ORIGINAL RESEARCH

Role of multiparametric MRI in the diagnosis of prostatic lesions

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ABSTRACT

Background: To assess the role of Multiparametric MRI as a non-invasive investigation in diagnosis of suspected prostatic lesions with raised PSA levels or lower urinary tract symptoms. **Materials & Methods:**Data was collected from patients with suspected prostate lesions attending/referred from different parts of Gujarat and also some from other states who come out to our imaging centre located in the premises of Gujarat cancer and research institute (GCRI). A total of 50 subjects were included. This was followed by evaluation with perfusion map and contrast kinetic analysis.**Results:**In the present study, in Adenocarcinoma final diagnosis, 2(6.5%) patients had DCE -CURVE TYPES I, 2(6.5%) patients had DCE -CURVE TYPE II and 27(87.1%) patients had DCE -CURVE TYPE III.**Conclusion:**The efficacy of Mp-MRI including the findings that morphological (T1W and T2W) and functional (DWI/ADC and DCE) modalities increase the performance of MRI in detecting cancer.

Keywords:MRI, prostatic lesions, diagnosis.

INTRODUCTION

Prostate gland occupies centre stage in the lives of many elderly males. Because of its location at bladder neck, enlargement of the gland leads to problems related to urinary obstruction.[1] Prostate gland occupies centre stage in the lives of many elderly males. Because of its location at bladder neck, enlargement of the gland leads to problems related to urinary obstruction. As men age there is increased incidence of Lower Urinary Tract Symptoms. Both BPH and carcinoma of prostate were presents with obstructive urinary symptoms. Benign prostatic hyperplasia is characterised pathologically by a cellular proliferation of the epithelial and stromal elements in the prostate gland. These changes begin histologically in the third decade of life and clinically in the fifth decade of life, resulting in increased resistance to urinary flow during micturition. Dysuria, slow stream, increased urinary frequency and complete retention of urine have been historically mentioned as the most common symptoms in patients with carcinoma prostate. [1-4]Elevations ofserum PSA values can be caused by any process that disrupts the normal architecture of prostate allowing the diffusion of PSA into the stroma, leading to its' entry into the blood through the microvasculature. In case of BPH, the main reason for elevated levels of S. PSA is due to increase in glandular volume. Thus elevated serum PSA levels are observed in conditions such as prostatitis, prostatic infarcts and BPH, though the most clinically important elevations are seen in adenocarcinoma of prostate. Age specific ranges for PSA are important. They increase with advancing age. A single reference range of 0 – 4 ng/ml is not appropriate for men of all ages. Numerous grading systems have been designed for the histopathological grading of prostate cancer. The prostate biopsy Gleason score correlates with tumour aggressiveness, tumour volume, serum PSA levels, prognosis and influence of the treatment policy. Over the last decades significant advances have been made in the acquisition, interpretation, and reporting of MR images of the prostate. Pre-biopsy magnetic resonance imaging (MRI) can now be considered as an additional diagnostic test to serum prostate-specific antigen (PSA) and transrectal ultrasound (TRUS)-guided biopsies. [5-7]

Recommended use of MRI in prostate cancer consists of Mp-MRI that combines anatomical images (T1W & T2W) with two functional images (DWI and DCE) in order to significantly increase the sensitivity and specificity of MRI.[8] PIRADS V2 includes T2, DWI &

DCE for evaluation of prostate lesions.Diffusion-weighted MRI is a functional imaging tool that measures the random Brownian motion of water molecules in tissue. The apparent diffusion coefficient (ADC) on MRI or the net displacement of molecules quantifies the restriction of water diffusion and is measured by acquiring at least two set of images with different magnetic field gradient durations and amplitudes (b value). Performing DWI requires at least two b factors for the calculation of ADC. Multipoint b value analyses increase the accuracy of the calculated ADC at the expense of increased scanning time and decrease in signal to noise ratio (SNR). Earlier studies reported use of maximal b value of 1000 s/mm2, but more recently it has been shown that a value of up to 2000 s/mm2, which can be obtained on 3T scanners, may help to suppress signal from background normal prostate tissue and highlight the cancerous areas as hyperintense. [9] Interpretation with high b values >1000 s/mm^2 is advocated for DWI in combination with ADC, with the hallmark of cancer being low ADC and iso to high signal on high b value DWI images (≥ 1400 s/mm2). Limitations of DWI include increased noise and anatomic distortion of the image, especially at higher b values.Hence, this study was conducted to assess the role of Multiparametric MRI as a non-invasive investigation in diagnosis of suspected prostatic lesions with raised PSA levels or lower urinary tract symptoms.

