

Original Article



Imaging of Rectal Carcinoma at Surveillance

Md. Mofazzal Sharif¹, Islam U. Chowdhury², Deepak Shankar Ray³,
Mst. Monira Khatun⁴, Samia Ahmed⁵, Md. Abdul Hai⁶

Abstract

Background: Among communicable and non-communicable diseases, neoplastic diseases are the 6th leading cause of death in Bangladesh. Hospital-based cancer registries in Bangladesh reveal more than 50% of subjects with neoplastic disease (cancer) are estimated to be within 30 to 65 years of age. **Objective:** To observe imaging findings in patient with rectal carcinoma in terms of no residual disease, post treatment fibrosis, residual disease, loco-regional recurrence and metastasis at surveillance by CT, MR scan. **Methodology:** CT and MRI scan was performed with standard protocol among 64 subjects (both males, females) over a period of one year at department of Radiology and Imaging, KYAMCH who came for follow up. The study subjects were referred from Department of Oncology of same institution. **Result:** Among total 64 patients majority were female (54.68%) and rest were male (45.32%) and mean age was 51.38 (\pm 22.86) years. Most (26.56%) of the patients were in 31-40 years age group. CT scan was performed in 81.25% and MRI in 31.25% patients. No recurrence was observed to surveillance imaging in 18.75% patients. Post treatment fibrosis were seen in 23.43% and locoregional recurrence in 20.31% subjects. Local extension (35.93%), lymphadenopathy (43.75%) and distant metastases (26.56%) were observed. Associated imaging findings other than tumour recurrence or extension were ischaemic colitis (10.93%), perforation (4.68%), rectovesical fistula (3.12%), rectouterine fistula (1.56%) and rectovaginal fistula (6.25%). Other than loco regional extension, distant metastases were observed in liver (14.06%), lung (10.94%), bone (6.25%) and brain (4.68%). **Conclusion:** This study reveals that during image analysis of patients with rectal carcinoma, radiologists should carefully distinguish post treatment fibrosis from local recurrence, check the locoregional areas, possible sites for metastasis and oncologist should request for screening of chest including lower part of neck at the time imaging of abdomen at follow up.

Keywords: CT Scan, MRI, Rectal carcinoma, Surveillance.

Date of received: 10.11.2017

Date of acceptance: 07.08.2018

KYAMC Journal.2018;9(3): 104- 109 .

DOI: <http://dx.doi.org/10.3329/kyamej.v9i3.38780>

Introduction

Colorectal cancer is 9th most prevalent cancer among Bangladeshi population and causes more than 2500 cancer related death among total cancer patient reported on 2017.¹ Colorectal cancer is the second most common malignancy in Western societies with approximate 145,000 new cases in the US each year.² Most patients undergo resection of the primary tumour but up to 40% of these patients will relapse and die of their disease.³ Liver is the sole site of metastasis among 20-40% of patients with relapse.^{4,6} Approximately 75% of newly diagnosed patients undergo treatment with curative intent and subsequently enter a surveillance programme.⁷ The primary aim of surveillance is to identify patients with disease relapse at a resectable stage, as liver metastasectomy can be associated with an improved 5-year survival of 33%.⁶ The identification of local recurrence, which occurs in over 11% of colon

cancers, and/or metachronous carcinoma, with its annual incidence of 0.18%, are one of the important aspects of follow up.⁸⁻¹⁰ Colorectal cancer patients under observation may be referred for imaging either because regular imaging forms part of the surveillance strategy, or because tumour relapse is suggested by the development of new symptoms or a rise in the serum carcinoembryonic antigen (CEA). The use of imaging for surveillance is supported by a meta-analysis which has shown that after primary resection the intensification of follow up by the inclusion of imaging is associated with reduced mortality (odds ratio = 0.66, 95% confidence limits 0.46-0.95). The American Society of Clinical Oncology (ASCO) and the European Society for Medical Oncology (ESMO) now recommend imaging follow-up of patients with colorectal cancer.¹¹⁻¹⁵ Therefore imaging has important role in follow up or surveillance. Several studies

1. Associate Professor, Department of Radiology and Imaging, Khwaja Yunus Ali Medical College & Hospital, Enayetpur, Sirajganj, Bangladesh.
2. Head of Cancer Unit, Gonoshasthya Somaj Vittik Medical College and Hospital, Savar, Dhaka, Bangladesh.
3. Senior Consultant, Department of Oncology, Khwaja Yunus Ali Medical College & Hospital, Cancer Centre. Enayetpur, Sirajganj, Bangladesh.
4. Department of Microbiology Lecturer, NBMCH, Sirajganj, Bangladesh.
5. Registrar, Radiation Oncology, NICH, Dhaka, Bangladesh.
6. Professor and Head, Department of Oncology, Khwaja Yunus Ali Medical College & Hospital, Cancer Centre, Enayetpur, Sirajganj, Bangladesh.

