Imaging of Rectal Carcinoma at Surveillance

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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 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 (± 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.

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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 mAsx 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 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 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 hepatitis | 06     | 09.37      |
| Left supravacular           | 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 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. 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 colorectal 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. 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. 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 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.

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