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Study of Tumor Height in Rectal Cancers According to Digital Rectal Examination, M.R.I and Operated Specimen

[1]Sanjib Kundu, [2]Paran Tudu and [3]Saurabh Garai

[1]Department of General Surgery, Chhatna Superspeciality Hospital, Bankura, Chhatna Superspeciality Hospital, Sarberia, Chhatna, Bankura 722132, India

[2,3]Department of General Surgery, Bankura Sammilani Medical College, Bankura, West Bengal 722102, India

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Corresponding Author
Saurabh Garai,
Department of General Surgery, Bankura Sammilani Medical College, Bankura, West Bengal 722102, India
garai.saurabh@gmail.com

Author Designation
[1]Specialist
[2,3]Assistant Professor

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ABSTRACT
The second most frequent cancer in women and the third most prevalent in males is colorectal cancer. It is the third most common cause of newly diagnosed cancer cases and cancer-related deaths in the US, affecting both men and women equally. The aims to determine the accuracy of Digital rectal examination (DRE) and M.RI of Pelvis to measure tumor height (Distance of distal end of tumor from anal verge) in rectal cancer cases in respect to actual height measured in operated specimen after specific surgical Procedure. This descriptive, Cross sectional study was conducted in Department of General surgery, Dept. Radio-diagnosis and Dept. of Pathology of Bankura Sammilani Medical College and hospital, Bankura, West Bengal, India from January 2020 to June 2021. The mean Duration of Rectal Symptoms (Days) (Mean±S.D) of patients was 145.9545±105.3839. The mean Digital Rectal Examination (Mean±S.D) of patients was 4.0015±0.6090. The mean MRI (Mean±S.D) of patients was 4.6989±0.7400. The mean Operated Specimen (Mean±S.D) of patients was 4.3152±0.6315. To sum up, there is a great deal of variation and association between the tumor height measurements made for rectal malignancies using digital rectal examination (DRE), magnetic resonance imaging (MRI) and analysis of surgical material. MRI offers a more accurate and non-invasive evaluation than DRE, which has limitations related to tumor location and examiner variability. As DRE is also comparable with operated specimen, (though it is less sensitive than MRI), may be used in pre-operative planning in poorly served areas where MRI is not available.

INTRODUCTION

In terms of cancer incidence, colorectal cancer ranks second in women and third in men[1]. It is the third most common cause of newly diagnosed cancer cases and cancer-related deaths in the US, affecting both men and women equally. According to projections, there will be between 97 and 220 new cases of colorectal cancer in 2018, with 44% of those instances occurring in the rectum[2]. Compared to less developed nations, the incidence is noticeably higher in developed nations. Nonetheless, the death rate is decreased in more industrialized nations due to improved rectal cancer staging and treatment, as well as increasing screening. However, in patients under 50 years of age, the frequency has grown and the annual death rate has increased by 1% in this particular group[3].

The most frequent cancer in the gastrointestinal system is colorectal carcinoma[4]. Every year, more than 1.3 lakh new cases are detected in western nations (USA). While it is lower in India than in Western nations (4.1 per lakh for men and 3.9 per lakh for women), it has been rising gradually in recent years. The primarystay of care for rectal carcinoma is surgery[5]. There is a high local recurrence rate of up to 33% even with significant advancements in surgery. Appropriate surgery is required to maintain a sufficient resection margin due to the high likelihood of local recurrence. As with upper rectal or recto-sigmoid resections, a partial mesorectal extension of at least 5 cm distal to the tumor is appropriate for rectal malignancies that are positioned less than 5 cm from the anal margin[6]. Surgical planning will vary from less invasive surgery to more invasive surgery due to small centimeter variations. After surgery, there was a significant change in life quality despite minor centimeter variations. A consistent diagnostic method to compare the rectal height measurement report does not exist. They can determine whether or not the digital examination report and the magnetic resonance imaging (MRI) report accurately measure the rectal height by comparing them with the operative specimen measurement report. The main reason for this dominance is the superb soft tissue contrast between tumour and other soft tissues on T2-weighted imaging on MRI, while Computed Tomography (CT) has difficulties in this regard. Multi- disciplinary meetings using MRI have led to improved possibilities of selecting the most appropriate treatment for patients with rectal cancer[7]. The aims to determine the accuracy of Digital rectal examination (DRE) and M.RI of Pelvis to measure tumor height in rectal cancer cases in respect to actual height measured in operated specimen after specific surgical Procedure.