Correspondent: Dr. Md. Mofazzal Sharif, Associate Professor, Department of Radiology and Imaging, Khwaja Yunus Ali Medical College & Hospital, Enayetpur, Sirajganj, Bangladesh. Mobile- 01717-017552, E-mail : mofazzal.sharif@gmail.com.

done in abroad described imaging findings in early rectal carcinoma and few publications described imaging findings in surveillance cases which included postoperative fibrosis, recurrence in anastomotic site, local invasion, lymphnode and distant metastases.^{4,5,7-9} This recent study was conducted with the aim to identify imaging findings based on CT scan and MRI in follow up cases of rectal carcinoma on basis of previous studies conducted in abroad. The findings of this study would guide the radiologist in proper reporting so that the oncologist could provide appropriate treatment.

Material and Methods

Patients who were on follow up and referred to Department of Radiology and Imaging at Khwaja Yunus Ali Medical College and Hospital, Enayetpur Sirajganj, Bangladesh for imaging purpose from Department of Oncology of the same institution were enrolled for the present descriptive study. Patients for preliminary diagnosis of rectal carcinoma or those patients referred for imaging, staging for the first time were excluded from the study. At first all the necessary documents, previous imaging reports were reviewed. Then CT scan or MRI was done with standard protocol with GIT and IV contrast. All scans were obtained from lower neck up to mid thigh. Contrast used in CT Scan was Iopamiro 350 mg / ml and Omniscan (Gadodiamide 0.5 mmol / ml) in MRI. Adequate opacification of small intestines was done by administration of 10 ml contrast media dilute within 250 ml of water per oral. Foley's catheter (14 Fr) was kept in situ within rectum before acquisition of image. First scannogram was taken in both CT and MRI Scan. CT Scan was performed by Philips Brilliance 64 slice™ in breath holding inspiration at 3 mm collimation at 120 Kv, 200-350 mAs tube current. Arterial, venous phase images were taken at 30 second after IV injection. Then per rectal contrast was given (5 ml within 200 ml of water) by in situ catheter and delayed images (2 minute, 3 minute, 5 minute) were obtained. IV contrast of CT Scan was injected at 3 ml/ sec by pressure injector (Stellant from MEDRAD). MRI Scan was taken by Philips Achieva 1.5 T™ in FSE, T1, T2, Fat-Sat GRE post contrast, STIR, TIBS Pulse sequence in Coronal, Sagittal, Axial Planes without and with contrast (1 vial or 10 ml in each patient). In MRI, contrast was given manually. After acquisition, all the images were sent to work station. Images were analyzed at 1024 x 768 pixels by two radiologists to eliminate subjective bias and finally reports were reviewed by Oncologists. Collected data were analyzed by SPSS (ver. 20, IBM) and presented in tables and graphs.

Results

Among total 64 patients majority were female 54.68% and rest were male 45.32% (Figure 1). Age of the patients ranged from 29-76 years and mean age was 51.38 ± 22.86 years. Most 26.56% of the patients were in 31-40 years age group. About 18.75% patients were found below 30 years age group (Figure 2). CT scan was performed in 81.25% and MRI in 31.25% patients (Table I). No recurrence occurred in surveillance imaging in 18.75% patients. Post treatment fibrosis was seen in 23.43% patients [Illustration 1]. About 20.31% had locoregional recurrence. Local extension 35.93%, lymphadenopathy 43.75% [Illustration 2] and distant

