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Rectal Cancer: A Mini Literature Review

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Abstract

Rectal cancer, as a part of colorectal cancer, is one of the most common cancer in the world. In Indonesia, as reported in GLOBOCAN 2018, colorectal cancer is number eight by cancer site in term of incidence, mortality, and prevalence. It is also number five of new cases in 2018. Anatomy of rectum starts proximally at rectosigmoid junction which is as high as third sacral and extending to anorectal ring, just proximal to dentate line. In general, the upper third is located intraperitoneally and the lower two-thirds of the rectum extraperitoneally. Adenocarcinoma is the most common type of histopathology in rectal cancer. The etiology of rectal cancer is believed to be multifactorial, including both genetic and environmental factors. Hematochezia is the most common presenting symptom in rectal cancer. Diagnostic tool of rectal cancer is divided into invasive and non-invasive examinations. The simplest method to recognize is digital rectal examination that can detect around 70% of rectal cancer. TNM classification is used as a standard to evaluate the extend of tumour. Surgery alongside with radiation therapy and chemotherapy play important roles as main treatment modality of rectal cancer. The standard treatment for conventional (2-dimensional technique), consists of three 3 fields. If 3-dimensional technique preferred, 3D conformal radiotherapy (3DCRT) is more recommended than intensity-modulated radiation therapy (IMRT). For postoperative cases, the radiation treatment is conventional fractionation to a total dose of 45 Gy to the entire pelvis, followed by a boost of 5.4 Gy to the tumor bed.

Keywords: Rectal cancer, Radiotherapy, IMRT, 3DCRT

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Introduction

Rectal cancer is number third cancer in the United States. In males, it was the second most common cause of death. In female, it was the third common cause of death.¹ In Europe, every year, approximately 100,000 new cases of rectal cancer are confirmed. Early detection and increasing age of the population is the reason behind its increase. The high incidence rates specifically happened in the western population such as North America, Western Europe, and Australia. The factors that contribute to this might be the combination of risk factors like the habit of eating red meat, smoking, and obesity.²

Literature Review

Anatomy

Shape of rectum is different from sigmoid colon because it has no sacculations and appendices

epiploicae. Anatomically, rectum is the continuation of the sigmoid colon and also the upper part of the anal canal. The rectum length is known varied between 12 to 15 cm as measured by rigid endoscopy. In general, the upper third is located intraperitoneally and the lower two-thirds of the rectum extraperitoneally. Specifically, proximal third is peritonealized anteriorly and laterally, supplied by superior rectal artery from inferior mesentery artery. Middle third is peritonealized anteriorly, and is supplied by middle rectal artery from internal iliac. Lower rectum is not peritonealized, and is supplied by inferior rectal artery from internal pudendal artery. The first nodal level of rectum is located in the mesorectum, draining mostly to the para-aortic nodes and inferior mesenteric nodes. Mesorectum itself is loose connective tissue that is thicker posteriorly. it contains terminal branches of

inferior mesentery artery and needs to be removed for surgery that is adequate. The lower lymph drainage is variable both laterally and proximally along the middle rectal vessels towards nodes at the internal iliac vessels. Anorectal ring consist of levator ani muscles, internal and external sphincters. Anorectal ring represents inferior limit for functional sphincter preservation surgery, and also represent lymphatic watershed for rectal cancer spread. If there was a tumor arising above anorectal ring, it tend to metastasize along distribution of middle rectal vessels to internal iliac lymph nodes as compared to tumors that may extend into anal canal, which may spread to superficial inguinal nodes and external iliac pathways.^{1,2}

Histopathology

Most common histopathology found in rectal cancer is adenocarcinoma. The statistics data, adenocarcinoma is more than 90 % of rectal cancer. It originates from epithelial cells of the colorectal mucosa.³ Other types of rectal carcinomas are adenosquamous, squamous cell, undifferentiated carcinomas and spindle cell. Adenocarcinoma is characterized by glandular formation, which is the basis for histologic tumor grading. In well differentiated adenocarcinoma, more than 95% of the tumor is gland forming. Moderately differentiated adenocarcinoma shows 50-95% gland formation. Lastly, poorly differentiated adenocarcinoma is mostly solid with <50% gland formation. In daily practice, moderately differentiated is the most common rectal adenocarcinoma diagnosed. It is about 70% of adenocarcinoma.⁴

