Abstract
Rectal cancer has a high incidence in our area. The different treatment options that can be used in each case depend fundamentally on the extension of the tumor at the time of diagnosis. Thus, radiologists have a central role in the management of this disease. We discuss the optimum imaging technique for staging rectal cancer, some fundamental histological aspects, and the accepted semiology in the interpretation of different imaging studies carried out in these patients, as well as the diagnostic performance of each technique. We provide a general overview of the prognosis and different treatment options. This knowledge is very useful for radiologists participating in multidisciplinary teams and for understanding the transcendence of the information provided by image interpretation in these patients.

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Anatomic Considerations

The rectum extends from the rectosigmoid junction to the anorectal ring, with its proximal limit at 12-15 cm from the anal margin, an imprecise boundary. As an international reference, rectal tumors are divided, depending on the distance between the distal end and the anal margin, into low (up to 5 cm), medium (between 5.1 and 10 cm) and high categories (from 10.1 to 15 cm).

Several anatomic structures are important for adequate RC staging. Mesorectal fascia (MRF) represents the visceral fascia of the extraperitoneal portion of the rectum and surrounds the mesorectal fat. Posteriorly, it is related to the parietal presacral fascia or Waldeyer’s fascia. Between these two is the holy plane of surgeons, a relatively avascular space that is dissected when total excision of the mesorectum is performed. Between the parietal fascia and the sacrum is the retrorectal space that contains the presacral vessels, visible in the sagittal plane of an MRI as small, hypointense nodular structures. Damage to the parietal fascia and the presacral vessels during surgery can cause bleeding that is difficult to control. The MRF and parietal fascia join at S4 and form the retrosacral ligament, which continues caudally to insert into the posterior face of the rectum and should be divided during surgery. Anteriorly, the MRF fuses with the vestige of the urogenital septum to form Denonvilliers’ fascia in men or the rectovaginal septum in women (fig. 1).

The insertion of the peritoneum is higher at the back of the rectum and at its lateral sides than at its anterior wall because the upper third of the rectum has an intraperitoneal component. In sagittal images, the anterior reflection of the peritoneum is demarcated as a hypointense linear structure that extends from the bladder surface in males or the uterus in females to the anterior wall of the rectum. Below this point, the peritoneum fuses with Denonvilliers’ fascia. In axial images, the anterior peritoneal reflection adopts a “V” shape.

The lower third of the rectum corresponds to the last 5 or 6 cm and extends from the level of the origin of the elevator muscles in the pelvis to the anal margin. In this region, the mesorectum gradually diminishes caudally until the fusion of the MRF with the upper border of the internal sphincter, which in turn maintains continuity with the circular fibers of the rectal wall. The structures that support the rectum and conform to the pelvic floor are the rectosacral ligament and the levator ani complex formed by the puborectal, pubococcygeus, iliococcygeus, and coccygeus muscles. The rectum forms an angulation with the anal canal upon being stretched forward by the puborectalis. In sagittal images, this muscle can be visualized as a muscular thickening behind the area of angulation between the rectum and the anal canal. The external sphincter is formed by a muscular ring that fuses with fibers of the levator ani and surrounds the internal sphincter (fig. 2).

The lymphatic drainage of the upper two thirds of the rectum occurs only through the nodes of the mesorectum and the inferior mesenteric artery, whereas the distal third can drain together with the vasa recta into the internal iliac chain. Occasionally these vessels are seen passing through the rectal wall to the MRF. Distal tumors that infiltrate the anal canal can also drain into the inguinal lymphatic vessels.

Staging

The sixth edition of the TNM staging, described by the International Union against Cancer (IUAC) and the American Joint Committee on Cancer (AJCC), is utilized internationally for the staging of RC and is used more than the classical modified Astler-Coller or Dukes
systems\(^4,5\) (tables 1 and 2). The R classification (table 3) is an auxiliary classification to record the presence or absence of residual tumors in the primary tumor, in lymph nodes, or in a distant location after treatment, be it surgical, radiotherapeutic, chemotherapeutic, or combined. Therefore, it reflects the efficiency of the primary treatment, influences subsequent treatment, and has prognostic implications.\(^6\) The diagnosis of RC is made histologically, so tests for its staging should only be done after a positive pathological documentation.

