

easily position the docking or anchoring devices around the native valve leaflets and the chordae tendineae.

[0011] In an embodiment of the invention, a system for replacing a native mitral valve of a heart comprises a prosthetic mitral valve including an expandable frame and housing a plurality of leaflets for controlling blood flow therethrough, wherein the frame is expandable from a collapsed first position wherein the frame has a first outer diameter for delivery of the prosthetic mitral valve through a catheter to an expanded second position wherein the frame has a second outer diameter greater than the first outer diameter, wherein the frame includes bottom corners, and the prosthetic mitral valve further comprises a protective cuff that includes two different materials and surrounds the bottom corners of the frame. The system also comprises a coiled anchor for docking the prosthetic mitral valve at a native mitral valve of the heart. The coiled anchor has a first end, a second end, and a central axis extending between the first and second ends, and defines an inner space coaxial with the central axis. The coiled anchor includes a coiled core including a bio-compatible metal or metal alloy and having a plurality of turns extending around the central axis in a first position, and a cover layer around the core, the cover layer including a bio-compatible material that is less rigid than the metal or metal alloy of the coiled core. The coiled anchor is adjustable from the first position to a second position wherein at least one of the plurality of turns is straightened for the coiled anchor to be delivered through a catheter to the native mitral valve, and from the second position back to the first position. The coiled anchor is implantable at the native mitral valve with at least a portion on one side of the native mitral valve in a left atrium of the heart and at least a portion on an opposite side of the native mitral valve in a left ventricle of the heart, to support or hold the prosthetic mitral valve in the inner space when the coiled anchor is implanted at the native mitral valve.

[0012] There is also disclosed that the frame is expandable from a collapsed first position wherein the frame has a first outer diameter for delivery of the prosthetic mitral valve through a catheter to an expanded second position wherein the frame has a second outer diameter greater than the first outer diameter. When the coiled anchor and the prosthetic mitral valve are unbiased, a smallest inner diameter of the inner space

defined by the coil anchor can be smaller than the second outer diameter of the prosthetic mitral valve.

[0013] There is also disclosed a coiled anchor for docking a mitral valve prosthesis at a native mitral valve of a heart has a first end, a second end, and a central axis extending between the first and second ends, and defines an inner space coaxial with the central axis. The coiled anchor includes a first coil having a plurality of turns in a first circumferential direction and extending from a first end to a second end, a second coil having a plurality of turns in a second circumferential direction opposite to the first circumferential direction and extending from a first end to a second end, and a joint configured to hold the first end of the first coil and the first end of the second coil together, such that the first and second coils each extends away from the joint and from one another along the central axis. The coiled anchor has a first position where the respective turns of the first coil and the second coil each extends around the central axis. The coiled anchor is adjustable from the first position to a second position wherein at least one of the plurality of turns of the first coil or the second coil is straightened for the coiled anchor to be delivered through a catheter to the native mitral valve, and from the second position back to the first position. The coiled anchor is implantable at the native mitral valve with at least a portion of the first coil on one side of the native mitral valve in a left atrium of the heart, and at least a portion of the second coil on an opposite side of the native mitral valve in a left ventricle of the heart, to support or hold the mitral valve prosthesis in the inner space when the coiled anchor is implanted at the native mitral valve.

[0014] There is also disclosed a method for delivering a coiled anchor that is configured to dock a mitral valve prosthesis at a native mitral valve of a heart includes positioning a catheter for delivery of the coiled anchor at the native mitral valve, positioning a loop around chordae tendineae, closing the loop to draw the chordae

WHAT IS CLAIMED IS:

1. A system for replacing a native mitral valve of a heart comprising:
 - a prosthetic mitral valve comprising an expandable frame and housing a plurality of leaflets for controlling blood flow therethrough, wherein the frame is expandable from a collapsed first position wherein the frame has a first outer diameter for delivery of the prosthetic mitral valve through a catheter to an expanded second position wherein the frame has a second outer diameter greater than the first outer diameter, wherein the frame includes bottom corners, and the prosthetic mitral valve further comprises a protective cuff that includes two different materials and surrounds the bottom corners of the frame;
 - a coiled anchor for docking the prosthetic mitral valve at the native mitral valve of the heart and having a first end, a second end, a central axis extending between the first and second ends, and defining an inner space coaxial with the central axis, the coiled anchor comprising:
 - a coiled core comprising a bio-compatible metal or metal alloy and having a plurality of turns extending around the central axis in a first position; and
 - a cover layer around the core, the cover layer comprising a bio-compatible material that is less rigid than the metal or metal alloy of the coiled core;
 - wherein the coiled anchor is adjustable from the first position to a second position wherein at least one of the plurality of turns is straightened for the coiled anchor to be delivered through a catheter to the native mitral valve, and from the second position back to the first position;
 - wherein the coiled anchor is implantable at the native mitral valve with at least a portion on one side of the native mitral valve in a left atrium of the heart and at least a

portion on an opposite side of the native mitral valve in a left ventricle of the heart, to support or hold the prosthetic mitral valve in the inner space when the coiled anchor is implanted at the native mitral valve.

2. The system of claim 1, wherein the cover layer comprises a fabric layer.
3. The system of claim 1 or 2, wherein the cover layer comprises a foam layer.

4. The system of one of claims 1 to 3, wherein the cover layer comprises a fabric layer surrounding a foam layer.
5. The system of one of claims 1 to 4, wherein the coiled core comprises a shape memory material.
6. The system of any one of claims 1 to 5,
wherein when the coiled anchor and the prosthetic mitral valve are unbiased, a smallest inner diameter of the inner space defined by the coil anchor is smaller than the second outer diameter of the prosthetic mitral valve.
7. The system of any one of claims 1 to 6, wherein when the prosthetic mitral valve is held in the inner space of the coiled anchor, respective portions of the coiled anchor and the frame in contact with one another are restricted from expanding to the second outer diameter.
8. The system of claim 7, wherein a frictional force is generated between the contact between the cover layer of the coiled anchor and the frame of the prosthetic mitral valve, to restrict circumferential motion between the coiled anchor and

the prosthetic mitral valve, such that circumferential unwinding of the coiled anchor and radial expansion of the inner space of the coiled anchor is restricted.

9. The system of claim 7 or 8, wherein a portion of the frame that does not contact with the coiled anchor is configured to expand radially outwardly to a diameter that is greater than the smallest inner diameter of the coiled anchor and smaller than the second outer diameter of the frame of the prosthetic mitral valve.

10. The system of one of claims 7 to 9, wherein the frame of the prosthetic mitral valve has a first end and a second end, and wherein the protective cuff surrounds at least a portion of the second end of the prosthetic mitral valve that is positioned farthest away from the first end of the prosthetic mitral valve.

11. The system of any one of claims 1 to 10, wherein the protective cuff comprises at least one of a foam layer or a fabric layer.

12. The system of one of claims 1 to 10, wherein the protective cuff comprises a first fabric material surrounding a second material different from the first fabric material.

13. The system of one of claims 1 to 10, wherein the protective cuff comprises two layers.

14. The system of one of claims 1 to 13, wherein the coiled anchor includes a first coil and a second coil connected to each other with a joint.