metastases 26.56% were observed in present study (Table II). Associated imaging findings (Table III) other than tumour recurrence or extension were ischaemic colitis 10.93%, perforation 4.68%, rectovesical fistula 3.12%, rectouterine fistula 1.56% and rectovaginal fistula 6.25% [Illustrations 3, 4]. Mesorectal fat invasion was observed in 35.93% subjects. Rectal carcinoma invaded adjacent muscle in 23.43% patients and Levator ani 40% was the muscle most frequently involved followed by Obturator internus 26.67%, Coccygeus 26.67%, Piriformis 20% and Gluteus maximus 6.67%. Vaginal 18.75% uterine 21.87%, ovarian 1.56%, urinary bladder 17.18%, small intestinal 7.81% and perineural 3.12% extension and invasion were also seen (Table IV) [Illustration 5,6]. Mesorectal 32.81% lymphnodes were frequently involved in current study followed by involvement of internal iliac 25%, external iliac 20.31%, common iliac 17.18%, pre-para aortic 15.62% and portahepatis 9.37% lymphnodes. Left supraclavicular lymphnode extension was revealed in 3.12% patients [Illustration 7]. Distant metastases were observed in liver 14.06%, lung 10.94%, bone 6.25% and brain 4.68% [Illustration 8].

Figure 1: Pie diagram showing gender distribution of the study subjects (n=64).

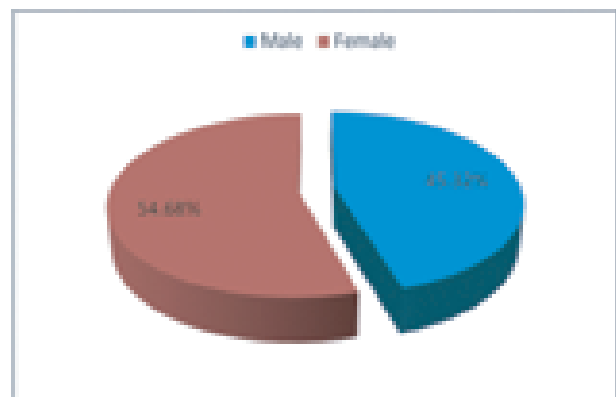


Figure 2: Bar diagram showing age distribution of the study subjects (n=64).

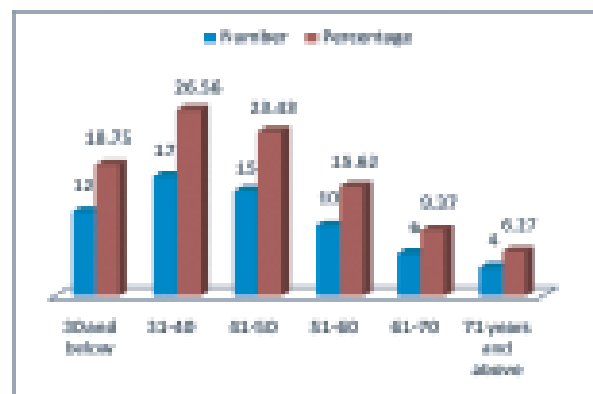


Table I: Modality of imaging of the study subjects (n=64)

Modality of imaging	Number	Percentage
CT scan	52	81.25
MRI	20	31.25

*Multiple findings were elicited as some patients did CT scan and MRI at same time.

Table II: Imaging findings of the of the study subjects (n=64)

Imaging findings	Number	Percentage
No recurrence	12	18.75
Post operative fibrosis	15	23.43
Loco-regiond recurrence	13	20.31
Local extension to adjacent organ	23	35.93
Lymphadenopathy	28	43.75
Distant metastases	17	26.56

*Multiple findings were elicited

Table III: Associated imaging findings of the of the study subjects (n=64)

Associated imaging findings	Number	Percentage
Ischaemic colitis	07	10.93
Perforation	03	04.68
Fistula formation		
Recto-vesical	02	03.12
Recto-uterine	01	01.56
Recto-vaginal	04	06.25

*Multiple findings were elicited

Table IV: Imaging findings of local extension (n=23 out of total 64 study subjects)

Imaging findings of local extension	Number	Percentage
Pararectal fat	23	35.93
Adjacent muscle	15	23.43
Levator ani	06	40
Obturator internus	04	26.67
Coccygeus	04	26.67
Piriformis	03	20.00
Gluteus maximus	01	06.67
Vagina	12	18.75
Uterus/Cervix	14	21.87
Ovaries	01	01.56
Prostate	06	09.37
Urinary bladder	11	17.18
Adjacent small bowel loops	05	07.81
Extension along sacral/coccygeal nerve plexus	02	03.12

*Multiple findings were elicited

Table V: Involvement of lymphnodes (n=28)

Lymphnodes	Number	Percentage
Perirectal	21	32.81
Internal iliac	16	25.00
External iliac	13	20.31
Common iliac	11	17.18
Pre, para aortic	10	15.62
Portocaval, Porta hepatis	06	09.37
Left supraclavicular	02	03.12

*Multiple responses were elicited

Table VI: Distant metastases in the study subjects (n=17)

Imaging findings	Number	Percentage
Hepatic	09	14.06
Pulmonary	07	10.94
Bone	04	06.25
Brain	03	04.68

*Multiple findings were elicited

Illustration 1: Post treatment fibrosis in 39 years old female patient revealed as focal minimal enhancement along left lateral, posterior walls of rectum without any mesorectal fat stranding and normal CEA level.

