compressed condition/folded configuration wherein the thin wall portion folds onto an outer surface of the thick wall portion under urging of the elastic outer tubular layer. When the implant passes therethrough, the outer tubular layer stretches and the inner tubular layer at least partially unfolds into an expanded lumen diameter to accommodate the diameter of the implant. Once the implant passes, the outer tubular layer again urges the inner tubular layer into the folded configuration with the sheath reassuming its smaller profile. In addition to a reduced initial profile size, the integral construction of the inner tubular layer guards against the leaks and snags of prior art split-tube and uniform thickness liner combinations. The sheath may also include selectively placed longitudinal rods that mediate friction between the inner and outer tubular layers to facilitate easy expansion and collapse, thereby reducing the push force needed to advance the oversized implant through the sheath's lumen.

[0010] Embodiments include a sheath for delivery of an implant mounted on a catheter. The sheath may include an elastic outer tubular layer and an inner tubular layer. The outer tubular layer defines a circumferentially continuous initial elastic lumen extending axially therethrough and having an initial diameter. The outer tubular layer includes at least one longitudinal rod coupled to and extending from an inner surface of the outer tubular layer and into the initial elastic lumen. The inner tubular layer has a thick wall portion integrally connected to a thin wall portion – such as by co-extrusion during manufacture. The thick wall portion has a C-shaped cross section with a first longitudinally extending end and a second longitudinally extending end. The thin wall portion extends between the first and second longitudinally extending ends to define an expanded lumen extending axially through the inner tubular layer. The expanded lumen has an expanded diameter larger than the initial diameter of the initial elastic lumen. The inner tubular layer, in a compressed condition, extends through the initial elastic lumen of the elastic outer tubular layer with the elastic outer tubular layer urging the first longitudinally extending end of the inner tubular layer under the second longitudinally extending end of the inner tubular layer. The inner tubular layer in a locally expanded condition has the first and second longitudinally extending ends radially expanded apart, against the urging of the elastic outer tubular layer by passage of the implant, into a non-overlapping or a less overlapping condition with the thin wall portion extending therebetween to form the expanded lumen. The inner tubular layer is

configured to be urged by the outer elastic tubular layer into the compressed condition after passage of the implant through the expanded lumen. The at least one longitudinal rod spaces the inner tubular layer from the outer tubular layer and provides a bearing surface to facilitate relative movement between the inner tubular layer and the outer tubular layer when moving between the locally expanded condition and the compressed condition.

[0011] In another aspect, the outer surface of the inner tubular layer and/or the inner surface of the outer tubular layer can have a lubricious coating configured to allow free relative sliding of the outer elastic layer and inner tubular layer. A longitudinally extending portion or strip of the outer surface of the inner tubular layer can be adhered to a corresponding longitudinally extending portion of the inner surface of the outer tubular layer to provide some restriction on rotation between the inner and outer layer.

[0012] In another embodiment, the tubular layers may include a plurality of longitudinal rods coupled to their surfaces. For example, the inner surface of the outer tubular layer may include rods extending into the initial elastic lumen. The rods are configured to provide a bearing surface to facilitate relative movement of the layers when moving from the locally expanded condition to the compressed condition (and back). Longitudinal rods embedded within the elastic outer tubular layer can also protrude from both an inner and outer surface of the elastic outer tubular layer.

[0013] The longitudinal rods may be circumferentially spaced about the inner surface of the outer tubular layer. The inner tubular layer may also include contact-area reducing rods coupled to its inner surface.

[0014] In another aspect, the sheath can include a radiopaque tubular layer extending around a longitudinal portion of the elastic outer tubular layer. In some embodiments, the outer tubular layer is comprised of a transparent material

[0015] In some embodiments, a heat-shrink tube can be applied around the elastic outer tubular layer at a distal end of the elastic outer tubular layer.

[0016] In some embodiments, a distal portion of the elastic outer tubular layer and inner tubular layer are adhered to each other. For example, a distal portion of the elastic outer tubular layer can be adhered to an expanded outer surface of the inner tubular layer. The distal portion of the elastic outer tubular layer and inner tubular layer can be reflowed onto each other into a sealed configuration. In some

WHAT IS CLAIMED IS:

1. A sheath comprising:

a circumferentially continuous elastic outer tubular layer defining an initial elastic lumen extending axially therethrough, the initial elastic lumen having an initial diameter, the outer tubular layer including at least one longitudinal rod coupled to and extending from an inner surface of the outer tubular layer and into the initial elastic lumen; and

an inner tubular layer having a thick wall portion integrally connected to a thin wall portion, wherein the thick wall portion has a C-shaped cross section with a first longitudinally extending end and a second longitudinally extending end and wherein the thin wall portion extends between the first and second longitudinally extending ends so as to define an expanded lumen extending axially through the inner tubular layer, the expanded lumen having an expanded diameter larger than the initial diameter of the initial elastic lumen and;

wherein the inner tubular layer, in a compressed condition, extends through the initial elastic lumen of the elastic outer tubular layer with the first longitudinally extending end of the inner tubular layer under the second longitudinally extending end of the inner tubular layer; and

wherein the inner tubular layer, in a locally expanded condition, has the first and second longitudinally extending ends radially expanded apart into a less overlapping condition with the thin wall portion extending therebetween to form the expanded lumen;

wherein the inner tubular layer is configured to be urged by the outer elastic tubular layer into the compressed condition after passage of an implant through the expanded lumen; and

wherein the at least one longitudinal rod spaces the inner tubular layer from the outer tubular layer and provides a bearing surface to facilitate relative movement between the inner tubular layer and the outer tubular layer when moving between the locally expanded condition and the compressed condition.

2. The sheath of claim 1, wherein at least one of an outer surface of the inner tubular layer or an inner surface of the outer elastic tubular layer has a lubricious coating.

3. The sheath of any one of the above claims, wherein at least one longitudinally extending portion of the outer surface of the inner tubular layer is

adhered to a corresponding longitudinally extending portion of the inner surface of the outer tubular layer.

4. The sheath of any one of the above claims, wherein the at least one longitudinal rod coupled to the inner surface of the outer tubular layer comprises a first plurality of longitudinal rods circumferentially spaced about the inner surface of the outer tubular layer.

5. The sheath of any one of the above claims, further comprising at least one longitudinal rod coupled to an inner surface of the inner tubular layer and extending from the inner surface of the inner tubular layer toward a longitudinal axis of the inner tubular layer.

6. The sheath of claim 5, wherein the at least one longitudinal rod coupled to the inner surface of the inner tubular layer comprises a second plurality of longitudinal rods circumferentially spaced about the inner surface of the inner tubular layer.

7. The sheath of any one of the above claims, further comprising a radiopaque tubular layer extending around a longitudinal portion of the elastic outer tubular layer.

8. The sheath of any one of the above claims, wherein a distal portion of the elastic outer tubular layer is adhered to an expanded outer surface of the inner tubular layer.

9. The sheath of any one of the above claims, wherein a distal portion of the elastic outer tubular layer and inner tubular layer are adhered to each other.

10. The sheath of any one of the above claims, wherein the distal portion of the elastic outer tubular layer and inner tubular layer are reflowed onto each other into a sealed configuration.

11. The sheath of any one of the above claims, further comprising a third plurality of longitudinal rods embedded within the elastic outer tubular layer.

12. The sheath of any one of the above claims, wherein a distal portion of the sheath has a flared shape.

13. The sheath of claim 12, wherein the flared shape is folded into an overlapping arrangement.