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The Promise of Pre-Biopsy MRI in a District General Hospital (DGH) Setting

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Abstract

INTRODUCTION AND OBJECTIVES: Pre-biopsy multi-parametric magnetic resonance imaging (MP-MRI) is reported to have a negative predictive value (NPV) of 89% in prostate cancer diagnosis & can avoid a biopsy in around 25%. We aimed to replicate these results in a DGH.

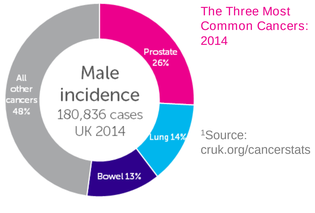
METHODS: 108 men underwent MP-MRI & transperineal sector prostate biopsies (TP-Biopsy). The presence or absence of an index lesion on MP-MRI was reported. Clinically significant (CS) cancer was defined as Gleason ≥4+3 and/or Maximum tumour length ≥6mm and/or tumour ≥ 40% core involvement. MP-MRI results were compared with TP-Biopsy to derive sensitivity (S), specificity (Sp), positive predictive value (PPV) and NPV for MP-MRI.

RESULTS: MP-MRI demonstrated a lesion in 85. Of these 44 had cancer (22 were CS). Of the 23 with no lesion, 9 had cancer (4 were CS). For MPMRI, sensitivity was 84.62% [95%CI 65.13-95.64], specificity was 23.17% [14.56-33.80], PPV was 25.88% [22.19-29.95] & NPV was 82.61% [63.98-92.70]. If MPMRI is used as a screening test, a negative MP-MRI would allow 21.3% of men to avoid a biopsy with 3.7% fewer clinically significant cancers identified. If we defined CS cancer as any cancer with an intermediate risk or higher (PSA>10 or Gleason score >7 or clinical stage of >T2b), for MP-MRI the sensitivity was 78.95% [62.68-90.45], spefificity was 21.43% [12.52-32.87], PPV was 35.29% [30.77-40.10] & NPV was 65.22% [46.68-80.07].

CONCLUSIONS: The National Institute for Health and Care Excellence (NICE) advise against repeat prostate biopsy if the MRI is normal, however our results suggest 17-35% CS prostate cancer is missed by MP-MRI depending on definition used. Currently we feel MRI alone is an unreliable test to exclude CS prostate cancer in our unit.

Introduction

Prostate cancer is the most common cancer in men.



Every year hundreds of thousands of men undergo a transrectal ultrasound (TRUS) guided biopsy of the prostate to see if they have the disease.

TRUS biopsies can miss a significant number of clinically significant prostate cancers requiring men to undergo further investigation.

Further to this TRUS biopsies are not without their risks with severe sepsis being one of them.

Aims

Pre-biopsy MP-MRI has been reported to have a NPV of 89%[2] in prostate cancer diagnosis. If used as a triage test could identify up to a quarter of men who could safely avoid an unnecessary biopsy.

We aimed to replicate these results in a DGH.

Methods

Retrospective analysis of 108 men who underwent a MP-MRI of the prostate prior to having a transperineal prostate biopsy.

The presence or absence of an index lesion on MP-MRI was reported by one of two specialist radiologists.

Clinically significant prostate cancer (primary definition) defined as:
- Gleason ≥ 4+3
- And / or Maximum tumour length ≥ 6mm
- And / or Tumour ≥ 40% of core involvement

MP-MRI results compared to results of transperineal prostate biopsies to determine sensitivity, specificity, positive predictive value and negative predictive value of MP-MRI in detecting clinically significant prostate cancer.

Conclusion

If we were to use MP-MRI in our unit as a triage test about a 5th of men would be able to avoid a biopsy.

However…

Depending on the definition of clinically significant prostate cancer used between 17 and 35% of clinically significant cancer is missed if relying on MP-MRI alone.

MP-MRI alone is an unreliable test to exclude clinically significant prostate cancer in our unit.

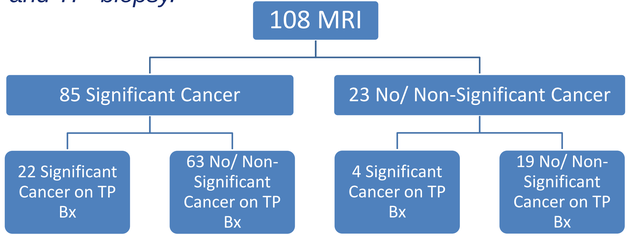
References

1 **Cancer Research UK**. http://www.cancerresearchuk.org/health-professional/cancer-statistics/incidence/common-cancers-compared#heading-One.

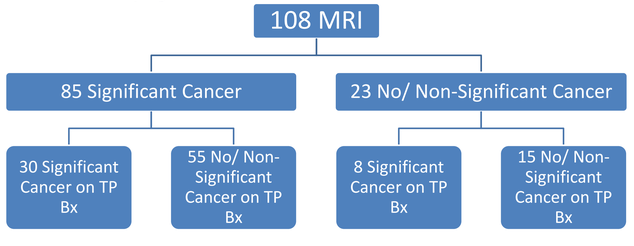
2 **Ahmed H, Bosaily A, Brown L et al.** Diagnostic accuracy of Multi-parametric MRI and TRUS biopsy in prostate cancer (PROMIS): a paired validation confirmatory study. THE LANCET, Volume 389, Issue 10071, 25 Feb- 3 Mar 2017, Pages 815-822

Results

Diagnostic accuracy for detection of clinically significant prostate cancer (primary definition) between MP-MRI and TP biopsy.



Diagnostic accuracy for detection of clinically significant prostate cancer (secondary definition) between MP-MRI and TP biopsy.



Definition of clinically significant cancer	Sensitivity	Specificity	PPV	NPV
Gleason ≥ 4+3 +/- Maximum tumour length ≥ 6mm +/- Tumour ≥ 40% of core (Primary Definition)	85%	23%	26%	83%
Any Intermediate Risk Cancer: PSA ≥ 10 +/- Gleason ≥ 7 +/- Clinical stage ≥ T2b (Secondary Definition)	79%	21%	35%	65%