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In vivo repopulation of decellularized bovine jugular valved vein grafts with autologous cells occurs in sheep when implanted in pulmonary valve position.

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Objectives:

Glutaraldehyd fixed bovine jugular valved vein grafts ("Contegra") used for reconstruction of the pulmonary outflow tract are unable to grow. The aim of this study was to investigate the performance of not fixed but decellularized bovine jugular valved vein grafts implanted in pulmonary position in respect to function, cellular repopulation - a prerequisite for potential growth -, and morphology in the sheep model.

Method:

The quality of detergent decellularized bovine jugular valved vein grafts (DBJV) was evaluated by histological stains (H&E, Movat-pentachrome) and by scanning electron microscopy (SEM). DBJV (n=8) were then implanted in pulmonary position for three or six months. Prior explantation the function was investigated by echocardiography. After explantation the conduits were analyzed by histological and morphological means. Data were compared to implanted Contegra (n=3).

Results:

Decellularized scaffolds were free of cells with preserved extracellular matrix including basement membrane. Two DBJV and one Contegra animal died during follow-up. Echocardiography revealed similar function in both groups. After six months DBJV (n=3) were lined with endothelial cells (EC) expressing eNOS/vWF, while in Contegra no EC were found. The interstitium of DBJV was partially repopulated with cells expressing sm- α -actin and procollagen-I. In Contegra no cells were detected. Calcification and neointima formations were observed in DBJV and Contegra.

Conclusions:

Function and morphological changes were comparable, however, the in vivo repopulation of DBJV with host derived endothelial and interstitial cells indicates a superiority of DBJV since tissue viability and the potential to grow are crucial requirements in pediatric surgery.