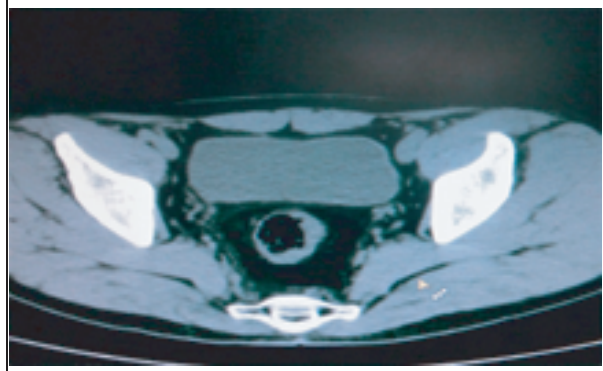


Illustration 2: Follow up Contrast MRI of pelvis in 42 years old male patient after completion of two cycle of chemotherapy showing inhomogeneous enhancing soft tissue in rectum with mesorectal necrotic lymphnodes, right mesorectal fat and right seminal vesicle invasion.

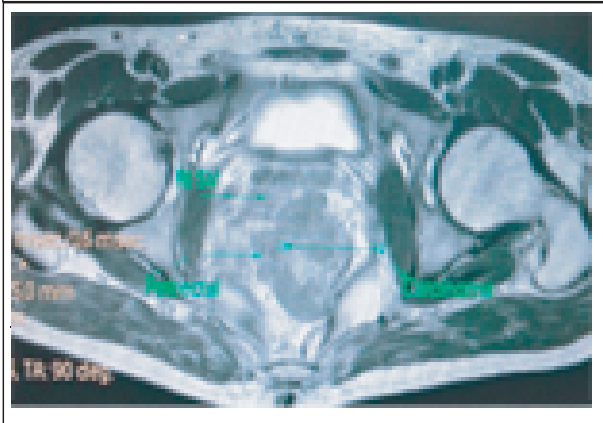


Illustration 3: Recto-uterine fistula (Single arrow) in 55 years old female patient with adenocarcinoma of rectum.

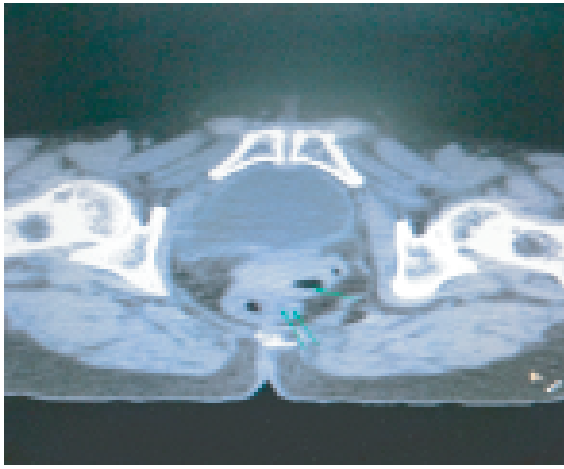


Illustration 4: Non contrast CT scan of stage IV rectal carcinoma in 48 years old female patient during post concurrent chemoradiotherapy state showing air density within urinary bladder indication fistulous communication bladder with rectum.



Illustration 5: Thickening of nerves of left sacral plexus (arrow) compared with right side indicating perineural extension of tumour in known case of rectal carcinoma patient with back pain on followup.

