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(54) **MINIMALLY INVASIVE ANNULOPLASTY PROCEDURE AND APPARATUS**

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(57) **ABSTRACT**

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Clips of a self-closing type are used in annuloplasty procedures. Each clip is generally U-shaped with two end points separated from each other when it is constrained to be in an open configuration, but tends to coil up to assume its naturally closed configuration if the constraint is removed. A plurality of such clips in open configurations penetrate the tissue around the annulus circumferentially and then the constraint keeping them in the open configuration is removed such that they pull the tissue together between their two end points and this tends to reduce the diameter of the annulus. Such clips may be deployed each in the form of a clip assembly, having at least one of its end points connected to a needle through a flexible member and a release mechanism by which the clip can be easily released. The needle is caused to penetrate the tissue at one position and to come out therefrom at another circumferentially separated positions. Alternatively, a clip delivery device may be used with a plurality of such clips loaded to a clip-holder serving to keep them in open configurations. A pusher pushes the loaded clips out of the device one at a time. Self-closing clips can be used efficiently also in ring annuloplasty and valve replacement procedures.

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