MATERIALS AND METHODS

Study design: Institution based Method comparison study, descriptive, cross sectional.

Study setting and timelines: All histopathologically confirmed operable cases of rectal carcinoma of T1&T2,No stage, showing rectal growth on digital rectal examination are included in the study design within specified time limit of 1.5 years, were studied.

Place of study: Inpatient and Out Patient of Department of General surgery, Dept. Radio-diagnosis and Dept. of Pathology of Bankura Sammilani Medical College and hospital, Bankura, West Bengal, India, which is a tertiary care center, catering districts of Bankura, Purulia, Medinipur and Bardhaman West.

Period of study: January 2020 to June 2021, of which 16 months allotted for recruitment one month for result analysis and one month for writing the report.

Study population: The study population was comprised of histopathologically confirmed operable cases of rectal carcinoma (minimum 58) patients, satisfying the criteria mentioned below. They were considered into the study at General Surgery department of Bankura Sammilani Medical College and Hospital, Bankura. The facilities, expertise and the necessary infrastructures are available in this hospital

Sample size: A sample size of minimum 58 is considered in this study.

Inclusion criteria: All histopathologically confirmed operable cases of rectal carcinoma of stage T1&T2 No, showing rectal growth on digital rectal examination is included in the study design.

Exclusion criteria:

- Patients presented with rectal symptoms but there is no growth in digital rectal examination
- Patients presented with rectal growth but not palpable with digital rectal examination
- Patients presented with rectal growth but non-carcinomatous lesion on biopsy.
- Inoperable cases of rectal carcinoma
- As in case of rectal carcinoma with Lymph node, Local or distal metastasis, pre- operative chemotherapy or radiotherapy is indicated, which will alter the size of the rectal growth So, only T1, and T2 No cases can be included in the study

Study variables:

- Age
- Gender
- Religion
- Occupation
- Residential location (Rural/Urban)
- Height of the patient
- Weight
- BMI
- Average monthly income

- Duration of rectal symptoms
- Tumor height measured by DRE
- Tumor height measured by MRI
- Tumor height in operated specimen

RESULTS

In Table 1 showed that the mean Duration of Rectal Symptoms (Days) (Mean±S.D) of patients was 145.9545±105.3839. In above table showed that the mean Digital Rectal Examination (Mean±S.D) of patients was 4.0015±0.6090. In above table showed that the mean MRI (Mean±S.D) of patients was 4.6989±0.7400. In above table showed that the mean Operated Specimen (Mean±S.D) of patients was 4.3152±0.6315.

-0.095 was the value of the Pearson Correlation Coefficient (r). The Operated Specimen vs. Age (years) showed a negative correlation. There was a.448 p-value. There was no statistical significance in the outcome. The Pearson Correlation Coefficient (r) has a value of -.038. A negative correlation was discovered between the BMI and the operated specimen. There was a.762 p-value. There was no statistical significance in the outcome. The Pearson Correlation Coefficient (r) has a value of -0.159. A negative correlation was discovered between the average monthly family income and the operated specimen. There was a 0.203 p-value. There was no statistical significance in the outcome. The Pearson Correlation Coefficient (r) has a value of -0.705. The length of the rectal symptoms (days) and the operated specimen showed a negative correlation. p-value was less than 0.0001. The result was statistically significant. The value of Pearson Correlation Coefficient (r) was 0.992. The Positive Correlation was found between Operated Specimen vs Digital Rectal Examination. The p-value was <0.0001. The result was statistically significant. The value of Pearson Correlation Coefficient (r) was 0.958. The Positive Correlation was found between Operated Specimen vs MRI. The p-value was <0.0001. The result was statistically significant (Fig. 1).

