Effects of glucagon like peptide-1 receptor agonists and their combination with sodium-glucose cotransporter-2 inhibitors on myocardial deformation and work index in type 2 diabetes: 1 year follow up

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Background/Introduction:

Type-2 diabetes mellitus (T2DM) exacerbates mechanisms of atherosclerosis and heart failure.

Purpose: We investigated the effect of novel antidiabetic drugs, glucagon like peptide-1 receptor agonists (GLP-1RA) and sodium-glucose cotransporter-2 inhibitors (SGLT-2i) and their combination on myocardial function.

Methods: A hundred-sixty T2DM patients (age: 58 ± 10years) were randomized to insulin (n = 40), liraglutide (n = 40), empagliflozin (n = 40) or their combination (GLP-1RA + SGLT-2i) (n = 40) as add-on to metformin. We measured at baseline and 1 year post-treatment: a) global LV longitudinal strain (GLS), systolic (GLSR) and diastolic (GLSR E) strain rate, global circumferential (GCS) and radial (GRS) strain, peak twisting (pTw), peak twisting velocity (pTwVel) and peak untwisting velocity (pUtwVel), b) global myocardial work index (GWI), global constructive (GCW) and global wasted work (GWW) derived by pressure-myocardial strain loops using speckle tracking imaging.

Results: After 1 year of treatment, all patients improved GLS, GCS, GRS and pUtwVel ($p < 0.05$). GLP-1RA or GLP-1RA + SGLT-2i provided a greater increase of GLS (11.5% and 13% vs. 6.8% and 2.3%), GWI (12.7% and 17.4% vs. 3.1% and 2%), GCW (12.3% and 15% vs. 2.2% and 7.8%) and a greater reduction of GWW (38.7% and 41.6% vs. 13.5% and 4.9%) compared with insulin or SGLT-2i, despite a similar HbA1c reduction ($p < 0.05$ for all comparisons) (Table). Patients under combined treatment with GLP-1RA + SGLT-2i achieved a 2-fold reduction of pTw and a 2-fold increase of pUtwVel than those under each one regimen or insulin ($p < 0.05$). The dual therapy showed the greatest effect on measured myocardial markers in LVEF < 55% ($p < 0.05$).

Conclusions: One year treatment with GLP-1RA or combination of GLP-1RA and SGLT-2i resulted in a greater improvement of myocardial deformation and effective cardiac work than insulin or SGLT-2i treatment, independently of glycemic control in T2DM.

		All patients (n = 160)	Insulin (n = 40)	GLP-1RA (n = 40)	SGLT-2i (n = 40)	GLP-1RA + SGLT-2i (n = 40)	p-value
GLS, %	Baseline	-16.4 ± 3.7	-16.4 ± 3.5	-16.2 ± 3.5	-17 ± 4	-16 ± 4	0.139
	1 year	-17.9 ± 3.9	-17.6 ± 4.2	-18.3 ± 3.5	-17.4 ± 3.4	-18.4 ± 4.7	0.003
GWI, mmHg%	Baseline	1538 ± 430	1644 ± 416	1510 ± 403	1536 ± 535	1463 ± 362	0.116
	1 year	1692 ± 412	1696 ± 377	1730 ± 318	1568 ± 456	1772 ± 499	0.006
pTw, deg	Baseline	15.7 ± 6	16 ± 5.1	15.6 ± 5	15.2 ± 6	16.1 ± 8	0.910
	1 year	14.6 ± 5.1	15.4 ± 5.4	14.4 ± 5.4	14.7 ± 4.6	14 ± 5	0.034
pUtwVel, deg/s	Baseline	-104 ± 42	-100 ± 44	-107 ± 41	-101 ± 28	-111 ± 54	0.550
	1 year	-116 ± 49	-107 ± 55	-114 ± 45	-108 ± 38	-134 ± 61	0.017

Table