Etiology

Etiology of rectal cancer is still unclear and believed to be multifactorial, including both genetic and environmental factors. It was estimated around 75% rectal cancer are sporadic, while around 15% has positive family history of colorectal cancer or polyps. According to the cases, it occurs in people with genetic factor, like familial adenomatous polyposis, hereditary nonpolyposis colorectal cancer or in people with inflammatory bowel disease.⁵ Things that are related with environmental factor is sedentary lifestyle. Alcohol consumption and cigarette smoking also tend to be associated with the risk of rectal cancer. Genetic factor is often associated with the development of benign adenomatous polyps lining the wall of the bowel. If it grows more than 2 cm and contains dysplastic cells, then it will most likely progress to cancer. This progression is associated with an accumulation of genetic alterations, including

inactivation of tumor suppressor genes and activation of oncogenes.⁶

Clinical Manifestation

Hematochezia is the most common presenting symptom in rectal cancer, occurring in 60% of patients. The second is a change in bowel habit that is attributed to 43% patient. It usually occurred as diarrhea, especially if the tumor has a enormous villous component. In addition, obstructive symptoms also occur if the size of tumor is large. The third is occult bleeding which is detected through fecal occult blood test in 26% patient. Abdominal pain occurred in 20% patient. It most likely occurred in colon cancer rather than rectal cancer. It was associated with partial obstruction of large bowel. Malaise also observed in 9% patients with rectal cancer. The other symptoms of rectal cancer are constipation, reduced stool caliber and in locally advanced disease the symptoms like tenesmus, rectal urgency, inadequate emptying, urinary symptoms, buttock and perineal pain may occur.^{1,7} Though physical examination, signs of anemia, sometimes a palpable mass in the abdomen, or signs of intestinal obstruction can be found. In digital rectal examination that is performed on every patient with anorectal symptoms, the purpose is to assess the integrity of anal sphincter, determine the size and degree of tumor fixation in the one third middle and distal rectum as well as measure the distance between the tumor and the anocutaneous line. On digital rectal examination, the assessment must be included: tumor conditions, tumor mobility, and tumor extension.⁸

Imaging

Endorectal Ultrasonography (ERUS): Its procedure is usually performed by a trained digestive surgeon or radiology specialist, this procedure is considered accurate for assessing tumors at T1 size, for evaluation of lymph nodes and perirectal tissue by inserting probes in the rectum directly or with the aid of protoscopy.⁹

Computed Tomography (CT) Scan: It helps to identify tumor invasion outside the rectum and surrounding organs such as the urinary tract, bladder, and reproductive organs. However, it is difficult to distinguish the lining of the intestinal wall. CT scan allows for detection of spread to lymph nodes in the retroperitoneal area or tumor spread to the liver. It can help determine whether the tumor has advanced stage and should it undergo neoadjuvant therapy before surgery.⁹

Magnetic Resonance Imaging (MRI): The advantage of

using MRI is that it can detect cancerous lesions early (cT1-T2) and is more sensitive than CT in detecting metastases in the liver of patients with fatty liver. It is better than CT scan to determine the local stages of T and N (circumferential boundary or the involvement of the sacrum in recurrence cases). The distance between the tumor and mesorectal fascia can be a predictor of mesorectal fascia involvement where the size ≤ 1 mm has a risk of local recurrence that reaches 20%.⁹

Noninvasive diagnostic procedure

Fecal Occult Blood Test (FOBT): This test is used to identify hemoglobin in feces as a sign of bleeding in gastrointestinal tract. It appears to be not specific test for rectal cancer as it may also be found in polyp that sized more than 2 cm. However, by repeating fecal occult blood test, the sensitivity of this test can reach 90%.¹⁰

