Claims

1. A method for preparing a limiting expandable aortic valve conduit, characterized in that, comprising:

Step 1: cutting and connecting:

selecting a polyester corrugated conduit with a corrugated width of 1.24-1.89mm, a corrugated height of 0.93-1.44mm, and a ratio of the corrugated width to the corrugated height of 1.24-1.36, cutting the polyester corrugated conduit in an axial direction of the polyester corrugated conduit, and cutting the polyester corrugated conduit to obtain a distal conduit, a valve intermediate conduit and a proximal conduit; and cutting the valve intermediate conduit along the axial direction of the valve intermediate conduit to obtain a rectangular corrugated conduit material, arranging the corrugations along the axial direction of the whole limiting expandable aortic valve conduit, and then sewing into a valve connecting conduit;

obtaining an aortic valve preliminary conduit by sequentially connecting a proximal conduit, the valve connecting conduit and the distal conduit with sutures;

Step 2: attaching a collagen fiber coating on internal gaps and inner and outer surfaces of the aortic valve preliminary conduit:

S1: preparing collagen fibers;

S2: obtaining a collagen fiber having a melting point of 68.54-71.24°C through first chemical crosslinking by using biologically derived collagen as raw material and glutaraldehyde as crosslinking agent;

S3: spraying the collagen fiber subjected to the first chemical crosslinking obtained in step S2 on the polyester corrugated conduit, and drying to obtain the polyester corrugated conduit adsorbed with the collagen fiber, wherein a spraying density of the collagen fiber subjected to the first chemical crosslinking on the surface of the polyester corrugated conduit is 1.5-6mg/cm^2;

S4: immersing the polyester corrugated conduit adsorbed with the collagen fiber in a crosslinking agent solution to obtain the polyester corrugated conduit immersed with the crosslinking agent adsorbed with the collagen fiber, wherein the crosslinking

agent solution is a compound solution of N-hydroxysuccinimide and 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride, the compound solution is compounded according to a mass ratio of 1:1, and the concentration is 27-40mg/mL;

S5: immersing the polyester corrugated conduit obtained in step S4 into a collagen fiber solution of 3.5-5.5mg/mL of the collagen fiber subjected to the first chemical crosslinking, standing for 2 hours or more, and drying to obtain a polyester biological patch attached with a collagen fiber coating, wherein the melting point of the collagen fiber coating is 77.59-79.84°C;

Step 3: drying the limiting expandable biological valve to obtain a dried limiting expandable biological valve;

Step 4: assembling a valve holder, the dried limiting expandable biological valve and the aortic valve preliminary conduit to obtain a limiting expandable aortic valve conduit.

2. The method according to claim 1, characterized in that, in a natural state of the aortic valve preliminary conduit, an axial length of the proximal conduit is not less than 5mm, and the proximal conduit comprises at least 2 corrugations in an axial direction; an axial length of the valve connecting conduit is 23-29mm, and the valve connecting conduit comprises 24-36 corrugations in a circumferential direction; an axial length of the distal conduit is not less than 70mm, and the distal conduit comprises at least 30 corrugations in an axial direction.

3. The method according to claim 1, characterized in that, a maximum circumferential tensile elongation range of the limiting expandable aortic valve conduit is 2.2-4.8%, an elastic deformation rate range of the distal conduit is 1.0-2.3%, a value of the elastic deformation rate in the maximum circumferential tensile elongation range is 38-68%, and a maximum tensile force range of the distal conduit is 13.5-55.9N.

4. The method according to claim 1, characterized in that, an outer diameter of a maximum bulging portion of the valve connecting conduit ranges from 28-38mm, and an outer diameter of a joint at two ends of the valve connecting conduit ranges from 24-33mm.

5. The method according to claim 1, characterized in that, further comprising a limiting expandable biological valve, wherein the limiting expandable biological valve is sewn on an inner surface of the valve connecting conduit, or the limiting expandable biological valve is sewn on an inner surface of a joint of the valve connecting conduit and the proximal conduit.

6. The method according to claim 1, characterized in that, two symmetrically arranged knotting protrusions are integrally connected to a rod body of the valve holder, and a suture cutting groove is formed between the two knotting protrusions.