Prognostic Factors in Rectal Cancer

Different factors influence the prognosis of RC. For the same grade of lymph node involvement, survival at five years varies with the tumor T grade: 67\% for T1-2, 44\% for T3, and 37\% for T4.\(^7\) The presence of metastatic adenopathy in the mesorectum, especially N2 (4 or more nodes), also affects the survival for each T stage. To adequately establish the nodal prognosis, at least 12 nodes should be identified in the specimen.\(^8\) Patients with T3 tumors, the most numerous group, represent a heterogeneous group with regards to prognosis. Thus, tumors that penetrate minimally into fat, with values that oscillate between 4 and 6 mm, are associated with greater survival rates than those that infiltrate deeper fat.\(^9,10\) Therefore, the sixth edition of the TNM classification proposes an optional T3 expansion into four groups based on the depth of tumor penetration into the fat of the mesorectum\(^1,4\) (table 1). One of the most important prognostic factors in local recurrence is the impairment or threat of the circumferential margin, defined pathologically as the tumor within 1-2 mm of the MRF, considering as tumors both masses that extend from the rectal wall to the fascia and any disconnected tumor within the

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**Figure 2.** Coronal image of the anal canal where we see the levator ani as a linear structure originating in the pelvic wall and extending to the sphincter complex. The circumferential muscular thickening corresponds to the puborectal (PR) muscular ring. Caudally, the PR is continuous with the external sphincter formed by striated fibers. It is surrounded by the internal sphincter that continues from the muscularis of the rectum and is composed of smooth muscle. In the cranial region this is the mesorectal fascia, but is difficult to identify at this level.

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**Table 1.** TNM Classification (American Joint Committee on Cancer/International Union against Cancer)

<table>
<thead>
<tr>
<th>Categories</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Primary tumor (T)</strong></td>
<td></td>
</tr>
<tr>
<td>TX</td>
<td>The primary tumor cannot be assessed</td>
</tr>
<tr>
<td>TO</td>
<td>There is no evidence of a primary tumor</td>
</tr>
<tr>
<td>Tis</td>
<td>Carcinoma in situ (intraepithelial or intramucosal carcinoma)</td>
</tr>
<tr>
<td>T1</td>
<td>The tumor invades the submucosa</td>
</tr>
<tr>
<td>T2</td>
<td>The tumor invades muscularis propria</td>
</tr>
<tr>
<td>T3</td>
<td>The tumor crosses the muscularis propria and reaches the subserosa, pericolic or perirectal tissue, but is not peritonealized</td>
</tr>
<tr>
<td>pT3a</td>
<td>Optional expansions of T3</td>
</tr>
<tr>
<td>pT3b</td>
<td>Minimal invasion: &lt; 1 mm beyond the muscularis propria</td>
</tr>
<tr>
<td>pT3c</td>
<td>Light invasion: 1-5 mm beyond the muscularis propria</td>
</tr>
<tr>
<td>pT3d</td>
<td>Moderate invasion: &gt; 5-15 mm beyond the muscularis propria</td>
</tr>
<tr>
<td>T4</td>
<td>Extensive invasion: &gt;15 mm beyond the muscularis propria</td>
</tr>
<tr>
<td></td>
<td>The tumor directly invades other organs or structures (T4a) or perforates the visceral peritoneum (T4b)</td>
</tr>
<tr>
<td><strong>Regional lymph nodes (N)</strong></td>
<td></td>
</tr>
<tr>
<td>NX</td>
<td>The regional lymph nodes cannot be evaluated</td>
</tr>
<tr>
<td>N0</td>
<td>No metastasis in the regional lymph nodes</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis in 1 to 3 regional lymph nodes</td>
</tr>
<tr>
<td>N2</td>
<td>Metastasis in 4 or more regional lymph nodes</td>
</tr>
<tr>
<td><strong>Distant metastasis (M)</strong></td>
<td></td>
</tr>
<tr>
<td>MX</td>
<td>The presence of distant metastasis cannot be evaluated</td>
</tr>
<tr>
<td>M0</td>
<td>No distant metastases</td>
</tr>
<tr>
<td>M1</td>
<td>There is distant metastasis</td>
</tr>
</tbody>
</table>

TNM: tumor, adenopathy, metastasis; cTNM: indicates pretreatment classification based on clinical examination, imaging tests, endoscopy, biopsy or surgical exploration; pTNM: indicates postsurgical histopathological classification; ypTNM: indicates postsurgical histopathological classification carried out after neoadjuvant treatment.
mesorectal fat. Infiltration of the extramural veins (IEMV) is associated with poorer survival and more frequent liver metastases.