DISCUSSION

The study population was comprised of histopathologically confirmed operable cases of rectal carcinoma (66 patients), satisfying the inclusion criteria. They were considered into the study at General Surgery department of Bankura Sammilani Medical College and Hospital, Bankura. The facilities, expertise & the necessary infrastructures are available in this hospital.

Al histopathologically confirmed operable cases of rectal carcinoma of stage T1&T2 No, showing rectal growth on digital rectal examination is included in the study design.

Present study showed that 27 (40.9%) patients were from rural area and 39 (59.1%) patients were from urban area. The value of z is 2.0889. The value of p is 0.03662. The result is significant at p<0.05

Table 1: Distribution of mean duration of rectal symptoms (days), digital rectal examination, MRI, operated specimen

	Number	Mean	SD	Minimum	Maximum	Median
Duration of rectal symptoms (Days)	66	145.9545	105.3839	15.0000	540.0000	120.0000
Digital rectal examination	66	4.0015	0.6090	2.6000	4.9000	4.0000
MRI	66	4.6989	0.7400	2.8000	6.2500	4.7200
Operated specimen	66	4.3152	0.6315	2.7000	5.3000	4.3500

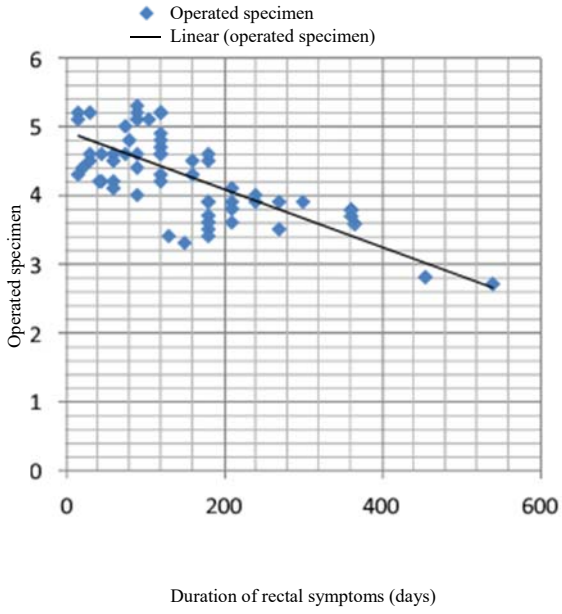

Fig. 1: Duration of rectal symptoms (days)

Sato *et al*.[8] showed that 6.8 and 5.6 cm, respectively, were the mean distances to the ARR (p = 0.070). As the measured distances grew, a significant proportionate bias was seen in the discrepancy between the BE- and MRI-based readings. The choice of the best surgical technique was unaffected by the use of either landmark. Torkzad *et al*.[9] showed a thorough summary of the state of MRI in the locoregional diagnosis, monitoring and treatment of rectal cancer is provided. Based on the most recent data, the conclusions of MRI and their correctness are reassessed. Based on published research and their personal expertise, they also describe the optimization of MRI acquisition and pertinent regional anatomy. Attenberger *et al*.[10] showed that For each of the three separate MRIs starting at the anal margin, the following revised cut-off values were suggested using ROC analysis: low 0-7.7 cm, mid 7.7-13.3 cm and high >13.3 cm (MRI1); low 0-7.4 cm, mid 7.4-11.2 cm and high >11.2 cm (MRI2) and low 0-7.1 cm, mid 7.1-13.7 cm and high >13.7 cm (MRI3). The agreement between MRI1 and MRI3 and the gold standard was strong (r = 0.66 and 0.67, respectively). This study shows that, when compared to the gold standard rigid rectoscopy, MRI1 and MRI3 measurements may be used interchangeably as a reliable approach to evaluate tumor height.

