

# CORRELATION BETWEEN MULTI-PARAMETRIC MAGNETIC RESONANCE IMAGING AND RADICAL PROSTATECTOMY OUTCOME

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## Introduction

According to the American Cancer Society, Prostate cancer (PCa) is among the most common malignancies in males, with an estimation of approximately 248,530 new cases and 34,130 deaths in the United States alone in 2021. Multi-parametric Magnetic Resonance Imaging (mp-MRI) is a technique aiming to improve the diagnostic sensitivity of prostate biopsy and is utilized in programs such as active surveillance and for surgical planning. It can be utilized in detection of PCa and identification of extraprostatic disease. Radical prostatectomy is the commonest utilized therapeutic approach in patients diagnosed with a clinically localized PCa.

## Aim of the work

The aim of this study is to correlate between mp-MRI and radical prostatectomy outcome.

## Patients and Methods

This study included 50 patients who underwent radical prostatectomy after having done mp-MRI at Alexandria Main University Hospital from 2016 to 2022. The following informations collected from the files of patients were entered into a master table :

- Laboratory investigation : Prostate Specific Antigen (PSA)
- Mp-MRI Prostate report : o Prostate measurement. o Definite suspicious lesions analysis on T2WI, DWI and DCE sequences with final PI-RADS category. o Extraprostatic Extension (EPE). o Pelvic lymph nodes. o Visualized portion of the axial skeleton.
- Histopathological results : o Prostate size. o Histologic type of tumor. o Histologic grade. o Tumor size. o Location of dominant nodule. o EPE. o Lymphovascular invasion. o Perineural invasion.

## Results

In the current study, PIRADS score was statistically significantly associated with Gleason score categories and histological grade with equal p<0.001. There was also a statistically significant association between PIRADS score and EPE (histopathology) (p=0.003) as well as between PIRADS score and Seminal Vesicle Invasion (SVI) on histopathology (p=0.003). Table (1)

Table (1): Relation between PIRADS Score and different histological parameters (n=50)

|                      | N  | PIRADS Score |      |     |      |     |      |     |       | FET $\chi^2$ | p       |
|----------------------|----|--------------|------|-----|------|-----|------|-----|-------|--------------|---------|
|                      |    | 2            |      | 3   |      | 4   |      | 5   |       |              |         |
|                      |    | No.          | %    | No. | %    | No. | %    | No. | %     |              |         |
| Gleason Score        |    |              |      |     |      |     |      |     |       |              |         |
| 6                    | 9  | 1            | 11.1 | 5   | 55.6 | 3   | 33.3 | 0   | 0.0   | 32.374*      | <0.001* |
| 7                    | 12 | 0            | 0.0  | 2   | 16.7 | 5   | 41.7 | 5   | 41.7  |              |         |
| 8                    | 6  | 0            | 0.0  | 0   | 0.0  | 0   | 0.0  | 6   | 100.0 |              |         |
| 9                    | 23 | 0            | 0.0  | 3   | 13.0 | 0   | 0.0  | 20  | 87.0  |              |         |
| Histological grade   |    |              |      |     |      |     |      |     |       |              |         |
| Low                  | 9  | 1            | 11.1 | 5   | 55.6 | 3   | 33.3 | 0   | 0.0   | 33.287*      | <0.001* |
| Intermediate         | 12 | 0            | 0.0  | 2   | 16.7 | 5   | 41.7 | 5   | 41.7  |              |         |
| High                 | 29 | 0            | 0.0  | 3   | 10.3 | 0   | 0.0  | 26  | 89.7  |              |         |
| EPE [Histopathology] |    |              |      |     |      |     |      |     |       |              |         |
| Absent               | 33 | 1            | 3.0  | 10  | 30.3 | 7   | 21.2 | 15  | 45.5  | 11.701*      | 0.003*  |
| Present              | 17 | 0            | 0.0  | 0   | 0.0  | 1   | 5.9  | 16  | 94.1  |              |         |
| SVI [Histopathology] |    |              |      |     |      |     |      |     |       |              |         |
| Absent               | 36 | 1            | 2.8  | 10  | 27.8 | 8   | 22.2 | 17  | 47.2  | 11.729*      | 0.003*  |
| Present              | 14 | 0            | 0.0  | 0   | 0.0  | 0   | 0.0  | 14  | 100.0 |              |         |
| Total                | 50 | 1            | 2.0  | 10  | 20.0 | 8   | 16.0 | 31  | 62.0  |              |         |

$\chi^2$ : Chi square test FET: Fisher Exact test  
p: p value for comparing between the studied categories  
\*: Statistically significant at p ≤ 0.05

There was a statistically significant association between EPE on mp-MRI and EPE on pathology (p<0.001). The diagnostic performance of mp-MRI for EPE: The sensitivity and specificity were 88.24% and 96.97%, respectively; the PPV and NPV were 93.75% and 94.12%, respectively while the accuracy was of 94.0 %. (Table 2).

Table (2):Agreement (sensitivity, specificity and accuracy) for EPE (n=50)

|                  | EPE<br>(Histopathology) |      |                    |      | Sensitivity | Specificity | PPV   | NPV   | Accuracy |
|------------------|-------------------------|------|--------------------|------|-------------|-------------|-------|-------|----------|
|                  | Present<br>(n = 17)     |      | Absent<br>(n = 33) |      |             |             |       |       |          |
|                  | No.                     | %    | No.                | %    |             |             |       |       |          |
| EPE on mp-MRI    |                         |      |                    |      |             |             |       |       |          |
| Present (n = 16) | 15                      | 30.0 | 1                  | 2.0  | 88.24       | 96.97       | 93.75 | 94.12 | 94.0     |
| Absent (n = 34)  | 2                       | 4.0  | 32                 | 64.0 |             |             |       |       |          |
| $\chi^2$ (p)     | 37.434* (<0.001*)       |      |                    |      |             |             |       |       |          |

$\chi^2$ : Chi square test  
p: p value for comparing between the studied categories  
\*: Statistically significant at p ≤ 0.05  
PPV: Positive predictive value  
NPV: Negative predictive value

## Conclusion

- Mp-MRI with integration of PIRADS scoring system correlates with radical prostatectomy results including EPE and SVI with high diagnostic accuracy.  
- Mp-MRI remains the imaging modality of choice for detection, evaluation and planning of treatment with radical prostatectomy for patients with clinically significant PCa.