MATERIALS & METHODS

Data was collected from patients with suspected prostate lesions attending/referred from different parts of Gujarat and also some from other states who come out to our imaging centre located in the premises of Gujarat cancer and research institute (GCRI). A total of 50 subjects were included. Written informed consent for participation in the study was taken prior to the scan.Dynamic contrast enhanced imaging: Gadolinium based contrast (10 ml) was injected intravenously followed by 20 ml bolus of saline and repeatedly image a volume of interest during the intravenous administration of contrast agents. This was followed by evaluation with perfusion map and contrast kinetic analysis.

A. Reporting using standard PIRADS V2 criteria: Suspicious area in prostate was evaluated with MRI sequences (T2W, DWI and DCE) and according to which the suspicious area was assessed for likelihood of malignancy and categorized according to PIRADS V2 in 1(very low), 2(low), 3 (intermediate), 4(high) and 5(very high suspicion formalignancy).
B. All the 50 patients were followed up for the further evaluation to compare 3T MRI results with histopathological findings by confirmation by either TRUS guided biopsy or radicalprostatectomy. Chi-squared test was done.

RESULTS

9(18.0%) patients had BPH, 39(78.0%) patients had Ca Prostate and 2(4.0%) patients had Prostate Abscess.31(62.0%) patients had Adeno carcinoma, 8(16.0%) patients had Benign Prostatic Hyperplasia, 4(8.0%) patients had Inflammation and 7(14.0%) patients had Negative report in biopsy.

Table 1: Distribution of provisional diagnosis

Provisional diagnosis	Frequency	Percent
BPH	9	18.0%
Ca Prostate	39	78.0%
Prostate Abscess	2	4.0%
Total	50	100.0%

Table 2: Distribution of biopsy

Biopsy	Frequency	Percent
Adeno carcinoma	31	62.0%
Benign Prostatic Hyperplasia	8	16.0%
Inflammation	4	8.0%
Negative	7	14.0%
Total	50	100.0%

Table 3: Association between age in group: final diagnosis

	FINAL DIAGNOSIS					
Age in group	**Adenocarcinoma**	**Adenocarcinoma BPH**	**BPH**	**Prostate abscess**	**Prostatitis**	**TOTAL**
41-50	2	0	2	0	0	4
Row % Col %	50.0	0.0	50.0	0.0	0.0	100.0
	6.5	0.0	25.0	0.0	0.0	8.0
51-60	2	0	0	2	0	4
Row % Col %	50.0	0.0	0.0	50.0	0.0	100.0
	6.5	0.0	0.0	100.0	0.0	8.0
61-70	22	4	2	0	1	29

Row % Col %	75.9 71.0	13.8 57.1	6.9 25.0	0.0 0.0	3.4 50.0	100.0 58.0
71-80 Row % Col %	4 50.0 12.9	2 25.0 28.6	2 25.0 25.0	0 0.0 0.0	0 0.0 0.0	8 100.0 16.0
81-90 Row % Col %	1 20.0 3.2	1 20.0 14.3	2 40.0 25.0	0 0.0 0.0	1 20.0 50.0	5 100.0 10.0
TOTAL Row % Col %	31 62.0 100.0	7 14.0 100.0	8 16.0 100.0	2 4.0 100.0	2 4.0 100.0	50 100.0 100.0

Chi-square value: 38.7330; **p-value:** 0.0012

In Adenocarcinoma final diagnosis, 2(6.5%) patients were 41-50 years old, 2(6.5%) patients were 51-60 years old, 22(71.0%) patients were 61-70 years old, 4(12.9%) patients were 71-80 years old and 1(3.2%) patients were 81-90 years old.In **Adenocarcinoma** + BPH final diagnosis, 4(57.1%) patients were 61- 70 years old, 2(28.6%) patients were 71-80 years old and 1(14.3%) patients were 81-90 years old.In BPH final diagnosis, 2(13.3%) patients were 41-50 years old, 2(25.0%) patients were 51-60 years old, 2(25.0%) patients were 71-80 years old and 2(25.0%) patients were 81-90 years old. In Prostate abscess final diagnosis, 2(100.0%) patients were 51-60 years old. In Prostatitis final diagnosis, 1(50.0%) patients were 61-70 years old and 1(50.050.0%) patients were 81-90 years old. Association of Age in group vs. final diagnosis was statistically significant (p=0.0012).

