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CLINICAL RESEARCH

Adverse impact of diabetes mellitus on left ventricular remodelling in patients with chronic primary mitral regurgitation

Impact du diabète sur le remodelage ventriculaire gauche chez les patients atteints d'insuffisance mitrale primitive

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KEYWORDS

Chronic mitral regurgitation;
Volume-overload left ventricular remodelling;
Diabetes mellitus

Summary

Background. — Diabetes mellitus (DM) has an impact on left ventricular (LV) geometry and function, and is associated with worsening of pressure-overload LV remodelling; however, its impact on volume-overload LV remodelling is unknown.

Aim. — The objective of the study was to examine the association between DM and LV remodelling in patients with chronic mitral regurgitation (MR) caused by mitral valve prolapse.

Abbreviations: BMI, body mass index; DM, diabetes mellitus; LV, left ventricle/ventricular; LVEDD, left ventricular end-diastolic diameter; LVEF, left ventricular ejection fraction; LVESD, left ventricular end-systolic diameter; MR, mitral regurgitation.

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Methods. — During a median follow-up of 3.26 [interquartile range 1.59–6.06] years, we evaluated the evolution of echocardiographic variables in 375 consecutive patients, including 61 (16%) patients with DM. The main endpoint was LV remodelling evaluated by LV end-diastolic diameter (LVEDD) and LV mass index increase. LV end-systolic diameter (LVESD) and ejection fraction (LVEF) were also evaluated.

Results. — Patients with DM increased their LVEDD more than patients without DM (1.98 ± 4.1 vs 0.15 ± 4.54 mm/year of follow-up; $P = 0.002$). LVEF remained stable in the two groups. After adjustment for potential confounders, including age, sex, hypertension, body mass index, MR severity, medications and follow-up duration, DM remained independently associated with LVEDD increase ($\beta = 2.30$; $P < 0.001$). When comparing patients with DM with patients without DM matched for age, sex and LVEDD at baseline, DM was independently associated with increased LVEDD ($\beta = 2.14$; $P = 0.002$), LV mass index ($\beta = 10.7$; $P = 0.004$) and LVESD ($\beta = 2.07$; $P = 0.01$).

Conclusion. — DM is associated with worsening of LV remodelling in patients with moderate or severe chronic MR caused by mitral valve prolapse.

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MOTS CLÉS

Insuffisance mitrale chronique ;
Remodelage ventriculaire gauche induit par une surcharge en volume ;
Diabète

Résumé

Contexte. — Le diabète impacte la géométrie et la fonction ventriculaire gauche, et est associé avec une aggravation du remodelage ventriculaire gauche induit par une surcharge en pression. Cependant, son impact sur le remodelage induit par une surcharge en volume reste méconnu.

Objectif. — L'objectif de cette étude était d'évaluer l'association entre diabète et remodelage ventriculaire gauche chez des patients présentant une insuffisance mitrale (IM) chronique due à un prolapsus valvulaire mitral.

Méthodes. — Durant un suivi médian de 3,26 [1,59–6,06] ans, nous avons étudié l'évolution des paramètres échocardiographiques de 375 patients consécutifs incluant 61 (16 %) patients diabétiques. Le critère de jugement principal était le remodelage ventriculaire gauche évalué par l'augmentation du diamètre télédiastolique (DTDVG) et de l'indice de masse ventriculaire gauche (IMVG). L'évolution du diamètre télesystolique (DTSVG) et de la fraction d'éjection du ventricule gauche (FEVG) a également été étudiée.

Résultats. — L'augmentation du DTDVG a été plus importante chez les patients diabétiques par rapport aux non diabétiques ($1,98 \pm 4,1$ vs $0,15 \pm 4,54$ mm/an de suivi ; $p = 0,002$). La FEVG est restée stable dans les deux groupes. Après ajustement pour les potentiels facteurs confondants incluant âge, sexe, hypertension, IMC, sévérité de l'IM, traitement médicamenteux et durée de suivi, le diabète était indépendamment associé à l'augmentation du DTDVG ($\beta = 2,30$; $p < 0,001$). En comparant les patients diabétiques et des patients non-diabétiques appariés en âge, sexe et DTDVG à l'inclusion, le diabète était indépendamment associé à l'augmentation du DTDVG ($\beta = 2,14$; $p = 0,002$), de l'IMVG ($\beta = 10,7$; $p = 0,004$), et du DTSVG ($\beta = 2,07$; $p = 0,01$).

Conclusion. — Le diabète est associé à une aggravation du remodelage ventriculaire gauche chez les patients présentant une IM moyenne/sévère due à un prolapsus valvulaire mitral.

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Background

Diabetes mellitus (DM) has a direct effect on left ventricular (LV) structure, and has an impact on aging and pressure overload-induced LV remodelling [1–4]. Cardiac remodelling over the adult life course is characterized by increasing LV wall thickness, decreasing LV dimensions and increasing fractional shortening with advancing age. The presence of DM modifies this remodelling pattern, with greater age-associated increases in wall thickness and lesser age-related reductions in LV diameters with age [1]. In a pressure-overload murine model using aortic banding, a high-fat

diet induces insulin resistance and adverse LV remodelling with greater hypertrophy [4]. In humans, DM is associated with worsening of the hypertrophic LV remodelling associated with calcified aortic stenosis, including an increased LV mass, larger cavity dimensions and reduced systolic function (assessed by longitudinal systolic strain) [3].

Mitral regurgitation (MR) induces a volume overload of the left ventricle (LV) that leads to compensatory adaptations, including LV remodelling. At an early stage, the chronic compensation of MR is characterized by LV enlargement and eccentric hypertrophy, with preserved apparently normal systolic function. Later, these compensatory

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