Passive external cardiac constraint improves segmental left ventricular wall motion and reduces akinetic area in patients with non-ischemic dilated cardiomyopathy


Objective
To verify changes in left ventricular (LV) volumes and regional myocardial wall motion after implantation of a textile cardiac support device (CSD) for passive external constraint in non-ischemic dilated cardiomyopathy.

Methods
In nine male patients participating in a non-randomized clinical trial LV volumes were determined and the segmental LV wall motion was studied by contrast-enhanced electron-beam CT in a sectionwise manner at three ventricular levels (base and middle and apex of ventricle) before and 32 ± 6 months after CSD implantation. In 16 myocardial segments ejection fraction and wall thickening were measured semiautomatically after drawing the myocardial contours. The wall motion score index was calculated based on semiquantitative visual grading in each segment.

Results
The global LV volumes decreased significantly from 304.3 ± 90.9 to 231.5 ± 103.9 ml end-diastole and from 239.7 ± 83.7 to 164.0 ± 97.7 at end-systole (P < 0.05). Overall ejection fraction increased from 14.8 ± 8.2 to 25.7 ± 17.1% (P< 0.05). A segment-by-segment analysis demonstrated a significant increase of regional ejection fraction in the basal myocardium as well as in the mid-inferior, mid-inferolateral, and mid-anterolateral myocardium. Overall wall thickening increased from 16.4 ± 13.3 to 24.2 ± 18.1% (p< 0.05), but without significant differences in a segment-by-segment comparison. The mean wall motion score index improved from 2.70 ± 0.26 to 2.20 ± 0.71 (p< 0.05), with an increased wall motion in eight (89%) patients. A section-by-section analysis demonstrated significantly improved wall motion in the inferior and lateral segments at each ventricular level. Postoperatively, the number of akinetic and markedly hypokinetic segments decreased significantly (p< 0.05) from 56 (39%) to 26 (18%) and from 76 (53%) to 56 (37%), respectively.

Conclusion
CSD implantation improves segmental wall motion, predominantly in the inferior and lateral myocardium, and reduces the number of akinetic and hypokinetic segments.

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