

P-197

Clinical implementation of a model-based training course to reduce the learning curve in interventional therapy of congenital heart defects

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Introduction: Cardiac catheterisation has become a routine alternative to open heart surgery for many aspects of congenital heart defects. Today, many "simple" defects such as PDA, ASD, pulmonary or aortic stenosis or coarctation of the aorta are managed interventionally whenever suitable. Despite the state-of-the-art technical equipment in most of the cardiac catheter labs, there has not been much change in the practical training. Training is still performed under the expert guidance of an experienced doctor mainly by "practicing on the patient". As the number of cardiac interventions is steadily increasing and the interventions become more complex, the interest for new training opportunities and modalities increase.

Methods: After developing various 3D silicon heart models we established a comprehensive clinical training course for PDA closure and balloon dilatation of the pulmonary valve and implemented this model based course as a part of two one week workshops at the Ayder Hospital in Mekelle, Ethiopia. The pediatric and cardiologists participating in the workshop have not carried out interventional catheterisation before. The course consisted of an initial full day model based training followed by actual treatment of patients with PDA and pulmonary stenosis. At the beginning of every day a repeat model catheterization was performed. In order to evaluate the efficacy of these models, the required X-ray time for the interventions was measured at different times.

Results: After repeat hands-on training 17 patients (15 PDA, 2 PS) were treated successfully by the newly trained cardiologists as first operators. Handling of the catheter material including wires, balloons and catheters was smoothly. All new investigators confirmed the realistic aspect of the models. There was a significant reduction in the fluoroscopy time from the beginning (40 minutes) to the end of the workshop (18 minutes).

Conclusions: Real size 3D models could offer an attractive alternative in the education and training of interventional cardiologists. Real beginners could get the possibility to practice unlimited time on the model and improve their practical skills in order to be possibly best prepared for treating real patients. In addition these models may be suitable for maintaining technical skills in lower volume centers.