Non enzymatic tumor marker: Tumor marker in rectal cancer is one of the test to help confirm invasive procedure test. It also has role in screening and evaluating the response of rectal cancer treatment. The tumor markers usually used are carcinoembryonic antigen (CEA), cancer antigen (CA) 19-9, tissue polypeptide specific antigen (TPS), and tumor antigen of colorectal cancer (tumor-associated glycoprotein, TAG-72). Its specificity and sensitivity increase along with the simultaneous assessment of several markers.¹⁰

Staging

TNM classification is used as a standard to evaluate the extend of tumor. It can be assessed as cTNM and pTNM. cTNM is used for clinical staging and it based on physical examination, radiological imaging, and endoscopic findings. However, pathological staging is designated as pTNM and depends on data acquired clinically in addition to surgical and pathological findings.¹¹

In TNM classification, it can be added prefix like “y” and “r”. “y” indicates that the tumor has already been treated before surgical resection while “r” can indicate that the staging is used for recurrent tumor. If it remains unclear in deciding TNM, less advanced category should be used. In order to obtain accurate pN stage, at least 12 pelvic nodes must be identify.¹¹

Management of Rectal Cancer, by Stage

Treatment of Stage 1 (T1-2N0M0) Rectal Cancer

Transanal excision for stage 1 must meet following criteria : size < 3 cm, low grade, 8cm from anal verge, without lymphovascular invasion (LVI), mobile, occupy < 30% of the circumference. If patients have

margin <3cm, high grade histology, or lymphovascular invasion, the patient should undergo low anterior resection (LAR), or abdominoperineal resection (APR), or receive postoperative chemoradiotherapy after transanal excision.¹²

Treatment of Stage II-IIIc (T3N0-T4N2b) Rectal Cancer

Patient with T3 or greater or node positive are indicated to chemoradiation therapy as preoperative treatment to downstage disease, reduce the risk of local recurrence and increase the possibility to perform sphincter sparing procedure for patients with low lying tumors.¹⁴

Treatment of Stage IV Rectal Cancer

The preferences therapy depends on the extent of metastatic disease. Patient with limited metastatic disease involving one site may be curable if their metastases are surgically resectable. Patients with large, symptomatic primary lesions amenable to surgical resection may benefit from aggressive local therapy with preoperative chemoradiation therapy, followed by surgical resection of both the primary and metastatic lesions.¹²

Treatment Modalities of Rectal Cancer

Surgery

Surgery is the treatment modality for local disease. Technique of surgery for rectal cancer are transanal resection, LAR, and APR. Transanal resection is used for tumor less then 3 cm, mobile, grade 1-2, within 8 cm from anal verge and involve < 30% of rectal circumference. LAR is transabdominal approach that resect mesorectum and the tumor but leaves the anal sphincter intact or preserving anal sphincter. It is indicated for patient that can be resected with at least 2 cm distal margin. APR is type of surgery for locally advanced disease that removing the tumor, mesorectum, anus, levator muscle and continued with having permanent colostomy.¹²

Chemotherapy

It is indicated as both neoadjuvant and adjuvant treatment alongside with radiation therapy. It also has an important role in palliative treatment. In chemoradiation setting, continuous infusion 5-FU (225-250 mg/m²/day) is given concurrently as radiosensitizer. Capecitabine (825 mg/m² twice daily) also can be used as substitute because of ease administration and shown comparable pathological response rate. In the adjuvant and metastatic setting,

Table 1. UICC TNM Staging System for colorectal cancer.

Tumor (T)

TX: The primary tumor cannot be evaluated.

T0 (T plus zero): There is no evidence of cancer in the colon or rectum.

Tis: Refers to carcinoma in situ (also called cancer in situ). Cancer cells are found only in the epithelium or lamina propria, which are the top layers lining the inside of the colon or rectum.

T1: The tumor has grown into the submucosa, which is the layer of tissue underneath the mucosa or lining of the colon.

