

## More than the eye can see: Left ventricular global longitudinal strain assessment in a patient with takotsubo cardiomyopathy within a 9-month follow-up

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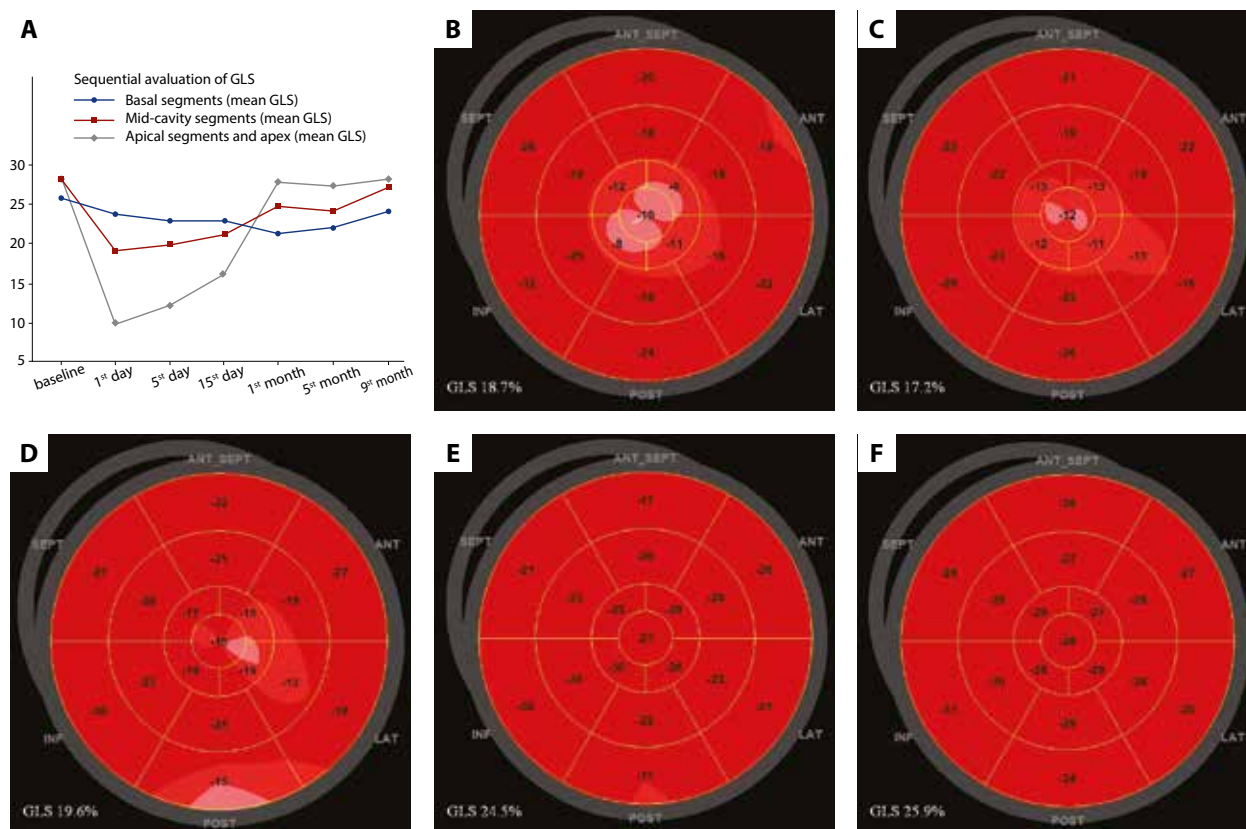
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Takotsubo cardiomyopathy (TTC) is a cardiac condition characterized by acute but reversible left ventricular (LV) dysfunction in the absence of obstructive coronary artery disease [1–3]. Two-dimensional (2D) speckle-tracking echocardiography (STE) is a useful method for evaluating global and regional left ventricular function and is consistently more sensitive than conventional echocardiography in detecting minor myocardial abnormalities [1]. The utility of STE in TTC patients has been described in a few short-term reports [1–4], however, there is limited understanding around the time course of functional recovery in TTC patients [1]. In this article, we present a case of a 30-year-old female with a sequential evaluation of global longitudinal strain (GLS) during a 9-month follow-up.

