



Editor's choice to the December 2023 issue

Johan HC Reiber¹

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- 1) **Deep learning assisted measurement of echocardiographic left heart parameters: improvement in interobserver variability and workflow efficiency.**
- 2) **Diagnostic performance of quantitative flow ratio in nonST elevation acute coronary syndromes in comparison to nonhyperemic pressure ratios: a prospective study.**
- 3) **CCTA-based CABG SYNTAX Score: a tool to evaluate completeness of coronary segment revascularization after bypass surgery.**

Dear Reader,

For this last issue of the year 2023, I have selected three very interesting papers:

First, a small study on the advantages of applying Deep Learning techniques to echocardiographic sequences, which fits very well in this issue with so many Echo publications and also highlighting the general developments in automating analysis procedures through the applications of Deep Learning (DL). This first paper by Dr V Mor-AVI from the University of Chicago in the team of Prof R Lang, demonstrates the improvement in inter-observer variability and workflow efficiency [1]. This is a small study based on only 12 randomly selected echocardiograms, and the goal was to see how much DL techniques can contribute to the measurement of 20 left heart measurements (Fig. 1). Conventional image interpretation took an average of 12 min, while the DL-assisted image interpretation with automated pre-measurements took an average of 6 min 49 s, that is 57% of the time needed for the conventional interpretation, reflecting average time savings of 43%. Also, this DL-assisted approach resulted in less inter-reader variability than the

conventional methodology: 2–3 times smaller coefficients of variation.

It should be noted, that the successes of DL in general are truly based on the composition of the training sets (should represent a broad coverage of both normals and pathologies), and the quality of the annotations that are used for the trainings. It is also important that the DL-approach should come with a suggestion to the doctor or technician, who should be able to quickly check the qualities of the automations (contouring, e.g.) before accepting the results and store these in the patient files. The work by the team of Prof Lang demonstrates the advantages if everything is done well.

The second paper is by Dr C Lontou and co-authors from the Cardiology Department of the Evaggelismos General Hospital, Athens, Greece with Dr K Triantafyllou as the supervisor, on the diagnostic accuracy of the image-based QFR-approach for the assessment of coronary physiology versus non-hyperaemic pressure ratio's [2]. This was a prospective, single-center study in patients with non-ST elevation acute coronary syndrome (NSTEMI-ACS) including 60 vessels with intermediate coronary stenoses, in which the QFR was compared with other techniques based on non-hyperaemic pressure ratio's (NHPRs, being iFR, DFR or RFR).

The results demonstrated a significant correlation between NHPR and QFR ($r=0.84$) (Fig. 2A). A very high diagnostic accuracy was found between the QFR and the NHPR with an area-under-the-curve (Fig. 2b; $AuC=0.962$) versus an $AuC=0.864$ for the diagnostic accuracy for % diameter-stenosis (Fig. 2C). The authors concluded that due to its high negative predictive value, the QFR can be used to safely avoid unnecessary invasive physiologic assessment of these lesions.

And the third paper was written by Dr N Kotoku and Dr S Kageyama under the supervision of Prof PW Serruys from the Department of Cardiology, the University of Galway in Ireland [3]. In this manuscript the authors describe the updated coronary computed tomographic angiography (CCTA) - based coronary artery bypass graft (CABG) anatomic SYNTAX Score (aSS) and assess its utility and

I wish the Journal a great future under a new leadership.

✉ Johan HC Reiber
hreiber@medisimaging.com

¹ Dept of Radiology, Leiden University Medical Center, Leiden, The Netherlands

Fig. 1 Flow chart of the study design [1]