T2: The tumor has grown into the muscularis propria, a deeper, thick layer of muscle that contracts to force along the contents of the intestines.

T3: The tumor has grown through the muscularis propria and into the subserosa, which is a thin layer of connective tissue beneath the outer layer of some parts of the large intestine, or it has grown into tissues surrounding the colon or rectum.

T4a: The tumor has grown into the surface of the visceral peritoneum, which means it has grown through all layers of the colon.

T4b: The tumor has grown into or has attached to other organs or structures.

Node (N)

The "N" in the TNM system stands for lymph nodes. The lymph nodes are tiny, bean-shaped organs located throughout the body. Lymph nodes help the body fight infections as part of the immune system. Lymph nodes near the colon and rectum are called regional lymph nodes. All others are distant lymph nodes that are found in other parts of the body.

NX: The regional lymph nodes cannot be evaluated.

N0 (N plus zero): There is no spread to regional lymph nodes.

N1a: There are tumor cells found in 1 regional lymph node.

N1b: There are tumor cells found in 2 or 3 regional lymph nodes.

N1c: There are nodules made up of tumor cells found in the structures near the colon that do not appear to be lymph nodes.

N2a: There are tumor cells found in 4 to 6 regional lymph nodes.

N2b: There are tumor cells found in 7 or more regional lymph nodes.

Metastasis (M)

The "M" in the TNM system describes cancer that has spread to other parts of the body, such as the liver or lungs. This is called distant metastasis.

M0 (M plus zero): The disease has not spread to a distant part of the body.

M1a: The cancer has spread to 1 other part of the body beyond the colon or rectum.

M1b: The cancer has spread to more than 1 part of the body other than the colon or rectum.

M1c: The cancer has spread to the peritoneal surface.

Source: Reference no. 11

FOLFOX (5-FU plus Oxiplatin – based chemotherapy) or FOLFIRI (5-FU plus Irinotecan – based chemotherapy) have been widely used.¹²

Radiotherapy

Neoadjuvant chemoradiation is preferred option rather than adjuvant chemoradiation for locally advance as it improves resectability, decrease the possibility of locoregional recurrence after surgery and increase the chance of sphincter sparing especially in low lying lesion. In adjuvant setting concurrent with chemotherapy, it decreases the risk of local recurrence in \geq T3 or N+. The techniques used can be 3D Conformal radiotherapy (3DCRT) and intensity-modulated radiation therapy (IMRT). IMRT can be considered in certain case but 3DCRT is more recommended based on NCCN. Radiotherapy also has a role in palliative treatment and metastatic foci.¹²

Radiation Technique

2D Technique

In 2D, portal field created depends on the location of the primary tumor and the lymph node involved, however 3 fields that consist of posterior-anterior (PA) field and opposing lateral fields are the most commonly used. In patients who receive postoperative radiation, oral contrast can be given a few hours before simulation in the simulator with the intent to evaluate the number of intestines that enter the field. The method that is used to reduce the volume of intestines that enter the area of radiation such as positioning the patient in prone position with a full bladder.⁸

Traditional borders for the PA field are superior L5/S1 interspace; inferior, the inferior edge of the obturator foramen or 3 cm below the GTV, whichever is more distal; and lateral, 1.5–2 cm beyond the pelvic brim. Borders for the lateral fields include superior, same as

Table 2. AJCC-UICC TNM staging for colorectal cancer stage grouping.