The patient with a history of supraventricular tachycardia was admitted to the hospital with chest pain radiating to the left arm. An electrocardiogram showed sinus rhythm with T wave inversion and QT prolongation. High-sensitivity troponin T and the concentration of N-terminal brain natriuretic propeptide were moderately elevated. Transthoracic echocardiography (TTE) revealed hypokinesis/akinesis of new apical segments and the apex. Compared to a routine TTE performed 4 months before the admission to the hospital, LV ejection fraction (LVEF) decreased from 70% to 50%. 2D STE analysis showed a severe decline in longitudinal strain (LS) within all apical segments and the apex, as well as a mild decline within mid-cavity segments, with reduced GLS from 26.9% to 18.7% (Figure 1A–B). Coronary angiography showed no abnormalities. Based on the patient's clinical features, along with electrocardiogram and echocardiographic

abnormalities in the absence of coronary lesions, a typical apical ballooning TTC was diagnosed. The patient was treated with zofenopril, propranolol, spironolactone, and atorvastatin for 9 months. Subsequent control TTEs were performed on the 5<sup>th</sup> and 15<sup>th</sup> day of hospitalization (Figure 1C and D), as well as at 5 (Figure 1E), and 9 months after admission to the hospital (Figure 1F) revealing progressive improvement to LV contractile function. LVEF returned to the normal range of 70% within 5 months (Supplementary material, *Video S1*) and a GLS of 25.9% within 9 months. Interestingly, the control 2D STE assessment revealed that although LS in apical segments had been impaired for just a short time (LS drop from 28.2% to 10%), mid-cavity and basal segments were also affected — however to a lesser extent, but for a prolonged duration (LS drop from 28% to 19.2% and from 25.7% to 21.2%, respectively) (Figure 1A). Not all changes were easily noticeable in conventional 2D echocardiography and suggest a slow, gradually spreading process.

In our report, we describe a case of TTC with changing LV systolic function assessed by LVEF and GLS throughout the acute and subacute phases (lasting approximately 1 month) and gradual recovery to baseline over the following 8 months. Our report is consistent with other studies reporting the presence of subtle LV dysfunction, even after the normalization of LVEF [1, 3]. To our knowledge, this is the first case reported in the literature showing the long-term sequential evaluation of GLS in a TTC patient. Further analysis of correlation of segmental myocardial deformation using strain-encoded cardiac magnetic resonance imaging (SENC) and STE could be useful [5].



**Figure 1.** GLS assessment. **A.** Sequential evaluation of GLS from baseline (4 months before diagnosis of TTC) through and during 9 months follow-up. **B.** The day of hospital admission — severe segmental decline in longitudinal strain within all apical segments and apex, with the concomitant mild decline within mid-cavity segments. **C.** 5<sup>th</sup> day of hospitalization — a progressive segmental decline of longitudinal strain within mid-cavity and basal segments of the inferolateral wall with a slight improvement in all apical segments and apex. **D.** 15<sup>th</sup> day of hospitalization — improvement in longitudinal strain within the apical segments, apex, and mid-cavity segments, excluding mid-cavity segments of the anterolateral and inferolateral wall. **E.** 5 months after hospital admission — continuous slight improvement in longitudinal strain within all previously impaired segments. **F.** 9 months after admission to the hospital — full improvement in longitudinal strain within all segments compared to baseline

Abbreviations: GLS, global longitudinal strain; TTC, takotsubo cardiomyopathy

### Supplementary material

Supplementary material is available at [https://journals.viamedica.pl/kardiologia\\_polska](https://journals.viamedica.pl/kardiologia_polska).

### Article information

**Conflict of interest:** None declared.

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