

[0019] In addition, it is desirable to provide devices and methods that can be utilized in a variety of implantation approaches. Depending on a particular patient's anatomy and clinical situation, a medical professional may wish to make a determination regarding the optimal method of implantation, such as inserting a replacement valve directly into the heart in an open procedure (open heart surgery or a minimally invasive surgery) or inserting a replacement valve from veins and via arteries in a closed procedure (such as a catheter-based implantation). It is preferable to allow a medical professional a plurality of implantation options to choose from. For example, a medical professional may wish to insert a replacement valve either from the ventricle or from the atrial side of the mitral valve.

[0020] Therefore, the present invention provides devices and methods that address these and other challenges in the art.

Summary

[0021] In one illustrative embodiment, a system for docking a heart valve prosthesis is provided and includes a helical anchor formed as multiple coils adapted to support a heart valve prosthesis with a first end coil portion positioned above a heart valve annulus and a second end coil portion positioned below the heart valve annulus, wherein a middle coil portion has a diameter smaller than a diameter of the first end coil portion and a diameter of the second end coil portion and a seal coupled with the helical anchor. A first coil of the multiple coils normally at a first diameter is expandable to a second, larger diameter upon application of radial outward force from within the helical anchor, and a second coil is movable from a larger diameter to a smaller diameter as the first coil expands from the first diameter to the second diameter. The seal includes portions extending between adjacent coils for preventing blood leakage through the helical anchor and past the heart valve prosthesis. The system can further include a heart valve prosthesis capable of being delivered to a native heart valve position of a patient and expanded inside the multiple coils and into engagement with leaflets of the heart valve. The seal is engaged with both the helical anchor and the heart valve prosthesis. The coils of the helical anchor may be formed of a superelastic or a shape memory

material, or other suitable material. The seal may be a membrane or panel extending over at least two coils of the helical anchor. The membrane or panel is moved between an undeployed state and a deployed state, the undeployed state being adapted for delivery to a site of implantation and the deployed state being adapted for implanting the system and anchoring the heart valve prosthesis. The undeployed state may be a rolled up state on one of the coils of the helical anchor or any other collapsed state. The membrane or panel may include a support element affixed therewith, such as an internal, spring-biased wire. The seal may further include one or more seal elements carried by

What is claimed is:

1. A system for docking a heart valve prosthesis, comprising:

a helical anchor formed as multiple coils adapted to support a heart valve prosthesis with a first end coil portion positioned above a heart valve annulus and a second end coil portion positioned below the heart valve annulus, wherein a middle coil portion has a diameter smaller than a diameter of the first end coil portion and a diameter of the second end coil portion, and wherein a first coil of the multiple coils normally at a first diameter is expandable to a second, larger diameter upon application of radial outward force from within the helical anchor, and a second coil is movable from a larger diameter to a smaller diameter as the first coil expands from the first diameter to the second diameter; and

a seal coupled with the helical anchor and including portions extending between adjacent coils for preventing blood leakage through the helical anchor and past the heart valve prosthesis.

2. The system of claim 1, further comprising:

a heart valve prosthesis capable of being delivered to the heart valve position of a patient and expanded inside the multiple coils and into engagement with leaflets of the heart valve, the seal engaged with both the helical anchor and the heart valve prosthesis.

3. The system of claim 1, wherein the helical anchor further comprises a shape memory material.

4. The system of claim 1, wherein the seal further comprises a membrane or panel extending over at least two coils of the helical anchor.

5. The system of claim 4, wherein the membrane or panel is moved between an undeployed state and a deployed state, the undeployed state being adapted for delivery to a site of implantation and the deployed state being adapted for implanting the system and anchoring the heart valve prosthesis.

6. The system of claim 5, wherein the undeployed state comprises a rolled up state on one of the coils of the helical anchor.
7. The system of claim 5, wherein the undeployed state comprises a collapsed state.
8. The system of claim 4, wherein the membrane or panel includes a support element affixed therewith.