AJCC Stage	Stage grouping	Stage description
0	Tis	The cancer is in its earliest stage. This stage is also known as carcinoma in situ or intramucosal carcinoma (Tis). It has not grown beyond the inner layer (mucosa) of the colon or rectum.
	N0	
	M0	
I	T1 or T2	The cancer has grown through the muscularis mucosa into the submucosa (T1), and it may also have grown into the muscularis propria (T2). It has not spread to nearby lymph nodes (N0) or to distant sites (M0).
	N0	
	M0	
IIA	T3	The cancer has grown into the outermost layers of the colon or rectum but has not gone through them (T3). It has not reached nearby organs. It has not spread to nearby lymph nodes (N0) or to distant sites (M0).
	N0	
	M0	
IIB	T4a	The cancer has grown through the wall of the colon or rectum but has not grown into other nearby tissues or organs (T4a). It has not yet spread to nearby lymph nodes (N0) or to distant sites (M0).
	N0	
	M0	
IIC	T4b	The cancer has grown through the wall of the colon or rectum and is attached to or has grown into other nearby tissues or organs (T4b). It has not yet spread to nearby lymph nodes (N0) or to distant sites (M0).
	N0	
	M0	
IIIA	T1 or T2	The cancer has grown through the mucosa into the submucosa (T1), and it may also have grown into the muscularis propria (T2). It has spread to 1 to 3 nearby lymph nodes (N1) or into areas of fat near the lymph nodes but not the nodes themselves (N1c). It has not spread to distant sites (M0).
	N1/N1c	
	M0	
		OR
IIIB	T1	The cancer has grown through the mucosa into the submucosa (T1). It has spread to 4 to 6 nearby lymph nodes (N2a). It has not spread to distant sites (M0).
	N2a	
	M0	
IIIC	T3 or T4a	The cancer has grown into the outermost layers of the colon or rectum (T3) or through the visceral peritoneum (T4a) but has not reached nearby organs. It has spread to 1 to 3 nearby lymph nodes (N1a or N1b) or into areas of fat near the lymph nodes but not the nodes themselves (N1c). It has not spread to distant sites (M0).
	N1/N1c	
	M0	
		OR
IIIB	T2 or T3	The cancer has grown into the muscularis propria (T2) or into the outermost layers of the colon or rectum (T3). It has spread to 4 to 6 nearby lymph nodes (N2a). It has not spread to distant sites (M0).
	N2a	
	M0	
		OR
IIIC	T1 or T2	The cancer has grown through the mucosa into the submucosa (T1), and it might also have grown into the muscularis propria (T2). It has spread to 7 or more nearby lymph nodes (N2b). It has not spread to distant sites (M0).
	N2b	
	M0	
IIIC	T4a	The cancer has grown through the wall of the colon or rectum (including the visceral peritoneum) but has not reached nearby organs (T4a). It has spread to 4 to 6 nearby lymph nodes (N2a). It has not spread to distant sites (M0).
	N2a	
	M0	
		OR
IIIC	T3 or T4a	The cancer has grown into the outermost layers of the colon or rectum (T3) or through the visceral peritoneum (T4a) but has not reached nearby organs. It has spread to 7 or more nearby lymph nodes (N2b). It has not spread to distant sites (M0).
	N2b	
	M0	
		OR
IVA	T4b	The cancer has grown through the wall of the colon or rectum and is attached to or has grown into other nearby tissues or organs (T4b). It has spread to at least one nearby lymph node or into areas of fat near the lymph nodes (N1 or N2). It has not spread to distant sites (M0).
	N1 or N2	
	M0	
IVB	Any T	The cancer may or may not have grown through the wall of the colon or rectum (Any T). It might or might not have spread to nearby lymph nodes. (Any N). It has spread to 1 distant organ (such as the liver or lung) or distant set of lymph nodes, but not to distant parts of the peritoneum (the lining of the abdominal cavity) (M1a).
	Any N	
	M1a	
IVB	Any T	The cancer might or might not have grown through the wall of the colon or rectum (Any T). It might or might not have spread to nearby lymph nodes (Any N). It has spread to more than 1 distant organ (such as the liver or lung) or distant set of lymph nodes, but not to distant parts of the peritoneum (the lining of the abdominal cavity) (M1b).
	Any N	
	M1b	
IVC	Any T	The cancer might or might not have grown through the wall of the colon or rectum (Any T). It might or might not have spread to nearby lymph nodes (Any N). It has spread to distant parts of the peritoneum (the lining of the abdominal cavity), and may or may not have spread to distant organs or lymph nodes (M1c).
	Any N	
	M1c	

Table 3. Elective lymph node target delineation for rectal cancer.

