Claims

1. A split type precisely-anchorable transcatheter mitral valve system, characterized in that,
the system comprises a split transcatheter mitral valve anchoring stent and a transcatheter artificial biological mitral valve,
wherein a shape and structure of the transcatheter mitral valve anchoring stent are matched with a mitral valve's real structure after a patient image data is subjected to three-dimensional reconstruction, the transcatheter mitral valve anchoring stent is firstly delivered to a mitral valve position of the patient to be released, deformed, personalized and precisely aligned with personalized precise alignment of supravalvular and subvalvular tissues on the mitral valve position of the patient;
the transcatheter artificial biological mitral valve is delivered into the transcatheter mitral valve anchoring stent to be released, the transcatheter artificial biological mitral valve is released and deformed and expanded to a functional state, the transcatheter mitral valve anchoring stent is deformed again and combined with an expanded transcatheter artificial biological mitral valve, and meanwhile, re-deformation of the transcatheter mitral valve anchoring stent causes the transcatheter mitral valve anchoring stent to be anchored with the subvalvular tissues in a preset combination.

2. The split type precisely-anchorable transcatheter mitral valve system according to claim 1, characterized in that, the mitral valve system further comprises a delivery assembly, the delivery assembly comprises a transcatheter mitral valve anchoring stent delivery kit and a transcatheter artificial biological mitral valve delivery kit, and the transcatheter mitral valve anchoring stent delivery kit comprises a delivery catheter, and a transcatheter mitral valve anchoring stent delivery device.

3. The split type precisely-anchorable transcatheter mitral valve system according to claim 1, characterized in that, the split type transcatheter mitral valve anchoring stent and the transcatheter artificial biological mitral valve are in anterior and posterior routes, and then are assembled again into one body in vivo, and simultaneously the transcatheter mitral valve anchoring stent is deformed again to be combined with a mitral valve of the patient's lesion mitral valve and subvalvular tissue to achieve the mitral valve in situ replacement of the lesion mitral valve.

4. The split type precisely-anchorable transcatheter mitral valve system according to claim 1, characterized in that, the transcatheter mitral valve anchoring stent has a compressed state disposed in the delivery catheter, a first anchoring state after being released by the delivery catheter, and a second anchoring state after being combined with the transcatheter artificial biological mitral valve,

in the first anchoring state, posterior deformation of the transcatheter mitral valve anchoring stent after being released by the delivery catheter is in personalized precise alignment and engagement and clamping with the supravalvular and subvalvular tissues on the mitral valve position of the patient;

in the second anchoring state, the transcatheter artificial biological mitral valve is introduced into the transcatheter mitral valve anchoring stent in the first state by the delivery catheter to expand a secondary deformation by balloon expandable external force, and it is integrated with the expanded transcatheter artificial biological mitral valve, and meanwhile, the transcatheter mitral valve anchoring stent is anchored with the patient's mitral valve position tissue in a preset combination.

5. The split type precisely-anchorable transcatheter mitral valve system according to claim 4, characterized in that,

in the first anchoring state, the transcatheter mitral valve anchoring stent is processed and shaped into a funnel shape with a large atrial surface and a small ventricular surface, deformation and return of the transcatheter mitral valve anchoring stent after being inputted and released through the delivery catheter accurately corresponds to the patient's dynamic lesion mitral valve supravalvular and subvalvular tissues, and personalized alignment engagement and clamping is performed;

in the second anchoring state, the transcatheter mitral valve anchoring stent in the first anchoring state and the transcatheter artificial biological mitral valve in the delivery catheter are balloon expanded to integrate together, so that the transcatheter mitral valve anchoring stent is combined with the transcatheter artificial biological mitral valve by a centripetal return clamping generated by the secondary deformation from an original funnel shape to cylindrical shape, and meanwhile, tight combination of the mitral valve position and the supravalvular tissues of the patient is completed.

6. The split type precisely-anchorable transcatheter mitral valve system according to claim 1, characterized in that, a real structure of the three-dimensional reconstruction is a digital image model or a three-dimensional printed simulation entity model; the real structure of the three-dimensional

reconstruction is a three-dimensional dynamic image of a virtual simulation after digital conversion of CT, ultrasonic and nuclear magnetic integrated images and a corresponding three-dimensional printing simulation entity model.