Table 4: Association between weight loss: final diagnosis

	FINAL DIAGNOSIS					
WEIGHT LOSS	**Adenocarcinoma**	**Adenocarcinoma + BPH**	**BPH**	**Prostate abscess**	**Prostatitis**	**TOTAL**
Absent Row % Col %	11 37.9 35.5	6 20.7 85.7	8 27.6 100.0	2 6.9 100.0	2 6.9 100.0	29 100.0 58.0
Present Row % Col %	20 95.2 64.5	1 4.8 14.3	0 0.0 0.0	0 0.0 0.0	0 0.0 0.0	21 100.0 42.0
TOTAL Row % Col %	31 62.0 100.0	7 14.0 100.0	8 16.0 100.0	2 4.0 100.0	2 4.0 100.0	50 100.0 100.0

Chi-square value: 17.3485; **p-value:** 0.0017

In Adenocarcinoma final diagnosis, 20(64.5%) patient had weight loss present.In Adenocarcinoma + BPH final diagnosis, 1(14.3%) patient had weight loss present.Association of weight loss vs. final diagnosis was statistically significant (p=0.0017).

Table 5: Association between DRE: final diagnosis

	FINAL DIAGNOSIS					
DRE	**Adenocarcinoma**	**Adenocarcinoma + BPH**	**BPH**	**Prostate abscess**	**Prostatitis**	**TOTAL**
Absent Row % Col %	6 33.3 19.4	3 16.7 42.9	5 27.8 62.5	2 11.1 100.0	2 11.1 100.0	18 100.0 36.0
Present Row % Col %	25 78.1 80.6	4 12.5 57.1	3 9.4 37.5	0 0.0 0.0	0 0.0 0.0	32 100.0 64.0
TOTAL Row % Col %	31 62.0 100.0	7 14.0 100.0	8 16.0 100.0	2 4.0 100.0	2 4.0 100.0	50 100.0 100.0

Chi-square value: 13.4202; **p-value:** 0.0094

In Adenocarcinoma final diagnosis, 25(80.6%) patient had DRE present. In Adenocarcinoma + BPH final diagnosis, 4(57.1%) patient had DRE present.In BPH final diagnosis, 3(37.5%) patient had DRE present. Association of DRE vs. final diagnosis was statistically significant (p=0.0094).

Table 6: Association between provisional diagnosis: final diagnosis

	FINAL DIAGNOSIS					
PROVISIONAL DIAGNOSIS	**Adenocarcinoma**	**Adenocarcinoma + BPH**	**BPH**	**Prostate abscess**	**Prostatitis**	**TOTAL**
BPH	0	0	8	0	1	9
Row %	0.0	0.0	88.9	0.0	11.1	100.0
Col %	0.0	0.0	100.0	0.0	50.0	18.0
Ca Prostate Row % Col %	31	7	0	0	1	39
	79.5	17.9	0.0	0.0	2.6	100.0
	100.0	100.0	0.0	0.0	50.0	78.0
Prostate Abscess	0	0	0	2	0	2
Row %	0.0	0.0	0.0	100.0	0.0	100.0
Col %	0.0	0.0	0.0	100.0	0.0	4.0
TOTAL	31	7	8	2	2	50
Row % Col %	62.0	14.0	16.0	4.0	4.0	100.0
	100.0	100.0	100.0	100.0	100.0	100.0

Chi-square value: 96.5812; **p-value:**<0.0001

In Adenocarcinoma, 31(100.0%) patients had Ca Prostate provisional diagnosis. In Adenocarcinoma + BPH, 7(100.0%) patients had CaProstate provisional diagnosis.In BPH, 8(100.0%) patients had BPH provisional diagnosis.In Prostate abscess final diagnosis, 2(100.0%) patient had Prostate Abscess provisional diagnosis.In Prostatitis, 1(50.0%) patients had BPH provisional diagnosisand 1(50.0%) patients had Ca Prostate provisional diagnosis.Association of provisional diagnosis vs. final diagnosis was statistically significant (p<0.0001).

