

**Interventional cardiac catheterization in neonatal age: results and early outcome in a multi-center Italian experience.**

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**INTRODUCTION.** Interventional cardiac catheterization in newborns is a challenging therapeutic option. However, technical advances and improvement of cardiologist's expertise widened indications and complexity of this approach in these patients.

**METHODS.** Interventional cardiac catheterization procedures performed in neonatal age in all Italian high-volume referral centres of Paediatric Cardiology were analysed in terms of morbidity and procedural or in-hospital mortality.

**RESULTS.** From January 2000 to December 2017, 1238 newborns underwent 1353 percutaneous cardiac interventional procedures. Mean weight was  $3.00 \pm 0.55$  kg (range 1.00-5.80) and median age was 2.0 days (range 0-31 days). Mortality and morbidity of this approach were 6.7% and 9.5%, respectively. At multi-variate analysis, in-hospital mortality was significantly related to low-weight at procedure ( $p < 0.01$ ), procedural failure ( $p < 0.01$ ), uni-ventricular physiology ( $p < 0.01$ ) and genetic syndromes ( $p < 0.01$ ). A trend to increase of number of the procedures was recorded over time (38 procedures/year in 2000 vs 90 procedures/year in 2017). In addition, also an increase in complexity of the interventions was reported over time. In fact, Rashkind atrioseptectomy and balloon valvuloplasty (either aortic or pulmonary balloon valvuloplasty) decreased from 81.6% of all procedures in 2000 to 71.1% in 2017 ( $p = 0.3$ ). This trend was presumably due to an improvement of techniques and materials which allowed different and more complex interventional procedures. These changes increased procedural complication rate and in-hospital mortality over time. These increases were more evident from 2000 to 2013 (both complication and mortality rate increased from 2.6% to 12.3%,  $p = 0.08$ ). However, from 2013 to 2017, no significant change in number and type of the procedures was recorded, although with significant decrease of failure (from 7.5% to 2.2%,  $p = 0.09$ ), complication (from 12.3% to 4.4%,  $p = 0.05$ ) and mortality rates (from 12.3% to 3.3%,  $p = 0.02$ ), respectively.

**CONCLUSION.** Interventional cardiac catheterization is a safe and feasible alternative to surgery in neonatal age. Low-weight, uni-ventricular physiology, associated syndromes and the failure of procedure significantly contribute to procedural and/or in-hospital mortality. However, future improvements in techniques and operator skills as well as a more accurate selection of patients might improve results and early outcome of this approach in this high-risk subset of patients.