シンポジウム03（ I-S03）

新しい手術方法の開発「治療から再生へー再生医療の進歩」

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[I-S03-1]【基調講演】 Toward next generation of tissue engineered vascular graftsfor pediatric heart surgery

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We developed the first tissue engineered vascular graft (TEVG) consisting of a biodegradable scaffold seeded with bone marrow-derived mononuclear cells (BM-MNCs) for the repair of congenital heart defects in children and confirmed its significant potential via an initial clinical trial. 25 patients underwent an extracardiac Fontan using TEVG in Tokyo. There was no graft-related mortality. There was no evidence of aneurysmal formation, graft rupture, graft infection, or calcification. Ten patients (40%) had asymptomatic graft stenosis. Six of 10 patients underwent successful balloon angioplasty. Angiographical assessment shows the growth of grafts.Current efforts are aimed at designing an improved TEVG to address stenosis, the most significant complication observed in our clinical trial. Based on animal experimental data, we figured out that higher dose cell seeding on the graft could reduce the stenosis rate in mouse model. We also characterized the prevalence and nature of thrombosis within our polyester scaffolds, determined whether thrombi degrade or remodel, and characterized cell infiltration to obtain a better understanding of the early sequence of events during TEVG remodeling. We have applied new protocol to FDA for the second generation of TEVG, including a rapid cell seeding technique, administration of Losartan, and higher dose of cell seeding in 24 patients as Fontan conduits. The carefully designed second clinical trial in USA under the supervision of the FDA will be started in 2020.