Table 7: Association between DCE -CURVE TYPE: final diagnosis

	FINAL DIAGNOSIS					
DCE -CURVE TYPE	**Adenocarcinoma**	**Adenocarcinoma + BPH**	**BPH**	**Prostate abscess**	**Prostatiti s**	**TOTAL**
I	2	0	8	2	0	12
Row %	16.7	0.0	66.7	16.7	0.0	100.0
Col %	6.5	0.0	100.0	100.0	0.0	24.0
II	2	0	0	0	2	4
Row % Col %	50.0	0.0	0.0	0.0	50.0	100.0
	6.5	0.0	0.0	0.0	100.0	8.0
III	27	7	0	0	0	34
Row %	79.4	20.6	0.0	0.0	0.0	100.0
Col %	87.1	100.0	0.0	0.0	0.0	68.0
TOTAL	31	7	8	2	2	50
Row % Col %	62.0	14.0	16.0	4.0	4.0	100.0
	100.0	100.0	100.0	100.0	100.0	100.0

Chi-square value: 63.6939; **p-value:**<0.0001

In Adenocarcinoma final diagnosis, 2(6.5%) patients had DCE -CURVE TYPES I, 2(6.5%) patients had DCE -CURVE TYPE II and 27(87.1%) patients had DCE -CURVE TYPE III.In Adenocarcinoma + BPH final diagnosis, 7(100.0%) patients had DCE -CURVE TYPE III.In BPH final diagnosis, 8(100.0%) patients had DCE -CURVE TYPES I.In Prostate abscess final diagnosis, 2(100.0%) patients had DCE -CURVE TYPES I.In Prostatitis final diagnosis, 2(100.0%) patients had DCE -CURVE TYPE II. Association of DCE -CURVE TYPE vs. final diagnosis was statistically significant.

Table 8: Association between PI-RADS: final diagnosis

	FINAL DIAGNOSIS					
PI-RADS	**Adenocarcinoma**	**Adenocarcinoma + BPH**	**BPH**	**Prostate abscess**	**Prostatiti s**	**TOTAL**
II	0	0	7	2	2	11
Row %	0.0	0.0	63.6	18.2	18.2	100.0
Col %	0.0	0.0	87.5	100.0	100.0	22.0
III	3	0	1	0	0	4
Row % Col	75.0	0.0	25.0	0.0	0.0	100.0

%	9.7	0.0	12.5	0.0	0.0	8.0
IV	13	2	0	0	0	15
Row % Col	86.7	13.3	0.0	0.0	0.0	100.0
%	41.9	28.6	0.0	0.0	0.0	30.0
V	15	5	0	0	0	20
Row %	75.0	25.0	0.0	0.0	0.0	100.0
Col %	48.4	71.4	0.0	0.0	0.0	40.0
TOTAL	31	7	8	2	2	50
Row % Col	62.0	14.0	16.0	4.0	4.0	100.0
%	100.0	100.0	100.0	100.0	100.0	100.0

Chi-square value: 48.3648; **p-value:**<0.0001

In Adenocarcinoma final diagnosis, 3(9.7%) patients had PI-RADS III, 13(41.9%) patients had PI-RADS IV and 15(48.4%) patients had PI-RADS V. In Adenocarcinoma + BPH final diagnosis, 2(28.6%) patients had PI-RADS IV and 5(71.4%) patients had PI-RADS V.In BPH final diagnosis, 7(87.5%) patients had PI-RADS II and 1(12.5%) patients had PI-RADS III.In Prostate abscess final diagnosis, 2(100.0%) patients had PI-RADS II. In Prostatitis final diagnosis, 2(100.0%) patients had PI-RADS II.Association of PI-RADS vs. final diagnosis was statistically significant (p<0.0001).