Treatment of Rectal Cancer

The treatment of RC is directed toward the prevention of both local and distant recurrence. Conventional surgical procedure is the TME, introduced in 1982. Its objective is to remove en bloc the mesorectum or with minimum defects, less than 5 mm, when the plane of resection was mesorectal (intact mesorectum). If after the surgery the margins are R1 or R2, the surgery ought to be immediate. Numerous studies have documented the benefits of these treatments. The Swedish Rectal Cancer Trial showed a reduction in the local recurrence rate from 27% to 11% upon combining the surgery with a short cycle of neoadjuvant RT. The addition of preoperative or postoperative CT to neoadjuvant RT has demonstrated benefits as opposed to RT alone in both improvement of local control of the disease (9.6% versus 17.1%) and rate of complete pathological remissions (up to 24%). However, combined therapy has succeeded neither in increasing the interval between the disease-free period and local relapse nor in increasing overall survival. With respect to whether it is better to administer these treatments in a neoadjuvant form, the more common way in Europe, or in an adjuvant form, more frequently used in the United States, a German clinical trial showed a lower rate of local recurrence at five years (6% versus 13%) and a lower rate of severe toxicity (27% versus 40%) in patients treated with preoperative chemoradiotherapy as opposed to postoperative chemoradiotherapy; there were no differences in overall survival. Other groups, however, advocate treating T3B or N1 patients solely with TME, followed by postoperative adjuvant therapy.
Transrectal ultrasound or endoscopy and MRI are widely used in the study of the thoracoabdominal extension of the disease, although several groups have also evaluated its potential for use in local staging. 1,2

Study Techniques

Transrectal US can be done by means of either a rigid probe, which permits the study of the last 12 cm of the rectum, or a flexible one. 30 Radial or linear transducers of high frequency (7 MHz) may be utilized, and the entire rectal circumference should be studied. The linear ones are the most appropriate for needle biopsy. They are used with the patients in the left lateral position, preferably after removing the rectal content spontaneously or with an enema. It is recommended to first perform a rectal exam to locate the tumor and then to introduce a probe covered with an inflatable balloon that is then distended with water. The entire tumor should be studied. It is advisable to initially pass by it with the probe and slowly pull it back, maintaining an angle of 90° with the lesion. Endoscopic US (EUS) uses an endoscope that incorporates a high frequency probe. 31

The use of an MRI requires no preparation of the patient. However, cleansing by enema some hours before MRI assures study of the collapsed rectum. It is not advisable to distend the lumen as this action may compress the mesorectal fat and diminish the distance between the tumor and the FMR. 32 However, rectal instillation of 50 ml of water or US gel does not significantly distend the rectum and can allow for better identification of the tumor. Optionally, a smooth muscle relaxant such as scopolamine bromide (20 mg) can be intramuscularly administered before beginning the study. It is necessary to utilize phased array coils positioned correctly in the pelvis to ensure an adequate signal from the promontory to the perineum. The study consists of "turbo" or fast T2 sequences. The use of enhanced T1 sequences is not necessary, nor is paramagnetic contrast. Sagittal images should be obtained over the rectum and axial images over the pelvis from the promontory to below the perineum, in 5 mm slices with a field of vision of 24 cm. They will allow us to locate the tumor, possible adenopathies, and its relationship to the MRF. Furthermore, these first images will serve to localize the high resolution sequences, consisting of T2-weighted series in 3 mm slices with a lesser field of vision (16 cm), localized over the sagittal series. They should include the entire tumor and should be oriented in a plane perpendicular to the longitudinal axis of the rectum. These images are essential for local staging. Optionally, high resolution images of the tumor parallel to the longitudinal axis of the rectum can be prescribed. In tumors of the lower third of the rectum it is necessary to obtain high-resolution coronal images that follow the greater axis of the anal canal. 31-34 Endorectal MRI, despite its excellent spatial resolution and contrast in areas proximal to the coil, is employed less often because it does not permit adequate evaluation of the radial margin, does not work for stenotic tumors, and is less available.