7. The split type precisely-anchorable transcatheter mitral valve system according to claim 1, characterized in that,

the transcatheter mitral valve anchoring stent is an umbrella tubular stent structure, comprising an atrial surface, a ventricular surface and an anchoring stent connecting part therebetween, wherein the atrial surface is an umbrella sheet, and has an umbrella shape matching with a real personalized morphology of the three-dimensional reconstruction of image data of the atrial surface of the patient, that is a first lattice portion; the ventricular surface comprises two positioning hook loops which are precisely preset with boundary positions of anterior and posterior leaflets of the mitral valve of the patient; the anchoring stent connecting partis funnel-shaped with a round opening, a diameter of the funnel's opening is matched with the patient's mitral valve perivalvular inner diameter, and a lower end of the funnel is a second lattice portion that matches morphology and degree of a mitral valve stenosis and/or regurgitation lesion.

8. The split type precisely-anchorable transcatheter mitral valve system according to claim 7, characterized in that, the first anchoring state of the anchoring stent connecting part is a three-dimensional shape-setting memory state of a real anatomical shape and a structure of a personalized corresponding patient after the delivery catheter is delivered and released, a shape-setting memory state of the anchoring stent connecting part from the atrial surface to the ventricular surface has a contractional taper matched with a petal orifice to a subvalve, with a taper of 5-45 degrees, depending on a shape of a lesion leaflet of the patient; the anchoring stent connecting part is deformed to expand from funnel-shaped deformation of a circular opening of the first anchoring state to a cylindrical preset second anchoring state.

9. The split type precisely-anchorable transcatheter mitral valve system according to claim 8, characterized in that, in the first anchoring state of the transcatheter mitral valve anchoring stent, after the positioning hook loops are released through the delivery catheter, anterior and posterior leaflet boundary positions of a lesion mitral valve of the patient matched with the positioning hook loops are

accurately inserted, to position the atrial surface of the transcatheter mitral valve anchoring stent, so as to realize personalized corresponding laying with the patient's left atrial morphology.

10. The split type precisely-anchorable transcatheter mitral valve system according to claim 7, characterized in that, the ventricular surface of the transcatheter mitral valve anchoring stent has a plurality of anchoring hook loops, and the anchoring hook loops extend from the anchoring stent connecting part to the ventricular surface and then are folded, so as to accurately match a real chordae tendineae and subvalvular tissue structure morphology of the three-dimensional reconstruction of the patient's lesion mitral valve subvalvular imaging data.

11. The split type precisely-anchorable transcatheter mitral valve system according to claim 10, characterized in that, number, size, morphology, and folding angle of the anchoring hook loops are accurately matched with a real chordae tendineae gap, size and shape of the mitral valve leaflets, and circumferential spacing of perivalvular tissues from a ventricular wall in three-dimensional reconstruction.

12. The split type precisely-anchorable transcatheter mitral valve system according to claim 10, characterized in that, in the first anchoring state of the transcatheter mitral valve anchoring stent, after the anchoring hook loops are released through the delivery catheter, the anchoring hook loops are positioned at a position of a chordae tendineae of the patient and the chordae tendineae's gap position to engage in a numerical a numerical alignment; in the second anchoring state of the transcatheter mitral valve anchoring stent, a plurality of the anchoring hook loops form clamping portion by action of deformation and resultant force of the atrial surface of the transcatheter mitral valve anchoring stent and the anchoring stent connecting part, and a plurality of deformed anchoring hook loops and a chordae tendineae under the patient's lesion mitral valve leaflet and the subvalvular tissues are tightly combined through a preset interwoven.

13. The split type precisely-anchorable transcatheter mitral valve system according to claim 10, characterized in that, the number of the anchoring hook loops is 3-9.

14. The split type precisely-anchorable transcatheter mitral valve system according to claim 7, characterized in that, the atrial surface's end portion of the anchoring stent connecting part of the transcatheter mitral valve anchoring stent is provided with a plurality of fixed support rod for

embedding a stent of a transcatheter artificial biological mitral valve, and the fixed support rods are bent along an axial direction of the atrial surface and ends thereof bend toward an axis of the transcatheter mitral valve anchoring stent.

15. The split type precisely-anchorable transcatheter mitral valve system according to claim 14, characterized in that, the anchoring stent connecting part of the mitral valve anchoring stent is provided with a plurality of end centripetal hook loops for embedding some ends of an outflow end of a stent of the transcatheter artificial biological mitral valve, and the end centripetal hook loops and the plurality of fixed support rods are in an up-and-down closure, and structurally firmly integrated with the transcatheter artificial biological mitral valve, and structurally firmly integrated with the transcatheter artificial biological mitral valve, thereby realizing zero displacement when releasing the transcatheter artificial biological mitral valve.

