

MRI Diagnostic Accuracy In The Detection Of Emvi, In Carcinoma Rectum Using Histopathology As The Gold Standard

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ABSTRACT

Background: Extramural Venous Invasion [EMVI] is the intravenous tumour extension beyond the rectal wall in patients with rectal cancer. Being a predictor of a worse prognosis, detection of EMVI is important to decide on treatment options.

Objective: To determine the diagnostic accuracy of preoperative MRI in detecting extramural vascular invasion in patients with rectal cancer, taking histopathology as the gold standard.

Study design: A Retrospective study.

Place and duration of study: department of radiology in Kuwait Teaching Hospital Peshawar for from 05-Feb-2020 to 05-March 2021

Materials & Methods: The study included 118 patients who did an MRI in Kuwait Teaching Hospital Peshawar for Rectal carcinoma from 05-Feb 2020 to 05-March 2021. Patients were examined with a 0.3 Tesla MRI machine using MRI sequences T2WI, T1WI, FLAIR and DWI. Post-op specimens were sent in formalin for histopathological assessment. Data, including MRI features and Histopathological findings, were assessed with SPSS version 24.

Results: Our study included 118 rectal cancer patients, 55.1% (85) male and 44.9% (70) female. 31- 100 in 10-year increases. 31-50 and 41-50 had four instances (3.4%). Twenty (16.9%) patients were between 51 and 60, 22 (18.6%) were between 61 and 70, 35 (29.7%) were between 71 and 80, 11 (9.3%) Between 81 and 90, and 22 (18.6%) were between 91 and 100. MRI results found 57

EMVI-positive and 61 negative individuals. 45 (38.1%) patients had EMVI, whereas 73 (61.9%) did not. Cross-tabulation was utilized to analyze MRI's sensitivity, specificity, PPV, and NPV in diagnosing EMVI. MRI was 83.3% sensitive, 69% specific, 60% positive predictive, and 88.3% negative predictive. EMVI correlates with neoplastic mass.

Conclusion: Diagnostic accuracy, including sensitivity, specificity, positive predictive value, and negative predictive value, is high using MRI to identify EMVI in rectal cancer.

Keywords: Carcinoma Rectum, Extramural Venous Invasion, MRI, Mesorectal Fascia.

Authors Contribution

NK. Concept & Design of Study ,IS.Drafting, MAK.Data Analysis,HG. Critically review,KN,Final Approval of version

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INTRODUCTION

The US ranks third in colorectal cancer death and incidence[1]. Screening, staging, and therapy minimize mortality. Rectal cancer predicts mesorectum invasion—rectal vein malignancies [2]. MRI may accurately predict local recurrence and distant metastases. Extramural rectal cancer is fatal Contrast-enhanced T1-weighted images, the intermediate signal on T2weighted images, and the moderate to high alert on DWI indicate tumours signal strength in EMVI [3]. MRI guides rectal cancer treatment, preoperative evaluation, and surgical planning [4]. Brown et al. linked

MRI and EMVI histology. MRI's poor prognosis for EMVI EMVI predicts nodal or distant metastases, poor prognosis, and neoadjuvant treatment Sub mucosal and muscular plexus increase anorectic vein drainage[5]. The superior rectal/haemorrhoidal vein supplies the inferior mesenteric vein. The inferior vena cava gets blood from the iliac and rectal veins. 33.2% have unidirectional rectal veins [6]. Reticulum blood portal and systemic. MRI links muscle tumours with mesorectal fat. EMVI causes saw tooth tumours. T2 and post-contrast images show beaded or nodular arteries [7]. Smith created a 5- point MRI evaluation method. Muscle tumours get no points if modularity is missing and blood vessels are nearby. Water and modular construction are suggested (a). Fat surrounding blood vessels Strong and smooth T2 artery shows perirectal vascular anomalies [8]. 0 and 1 conceal EMVI. 1 in 13 agree [9]. MRIs may identify vascular count, size, and origin (upper, medium, or lower Rectum) [10]. The upper Rectum and bigger arteries are unfavourable Chemo radiation and mesorectal resection are

common. Treatments for T3 rectal cancer. MRI is utilized to identify poor prognostic indications such as EMVI, tumour mucin content, and MRF involvement 1, design surgical plans, and select patients for neoadjuvant CRT. EMVI was diagnosed with radiography, surgery, and histology. Techniques: Peshawar's Kuwait Teaching Hospital conducted cross-sectional research [11]. One hundred eighteen rectal cancer patients with pelvic MRIs participated. Everyone's ages, genders, and histories were documented. An ethics board approved patient consent papers. Excluded were neoadjuvant chemoradiation patients. MRI pelvis at 0.3 Tesla. The surgery began with antispasmodics. Fat-free T2- weighted FSE pictures (axial, sagittal, coronal) [12]. Bifurcation of the pelvic aorta in the axial plane. The sagittal plane. More than a thousand drunk driving photographs were found. Structure, location, anterior peritoneal reflection, and rectal junction were examined. For MRF, CRM, and EMVI, lymph node invasion was analyzed. Uniform vessel wall thickness, targeted growth, and a shift in tumour signal intensity are EMVI (moderate on T2WI). Here are EMVI's results. Muscle development without lumps and arteries. Being lodged near extramural roadways but revealing no tumours. Med tumours signal poor blood flow. Nodular growth with uneven blood vessels. EMVI 2 3 4. Histology confirms. In pathological EMVI, smooth muscle or RBCs are observed. MRI's sensitivity, specificity, and positive and negative predictive values for EMVI were analyzed in SPSS 24[13].