Table 9: Difference of mean PSA: FINAL DIAGNOSIS

	FINAL DIAGNOSIS	Number	Mean	SD	Minimum	Maximum	Median	p-value
PSA	Adenocarcinoma	31	151.0645	214.2105	11.0000	911.0000	81.0000	0.2676
	Adenocarcinoma + BPH	7	206.4286	296.8214	25.0000	869.0000	86.0000	
	BPH	8	8.7500	5.3769	1.8000	17.0000	8.5000	
	Prostate abscess	2	7.0000	5.6569	3.0000	11.0000	7.0000	
	Prostatitis	2	14.0000	11.3137	6.0000	22.0000	14.0000	

In Adenocarcinoma final diagnosis, the mean PSA (mean± s.d.) of patients was 151.0645 ± 214.2105.In Adenocarcinoma + BPH final diagnosis, the mean PSA (mean± s.d.) of patients was 206.4286 ± 296.8214.In BPH final diagnosis, the mean PSA (mean± s.d.) of patients was 8.7500 ± 5.3769.In Prostate abscess final diagnosis, the mean PSA (mean± s.d.) of patients was 7.0000 ± 5.6569.In Prostatitis final diagnosis, the mean PSA (mean± s.d.) of patients was 14.0000 ± 11.3137.Difference of mean PSA with five final diagnosis was not statistically significant (p=0.2676).

Table 10: Difference of mean MRS: CHO+CR/CITRATE: final diagnosis

		Number	Mean	SD	Minimum	Maximum	Median	p- value
MRS : CHO+CR/CITRATE	Adenocarcinoma	31	2.0242	.8039	0.5000	3.8000	2.1000	<0.0001
	Adenocarcinoma + BPH	7	2.3543	.6681	1.5600	3.3000	2.1000	
	BPH	8	.2638	.1459	0.1100	0.4400	0.2550	
	Prostate abscess	2	.2250	.0212	0.2100	0.2400	0.2250	
	Prostatitis	2	.6550	.6293	0.2100	1.1000	0.6550	

In Adenocarcinoma final diagnosis, the mean MRS: CHO+CR/CITRATE (mean± s.d.) of patients was 2.0242 ±. 8039.In Adenocarcinoma + BPH final diagnosis, the mean MRS: CHO+CR/CITRATE (mean± s.d.) of patients was 2.3543 ± .6681.In BPH final diagnosis, the mean MRS: CHO+CR/CITRATE (mean± s.d.) of patients was. 2638 ± .1459 .In Prostate abscess final diagnosis, the mean MRS: CHO+CR/CITRATE (mean± s.d.) of patients was .2250 ± .0212.In Prostatitis final diagnosis, the mean MRS: CHO+CR/CITRATE (mean± s.d.) of patients was .6550 ± .6293.Difference of mean MRS: CHO+CR/CITRATE with five final diagnosis was statistically significant (p<0.0001).

DISCUSSION

T2-weighted MR imaging is the workhorse of prostate MR imaging. T2-weighted MR images have high spatial resolution and, thus, can clearly differentiate the normal intermediate- to high-signal-intensity peripheral zone from the low-signal-intensity central and transition zones in young male subjects. 10 In the aging man, owing to variable extension of the transition zone due to BPH, the size and signal intensity of the prostate transition zone may vary.High

spatial-resolution T2-weighted rapid acquisition, refocused echo sequences with a small field of view, performed with endorectal and/or external body phased-array coils, are generally used to depict prostate anatomy. T1-weighted contrast in the prostate is very low. Therefore, it is not possible to appreciate the different anatomic zones on T1- weighted images. On T2-weighted images, prostate cancer can appear as an area of low signal intensity within the high signal intensity of a normal peripheral zone.

The degree of signal intensity decrease may differ with the Gleason score: Higher Gleason score components 4 or 5 have shown lower signal intensities than do lower Gleason score components 2 and 3. 11 The density and the growth pattern of the cancer may also influence T2-weighted signal intensity. Cancers in the peripheral zone, which grow thinly scattered into the surrounding normal tissue, have shown no significant difference in quantitative T2 values with normal peripheral zone. On the other hand, densely growing cancers do show lower quantitative T2 values.[12]Hence, this study was conducted to assess the role of Multiparametric MRI as a non-invasive investigation in diagnosis of suspected prostatic lesions with raised PSA levels or lower urinary tract symptoms.

