

Towards High-quality prostate MRI: Frequency and reasons for repeated and extra sequences in prostate MRI examinations

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Background

- Magnetic resonance imaging (MRI) plays an essential role in both the assessment of clinically suspected prostate cancer, and in follow-up evaluation during and after treatment.
- MRI is susceptible to artifact, which can lead to poor-quality images and thus the need for repeated sequences.
- Repeated sequences increase the cost and duration of the procedure, contributing to a general decrease in diagnostic performance.
- Past literature on chest and abdominal MRI shows repeated sequences do not always improve in quality.
- By identifying the most commonly repeated sequences and the reasons for their repetition, we aim to help guide sequence optimization, quality improvement initiatives, and operational standardizations to improve the general quality of care of our patients.

Aim of our study

To determine the prevalence of repeat sequence and identify various reasons for repeating sequences.

Methods

We retrospectively reviewed 770 consecutive patients who underwent pelvic MRI examinations at MD Anderson from January to April 2020. We identified sequences done in addition to our standard institutional protocol and the reasons for these repeated sequences.

Results

Procedure	Total Number of Patient	Total Number of Repeated Sequences	Percentage of Repeated Sequences
Prostate sagittal T2-weighted	770	45	5.84%
Prostate Axial T2-weighted	770	20	2.60%
Prostate Axial T1-weighted	670	14	2.09%

Table 1: Top three procedures with repeated sequence. Note, not all MRI procedure were performed on all 770 patients. Types of procedures to be done were decided by radiologists based on study indications.

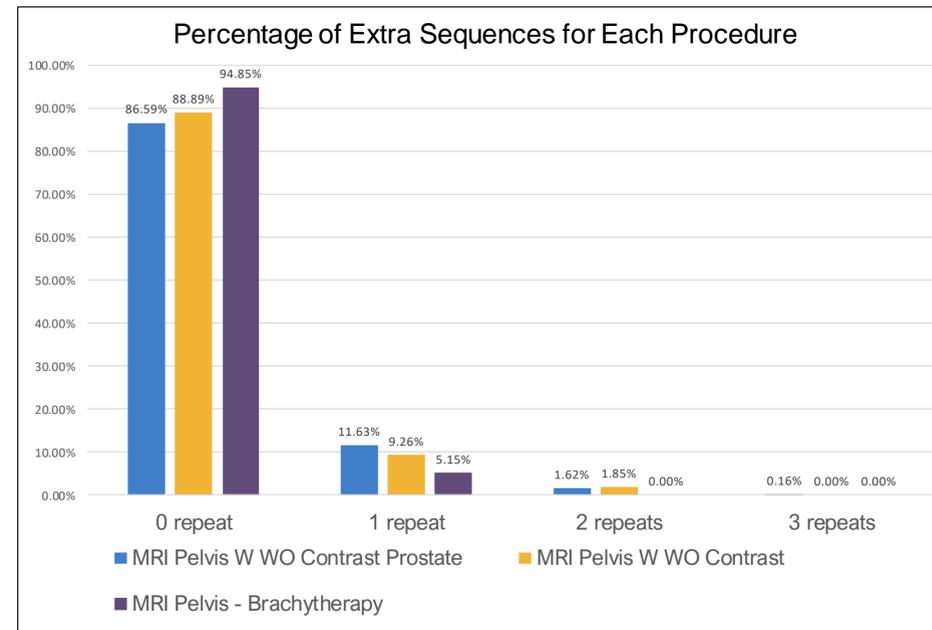


Figure 1: Grouping 770 patients into 3 categories: MRI Pelvis W WO Contrast Prostate, MRI Pelvis W WO Contrast, and MRI Pelvis – Brachytherapy. Then compare percentage of these patients who had repeated sequences.

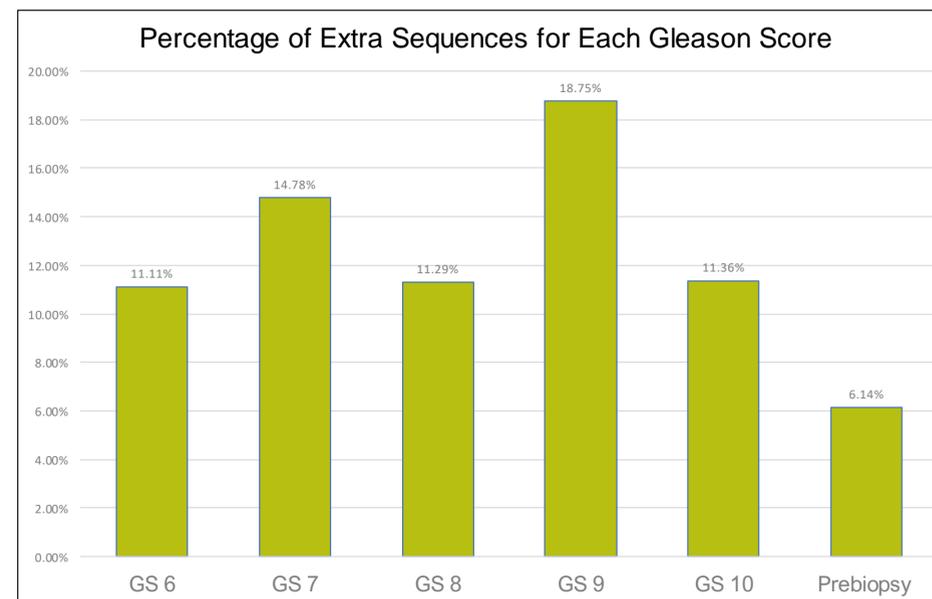


Figure 2: Grouping 770 patients into prebiopsy group (unknown Gleason score) and risk groups based on different Gleason score. Then compare percentage of these patients who had repeated sequences.

Results continued

- Of the 770 patients, 94 had at least one repeated sequence (12.21%); 1 patient had 3 repeated sequences (0.13%), 11 had 2 repeated sequences (1.43%) and 82 had 1 repeated sequence (10.64%).
- When segregating each case by risk group, 11.11% of low risk group patients (Gleason score 6, n = 117), 13.46 % of intermediate risk group patient (Gleason score 7 or 8, n = 327), 14.15% of high risk group patient (Gleason score 9 or 10, n = 212), and 6.14% of pre-biopsy patient (n = 114) had one or more repeats.

Conclusion

- For both prostate cancer staging and prostate brachytherapy assessment procedures, sequences were most often repeated due to motion artifact. The reasons for patient motion often arise from anxiety, drowsiness, or intolerance to coil. Endorectal coil repositioning is the second most common reason for repeated sequence for both prostate cancer staging and prostate brachytherapy assessment.
- In significantly greater fractions of patients, those who underwent prostate cancer staging (n = 669) had one or more repeats in comparison with those who underwent brachytherapy assessment (n = 101), 12.71% vs. 8.91% (p<0.05).
- Next step of our study, we will use PI-QUAL to assess whether repeated sequence significantly improve overall pelvic imaging quality.

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