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Prenatal diagnosis improves pre-operative status and outcomes after neonatal cardiac surgery: Impact of a Fetal cardiology program from a lower middle-income country.

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Introduction:

Congenital heart defects (CHD) are a major contributor of infant mortality in many parts of the world. Prenatal diagnosis of CHD has become standard of care in most high-income countries; however, in low and middle-income countries (LMICs), this is still an unexplored concept. The Fetal Cardiology division was developed at the Amrita Institute of Medical Sciences and Research Centre (AIMS), Kerala in 2008 with the goal of improving peri-operative outcomes for neonates with critical CHDs through availability of prenatal diagnosis and planned peri-partum care.

Methods:

Specific interventions performed included establishment of a comprehensive multidisciplinary fetal cardiac team, creation of a fetal cardiac database to track outcomes and a state-wide prenatal CHD screening capacity building program for obstetricians and radiologists with development of a referral pathway and network. This was done in collaboration with National Health Mission, Kerala, and an international non-governmental organization (Children's HeartLink). Trends in referral patterns of fetuses diagnosed with CHD, planned deliveries, pre-operative cardiac status, operative outcomes and costs were analyzed and compared with neonates diagnosed with CHD after birth for the period 2008-2017.

Results:

Our interventions created a culture of peri-natal cardiac care which resulted in:

- A three-fold increase (66 to 198) in number of referrals of neonates with diagnosis of fetal CHD.
- A 4-fold increase (9% to 38%) in the proportion of neonatal cardiac admissions with prenatal diagnosis between 2008 and 2017.
- A significantly better pre-operative status in prenatal group (median cardiac score 1 vs 3; $p < 0.001$; median Ca-TRIPS score 6 vs 8; $p = 0.001$).
- Prenatal group underwent surgery earlier (7.5 ± 6.5 vs 10.5 ± 8 days; $p = 0.02$)
- A three-fold reduction in surgical mortality in prenatal group (2.9% vs 9%; $p = 0.04$)
- Lower out of pocket expenses for patient families in prenatal group (median INR 63500 vs INR 134,000; $p = 0.02$)

Conclusions:

Through concerted efforts, we were successful in establishing a state-wide network for prenatal diagnosis of CHD in Kerala, resulting in significantly improved peri-operative outcomes of neonates with critical CHD with substantial reductions in costs of care, thus making it an optimal strategy for pediatric cardiac care in LMICs.