16. The split type precisely-anchorable transcatheter mitral valve system according to claim 14, characterized in that, in the first anchoring state of the transcatheter mitral valve anchoring stent, the plurality of fixed support rods maintain an angle consistent with the anchoring stent connecting part, and in the second anchoring state of the transcatheter mitral valve anchoring stent, the plurality of fixed support rods are axially parallel to coaptation circumference, so that the fixed support rods' ends are embedded on an inflow end of the stent of the transcatheter artificial biological mitral valve, and structurally firmly integrated with the transcatheter artificial biological mitral valve, thereby realizing zero displacement when releasing the transcatheter artificial biological mitral valve.

17. The split type precisely-anchorable transcatheter mitral valve system according to claim 14, characterized in that, the number of the fixed support rods is 3-12.

18. The split type precisely-anchorable transcatheter mitral valve system according to claim 7, characterized in that, the first lattice portion and the second lattice portion of the transcatheter mitral valve anchoring stent comprise a compressible diamond lattice, a V-shaped lattice and / or a hexagonal lattice, and the first lattice portion is adaptively connected to the second lattice portion.

19. The split type precisely-anchorable transcatheter mitral valve system according to claim 7, characterized in that, an outer periphery of the lattice portion of the atrial surface of the transcatheter mitral valve anchoring stent is spaced apart from an atrial wall of the patient by 1-2 mm.

20. The split type precisely-anchorable transcatheter mitral valve system according to claim 7, characterized in that, an inner peripheral edge diameter of the second lattice portion of the transcatheter mitral valve anchoring stent matches an outer diameter of various corresponding size specifications of the transcatheter artificial biological mitral valve.

21. The split type precisely-anchorable transcatheter mitral valve system according to claim 1, characterized in that, a surface of the transcatheter mitral valve anchoring stent is coated with a layer of medical polymer film.

22. The split type precisely-anchorable transcatheter mitral valve system according to claim 1, characterized in that, the atrial surface, the ventricular surface, and the anchoring stent connecting part of the transcatheter mitral valve anchoring stent are formed by machining the anchoring stent connecting part of a three-dimensional forming structure or the atrial surface, the ventricular surface, and the anchoring stent connecting part after laser integrated cutting.

23. The split type precisely-anchorable transcatheter mitral valve system according to claim 1, characterized in that, the transcatheter mitral valve anchoring stent is a metallic material or a non-metallic material having shape memory reshape properties.

24. The split type precisely-anchorable transcatheter mitral valve system according to claim 1, characterized in that, the transcatheter mitral valve anchoring stent is made of a nickel-titanium alloy material.

25. The split type precisely-anchorable transcatheter mitral valve system according to claim 1, characterized in that, the transcatheter artificial biological mitral valve comprises a radially compressible stent, a cobalt-chromium alloy stent with a cylindrical shape or a partially cylindrical shape after being expanded by the balloon, or a radially compressible self-expanding nickel-titanium alloy stent, and three fan-shaped leaflets disposed on an inner side of the cobalt-chromium alloy stent or the nickel-titanium alloy stent, each of the fan-shaped leaflets has a free edge, an arc-shaped bottom edge, and leaflet boundary connecting parts extending on both sides, and the cobalt-chromium alloy stent or the nickel-titanium alloy stent is a valve stent capable of supporting three types of crimped valve stents fixed at an interface of three pairs of leaflets.

26. The split type precisely-anchorable transcatheter mitral valve system according to claim 1, characterized in that, the stent of the artificial biological mitral valve is made from material of cobalt-based alloy or chromium alloy or nickel-titanium alloy.

27. The split type precisely-anchorable transcatheter mitral valve system according to claim 2, characterized in that, the transcatheter artificial biological mitral valve delivery kit comprises a transcatheter artificial biological mitral valve delivery device, a guide sheath, a valve holder, and a charging pump.

28. The split type precisely-anchorable transcatheter mitral valve system according to claim 27, characterized in that, the transcatheter mitral valve anchoring stent delivery device and the transcatheter artificial biological mitral valve delivery device can be punctured via femoral vein puncture, apical puncture, or left atrium puncture.

29. The split type precisely-anchorable transcatheter mitral valve system according to claim 25, characterized in that, the transcatheter mitral valve anchoring stent is firstly divided into a split type accurately anchoring lesion mitral valve position and releasing the same into a first anchoring state, and then the transcatheter artificial biological mitral valve is sent to the transcatheter mitral valve anchoring stent through the delivery catheter, and as the transcatheter artificial biological mitral valve is expanded, the transcatheter mitral valve anchoring stent is expanded to a second anchoring state, and finally, a final anchoring is further formed by embedding the anchoring stent connecting partwith the transcatheter artificial biological mitral valve and tightly binding a ventricular surface of the transcatheter mitral valve anchoring stent with the subvalvular tissues at the same time.