Letter to the Editor

Human aortic bioprosthesis

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We have read with the greatest interest the paper by Wolfgang A. Goetz et al. entitled Truly stentless molded autologous pericardial aortic valve prosthesis with single point attached commissures in a sheep model [1]. We congratulate the authors on their achievements in the development of valve bioprosthesis.

Apparently an autologous valve prosthesis is the subject of thorough study in the Medical University of Gdansk in cooperation with the Silesian Centre for Heart Diseases and with engineering support from the Ship Design and Research Centre in Gdansk. Therefore, we would like to comment on the above paper. The motivation for the autologous valve prosthesis we have developed and named HAB (human aortic bioprosthesis) has been quite similar to this emphasised by the authors. The idea of a valve bioprosthesis that is relatively inexpensive, reproducible, and has sufficient durability, as well as excellent haemodynamic parameters has existed in cardiovascular surgery for many years.

However, there are certain differences among our solution i.e. HAB and SPAC (single point attached commissures) presented in the discussed paper. As well as making the prosthesis simple and based on mold design we have aimed to make it functionally as close as possible to the real valve. One of the essential issues arising from our clinical experience is the safety and the durability of the connection of the leaflets with the aortic wall. As the condition of the aorta wall may be substantially changed due to certain disease processes we have developed a T-shaped laps in the upper part of the leaflets. This solution allows for the connection of the leaflets with the aorta wall, which reduces the maximum local stress in the aorta wall due to the increased number of connecting sutures. The risk of aorta wall fracture is addressed by the authors of the discussed paper, nevertheless they have decided to apply single point connection with patches located outside the aorta wall as the solution to the potential tearing problems. The multipoint connection introduced in HAB reduces the risk of aorta wall fracture and fatigue damage of the leaflets. The aorta wall fracture risk has to be taken in to consideration especially when human tissues are considered.

Additionally, the so far conducted in vitro experiments with HAB proved an excellent coaptation achieved with reduced overall height of the valve leaflets. The results of the in vitro study have been presented in 2008 during the 10th cardiosurgery meeting in Gdansk, Poland, and discussed by Robicsek and Moor.

The shape of HAB is slightly different than SPAC which allows for its wider opening. Once more three triangular laps added between the leaflets enhance the functioning of the valve. During the systole the leaflets are supposed to get closer to the aortic bulb walls because they take the shape of a tulip flower during systole. This enhances the hydrodynamics of the flow and results in deeper coaptation.

The HAB bioprosthesis has already been tested in vitro. Currently the program including the animal model tests is being introduced. The results of this research together with the thorough structural analysis of the HAB concept will be published as they become available.

Reference


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Reply to the Letter to the Editor

Reply to Siondalski et al.

Autologous pericardial aortic valve prosthesis

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