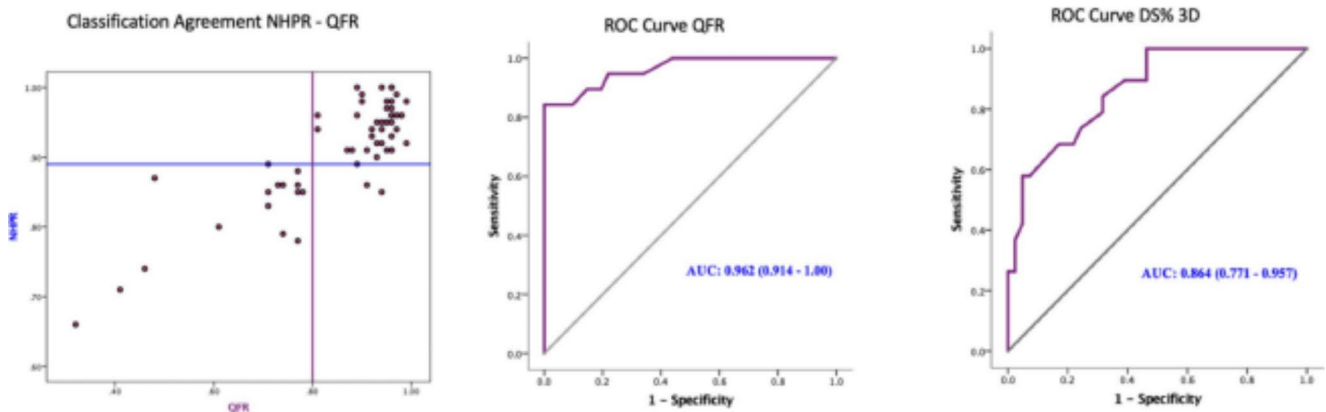
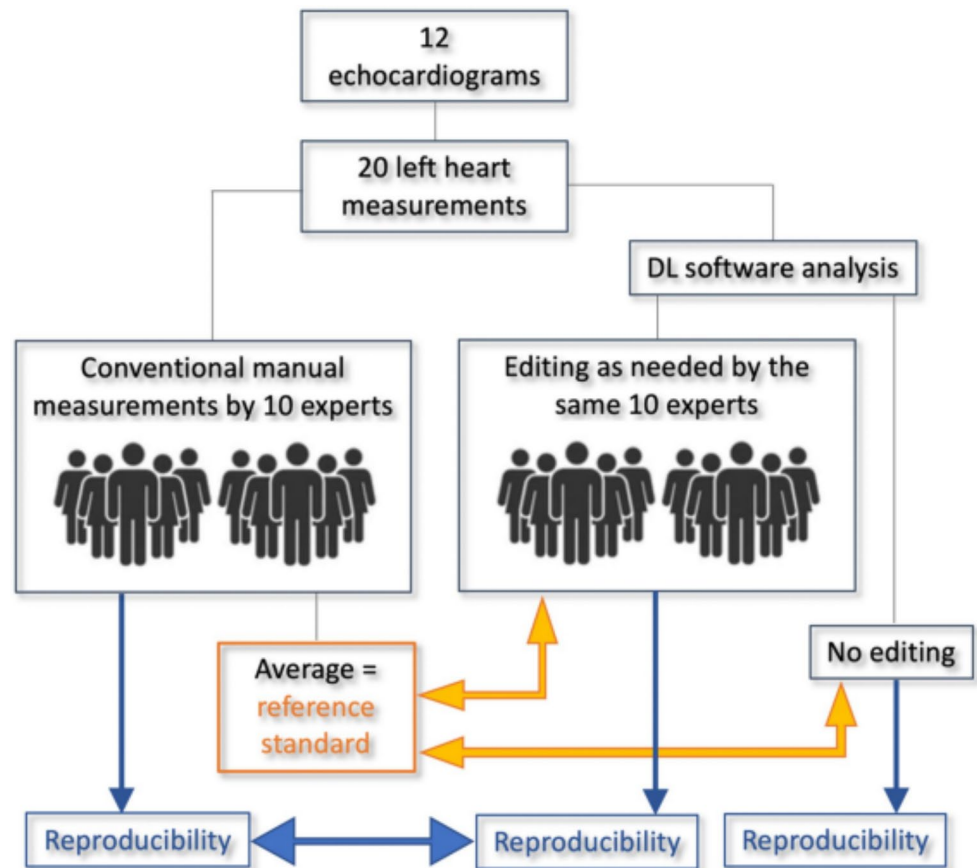


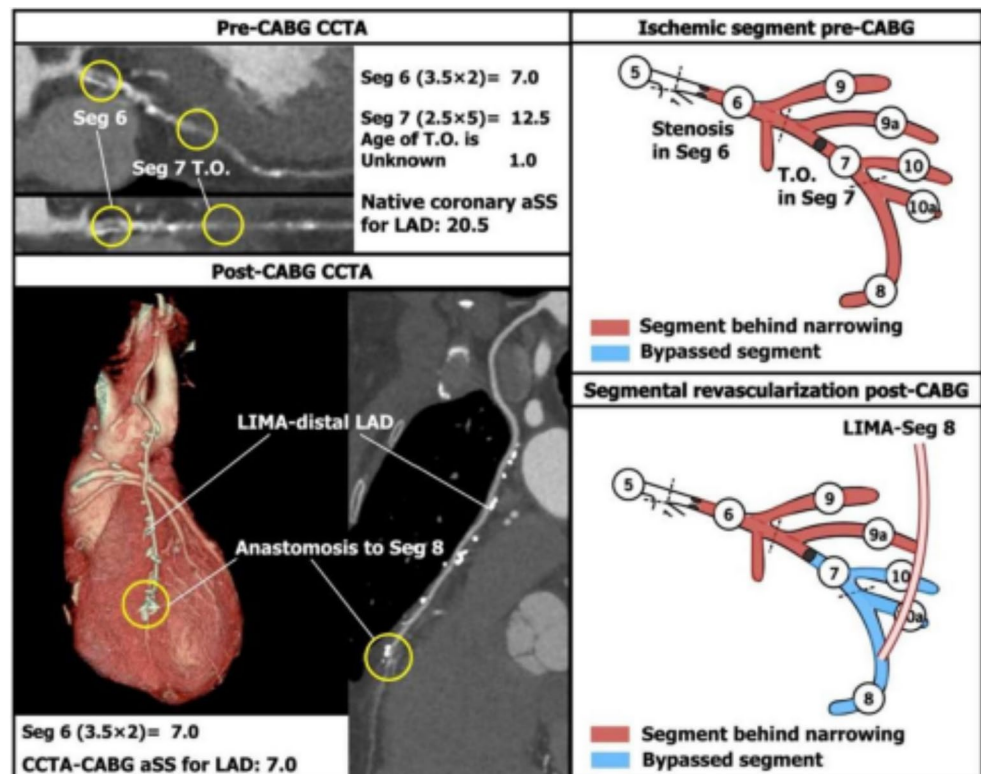
Fig. 2 Correlation and classification agreement between QFR and NHPR (A). Diagnostic performance of QFR in comparison to NHPRs assessed by AUC (B). Diagnostic performance of DS% 3D assessed by AUC (C)