Different study techniques using CT have been employed in the local staging of RC. Although all utilize the portal phase after intravenously administering contrast, some distend the rectum with water or methylcellulose whereas others favor studying it without distension. 35-39 In either case, it is necessary to arrange a multidetector CT (MDCT) to optimize the results and obtain images of 2-5 mm in thickness in multiple planes, including planes that are oblique, parallel, and perpendicular to the greater axis of the rectal tumor. 40,41 Neoplasias can affect part of or the entire rectal wall. In axial images it frequently adopts a “C” shape. At its core is where the tumor infiltrates the fat most frequently, which helps to locate it as anterior, posterior, or lateral.

T Staging

EUS is an excellent technique for the identification of the tumor and evaluation of its spread through the rectal wall. For this purpose, five laminae have to be taken into account. The first, echogenic, corresponds to the interface between the balloon and the mucosa. The second, hypoechoic, corresponds to the muscularis mucosa. The third is the submucosa, thicker and highly echogenic. The fourth is the muscular layer, hypoechoic, and limited by the hyperechoic
fat of the mesorectum. The tumor is hypoechoic and can be surrounded by fibrous tissue or edema, both of which are hypoechoic. Visualization of an echogenic band between the tumor and muscle, which corresponds to the preserved submucosa, is a reliable criterion of T1. On the contrary, in stage T2, the tumor penetrates the muscle, and the submucosal plane is lost. In T3 tumors the hypoechoic lesion crosses the muscular layer and penetrates the perirectal fat, and in T4 tumors, it infiltrates neighboring organs such as the prostate (fig. 3).

The diagnostic precision of EUS for T staging varies in the medical literature between 63% and 96%. It is a technique that is very operator-dependent. Two studies published in 2002, one multicenter with more than 400 patients, showed an accuracy less than 70%; these results are explained by the participation of technicians with distinct levels of experience. In a 2005 meta-analysis of ultrasound studies the accuracy was 85% with a trend towards worse results in the most recent series. In a new study with 424 patients, the accuracy was 81%. Limitations of the technique include overstaging of the disease, in part due to the interpretation of peritumoral fibrosis present in T2 tumors as tumor and the impossibility of going beyond a stenosing tumor, which can occur in up to 17% of cases.

In an MRI image the mucosa and muscularis propria appear hypointense, whereas the submucosa and the fat of the mesorectum are hyperintense. The external lamina frequently shows focal interruptions in the surface corresponding to vessels that penetrate the rectal wall, which should not be confused with tumor. The muscularis mucosa and the bilaminar structure of the muscularis propria are not consistently identified in MRI studies. Rectal cancer's signal is lower than submucosa's signal, but higher than the signal of the muscularis layer. Tumors with a mucinous differentiation constitute an exception as they show varying levels of increased signal in the T2-weighted sequences. As with EUS, the criterion for differentiating T1 from T2 tumors is the absence of tumor extension into

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**Figure 3** Endoscopic ultrasound showing a rectal cancer that infiltrates the muscularis but does not clearly exceed it, the reason for which it corresponds to stage T2. In the wall opposite the tumor the normal multilayered structure of the rectal wall is observed.

**Figure 4** Rectal tumor of the lower third with stage 1. The hypointense tumor (arrows) is surrounded by a band of tissue that corresponds to part of the intact submucosa. The muscularis is not affected. This signal is difficult to observe in magnetic resonance, making the distinction between T1 and T2 often impossible.

**Figure 5** Tumoral thickening of the rectal wall, replacing all the layers. The muscularis is not separated from the tumor and has lost its standard increased signal. However, the surface of the rectum is smooth and the adjacent fat is not occupied. It corresponds to stage T2.
the muscular layer (figs. 4 and 5). Some T1 tumors make contact with the muscular layer and change its shape but do not infiltrate it, so the radiological criteria for assessing a lesion as T2 is that the increased signal of the muscle thickness is partially or totally replaced by the signal of the tumor. The infiltration of the perirectal fat in stage T3 is identified by the presence of an advancing tumoral front, rounded or nodular, beyond the muscular contour (fig. 6a). Spiculation of the walls of the tumor zone is not sufficient for T3 staging, as this phenomenon is frequently caused by fibrosis (fig. 7).

The accuracy of MRI goes from 71% to 94% in the medical literature. Many of the staging failures occur due to the difficulty of distinguishing between minimal T2 and T3 tumors, i.e., between isolated fibrosis (pT2) or fibrosis that contains tumoral cells (pT3).

