

Mogu li kompjutorizirana tomografija i magnetna rezonancija srca unaprijediti cjelokupnu sliku?

Can cardiac computed tomography and magnetic resonance imaging improve the whole picture?

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Kompjutorizirana tomografija (CT) i magnetna rezonancija (MR) srca ne koriste se često za procjenu valvularne bolesti, primarno zbog ograničene vremenske i prostorne rezolucije tih metoda u usporedbi s ehokardiografijom. Međutim u pojedinim kliničkim situacijama ove metode mogu biti od koristi u obradi bolesnika s aortnom stenozom (AS). Koristeći CT i MR može se prikazati morfologija i gibanje valvule uz mjerenje površine valvule. Valvularne kalcifikacije moguće je detektirati samo pomoću CT-a, a pri nativnom CT pregledu može se i kvantificirati količina kalcija, pri čemu kalcijski skor aortne valvule ≥ 2065 Agatstonovih jedinica (AJ) u muškaraca i ≥ 1274 AJ u žena ukazuje na tešku AS. CT je standardna pretraga u planiranju TAVR (transkateterska zamjena aortnog zaliska) koja omogućuje precizno mjerenje dimenzija aortnog anulusa i procjenu morfologije aortnog bulbosa, aorte i ilijačnih arterija. Pomoću MR može se odrediti razina stenozе, i procijeniti remodeliranje miokarda uz precizne mjere biventrikularnih volumena, ejectionске frakcije i mase miokarda. Nadalje, koristeći fazno-kontrastni MR moguće je izmjeriti maksimalnu brzinu protoka kroz valvulu s izračunom maksimalnog gradijenta. Brzine izmjerene MR-om su podcijenjene u usporedbi s ehokardiografijom, a veća pogreška mjerenja prisutna je uz brzine veće od 3,5 m/s. Glavna prednost MR-a u usporedbi s ehokardiografijom je mogućnost prikaza valvule u bilo kojoj ravnini. Kod bolesnika s AS koristeći kasno postkontrastno MR snimanje moguće je detektirati zone mezokardne fibroze čije prisustvo je povezano s lošijim ishodom nakon zamjene zaliska, dok se difuznu fibrozu miokarda može detektirati samo novijim MR tehnikama, poput T1-mapiranja i mjerenja ekstracelularnog volumena. MR pregled siguran je u bolesnika s prostetskim valvulama, sternalnim suturama i koronarnim stentovima. Koristeći CT i MR moguće je evaluirati i prisutnost popratne aneurizme ascendentne aorte, no kalcifikate stijenke aorte može se prikazati samo CT-om.¹⁻³

Cardiac computed tomography (CT) and magnetic resonance imaging (MRI) are infrequently used for assessment of valvular diseases, mainly because of limited temporal and spatial resolution of these techniques compared to echocardiography. However, in specific clinical situations they can be of value in assessment of patients with aortic stenosis (AS). Using CT and MRI it is possible to depict valve morphology and motion with measurement of valve opening area. Valve calcifications can be detected using CT only, and on non-enhanced scan the amount of calcium can be quantified, with aortic calcium score ≥ 2065 Agatston units (AU) for men and ≥ 1274 AU for women being indicative of severe AS. CT examination is a standard pre-TAVR (transcatheter aortic valve replacement) procedure that enables precise measurement of aortic annulus, and evaluation of aortic bulb and aortoiliac morphology. Using MRI it is possible to detect the level of stenosis, and to evaluate myocardial remodeling response with precise measurement of biventricular volumes, ejection fraction and myocardial mass. Moreover using phase-contrast MRI it is possible to estimate maximum flow velocity through the valve with calculation of the maximum gradient. MRI-measured velocities are underestimated compared to echocardiography, and higher measurement error is present for velocities higher than 3,5 m/s. The main advantage of MRI over echocardiography is that it enables valve depiction in any plane. In AS patients using late gadolinium enhancement it is possible to detect replacement mid-wall fibrosis that is associated with worse prognosis after valve replacement, whereas diffuse myocardial fibrosis can be estimated using newer MRI techniques, such as T1-mapping and extracellular volume measurement. MRI scan is safe for patients with prosthetic valves, sternal wires and coronary stents. Using CT and MRI it is also possible to evaluate concomitant ascending aortic aneurysm, but aortic wall calcification can be detected using CT only.¹⁻³

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