	Mesorectal	Presacral		Lateral lymph node		External iliac node	Ischiorectal fossa	Inguinal	Sphincter complex
		Pelvic	Abdominal	Posterior	Anterior				
cT3	+	+	When LN+	+	+ (in case numerous mesorectum nodes (N2))				
cT4 (anterior pelvic organ)	+	+	When LN+	+	+	+		+	
cT4 (anal sphincter)	+	+	When LN+	+	+	+	+	+	+
cT3 with extra mesorectal node	+	+	When LN+	+	+	+			

Source: Reference no. 14

PA field; inferior, same as PA field; anterior, posterior margin of the pubic symphysis (bony landmark for internal iliac nodes) for T3 disease or at least 1 cm anterior to the anterior edge of the pubic symphysis (bony landmark for external iliac nodes) for T4 disease; and posterior, 1–1.5 cm posterior to the posterior edge of the bony sacrum.¹²

3D Technique

In rectal cancer, conformal 3D techniques include targets in tumors called GTV-P and lymph node called GTV-N. GTV-P is defined as a tumor that is palpated and visualized on radiological imaging and physical examination. GTV-N includes all lymph nodes that are seen in the perirectal, mesorectal, and iliaca lymph

node involved. High risk CTV (CTV-HR) is a GTV-P with a minimum expansion of 1.5 – 2 cm to superior, inferior, and the entire rectum, mesorectum, and presacral space. For standard risk CTV (CTV – SR) must include the entire mesorectum, bilateral interna iliaca lymph nodes for tumor T3. In addition, bilateral iliaca must also be included for patients with T4 tumors with anterior organ involvement.¹³

Clinical Target Volume Delineation (CTV) of rectal cancer in lymph nodes depends on tumor staging and tumor location. For lymph nodes involved in the drainage of rectal cancer, it currently divided into abdominal lymph nodes, presacral (PN), mesorectum (M), posterior and anterior lateral (LLN), external iliaca (EIN), ischiorectal fossa (IRF), complexes sphincter (SC), and Inguinal (IN). The mesorectum, presacral and posterior lateral lymph nodes are always included into the CTV.¹⁴

- Abdominal lymph nodes: these glands are inserted into the CTV target when there are positive lymph nodes in the area.
- Posterior lateral lymph nodes: it always included in CTV even though the upper limit is located in the common iliaca that branch into internal and external iliac branches.
- Anterior lateral lymph nodes: anatomically associated with obturator lymph nodes. Inserted into CTV in cT4 cases, multiple positive lymph nodes in the mesorectum (N2) and positive posterior lateral lymph nodes.
- External iliac lymph nodes: inserted if the primary tumor invades the structure of the nearest organ (cT4) or if the anterior lateral lymph node is positive.
- Lymph nodes ischiorectal: inserted into CTV when the primary tumor invades the ischiorectal fossa directly or when the external anal sphincter is infiltrated.

Table 4. Dose Constraints for Organ at Risk.

Organ At Risk	Constraint	
Small Bowel	QUANTEC	
	V15Gy < 120 cc (individual loops)	
	V45 Gy < 195 cc (entire potential space within peritoneal cavity)	
	RTOG 0822	
	V35 Gy < 185 cc	
	V40 Gy < 100 cc	
	V45 Gy < 65 cc	
	Dmax < 50 Gy	
	Bladder	QUANTEC
		Dmax < 65 Gy
V65 Gy < 50 %		
RTOG 0822		
V40 Gy < 40 %		
V45 Gy < 15 %		
Dmax < 50 Gy		
Femoral Heads	RTOG 0822	
	V40 Gy < 40 %	
	V45 Gy < 25 %	
	Dmax < 50 Gy	

Source: Reference no. 13

- Inguinal lymph nodes: included in cases where the inguinal lymph node is positive, the tumor mass is extended to the internal and external sphincter, and infiltration to 1/3 below the vagina.

