Impact of team preparation and procedure technique on outcome of the foetal balloon aortic valvuloplasty.

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Introduction:  
Prenatal interventions (PI) for foetal congenital cardiac malformations such as balloon aortic valvuloplasty (BAV) are performed in several centres worldwide. The centres report variable technical success and complications rates. We present our technical developments regarding the BAV and their impact on technical success of these procedures.

Methods:  
In years 2011-2012 13 BAV were performed in foetuses aged 20-31 weeks (avg.25). Evolving left heart hypoplasia was an indication for BAV in 7, foetal heart failure in 5 and combination of both in 1 case. Before the BAV program started, the procedure was simulated on the foetal cadaver. Prior to the procedure, aortic valve (AoV) diameter and distance from the apex to the AoV were measured. Safe position of the needle tip was assessed basing on expected position of proximal end of balloon in the left ventricle (LV). The LV was always punctured in a single attempt. The 18 G needle was inserted parallel to the interventricular septum (IVS) as close to the AoV as possible without threatening both aortic and mitral valves. Balance Middleweight (Abbott) guidewire was used in 4 and Whisper MS (Abbott) in 9 cases. Balloon size was calculated as 120% of AoV diameter. Maverick2 (Boston Scientific) balloons were used in 12 cases and Trek (Abbott) balloon in 1 case with size range 3.5-4 mm.

Results:  
In all cases the LV was successfully punctured, the AoV was traversed with a guidewire, the balloon was advanced through the AoV and inflated up to 3 times. The Whisper MS curved-tip hydrophilic guidewires showed better manoeuvrability and support. All foetuses survived the procedure. Pericardial effusion (6 cases) and bradycardia (5 cases) were the most common complications. One foetus died in utero one day after BAV due to premature placental separation. In 1 case intrauterine death occurred in late pregnancy due to placental insufficiency not related to the procedure.

Conclusions:  
Practice in the dissection room, proper selection of the equipment, careful measurements of the LV size and safe needle position help to decrease learning curve and reduce risk of lethal complications.