CT has limitations in the determination of early-stage tumors due to its lack of contrast resolution to discriminate the layers of the rectal wall. This is the reason for which many studies include T1 and T2 stages in a single group, and base staging on the interpretation of the infiltration of perirectal fat and of the neighboring organs. Thus, the irregularity and the spiculation of the rectal wall suggest a T3 stage (fig. 6b), and the infiltration of neighboring organs a T4. Studies published at the beginning of the 1980s showed excellent results, even though they were probably biased in their selection of patients with advanced disease. Later series established accuracy between 53% and 73%. In more recent studies that take advantage of the multiplanar capacity of MDCT scans there have been accuracy figures of 86-87%, clearly superior to those obtained only if axial images are evaluated. Due to its greater contrast resolution, MRI is preferable to CT in the detection of infiltration of neighboring organs such as the bladder, prostate, uterus and intestinal structures. Both EUS and MRI are superior to CT, but neither is clearly preference in local staging.A meta-analysis published in 2004 that compared the three techniques showed slightly better results for US than for the other techniques, especially in its specificity over the MRI in distinguishing T1 from T2 (86% versus 69%) and in its sensitivity for T3 identification (90% with EUS as opposed to 82% with MRI and 79% with CT). In a review study of 31 articles that
compared both tests, EUS slightly surpassed MRI when distinguishing between T1 and T2, which holds meaning for the selection of candidates for local surgery or TEM. However, there were no differences in higher stages (average accuracy of 73%). Therefore, EUS is the preferred technique for many groups in the imaging of patients with initial disease. The 15 MHz probes have even shown an 85.7% capability to distinguish between tumors confined to the mucosa or with incipient submucosal infiltration (level 1) and the more advanced submucosal infiltrations (levels 2 and 3).

N Staging

The normal or reactive lymph nodes of the mesorectum appear oval and echogenic on EUS. The hypoechic or heterogeneous nodes that appear rounded, or those that present irregular margins, are considered positive. With these criteria, the accuracy of the EUS in the nodal staging varies between 63% and 86%, with an average of 73%. The size criterion is a poor predictor of lymphatic metastasis as these have been diagnosed in 53% of the lymph nodes greater than 5 mm but also in 18% of the nodes less than 5 mm. Although more than half of the metastatic nodes are located less than 3 cm from the primary tumor, EUS cannot evaluate the nodes that are located outside of the focal range of the transducer. However, it is advantageous in that these nodes can be accessible by needle aspiration. The overall accuracy of MRI in the prediction of nodal involvement varies between 47% and 89.5%.

Imaging Evaluation of Prognostic Factors

MRI is the technique that provides more information regarding the prognostic factors that accompany RC. It is very precise in the evaluation of the extramural extension of the tumor. For this purpose, the radiologist should use a plane perpendicular to the tumor in the high-resolution T2-weighted sequence. The extramural extension has to be measured between the contour of the rectal wall and the visible edge of infiltration. If the wall is not seen in the infiltration zone we must locate the muscular layer at the tumor edge and trace its expected position within the infiltration area. We can expect discrepancies between this measurement and the histological measurement in ulcerated tumors that replace an extensive amount of the muscular wall as is the case if the images obtained are not perpendicular to the tumor. However, in a study that included 295 patients, the MERCURY group found a correspondence between the MRI and the pathological findings with a discrepancy not higher than 0.5 mm. This correlation is closer in T3 tumors that penetrate very little into the fat than in more advanced tumors.

MRI is also very precise in the determination of the infiltration of MRF, which is seen as a hypointense laminar structure that surrounds the fat of the mesorectum. It is practically always visualized in MRI studies and in MDCT. However, this plane is not visible with EUS. If the tumor or the infiltrated lymph nodes are very close to the MRF, make contact with it or go beyond it, then the radial resection margin will be infiltrated in the surgical specimen. If these nodes can be accessible by needle aspiration.

The best results were described in 2003 in a study in which value was not placed on the size criterion but on the presence of an irregular contour or a heterogeneous signal in the lymph node as predictors of infiltration, with sensitivity and specificity at 85% and 97%, respectively (fig. 8). Since then, however, these excellent results have not been corroborated. The application of contrasts based on iron particles is not presently a real possibility considering that, currently, these products are not commercially available. Although no technique is completely accurate, MRI has an advantage in the study of nodal involvement due to its capacity to evaluate the whole mesorectum and the iliac areas.

