

P162. Effects Of Decellularization (tri-col/tri-doc) On The Hydrodynamic Performance Of Porcine Aortic Valve:

Considerations On In-vitro Testing

Tomaso Bottio¹; Vincenzo Tarzia¹; Giulio Rizzoli²; Michele Spina²; Alessandro Gandaglia²; Filippo Naso²; Gino Gerosa¹

¹*Division of Cardiac Surgery, Department of Cardiac, Thoracic and Vascular Sciences, Padua University Medical School, Padova, Italy;* ²*Department of Experimental Biomedical Sciences, Padua University, Padova, Italy*

OBJECTIVES: Goal of the current heart-valve-tissue-engineering research is the development of an “ideal”valve-prosthesis. Decellularized heart-valve-matrix was suggested as a scaffold for tissue-engineering, providing the natural valve architecture and ideal conditions for repopulation with recipient cells. Therefore the appropriateness of the decellularization processes of porcine-aortic-valve is still controversial. Aim of the study was to investigate the effects of decellularization on the in-vitro hydrodynamic performances of porcine-aortic-valves pre- and post-TRI-COL/TRI-DOC treatment (Spina’s-methods) and to compare it with untreated-control-valves.

METHODS: Nine fresh-porcine-aortic-valves were tested in the aortic chamber of the Sheffield-Pulse-Duplicator. The valves were inserted in the rigid aortic-chamber of in-vitro system after suturing to an aortic root made of silicone and hydrodynamically tested. After in-vitro testing, three fresh-porcine-aortic-valves have been decellularized with TRI-COL, three with TRI-DOC and the last three served as untreated-controls. A further hydrodynamic-test was then performed on each treated-valve in the same system by adopting exactly the identical conditions used for the previous tests. Forward-flow-pressure-drop, closing-leakage-volumes, effective-orifice-area and stroke-work-loss were recorded.

RESULTS: Decellularized-porcine-aortic-valves showed significantly lower transvalvular-gradients than fresh-porcine-valves ($p < 0.0001$). EOA, stroke-work-loss and valvular-resistance observed after decellularization were all improved compared to controls ($p < 0.0001$). Furthermore we observed that the leaflet-coaptation-time was longer with the decellularized aortic-valves. The treated valves showed an averaged increased regurgitant-volume, which was related to increased both closing-volume and coaptation time. On the contrary the untreated-control-valves showed comparable results pre and after-storage.

CONCLUSIONS: According to our results, the TRI-COL and TRI-DOC treatments modify the normal porcine-aortic-valve hydrodynamic behaviour with improved systolic function and prolonged diastolic coaptation phase.