Treatment Delivery and Dose

For postoperative radiation, conventional fractionation to a total dose of 45 Gy to the entire pelvis, followed by a boost of 5.4 Gy to the tumor bed is recommended, using high-energy (≥ 6 MV) photons. Boost to a total of 54 Gy if positive margin present. For neoadjuvant therapy, conventional fractionation to a total dose of 45 Gy to the entire pelvis, followed by a boost of 5.4 Gy to the tumor bed is recommended, using high-energy (≥ 6 MV) photons. Patients with T4 disease or low-lying tumors may be boosted to a total dose of 54 Gy.¹²

Normal Tissue Tolerance

Organs at risk (OARs) in radiation therapy of rectal cancer in determining the tolerance of each organs can be based on QUANTEC and RTOG 0822. In both neoadjuvant and adjuvant settings, rectal cancer organ at risk usually include small bowel, bladder, and Femoral heads.¹³

Follow up

Active follow-up after definitive treatment for rectal cancer is recommended. Common radiation-induced adverse acute effects include diarrhea, abdominal discomfort/pain, increased frequency of urination, dysuria, and skin irritation. Possible chronic or late toxicities include loose stools, rectal urgency, infertility, ovarian dysfunction for premenopausal women, vaginal stenosis, pelvic hair loss, dry ejaculation for men, femoral head fracture, and a small risk of late, secondary radiation-related malignancy.¹²

Discussion

In assessing rectal cancer, digital rectal examination can give information concerning tumor location and fixation however it is not accurate for staging so that it should be confirmed with imaging modality for rectal cancer consist of ERUS, CT Scan, and MRI. MRI is considered the most sensitive especially in determining the local stages of T and N. It also better in identify the tumor and mesorectal fascia than CT Scan however CT scan still can help determine whether the tumor has advanced stage. It can help to decide if rectal cancer should undergo neoadjuvant therapy before surgery. In the other side, ERUS is limited for assessing tumors at T1 size, for evaluation of lymph node, and perirectal

tissue.¹⁰ Based on that, TNM classification is used as a standard to evaluate the extend of tumor.¹¹ It helped to determine rectal cancer staging and give information of its prognostic value and essential to make therapeutic decision. In rectal cancer, radiotherapy has a role both as neoadjuvant and adjuvant setting. In adjuvant setting, radiotherapy concurrent with chemotherapy has a role in decreasing risk of local recurrence in $\geq T3$ or N+ however neoadjuvant setting concurrent with chemotherapy is preferred than adjuvant as it improves resectability, decrease locoregional recurrence after surgery, and increase the possibility of sphincter sparing. The European Society of Medical Oncology (ESMO) also recommend it in case of lymph node involvement on imaging, the adequacy of total mesorectal excision is in question or advanced disease.¹⁵ Radiotherapy can be given both by 2D technique and 3D technique. Based on Corner et al that compare between both technique, it was concluded that 3D Conformal is more superior in terms of coverage of the tumor volume. It also significantly reduces the volume of small bowel irradiated.¹⁶ After the completion of treatment, active follow up must be performed to evaluate not only acute effect but also possible chronic or late effect.

Conclusion

Rectal cancer is one of the most common cancer in the world and in Indonesia. It has high incidence, mortality and prevalence in Indonesia. The treatment modalities are surgery, radiation therapy and chemotherapy. The role of each modality depends on its staging. Surgery is standard of treatment for early cases and chemotherapy for locally advanced cases and metastatic cases. Radiotherapy treatment roles mostly concurrent with chemotherapy as neoadjuvant preoperative or adjuvant postoperative. Radiotherapy can be performed both in 2D technique and 3D technique depends on the feasibility of the center. 2D technique usually used 3 field, anterior-posterior and opposing lateral fields. 3D technique require delineation of the tumor and its regional spread area. If 3D technique is applied 3DCRT is preferred. The advantage of 3D technique is able to evaluate dose in the tumor and also constraint of normal organ surrounding it.

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