

WHAT IS CLAIMED IS:

1. A sheath comprising:

at least one stiff wall portion having a stiff wall radial thickness and extending generally parallel to and partially around an elongate axis of the sheath and defining at least two edges, the two edges extending generally axially and between an inner surface and outer surface of the stiff wall portion; and

at least one elastic wall portion having an elastic wall radial thickness equal to the stiff wall radial thickness and extending generally parallel to and partially around the elongate axis, the elastic wall portion extending between the edges of the stiff wall portion so as to define an expandable tubular layer with a consistent radial thickness;

wherein the expandable tubular layer has a starting profile and defines a lumen and wherein the expandable tubular layer is configured to temporarily expand at least at the elastic wall portion to allow passage of an implant through the lumen and then return to approximate the starting profile after passage of the implant through the lumen;

wherein the sheath further comprises an elastic outer tubular layer extending around the expandable tubular layer, and an intermediate tubular layer comprising a plurality of braided fibers and extending between the expandable tubular layer and the outer tubular layer; and

wherein the stiff and elastic wall portions are arc segments of the expandable tubular layer.

2. The sheath of claim 1, wherein the at least one stiff wall portion includes a plurality of stiff wall portions and the at least one elastic wall portion includes a plurality of elastic wall portions.

3. The sheath of claim 1 or 2, wherein the stiff and elastic wall portions alternate extending around the elongate axis.

4. The sheath of any one of the above claims, wherein the braided fibers form an expandable mesh and wherein the elastic outer tubular layer is laminated onto the intermediate tubular layer.

5. The sheath of any one of the above claims, further comprising a low friction tubular layer coating the inner surface of the expandable tubular layer.

6. The sheath of any one of the above claims, wherein the two edges of each of the stiff wall portions extend parallel to the elongate axis.

7. The sheath of claim 1, wherein the elastic wall portion is 45 degrees to 90 degrees of an axial cross-section of the expandable tubular layer.

8. The sheath of claim 7, further comprising at least one elongate rod coupled to an inner surface of the elastic wall portion and extending generally parallel to the elongate axis.

9. The sheath of claim 7 or 8, wherein the stiff wall portion and the elongate rod have a lubricious inner surface configured to facilitate passage of the implant thereover.

10. The sheath of any one of claims 7-9, wherein the elastic wall portion is part of an outer elastic tubular layer and the stiff wall portion is embedded in the outer elastic tubular layer.

11. The sheath of any one of claims 7-10, wherein the lumen of the expandable tubular layer has a larger radius where defined by the elastic wall portion than where defined by the stiff wall portion.

12. The sheath of any one of claims 7-11, further comprising a plurality of elongate rods coupled to an inner surface of the elastic wall portion and the inner surface of the stiff wall portion, the elongate rods extending generally parallel to the elongate axis and inward into the lumen.

13. The sheath of any one of claims 7-12, wherein the elongate rods are spaced circumferentially apart around the lumen of the expandable tubular layer.

14. A sheath comprising:

an elastic tubular layer; and

at least one stiff wall embedded in the elastic tubular layer wherein a proximal portion of the stiff wall defines at least one first longitudinally extending gap and wherein a distal portion defines at least one second longitudinally extending gap, wherein a cumulative circumferential size of the at least one first longitudinally extending gap is smaller than a cumulative circumferential size of the at least one second longitudinally extending gap;

wherein the sheath has a starting profile and defines a lumen and wherein the sheath is configured to temporarily expand at the at least one first longitudinal gap and the at least one second longitudinal gap to allow passage of an implant through the lumen and then return to approximate the starting profile after passage of the implant through the lumen.

15. The sheath of claim 14, wherein the at least one second longitudinally extending gap extends from a distal end of the at least one first longitudinally extending gap.

16. The sheath of claims 14 or 15, wherein the at least one second longitudinally extending gap includes at least twice as many second longitudinally extending gaps as the at least one first longitudinally extending gap.

17. The sheath of any one of claims 14-16, wherein a distal end of each first longitudinally extending gap extends to a proximal end of a corresponding second longitudinally extending gap.

18. The sheath of any one of claims 14-17, wherein the at least one second longitudinally extending gap includes six second longitudinally extending gaps.

19. The sheath of any one of claims 14-18, wherein the at least one second longitudinally extending gap has at least a portion having a progressively, distally increasing cumulative circumferential size.

20. The sheath of any one of claims 14-19, wherein the at least one second longitudinal gap includes a plurality of second longitudinal gaps extending linearly and defining a plurality of stiff wall fingers.