Jacobs *et al*.[11] showed large variability in rectal tumor height as measured by colonoscopy and MRI. Since MRI measurements showed excellent inter- and intraobserver agreement, they suggest using tumor height measurement by MRI for diagnostic purposes and treatment allocation. Blomqvist et al.[12] showed preoperative radiotherapy was administered to 40 of the patients after the examinations which may explain some of the overstaging by MR and EUS. Preoperative MR revealed three individuals with surgically and histopathologically proven invasion of adjacent organs in the pelvis, however EUS revealed none of these patients. MR or EUS cannot reliably predict tumor penetration of the rectal wall or local lymph node metastases. However, magnetic resonance appears to be more helpful in identifying clinically concealed advanced illness before surgery.

Gao *et al*.[13] showed that There were 576 patients in all and 222 and 354 tumors were located above and straddle/below the APR, respectively, during the surgical procedure. The MRI assessed the height of the APR (anal verge) at a median distance of 8.7 (range: 4.5-14.3) cm. APR's height and body height had a positive correlation (r = 0.862, p<0.001). In relation to the APR, the MRI's accuracy in pinpointing the tumor's site was 92.1%. Local recurrence was far less common in rectal cancers above the APR compared to those straddling or below it (p = 0.042). There was no discernible difference in local recurrence between the radiation and no-radiation groups for individuals above the APR. Tumor location with respect to APR was an independent risk factor for LRFS, according to multivariate analyses.

In our study, all patients [66(100.0%)] had APR in performed operation. The mean Height (Mean±S.D) of patients was 162.8636±7.6236 (Cm). The mean Weight (Mean±S.D) of patients was 54.8182±6.8318 (kg). The mean BMI (Mean±S.D) of patients was 20.6744±2.2101.

Jhaveri *et al*.[14] showed that The preferred method for staging rectal cancer is magnetic resonance imaging (MRI), which helps surgeons achieve negative surgical margins. For surgical planning, MRI makes it easier to accurately examine the sphincter complex and the mesorectal fascia. Additionally, multiparametric MRI may aid in the estimate and prediction of therapy response as well as the identification of recurring illness.

Kim *et al*.[15] showed that MRI showed contrasted with transrectal ultrasonography, which still has a poor accuracy rate for detecting metastatic lymph node, has an excellent, similar accuracy rate for determining the depth of tumor invasion. T1 and T2 lesion accuracy may rise with endorectal coil imaging in magnetic resonance imaging. Furthermore, well-defined sagittal and coronal slice pelvic pictures can provide a wealth of information on invasion of neighboring organs or any levator ani muscle invasion. MRI can be helpful in determining the proper surgical technique and degree of lymph node dissection.

We found that the mean Duration of Rectal Symptoms (Days) (Mean±S.D) of patients was 145.9545±105.3839. The mean Digital Rectal Examination (Mean±S.D) of patients was 4.0015±0.6090. The mean MRI (Mean±S.D) of patients was 4.6989±0.7400. The mean Operated Specimen (Mean±S.D) of patients was 4.3152±0.6315 (Fig. 1).

The Pearson Correlation Coefficient (r) has a value of -0.705. The length of the rectal symptoms (days) and the operated specimen showed a negative correlation. p-value was less than 0.0001. There was statistical significance in the outcome. The Pearson Correlation Coefficient (r) has a value of.992. A positive correlation was discovered between the digital rectal examination and the operated specimen. p-value was less than 0.0001. There was statistical significance in the outcome. The Pearson Correlation Coefficient (r) has a value of 0.958. A positive correlation was seen between the MRI and the operated specimen. p-value was less than 0.0001. There was statistical significance in the outcome.

CONCLUSION

To sum up, there is a great deal of variation and association between the tumor height measurements made for rectal malignancies using digital rectal examination (DRE), magnetic resonance imaging (MRI)

and analysis of surgical material. MRI offers a more accurate and non-invasive evaluation than DRE, which has limitations related to tumor location and examiner variability. The relationship between measures of the operated specimen and MRI, however, emphasizes how crucial imaging is to preoperative planning. The complementing functions of DRE, MRI and pathological examination in identifying tumor height, directing efficacious treatment approaches and enhancing patient outcomes in the therapy of rectal cancer are highlighted by this study. As DRE is also comparable with operated specimen, (though it is less sensitive than MRI), may be used in pre-operative planning in poorly served areas where MRI is not available.

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