Figure 8  Adenopathy of small size but with irregular contours and slightly heterogeneity in a T3 tumor (arrows). The lymph nodes are practically touching the posterior region of the mesorectal fascia, implying an affected surgical margin if a total excision of the mesorectum was done.
408 patients, showed that MRI had a specificity of 92% in the identification of the free margin if the tumor was more than 1 mm from the MRF. In other words, we will almost never make a mistake when in a study we see a free radial margin. Based on previous published reports, a distance from the tumor’s edge larger than 1 or 2 mm is a MRI criterion utilized to establish a margin as free. If it is not possible to carry out an MRI, MDCT can be a valid alternative for determining infiltration of the radial margin.

IEMV is a finding that is present in approximately one fourth of the MRI studies on the extension of RC. It is always associated with a T3 or higher stage tumor and the affected vessel has to penetrate the rectal wall in the area of tumoral infiltration. It is always accompanied by the expansion of the vessel, even if it is minimal. Therefore, IEMV should be diagnosed if the intravascular signal is of intermediate intensity, similar to the tumor, associated with a minimal expansion of the vessel. The diagnosis will be obvious if the vessel is clearly expanded and the wall is nodular. These findings have a sensitivity and diagnostic specificity of 62% and 88%, respectively.

Tumoral spreading to the peritoneal surface (T4b) is identified by an anterior nodular infiltration through the peritoneal reflection, either at its anchorage to the anterior wall of the rectum or above it (fig. 10). False negatives can be found as there can be small areas of invaginated peritoneum, not visible with the spatial resolution of MRI, that are infiltrated by the tumor, but revealing an apparently free peritoneal surface in MRI; on the other hand, false positives arise upon suspecting infiltration in cases in which a nodular tumor surface contacts the peritoneum without infiltrating it.

Functional Imaging

Hybrid systems of positron emission tomography associated with CT have been utilized in RC for the detection of recurrence, but have a limited role in the evaluation of the initial extension, and different groups of experts discourage their use. It does not add additional advantages in nodal staging, a controversial aspect with standard techniques. It could be useful in some patients with advanced disease, given its greater sensitivity in the detecting distant disease. The study of tumoral perfusion with MDCT has demonstrated its usefulness in the prediction of the response to neoadjuvant treatment for RC. However, the reproducibility of this technique and its clinical impact must be demonstrated.

Water diffusion MRI techniques applied to RC are currently subject of research. Some authors have pointed out its utility in the detection of RC, including its earliest stages. Others have suggested that they can contribute to improve the characterization of the lymphatic nodules. If its utility is confirmed, MRI will have an increased impact on the initial treatment of these patients.

Restaging after Neoadjuvant Therapy

After chemotherapy, a second MRI can reveal a reduction in the size of the tumor and the stage of the lesion.
Nevertheless, its accuracy is lower because it is difficult to distinguish between residual tumors and the fibrosis that appears after treatment. There could be both down-staging when viable tumor nests are present within the fibrotic areas, impossible to identify in imaging tests, as well as over-staging when fibrosis areas are regarded as tumor. Mucinous tumors are less likely to reduce in size, although after treatment they may contain less tumoral remnants within the mucin lakes. The MERCURY group obtained an accuracy of 77% and a negative predictive value of 98% in the prediction of free radial margin after neoadjuvant treatment, in comparison with 91% and 93%, respectively, if there is no neoadjuvant therapy. A second MRI is not routinely performed in all centers. It can be more useful in patients whose radial margins were initially affected. In these patients, the extent of the surgery can be modified.

Conclusion

Accurate RC staging and risk assessment of local and distant relapse are of vital importance for choosing the therapeutic approach. Also, if neoadjuvant treatment is administered, there will be a unique opportunity to obtain valuable information to define the prognosis of the patient, which will ultimately determine his or her survival. The first-choice technique for distant staging is CT. For local staging, the techniques are EUS and MRI. EUS is more useful in early tumors, especially if local surgical treatment is proposed. MRI is necessary in more advanced tumors and permits evaluation not only of the tumor but of its relationship to the rest of the pelvic structures. Radiologists have a growing role in decision making for patients with RC as they expand and diversify their treatment options. These decisions should be made within multidisciplinary teams to maximize therapeutic effectiveness while saving efforts and intense treatment for patients that would hardly benefit from them.

Conflicts of Interest

The authors declare no conflicts of interest.

Authorship

Juan Ramón Ayuso designed and drafted the present manuscript. Mario Pagés and Carmen Ayuso were involved in this critical review and made intellectual and relevant contributions. All authors have given their final approval of the manuscript.

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