

Aortic, mitral and pulmonary valve replacement is routinely performed with reasonable clinical results. But the optimal substitute for the tricuspid valve remains controversial. Contemporary prostheses either mechanical or bioprosthetic are associated with a high risk of thrombosis and/or structural failure. Mitral allografts could have advantages over existing prostheses, especially in patients with infectious endocarditis.

We describe our first experience with cryopreserved mitral allograft processing and implantation into the tricuspid position in a sheep experimental model.

Material and Methods:

We subjected 20 sheep (age 1 year, weight 23 - 36 kilograms) to general anesthesia and a left thoracotomy. An epicardial echocardiographic study was performed and the mitral valve was harvested. Donor animals were put to death by intravenous anesthetic injection. Allografts were immersed into cultivation medium E 199 with an antibiotic cocktail. After 24 hours storage at the temperature of 37.0°C the valves were kept at + 5 to + 7 °C over a period of 3-5 days. Then they were transferred into the cryoprotective solution (E 199 with 10% dimethylsulfoxide) and sealed into plastic bags using a double-layer technique. Finally, they were programmed cooled and stored in the liquid stage of liquid nitrogen (- 196 °C) in a separate container.

One month later, the cryopreserved mitral allograft valves were thawed, and removed from wrap under sterile conditions. A simple pulling test performed by an experienced cardiac surgeon showed that the annulus, cusps, the chordae tendineae and papillary muscles of the cryopreserved MAV were strong enough for implantation purposes. Thawed mitral allografts were transplanted into the tricuspid position in 13 sheep recipients (age 1 year, weight 22-37 kilograms). The operations were performed under general anesthesia, via right thoracotomy, with extracorporeal circulation and cold crystalloid cardioplegia.