COMPARING IMAGE QUALITY AND REPORTING TIMES FOR SCAR IDENTIFICATION BETWEEN 2D AND 3D SEQUENCES IN CARDIAC MAGNETIC RESONANCE IMAGING

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Abstracts

Introduction Compared to standard 2D imaging (2D SAX), 3D free-breathing whole heart imaging (3D-WHI) allows for the acquisition of smaller voxel size. The subsequent increased spatial resolution could provide significant benefit in research and cardiology electrophysiology procedures especially when combined with late gadolinium enhancement (LGE). However, the perception that increased series size may result in longer reporting times and the possibility of worsened image quality have prevented this modality from being adopted into routine clinical practice. We aimed to investigate if the reporting time for 3D-WHI was longer compared to standard 2D SAX imaging and if a difference in image quality was present. Methods 15 consecutive cases of clinically indicated myocardial viability scans with same-sitting 2D SAX and 3D-WHI were duplicated with one LGE modality removed resulting in 15 pairs of 2D SAX only and 3D-WHI only cases. LGE visual reporting of paired cases was undertaken in 2 sittings, 3 months apart, by a single level 3 trained, Cardiac imaging consultant and analysed using Medis (Medical Imaging System, Leiden, The Netherlands) according to SCMR recommendations. The interpreter had access to all other non-LGE images obtained during the initial acquisition. Interpretation time was recorded from the time of series opening to report completion. Additional image quality assessment was undertaken quantitatively using features previously described by Klinke et al. (0–19, good to bad respectively) and qualitatively on a likert scale 0–2 (uninterpretable, poor/fair, good respectively) taking diagnostic utility and technical quality into account. Interpretation Time and quantitative image quality was compared with the Wilcoxon signed-rank test. Qualitative scores were compared narratively.

Results Of the 15 cases included, aetiologies were 10 ischaemic, 4 non-ischaemic and 1 normal case with LGE present in all but the normal case. Mean number of slices for the 2D SAX and 3D-WHI were 12 and 115 respectively. There was no difference in mean time taken to interpret 2D SAX and 3D-WHI LGE images (197.9 vs 175.2 seconds, p=0.609). No statistical difference between 2D SAX and 3D-WHI LGE was seen in mean image quality by quantitative analysis (1.5 vs 2.02).

Abstract 159 Table 1 Comparison image quality and reporting times of late gadolinium enhancement by sequence - 2D SAX and 3D Whole Heart Imaging (3D-WHI).

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Number of Slices, mean</th>
<th>&quot;Good&quot; Image quality, n(%)</th>
<th>LGE interpretation time (seconds), mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D</td>
<td>115</td>
<td>9 (60)</td>
<td>197.9</td>
</tr>
<tr>
<td>3D-SAX</td>
<td>12</td>
<td>9 (60)</td>
<td>175.2</td>
</tr>
<tr>
<td>3D-WHI</td>
<td>12</td>
<td>9 (60)</td>
<td>175.2</td>
</tr>
</tbody>
</table>

Abstract 158 Figure 2 Insufficient indication subclassification

Conclusions Promoting the understanding of TTE indications and contraindications amongst clinicians led to reduction of inappropriate referrals. This suggests the overall benefit may be enhanced by implementing a series of questions prior to electronic request submission.

Conflict of Interest None to declare
Abstract 160 Table 1 Demographic and outcome data for patients with cancelled or completed cardiac scans during the first wave of the COVID-19 pandemic

<table>
<thead>
<tr>
<th>Total Scans</th>
<th>Cancelled</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1600</td>
<td>1592</td>
<td>2234</td>
</tr>
<tr>
<td>Patients</td>
<td>Mean Age</td>
<td>%Female</td>
</tr>
<tr>
<td></td>
<td>56.3</td>
<td>41%</td>
</tr>
<tr>
<td>Repeat Scan</td>
<td>Same Modality</td>
<td>Different Modality</td>
</tr>
<tr>
<td>787</td>
<td>701</td>
<td>86</td>
</tr>
<tr>
<td>Dead (n)</td>
<td>ED n (%)</td>
<td>Cardiology n (%)</td>
</tr>
<tr>
<td>41</td>
<td>65(4%)</td>
<td>29(1.8%)</td>
</tr>
<tr>
<td>Death %</td>
<td>2.6%</td>
<td>2.0(0.2%)</td>
</tr>
<tr>
<td>Admitted (n) (%)</td>
<td>400(8%)</td>
<td>300(8%)</td>
</tr>
<tr>
<td>Without scan</td>
<td>60%</td>
<td>60%</td>
</tr>
</tbody>
</table>

Abstract 160 Figure 1 All cause mortality in patients with cancelled or completed outpatient cardiac tests from the time of the first round of cancellations (18/04/2020) at the beginning of the COVID-19 pandemic. Clinically urgent scans, as triaged by expert clinicians, were completed, and others cancelled. Mortality was greater for those with an adverse impact on mortality. 49% of patients underwent subsequent cardiac testing after a cancelled test. We maintained low waiting times throughout the pandemic.

Conflict of Interest None

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Background The first wave of the COVID-19 pandemic required rapid reconfiguration and reallocation of resources. We triaged all cardiac imaging requests from our referral network serving 2.5 million people, to our tertiary centre, performing only clinically urgent studies and cancelling non-urgent studies. Requesters received notification of cancellation in the same format as test reports and were encouraged to repeat their request when pandemic conditions had improved. The impact of this cancellation on patient outcomes is assessed.

Methods Retrospective analysis of routinely collected clinical and administrative data from the institutional data warehouse determined patient outcomes for those with cancelled and performed stress echocardiography, nuclear stress perfusion studies, cardiac CT angiography and cardiac MRI. Mortality data was drawn from the NHS spine. Data analysis was performed using R.

Results 1600 cardiac studies for 1592 patients were cancelled in April 2020, and 2234 cardiac studies were performed for 2184 patients between April and July 2020, representing high-risk outpatient requests. 41 patients who had cancelled scans died, and 105 patients with performed scans died (table 1). Of cancelled scans, 787 patients had a subsequent scan in some modality, of which 701 were the same modality as the original test. 761 patients had no repeat outpatient testing until October 2021. Mortality was higher in patients for whom scans were performed (log-rank p = 0.03, figure 1A). Non-elective admissions were higher in patients who had scans performed (4% in cancelled vs. 8% performed after 574 days of follow-up, log-rank p < 0.001 figure 1B). Over the course of the pandemic, our wait-times for cardiac testing did not exceed the national standard of 16 weeks. Limitations: Data was not collected prospectively, due to the level of emergency; cancellation data may not be complete. All cause mortality under pandemic conditions cannot be extrapolated to non-pandemic situations.

Conclusion Our approach to diagnostic testing in cardiology during the first wave of the COVID-19 pandemic accurately identified and tested high-risk patients without causing harm to those at lower risk, demonstrated by higher admission rates in patients in whom tests were performed, and the absence of an adverse impact on mortality. 49% of patients underwent subsequent cardiac testing after a cancelled test. We maintained low waiting times throughout the pandemic.

Conflict of Interest None