In the present study, 9(18.0%) patients had BPH, 39(78.0%) patients had Ca Prostate and 2(4.0%) patients had Prostate Abscess.In Adenocarcinoma final diagnosis, 2(6.5%) patients were 41-50 years old, 2(6.5%) patients were 51-60 years old, 22(71.0%) patients were 61-70 years old, 4(12.9%) patients were 71-80 years old and 1(3.2%) patients were 81-90 years old.In **Adenocarcinoma** + BPH final diagnosis, 4(57.1%) patients were 61- 70 years old, 2(28.6%) patients were 71-80 years old and 1(14.3%) patients were 81-90 years old.In BPH final diagnosis, 2(13.3%) patients were 41-50 years old, 2(25.0%) patients were 51-60 years old, 2(25.0%) patients were 71-80 years old and 2(25.0%) patients were 81-90 years old. In Prostate abscess final diagnosis, 2(100.0%) patients were 51-60 years old. In Prostatitis final diagnosis, 1(50.0%) patients were 61-70 years old and 1(50.050.0%) patients were 81-90 years old. Association of Age in group vs. final diagnosis was statistically significant (p=0.0012).In Adenocarcinoma final diagnosis, 25(80.6%) patient had DRE present. In Adenocarcinoma + BPH final diagnosis, 4(57.1%) patient had DRE present.In BPH final diagnosis, 3(37.5%) patient had DRE present. Association of DRE vs. final diagnosis was statistically significant (p=0.0094). A study by Ouzzane A et al (2011) found that among a multitude of tests available to evaluate patients with suspected prostate cancer, modern imaging techniques seem to be the most relevant and their use is growing fast. Magnetic resonance imaging (MRI) technology is the most important imaging tool for identifying early prostate cancers, characterisingtumours, helping in patient risk stratification and enabling focused use of biopsy. In addition, recent advances in transrectal ultrasonography of the prostate, such as realtime tissue elastography and contrast-enhanced ultrasonography, allow better identification of cancer. A ‘targeted biopsies only’ strategy (that is, without systematic biopsies) may reduce the number of biopsies (indicated only in patients with positive imaging), therefore avoiding the potentially unnecessary diagnosis of insignificant cancer. Any prospective, randomised trial testing MRI as an adjunct or replacement for biopsies will need to be carefully designed to include cost–utility and cost-effectiveness analysis of imaging.[13]

In the present study, in Adenocarcinoma final diagnosis, 2(6.5%) patients had DCE -CURVE TYPES I, 2(6.5%) patients had DCE -CURVE TYPE II and 27(87.1%) patients had DCE -CURVE TYPE III.In Adenocarcinoma + BPH final diagnosis, 7(100.0%) patients had DCE - CURVE TYPE III.In BPH final diagnosis, 8(100.0%) patients had DCE - CURVE TYPES I.In Prostate abscess final diagnosis, 2(100.0%) patients had DCE -CURVE TYPES I.In Prostatitis final diagnosis, 2(100.0%) patients had DCE -CURVE TYPE II. Association of DCE - CURVE TYPE vs. final diagnosis was statistically significant. In Adenocarcinoma final diagnosis, the mean PSA (mean± s.d.) of patients was 151.0645 ± 214.2105.In Adenocarcinoma + BPH final diagnosis, the mean PSA (mean± s.d.) of patients was 206.4286 ± 296.8214.In BPH final diagnosis, the mean PSA (mean± s.d.) of patients was 8.7500 ± 5.3769.In Prostate abscess final diagnosis, the mean PSA (mean± s.d.) of patients was 7.0000 ± 5.6569.In Prostatitis final diagnosis, the mean PSA (mean± s.d.) of patients was 14.0000 ± 11.3137.Difference of mean PSA with five final diagnosis was not statistically significant (p=0.2676). Another study by Johnson LM et al (2014) found that prostate cancer is the most common cancer diagnosis in American men, excluding skin cancer. The clinical behaviour of prostate cancer varies from low-grade, slow growing tumors to high-grade aggressive tumors that may ultimately progress to metastases and cause death. Given the high incidence of men diagnosed with prostate cancer, conservative treatment strategies such as active surveillance are critical in the management of prostate cancer to reduce therapeutic complications of radiation therapy or radical prostatectomy. In this review, we will review the role of multiparametric MRI in the selection and follow-up of patients on active surveillance.[14] Willis SR et al (2014) conducted a study to compare the diagnostic outcomes of the current approach of transrectal ultrasound (TRUS)-guided biopsy in men with suspected prostate cancer to an alternative approach using multiparametric MRI (mpMRI), followed by MRI- targeted biopsy if positive. A probabilistic sensitivity analysis was carried out using Monte Carlo simulation to explore the impact of statisticaluncertainty in the diagnostic parameters. In 1000 men, mpMRI followed by MRI-