reproducibility for determining the completeness of revascularization after CABG. This CCTA-CABG aSS is a visual assessment procedure using CCTA post-CABG data, which quantifies the failure in effectively grafting stenotic coronary segments, and therefore assesses the completeness of surgical revascularization. It is calculated by subtracting the aSS of successfully anastomosed coronary segments from the aSS of the native coronary tree. The CCTA-CABG aSS was evaluated in 45 consecutive patients with 117 bypass

grafts and 152 anastomoses. A typical example of a case with sequential lesions and a total occlusion is illustrated in Fig. 3.

The authors concluded that the CCTA-CABG aSS was feasible in all patients, who underwent CABG for complex coronary artery disease with substantial inter-observer reproducibility, and therefore can be used to quantify the completeness of revascularization after CABG.

Fig. 3 Example of the points subtracted from the native coronary aSS in a left anterior descending artery (LAD) with sequential lesions. If there were sequential lesions in segment (Seg) 6 and 7, and a bypass graft was anastomosed in the distal LAD, only the aSS of Seg 7 would be subtracted. Abbr.: aSS: anatomical SYNTAX Score; CABG: coronary artery bypass graft; CCTA: coronary computed tomographic angiography; LAD: left artery descending artery; LIMA: left internal mammary artery; T.O.: total occlusion



I do hope that these papers will provoke further debates by the readership after having read the original texts for further details. But as always, there are many very interesting papers in addition to these selected three papers in this issue, and I do hope that you will enjoy reading these!

And this is my last Editor's Choice and I hope that you have enjoyed reading these over the past period, and this is also my last contribution to the International Journal of Cardiovascular Imaging as your Editor-in-Chief. I have served the Journal for a very long time and would like to thank the Publisher, in particular S Fruehwirth and his team, for the confidence in me leading the Journal, and of course like to thank you, the Readership, for your support over so many years. The Journal has grown from a paper-printed journal to an e-journal over the years, its downloads has increased tremendously to a total of 412.111 in 2022. I have always hoped to increase the Impact Factor beyond the 3.0 threshold, but that is now for the next EiC to achieve.

The work as EiC is not possible without the support of excellent Adjunct, Associated Editors and the Editorial Board, and I would like to thank them here personally for their many years of fantastic contributions, and in particular the core of the Associate Editors who have been active often

on a daily / weekly basis (in alphabetical order): Umang Gupta, Francesco Prati, Hernan Mejía-Rentería, Paul Schoenhagen, Arthur Stillman, Johan de Sutter, and Nico RL van de Veire. Finally, it has been a pleasure working with the Associated Societies NASCI and ESCR.

References

- Mor-Avi V, Blitz A, Schreckenber M et al (2023) Deep learning assisted measurement of echocardiographic left heart parameters: improvement in interobserver variability and workflow efficiency. *Int J Cardiovasc Imaging*. <https://doi.org/10.1007/s10554-023-02960-5>
- Liontou C, Kalogera V, Oikonomou D et al (2023) Diagnostic performance of quantitative flow ratio in non-ST elevation acute coronary syndromes in comparison to non-hyperemic pressure ratios: a prospective study. *Int J Cardiovasc Imaging*. <https://doi.org/10.1007/s10554-023-02967-y>
- Kotoku N, Serruys PW, Kageyama S et al (2023) CCTA-based CABG SYNTAX score: a tool to evaluate completeness of coronary segment revascularization after bypass Surgery. *Int J Cardiovasc Imaging*. <https://doi.org/10.1007/s10554-023-02978-9>

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