

Claims

1. An expandable stent for implantation in a right ventricular outflow tract, the expandable stent comprising:

 a frame including a plurality of struts that define a repeating pattern of cells, wherein the repeating pattern of cells comprises:

 a column of exactly three generally diamond shaped cells positioned in end-to-end alignment;

 a column of exactly two generally diamond shaped cells positioned in end-to-end alignment;

 wherein the frame has a substantially hourglass shape with a narrow portion in between a proximal end portion and a distal end portion;

 wherein the proximal end portion and the distal end portion are configured to expand radially outward to contact a right ventricular outflow tract;

 wherein the distal end portion includes a first convex sealing portion for sealing engagement with an inner surface of the right ventricular outflow tract;

 wherein the proximal end portion includes a flared retaining portion configured to engage the inner surface of the right ventricular outflow tract at an angle between 30° and 60°; and

 wherein the proximal end portion includes a second convex sealing portion axially disposed between the narrow waist portion and the flared retaining portion.

2. The expandable stent of claim 1, further comprising a fabric cover secured to the narrow portion, the proximal end portion, and the distal end portion.

3. The expandable stent of claim 2, wherein the fabric cover is sewn to the frame.

4. The expandable stent of claim 1, wherein the narrow portion of the frame has an expanded diameter between 24 mm and 30 mm.

5. The expandable stent of claim 1, wherein the first convex sealing portion includes an outer radial portion oriented to sealingly engage the inner surface of the right ventricular

outflow tract and a radially inward tapered portion extending axially away from the waist portion.

6. The expandable stent of claim 1, wherein the flared retaining portion is sized to expand into retaining engagement with a portion of the inner surface of the right ventricular outflow tract having a vessel diameter of up to 40 mm.

7. The expandable stent of claim 1, wherein the first convex sealing portion is sized to expand into sealing engagement with a portion of the inner surface of the right ventricular outflow tract having a vessel diameter of up to 40 mm.

8. The expandable stent of claim 1, wherein the distal end portion includes a second flared retaining portion configured to engage the inner surface of the right ventricular outflow tract at an angle between 30° and 60°.

9. The expandable stent of claim 8, wherein the distal end portion includes a concave portion extending between the first convex sealing portion and the second flared retaining portion.

10. A valve assembly for implantation in a right ventricular outflow tract, the valve assembly comprising a frame having a substantially hourglass shape with a narrow portion in between a proximal end portion and a distal end portion, and a prosthetic valve secured to the frame in the narrow portion, the frame comprising:

- a plurality of struts that define a repeating pattern of cells, wherein the repeating pattern of cells comprises:

- a column of exactly three generally diamond shaped cells positioned in end-to-end alignment;

- a column of exactly two generally diamond shaped cells positioned in end-to-end alignment;

- wherein the proximal end portion and the distal end portion are configured to expand radially outward to contact a right ventricular outflow tract;

wherein the distal end portion includes a first convex sealing portion for sealing engagement with an inner surface of the right ventricular outflow tract;

wherein the proximal end portion includes a flared retaining portion configured to engage the inner surface of the right ventricular outflow tract at an angle between 30° and 60°; and

wherein the proximal end portion includes a second convex sealing portion axially disposed between the narrow waist portion and the flared retaining portion.

11. The valve assembly of claim 10, further comprising a fabric cover secured to the narrow portion, the proximal end portion, and the distal end portion.

12. The valve assembly of claim 11, wherein the fabric cover is sewn to the frame.

13. The valve assembly of claim 10, wherein the narrow portion of the frame has an expanded diameter between 24 mm and 30 mm.

14. The valve assembly of claim 10, wherein the first convex sealing portion includes an outer radial portion oriented to sealingly engage the inner surface of the right ventricular outflow tract and a radially inward tapered portion extending axially away from the waist portion.

15. The valve assembly of claim 10, wherein the flared retaining portion is sized to expand into retaining engagement with a portion of the inner surface of the right ventricular outflow tract having a vessel diameter of up to 40 mm.

16. The valve assembly of claim 10, wherein the first convex sealing portion is sized to expand into sealing engagement with a portion of the inner surface of the right ventricular outflow tract having a vessel diameter of up to 40 mm.

17. The valve assembly of claim 10, wherein the distal end portion includes a second flared retaining portion configured to engage the inner surface of the right ventricular outflow tract at an angle between 30° and 60°.

18. The valve assembly of claim 17, wherein the distal end portion includes a concave portion extending between the first convex sealing portion and the second flared retaining portion.

19. A system comprising:

- a catheter including a sleeve;

- an expandable stent for implantation in a right ventricular outflow tract, wherein the expandable stent is disposed in the sleeve, the expandable stent comprising:

- a frame including a plurality of struts that define a repeating pattern of cells, wherein the repeating pattern of cells comprises:

- a column of exactly three generally diamond shaped cells positioned in end-to-end alignment;

- a column of exactly two generally diamond shaped cells positioned in end-to-end alignment;

- wherein the frame has a substantially hourglass shape with a narrow portion in between a proximal end portion and a distal end portion;

- wherein the proximal end portion and the distal end portion are configured to expand radially outward to contact a right ventricular outflow tract;

- wherein the distal end portion includes a first convex sealing portion for sealing engagement with an inner surface of the right ventricular outflow tract;

- wherein the proximal end portion includes a flared retaining portion configured to engage the inner surface of the right ventricular outflow tract at an angle between 30° and 60°; and

- wherein the proximal end portion includes a second convex sealing portion axially disposed between the narrow waist portion and the flared retaining portion.

20. The system of claim 19, further comprising a fabric cover secured to the narrow portion, the proximal end portion, and the distal end portion.

21. The system of claim 19, wherein the narrow portion of the frame has an expanded diameter between 24 mm and 30 mm.

22. The system of claim 19, wherein the first convex sealing portion includes an outer radial portion oriented to sealingly engage the inner surface of the right ventricular outflow tract and a radially inward tapered portion extending axially away from the waist portion.

23. The system of claim 19, wherein the flared retaining portion is sized to expand into retaining engagement with a portion of the inner surface of the right ventricular outflow tract having a vessel diameter of up to 40 mm.

24. The system of claim 19, wherein the first convex sealing portion is sized to expand into sealing engagement with a portion of the inner surface of the right ventricular outflow tract having a vessel diameter of up to 40 mm.

25. The system of claim 19, wherein the distal end portion includes a second flared retaining portion configured to engage the inner surface of the right ventricular outflow tract at an angle between 30° and 60°.

26. The system of claim 25, wherein the distal end portion includes a concave portion extending between the first convex sealing portion and the second flared retaining portion.