WHAT IS CLAIMED IS:

1. A balloon catheter, comprising

an elongate tubular body;

an inflatable balloon at a distal end of the body;

a constraining structure positioned on the balloon, the constraining structure comprising a plurality of sinusoidal shaped radial rings connected by waved longitudinal struts, the constraining structure comprising an inflated diameter smaller than an inflated diameter of the balloon.

2. The balloon catheter of claim 1, wherein the constraining structure is attached to the catheter at a distal and/or proximal end of the balloon.

3. The balloon catheter of claim 1 or 2, wherein a diameter of the constraining structure when expanded is about 0.15-0.3 mm smaller than a diameter of the balloon when expanded.

4. The balloon catheter of any one of claims 1 to 3, wherein the balloon comprises pillows protruding through the constraining structure when inflated.

5. A constraining structure, comprising

a plurality of radial rings spaced apart along a length of the constraining structure;

a plurality of longitudinal struts spaced along a circumference of the constraining structure,

wherein the constraining structure is configured to be positioned over a balloon catheter and wherein the constraining structure has an expanded and a collapsed state and is biased to be in the collapsed state.

6. The constraining structure of any one of claims 5, wherein the radial rings comprise one or more first peaks extending towards a proximal end of the constraining structure and one or more second peaks extending towards a distal end of the constraining structure.

7. The constraining structure of claim 6, wherein the longitudinal struts extend from an end of the constraining structure to the radial ring positioned nearest an opposite end of the constraining structure.

8. The constraining structure of claim 7, wherein each longitudinal strut is attached to a peak of the radial ring closest to its point of attachment to the constraining structure.

9. The constraining structure of any one of claims 5 to 8, wherein the rings comprise one or more sine waves.

10. The constraining structure of claim 9, wherein a number of struts is twice a number of sine waves in the rings.

11. The constraining structure of any one of claims 5 to 10, wherein the longitudinal struts are waved struts.

CLAIMS

1. A balloon catheter, comprising

an elongate tubular body;

an inflatable balloon at a distal end of the body;

a constraining structure positioned on the balloon, the constraining structure comprising a plurality of sinusoidal shaped radial rings connected by longitudinal struts comprising a first longitudinal strut and a second longitudinal strut, a first end of the first longitudinal strut attached to a distal end of the constraining structure and a second end of the first longitudinal strut attached to a proximal end radial ring of said sinusoidal shaped radial rings, a first end of the second longitudinal strut attached to a proximal end of the constraining structure and a second end of the second longitudinal strut attached to a distal end radial ring of said sinusoidal shaped radial rings, such that said first longitudinal strut and said second longitudinal strut are attached in a staggered configuration, wherein a diameter of the constraining structure when expanded is smaller than an inflated diameter of the balloon and further wherein said first longitudinal strut and said second longitudinal strut move in opposing longitudinal directions during expansion of said constraining structure.

2. The balloon catheter of claim 1, wherein the constraining structure is attached to the catheter at a distal and/or proximal end of the balloon.

3. The balloon catheter of claim 1 or 2, wherein a diameter of the constraining structure when expanded is about 0.15-0.3 mm smaller than a diameter of the balloon when expanded.

4. The balloon catheter of claim 1 or 2, wherein the balloon comprises pillows protruding through the constraining structure when inflated.

5. A constraining structure, comprising

a plurality of radial rings spaced apart along a length of the constraining structure;

a plurality of longitudinal struts spaced along a circumference of the constraining structure, the plurality of longitudinal struts comprising a first longitudinal strut and a second longitudinal strut, a first end of the first longitudinal strut attached to

a distal end of the constraining structure and a second end of the first longitudinal strut attached to a proximal end radial ring of said plurality of radial rings, a first end of the second longitudinal strut attached to a proximal end of the constraining structure and a second end of the second longitudinal strut attached to a distal end radial ring of said plurality of radial rings, such that said first longitudinal strut and said second longitudinal strut are attached in a staggered configuration, wherein said first longitudinal strut and said second longitudinal strut move in opposing longitudinal directions during expansion of said constraining structure,

wherein the constraining structure is configured to be positioned over a balloon catheter and wherein the constraining structure has an expanded and a collapsed state.

6. The constraining structure of claim 5, wherein each of the radial rings comprises one or more first peaks extending towards the proximal end of the constraining structure and one or more second peaks extending towards the distal end of the constraining structure.

7. The constraining structure of claim 5, wherein the second end of the first longitudinal strut is attached to a peak of the proximal end radial ring extending toward the distal end of the constraining structure and the second end of the second longitudinal strut is attached to a peak of the distal end radial ring extending towards the proximal end of the constraining structure.

8. The constraining structure of any one of claims 5, 6, and 7, wherein each of the rings comprise one or more sine waves.

9. The constraining structure of claim 8, wherein a number of struts is twice a number of sine waves in each of the rings.

10. The constraining structure of any one of claims 5, 6, and 7, wherein the longitudinal struts are waved struts.