiency of consensus conference guidelines despite the support of eleven scientific societies. The strategy for diffusing consensus guidelines should be revisited [14].

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REFERENCES


