Claims

1. A valve repair system for repairing a native valve of a patient during a non-open-heart procedure, the valve repair system comprising:

a delivery device comprising a catheter, an actuation shaft, and a coupler;

a valve repair device configured to be delivered through the catheter of the delivery device, and configured to attach to a native valve of a patient, the valve repair device comprising:

a coaption element having a first end portion and a second end portion;

a proximal collar attached to the first end portion of the coaption element;

first and second paddles connected to the coaption element;

a distal collar connected to the first and second paddles;

wherein the coupler is releasably connected to the proximal collar;

wherein the actuation shaft extends through the coupler, the proximal collar, and the coaption element;

wherein the actuation shaft is releasably connected to the distal collar.

2. The valve repair system of claim 1 wherein movement of the distal collar away from the proximal collar by the actuation shaft opens the first and second paddles.

3. The valve repair system of claim 1 or 2 wherein the coupler comprises a plurality of flexible arms that engage the proximal collar to connect the proximal collar to the coupler.

4. The valve repair system of claim 3 wherein the flexible arm comprises eyelets and wherein the actuation shaft extends through the eyelets to hold the flexible arms in engagement with the proximal collar.

5. The valve repair system of claim 4 wherein the flexible arms are biased to an open position and wherein removal of the actuation shaft from the eyelets allows the flexible arms to open and release the proximal collar.

6. The valve repair system of claim 3 wherein the coupler includes stabilizer members that extend into guide openings of the proximal collar.

7. The valve repair system of claim 3 further comprising actuation lines connected to each of the flexible arms, wherein retraction of the actuation lines moves the flexible arms in a closing direction.

8. A recapturable valve repair system for repairing a native valve of a patient during a non-open heart procedure, the recapturable valve repair system comprising:

a delivery device comprising a catheter, and a coupler;

a valve repair device configured to be delivered through the catheter of the delivery device, and configured to attach to a native valve of a patient, the valve repair device comprising:

a coaption element;

a proximal collar attached to the coaption element;

first and second paddles connected to the coaption element;

wherein the coupler is releasably connected to the proximal collar;

a tethering line that connects the valve repair device to the delivery device for recapturing the valve repair device.

9. The valve repair system of claim 8 wherein the delivery device further comprises an actuation shaft that extends through the coupler, the proximal collar, and the coaption element, wherein the valve repair device further

comprises a distal collar, and the actuation shaft is releasably connected to the distal collar.

10. The valve repair system of claim 9 wherein the tethering line extends through the actuation shaft and is connected to the distal collar.

11. The valve repair system of any of claims 8-10 wherein the coupler comprises a plurality of flexible arms that engage the proximal collar to connect the proximal collar to the coupler.

12. The valve repair system of claim 11 further comprising actuation lines connected to each of the flexible arms, wherein retraction of the actuation lines moves the flexible arms in a closing direction.

13. The valve repair system of claim 9 wherein movement of the distal collar away from the proximal collar by the actuation shaft opens the first and second paddles.

14. The valve repair system of claim 11 wherein the flexible arm comprises eyelets and wherein the actuation shaft extends through the eyelets to hold the flexible arms in engagement with the proximal collar.

15. The valve repair system of claim 14 wherein the flexible arms are biased to an open position and wherein removal of the actuation shaft from the eyelets allows the flexible arms to open and release the proximal collar.

16. The valve repair system of claim 15 wherein each of the flexible arms includes a plurality of eyelets.

17. The valve repair system of claim 16 wherein the actuation shaft is reinsertable back into the eyelets to reconnect the coupler to the proximal collar.

18. The valve repair system of claim 17 wherein the actuation shaft is inserted into the eyelets sequentially and insertion of the actuation shaft into each eyelet moves the flexible arms closer together.

19. A method of recapturing a valve repair device with a delivery device comprising:

pulling a tethering line that extends through a catheter and coupler of a delivery device to draw a valve repair device toward the delivery device;

wherein the valve repair device comprises:

a coaption element;

a proximal collar attached to the coaption element;

first and second paddles connected to the coaption element;

coupling the coupler to the proximal collar.

20. The method of claim 19 further comprising extending an actuation shaft through the coupler, the proximal collar, and the coaption element.

21. The method of claim 20 further comprising connecting the actuation shaft to the valve repair device.

22. The method of claim 20 further comprising connecting the actuation shaft to a distal collar of the valve repair device.

23. The method of claim 20 wherein the tethering line extends through the actuation shaft and the tethering line is connected to the distal collar.

24. The method of any of claims 19-23 further comprising engaging the proximal collar with a plurality of flexible arms of the coupler to connect the proximal collar to the coupler.

25. The method of claim 24 further comprising retracting actuation lines that are connected to the flexible arms to move the flexible arms in an engaging direction.

26. The method of claim 20 wherein movement of the distal collar away from the proximal collar by the actuation shaft opens the first and second paddles.

27. The method of claim 21 wherein the flexible arm comprises eyelets and wherein the actuation shaft extends through the eyelets to hold the flexible arms in engagement with the proximal collar.

28. The method of claim 22 further comprising biasing the flexible arms toward an open position and removing of the actuation shaft from the eyelets to cause the biased flexible arms to open and release the proximal collar.

29. The method of claim 23 wherein each of the flexible arms includes a plurality of eyelets.

30. The method of claim 24 further comprising reinserting the actuation shaft back into the eyelets to reconnect the coupler to the proximal collar.

31. The method of claim 25 wherein the actuation shaft is inserted into the eyelets sequentially and insertion of the actuation shaft into each eyelet moves the flexible arms closer together.

32. A valve repair device for repairing a native valve of a patient, the valve repair device comprising:

a base assembly having:

a shaft; and

a cam attached to the shaft and configured to move between a first position and a second position;

a pair of paddles attached to the base assembly, wherein the pair of paddles are configured to move between an open position and a closed position; and

a pair of gripping members attached to the base assembly, wherein the gripping members are configured to attach to the native valve of the patient;

wherein movement of the cam from first position to the second position causes the pair of paddles to move apart.

33. The valve repair device claim 32, wherein the cam is fixed to the shaft, and wherein the cam is moved between the first position and the second position by rotating the shaft.

34. The valve repair device according to any of claims 32-33, wherein the cam is rotatably attached to the shaft, and wherein the cam is moved between the first position and the second position by rotating the cam about the shaft.