targeted biopsy 'clinically dominates' TRUS-guided biopsy as it results in fewer expected biopsies (600 vs 1000), more men being correctly identified as having clinically significant cancer (320 vs 250), and fewer men being falsely identified (20 vs 50). The mpMRI-based strategy dominated TRUS-guided biopsy in 86% of the simulations in the probabilistic sensitivity analysis. Their analysis suggests that mpMRI followed by MRI-targeted biopsy is likely to result in fewer and better biopsies than TRUS-guided biopsy.[15]
Ghai S et al (2015) found that multiparametric-magnetic resonance imaging (mp-MRI) has shown promising results in diagnosis, localization, risk stratification and staging of clinically significant prostate cancer. It has also opened up opportunities for focal treatment of prostate cancer. Combinations of T2-weighted imaging, diffusion imaging, perfusion (dynamic contrast-enhanced imaging) and spectroscopic imaging have been used in mp-MRI assessment of prostate cancer, but T2 morphologic assessment and functional assessment by diffusion imaging remains the mainstay for prostate cancer diagnosis on mp-MRI. Because assessment on mp-MRI can be subjective, use of the newly developed standardized reporting Prostate Imaging and Reporting Archiving Data System scoring system and education of specialist radiologists are essential for accurate interpretation. This review focuseson the present status of mp-MRI in prostate cancer and its evolving role in the management of prostate cancer.[16]
Thompson LC et al (2015) found that whether a general practitioner (GP) should order prostate-specific antigen (PSA) testing for a patient is a question that has been unresolved for 25 years. The benefits and risks of the new technology are discussed. Accurate anatomical and functional imaging of the prostate gland, and diagnosis of significant (intermediate- and high-risk) prostate cancer, is now becoming available in Australia. However, there is still a learning curve in the implementation of this technology.[17]
Elwenspoek MM et al (2019) found that the current diagnostic pathway for patients with suspected prostate cancer (PCa) includes prostate biopsy. A large proportion of individuals who undergo biopsyhave either no PCa or low-risk disease that does not require treatment. Unnecessary biopsies may potentially be avoided with pre-biopsy imaging. Seven high-quality trials (2582 patients) were included. Compared with systematic transrectal ultrasonography–guided biopsy alone, MRI with or without targeted biopsy was associated with a 57% (95% CI, 2%-141%) improvement in the detection of clinically significant PCa, a 33% (95% CI, 23%-45%) potential reduction in the number of biopsy procedures, and a 77% (95% CI, 60%-93%) reduction in the number of cores taken per procedure. One trial showed reduced pain and bleeding adverse effects. In this meta-analysis, pre-biopsy MRI combined with targeted biopsy vs systematic transrectal ultrasonography– guided biopsy alone was associated with improved detection of clinically significant PCa, despite substantial heterogeneity among trials. Prebiopsy MRI was associated with a reduced number of individual biopsy cores taken per procedure and with reduced adverse effects, and it potentially prevented unnecessary biopsies in some individuals. This evidence supports implementation of pre-biopsy MRI into diagnostic pathways for suspected PCa.[18]

CONCLUSION

The efficacy of Mp-MRI including the findings that morphological (T1W and T2W) and functional (DWI/ADC and DCE) modalities increase the performance of MRI in detecting cancer.Considering the high sensitivity, Mp-MRI should be the integral part in management of prostate cancer. Properly designed and conducted study may facilitate adequate staging of the tumor and could guide subsequent biopsy.

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