

having sufficient flexibility so that it can pass through tortuous anatomy without sacrificing rigidity of the catheter shaft. However, delivery catheters can be too stiff and be difficult to push through the vasculature. Hence, there is a need for delivery catheters with enhanced flexibility.

SUMMARY

[005] This summary is meant to provide some examples and is not intended to be limiting of the scope of the invention in any way. For example, any feature included in an example of this summary is not required by the claims, unless the claims explicitly recite the features. Also, the features, components, steps, concepts, etc. described in examples in this summary and elsewhere in this disclosure can be combined in a variety of ways. Various features and steps as described elsewhere in this disclosure may be included in the examples summarized here.

[006] Disclosed herein are steerable catheter devices and related methods, which can be used to deliver a medical device, tools, agents, or other therapy to a location within a body of a subject. In some implementations, the steerable catheter devices can be used to deliver a medical device through the vasculature, such as to a heart of the subject.

[006a] An aspect of the present disclosure provides a catheter assembly including a shaft and a connector assembly comprising a first connector portion and a second connector portion, wherein the first connector portion is fixedly coupled to a distal end of the shaft, and is rotatably coupled to the second connector portion by at least one radially extending pin retained within at least one slot on the second connector portion or on the first connector portion, wherein the at least one slot has a circumferential length larger than a maximum cross-sectional dimension of the pin so as to allow limited rotation of the second connector portion relative to the first connector portion about a longitudinal axis of the shaft. The at least one slot is sized to allow limited tilting of the second connector portion with respect to the longitudinal axis of the shaft.

[006b] Another aspect of the present disclosure provides an assembly comprising an outer sheath and a catheter assembly of the first aspect, wherein the shaft is a first shaft extending through the outer sheath and the second connector portion comprises one or more attachment features: a second shaft extending through the first shaft, a nose cone mounted on a distal end portion of the second shaft, and a radially expandable and compressible prosthetic heart valve

retained in a radially compressed state within the outer sheath and having one or more retaining arms that engage respective attachment features of the second connector portion.

[007] Certain embodiments of the disclosure concern a catheter assembly that includes a shaft and a connector assembly. The connector assembly can include a first connector portion and a second connector portion. The first connector portion can be fixedly coupled to a distal end of the shaft, and is rotatably coupled to the second connector portion by at least one radially extending pin retained within at least one slot on the second connector portion. The at least one slot can have an oversized circumferential dimension that allows limited rotation of the second connector portion relative to the first connector portion about a longitudinal axis of the shaft.

[008] In some embodiments, the at least one slot can be sized to allow limited tilting of the second connector portion with respect to the longitudinal axis of the shaft.

[009] In some embodiments, the at least one slot can have an oversized width in a direction along the longitudinal axis that allows limited axial movement of the first connector portion relative to the second connector portion.

What is claimed is:

1. A catheter assembly, comprising:
a shaft; and
a connector assembly comprising a first connector portion and a second connector portion, wherein the first connector portion is fixedly coupled to a distal end of the shaft, and is rotatably coupled to the second connector portion by at least one radially extending pin retained within at least one slot on the second connector portion or on the first connector portion, wherein the at least one slot has a circumferential length larger than a maximum cross-sectional dimension of the pin so as to allow limited rotation of the second connector portion relative to the first connector portion about a longitudinal axis of the shaft;
wherein the at least one slot is sized to allow limited tilting of the second connector portion with respect to the longitudinal axis of the shaft.
2. The catheter assembly of claim 1, wherein the at least one slot has an oversized width relative to the maximum cross-sectional dimension of the pin in a direction along the longitudinal axis that allows limited axial movement of the first connector portion relative to the second connector portion.
3. The catheter assembly of claim 1 or 2, wherein the at least one slot comprises first and second slots and the at least one pin comprises first and second pins disposed in the first and second slots, respectively.
4. The catheter assembly of claim 3, wherein each slot has an arc length around the longitudinal axis of less than 180 degrees.
5. The catheter assembly of any preceding claim, wherein the first connector portion comprises a distal end portion that extends into an axial bore of the second connector portion, and the at least one pin extends radially outwardly from the distal end portion into the at least one slot in the second connector portion.

6. The catheter assembly of any preceding claim, wherein the second connector portion comprises one or more attachment features configured to form a releasable attachment with corresponding retaining arms of an implantable medical device.

7. The catheter assembly of claim 6, wherein the one or more attachment features comprise one or more recesses configured to receive the one or more retaining arms of the implantable medical device.

8. The catheter assembly of claim 6 or 7, further comprising an outer sheath configured to extend over the connector assembly and the implantable medical device so as to retain the implantable medical device in a radially compressed state within the outer sheath when the retaining arms are in engagement with the attachment features of the second connector portion.

9. The catheter assembly of any preceding claim, further comprising another shaft having a proximal end connected to the second connector portion.

10. The catheter assembly of claim 3, wherein the first slot is opposite the second slot with respect to the longitudinal axis.

11. An assembly, comprising:
an outer sheath;
a catheter assembly of any preceding claim, wherein the shaft is a first shaft extending through the outer sheath and the second connector portion comprises one or more attachment features;
a second shaft extending through the first shaft;
a nose cone mounted on a distal end portion of the second shaft; and
a radially expandable and compressible prosthetic heart valve retained in a radially compressed state within the outer sheath and having one or more retaining arms that engage respective attachment features of the second connector portion.

12. The assembly of claim 11, wherein the first connector portion is a proximal connector portion and the second connector portion is a distal connector portion.