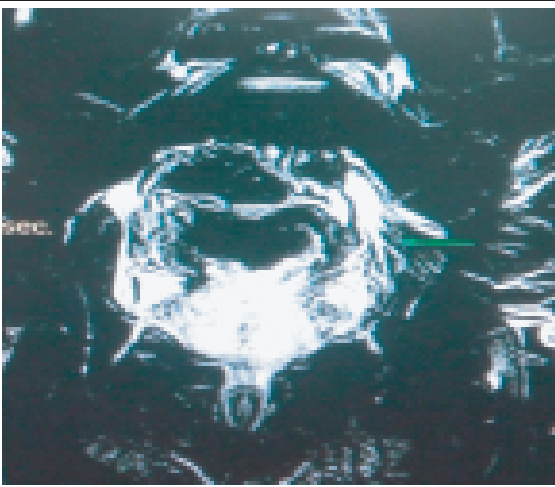


Illustration 6: Inhomogeneous enhancing metastatic soft tissue (open black arrow) in anterior abdominal wall associated with necrotic matted left internal iliac lymph nodes encasing adjacent vessels and infiltrating left lateral pelvic wall.

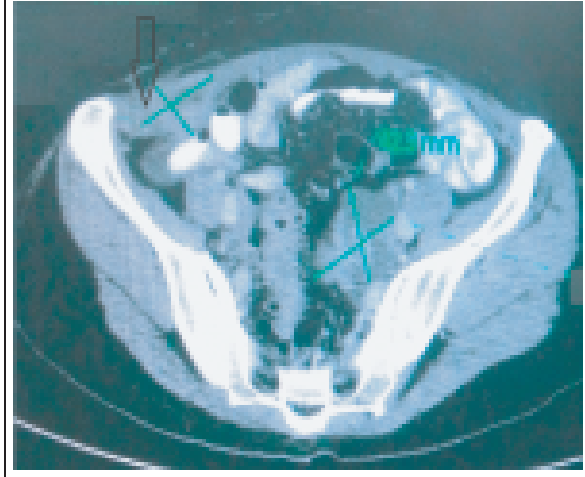


Illustration 7: Left supraclavicular lymphnode (arrow) on follow up imaging of chest.

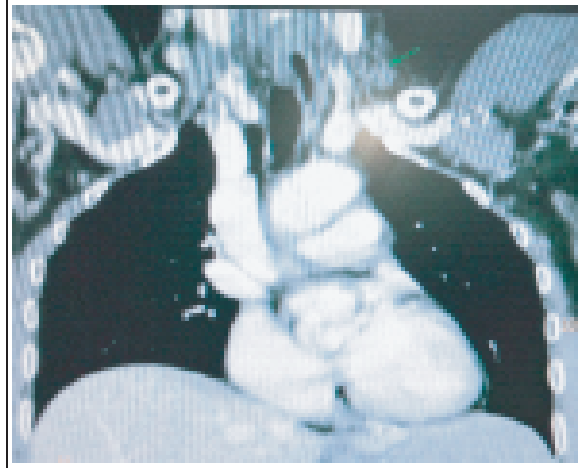
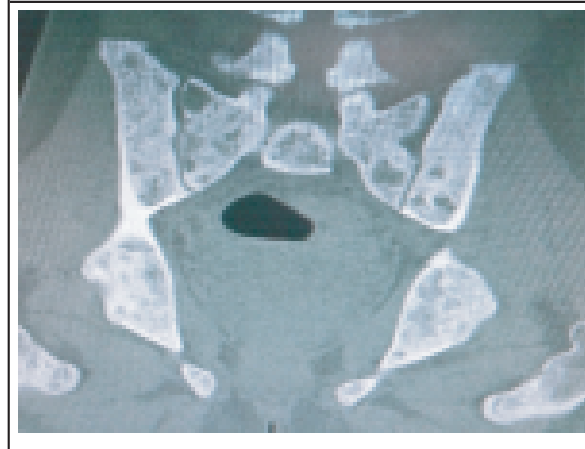


Illustration 8: Extensive bony metastases.



Discussion

Except in advanced colorectal carcinoma CT scan and MRI imaging have no role in initial diagnosis.³ Imaging is required in follow up to see recurrence, stage of disease so that these features can be compared with laboratory findings and patient is provided proper treatment. In patients with rectal carcinoma, resection is done after initial diagnosis followed by chemotherapy or radiotherapy. Sometimes in advanced cases, tumour size is reduced first by chemo-radiotherapy and followed by surgery. American Cancer Society reported that median age of colo-rectal carcinoma is 69 years with slight male predilection (M: F was 3: 2). But in present study it was observed that most of the patients were below 50 years of age and majority were female. This age incidence might be due to increased consumption of food with carcinogens or changed diet habit for food or affinity of young generation towards fast food with low dietary fiber and increased fat. In rural based Bangladesh, male patients paid more attention as they the bread winner of the family. So, for treatment purposes possibly those male patients went tertiary centre / capital and there was decreased number of male in present study.