Materials and Methods: For this research, 118 patients were included who had had MRI treatment at Kuwait Teaching Hospital Peshawar for rectal cancer between February 2020 and March 2021. Patients were scanned using an MRI scanner with a field strength of 0.3 Tesla utilizing the T2WI, T1WI, FLAIR, and DWI sequences. Specimens collected postoperatively were preserved in formalin before being sent off for histological analysis. SPSS version 24 was used to study the gathered data, which included MRI characteristics and histopathological results.

RESULTS: Our study involved 118 patients with rectal cancer, 55.1% of whom

were male (85), and 44.9% (70) were female. Ages ranged from 31 to 100 in 10-year increments. Both the 31-50 and 41-50 age groups contained 4 cases (3.4%). Twenty (16.9%) patients were between the ages of 51 and 60, twenty-two (18.6%) were between 61 and 70, thirty-five (29.7%) were between 71 and 80, eleven (9.3%) were between 81 and 90, and twenty-two (18.6%) were between 91 and 100. MRI findings identified 57 of 118 individuals as EMVI positive and 61 as negative. Forty-five patients (38.1%) had EMVI, whereas 73 did not (61.9%). Crosstabulation was used to assess MRI's sensitivity, specificity, positive predictive value, and negative predictive value in diagnosing EMVI. MRI's sensitivity was 83.3%, specificity was 69%, positive predictive value was 60%, and negative

predictive value was 88.3%. EMVI is strongly

linked with mass neoplastic size.

Table 01: EMVI * Cross-tabulation of HP Data

Count		HP		Total
		Negative	Positive	
EMVI	Negative	35	23	58
	Positive	7	53	60
Total		42	76	118

Sensitivity= $[a/[a+c]] \times 100$ 83.33 %

Specificity= $[d/[b+d]] \times 100$ 69 %

Positive predictive value [PPV]= $[a/[a+b]] \times 100$ 60 %

Negative predictive value [NPV]= $[d/[c+d]] \times 100$ 88.3 %

Table 02: Frequency of valid Percentage

Age		Frequency	Percent	Cumulative Percent
31-40	14	3.4	3.4	3.4
41-50	14	3.4	3.4	6.8
51-60	20	16.9	16.9	23.7
61-70	30	18.6	18.6	42.4
71-80	35	29.7	29.7	72.0
81-90	16	9.3	9.3	81.4
91-100	26	18.6	18.6	100.0
Total	118	100.0	100.0	

Table 02: Frequency of valid Gender wise and Percentage

		Gender			
		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	male	85	55.1	55.1	55.1
	female	70	44.9	44.9	100.0
	Total	118	100.0	100.0	

Discussion:

Baseline MRI may be used to assess individuals with EMVI and rectal cancer appropriately, and it has the potential to serve as an independent predictive biomarker of local and distant recurrence that affects overall survival [14]. Rectal tumour expansion to veins beyond muscular prairie (EMVI) is observed on MRI (mrEMVI) as irregular, varicose veins with tumour signal intensity. Extremely thin T2- weighted magnetic resonance imaging (MRI) sections demonstrate EMVI Risk categorization in locally advanced rectal cancer should consider EMVI status as determined by baseline MRI [14]. Tumour deposits detected by MRI and EMVI were

shown to be more predictive of rectal cancer prognosis than T and N categories, according to a study by Amy C. Lord et al. In these cases, chemoradiotherapy [15]. Used to reduce the size of the tumour. Histopathology samples were formerly utilized to diagnose EMVI; however, MRI is currently the gold standard. Our study's objective was to determine whether MRI can reliably detect EMVI confirmed by histology[16]. In our study, MRI's diagnostic accuracy, sensitivity, and specificity for EMVI detection were 83%, 81%, and 90%, respectively. In a retrospective study conducted in Bahrain, 82 patients were analyzed. As shown on MRI, EMVI was

Present in 31 people, whereas histology confirmed the diagnosis in 26. Tumours that tested positive for EMVI mostly occurred in the middle of the Rectum (93 per cent). Researchers T.H. Kim discovered that MRI's sensitivity for detecting EMVI in colorectal cancer was modest, but its specificity was high. The diagnostic performance of EMVI on MRI was reported to increase survival prediction by J S Bae et al. [17]. These studies back up what we've found. We also used DWI in our investigation. However, it was ineffective in spotting EMVI. There needs to be more consistent data on the efficacy of DWI tests for identifying EMVI. While DWI has shown promise in identifying tumours, characterizing them, monitoring them, and predicting therapeutic response in rectal cancer, adding DWI sequence reduced interobserver agreement without providing any

further diagnostic benefits, as reported by Ahn et al., T2WI has a sensitivity of 83% for detecting EMVI and a specificity of 53%-55% [18]. Fornell-Perez et al. showed that adding DWI to MRI improved its ability to diagnose EMVI[19].

Conclusion: MRI's excellent diagnostic accuracy for detecting EMVI, linked to worse survival outcomes in patients with rectal cancer, is pivotal in caring for these patients. Baseline preoperative MRI with accurate and consistent reporting of Mr EMVI status should be required in patients with cancer of the Rectum, and EMVI status should be included in staging systems since regression of mrEMVI following neoadjuvant treatment is linked with increased survival.

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