Recurrence occurs in one third of patients with rectal carcinoma.⁴⁻⁸ It was revealed that local recurrence occurred at line of anastomosis (60%) within one year after resection in 50% of cases, within two years after resection in 70-80% cases. However, it is difficult to distinguish post treatment fibrosis from local recurrence as both of the conditions show enhancement after contrast administration. If there is any mucosal swelling at treatment site and or fat striation in perioperative/ post treatment area or loco-regional lymphadenopathy then local recurrence is most likely within an enhancing lesion.⁶ It is reported that postoperative fibrosis remains enhancing six months after operation up to two years. So the radiologist must be careful to report post treatment fibrosis or local recurrence as these findings can change total oncological treatment plan. In current study, post treatment fibrosis occurred in 23.43% patients while recurrence was seen in 20.31% patients.

Conclusion

In follow up imaging of rectal carcinoma, post treatment fibrosis should be carefully distinguished from local recurrence and possible sites of metastases should also be checked by radiologists so that a quality reporting may help the oncologist to take correct treatment decision. The study recommends that oncologist should be advised for screening of chest including lower part of neck at the time imaging of abdomen at follow up so that possible site of distant metastases may not be missed.

Acknowledgement

We would like to thank those who actively participated in this study and also Department of Oncology for referring patient for this research work.

References

1. Are C. Cancer on the Global Stage: Incidence and Cancer-Related Mortality in Bangladesh. The ASCO post- 2017. available at <http://www.ascopost.com/issues/february-25-2017/>; accessed on 20th July, 2017.
2. Young PE, Womeldorph CM, Johnson EK, Maykel JA, Brucher B, Stojadinovic A, Aetat Early Detection of Colorectal Cancer Recurrence in Patients Undergoing Surgery with Curative Intent: Current Status and Challenges. *J Cancer*. 2014; 5(4):262-271.
3. Miles K, Burkill G. Colorectal cancer: imaging surveillance following resection of primary tumour. *Cancer Imaging*. 2007;7:143-149.
4. Dahnert W. *Radiology Review Manual*. 6th Edi. Gastrointestinal tract Lippicott Williams & Wilkins, Philadelphia. 2007; 813-815.
5. Hagga JR, Lanzieri CF, Gilkeson RC. *CT and MR Imaging of the Whole Bod*. 4th In; *Imaging of Abdomen and Pelvis*. Edited By- 4th ed, Mosby, St. Louis, 2003; 1238- 1242
6. Jemal A, Murray T, Ward E. *Cancer statistics, 2005*. *Cancer J Clin*. 2005; 55: 10-30.
7. Scheele J, Stangl R, Altendorf-Hofmann A. Hepatic metastases from colorectal carcinoma: impact of surgical resection on the natural history. *Br J Surg*. 1990; 77:1241-1246.
8. Sjoval A, Granath F, Cedermark B, Glimelius B, Holm T. Loco-regional recurrence from colon cancer: a population-based study. *Ann Surg Oncol*. 2007;14:432-440.
9. Phipps AI, Baron J, Newcomb PA. Prediagnostic smoking history, alcohol consumption, and colorectal cancer survival: The Seattle Colon Cancer Family Registry. *Cancer*. 2011;117(21):4948-4957.
10. Lee JK, Liles EG, Bent S, Levin TR, Corley DA. Accuracy of Fecal Immunochemical Tests for Colorectal Cancer: Systematic Review and Meta-analysis. *Ann Intern Med*. 2014;160:171-181.

11. Desch CE, Benson AB, Somerfield MR, Colorectal cancer surveillance: 2005 update of an American Society of Clinical Oncology practice guideline. *J Clin Oncol.* 2005;23:8512-8519.
12. American Cancer Society. Cancer Facts & Figures 2016. Available at [http:// document /acspc-047079. pdf](http://document/acspc-047079.pdf). Accessed: September 23;2016.
13. ESMO. Minimum Clinical Recommendations for Ann *Oncol.* 2007;18(2):21-22.
14. Bipat S, van Leeuwen MS, Comans EFI, Colorectal liver metastases: CT, MR imaging and PET for diagnosis - meta-analysis. *Radiology.* 2005;237:123-131.
15. Kim JH, Czernin J, Allen-Auerbach MS, between 18F-FDG PET, in-line PET/CT, and softw are fusion for estaging of recurrent colorectal cancer. *J Nucl Med.* 2005; 46:587-595.