CROSS-SECTIONAL STUDY OF NEED OF TARGETED USG AND ITS BENEFITS IN DECREASING FOETAL AND MATERNAL MORBIDITY AND MORTALITY BY OBSTETRIC DECISION MAKING IN A LOW RESOURCE SETTING

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ABSTRACT

BACKGROUND

Congenital anomalies are responsible for a remarkable proportion of mortality and morbidity in newborns. This paper was focused on incidence of structural congenital malformations detectable at birth among 6380 deliveries. This study was conducted to evaluate the need for targeted USG and its benefits in decreasing foetal and maternal morbidity and mortality by obstetric decision making in a low resource setting by assessing structural congenital anomalies and to predict the variables which coexist in the incidence of congenital anomalies so that we can reduce the related perinatal morbidity and mortality.

MATERIALS AND METHODS

This is a cross-sectional study carried out in the Dept. of OB-GYN at Mahatma Gandhi Memorial Government Hospital attached to KAPV Government Medical College, Trichy during 10 months period from April 2016 to January 2017. A total of 6380 deliveries over 10 months, from April 2016 to January 2017, were studied for gross congenital malformations at birth as well as diagnosed antenatally by USG. All congenital anomaly cases detected at delivery were included in the study and also data from the birth register, and available medical & USG records during antenatal period were studied.

RESULTS

We diagnosed 104 cases of foetal anomalies. The antenatal prevalence of congenital anomalies was 1.63%. Out Of 6380 deliveries, 104 cases were identified with a primary diagnosis of congenital anomalies giving a prevalence rate of 1.63%. Anomalies of the cardiovascular system were the most common defects; accounting for 40.38% of birth defects followed by CNS anomalies of 25.0% & GIT anomalies of 18.27%. The surgery rate for delivery for anomaly group 19-22 weeks cases was 11.77%, which is very low when compared to 23-40 weeks anomaly group cases, where the surgery rate was 42.53%. Perinatal morbidity rate is 105.77% and mortality rate is 894.23% in anomaly group which is higher than the normal foetus group where morbidity rate is only 1.59% and mortality rate is 3.60%.

CONCLUSION

The targeted USG and followup, decision making by specialists is important in reducing foetal and also maternal morbidity and mortality. Prevalence of congenital anomaly was 1.63% and anomalies of the cardiovascular system were the most common observed in our study. Majority cases were not associated with any risk factor. However, GDM is the most commonly associated one. Others are polyhydramnios and IUGR. Routine targeted USG by radiologist at 18-22 weeks is an important measure for early detection of malformation. This helps in primary prevention of disability and reduces perinatal morbidity and mortality. This prenatal diagnosis helps in reducing surgery rate and reduces maternal morbidity and mortality.

KEYWORDS

Congenital Anomaly, Targeted USG.

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BACKGROUND

Every year, about 7.9 million infants (6% of worldwide births) are born with serious birth defects. With the causes of over 50% of birth defects unknown, how do we diagnose and prevent them?

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Congenital anomalies are a global health problem. Every year an estimated 7.9 million children are born with a serious birth defect, 3.3 million children (Under five years) die from birth defects, and 3.2 million who survive may develop a disability later in the life.^{1,2} They are the leading causes of prenatal mortality and childhood morbidity and disability in many countries.

Aims and Objectives

To evaluate the need for targeted USG at 18-22 weeks and followup and its benefits in decreasing foetal and maternal morbidity and mortality by obstetric decision making in a low resource setting [by assessing structural congenital anomalies that are diagnosed prenatally & postnatally and by predicting the variables which coexist in the incidence of congenital anomalies].

MATERIALS AND METHODS

The diagnosis of congenital abnormality was based on clinical evaluation and ultrasound examination (as documented by doctors in the patients' folders). Patient's history, including antenatal history, history of exposure to teratogens and family history of consanguinity were obtained from these folders. Further information obtained include maternal age, gestational age and type of congenital abnormality.

Inclusion Criteria

For inclusion in the study, a live birth must have been born from April 2016 to January 2017. Total prevalence was calculated by dividing the numerator (registered cases of congenital anomalies) by the relevant denominator (total live births) for the same period of time. Cases included are-

1. All deliveries which occurred at MGMGH, Trichy.
2. From review of all the records of babies born in MGMGH, Trichy admitted in the Newborn Intensive Care Unit, Mahatma Gandhi Memorial Hospital with the diagnosis of congenital abnormality.

A child with more than one anomaly was counted once only based on the primary diagnosis. We calculated 95% confidence interval (CI) for each prevalence rate.

For purposes of this study, congenital abnormalities are defined as obvious abnormality of structure or form which is present at birth or noticed within a few days after birth.^{3,4}

Statistical Analysis: The study was analysed by the number and percentage for each variable mentioned in the tables.

RESULTS

We diagnosed 104 cases of foetal anomalies. The antenatal prevalence of congenital anomalies was 1.63%. Out Of 6380 deliveries, 104 cases were identified with a primary diagnosis of congenital anomalies giving a prevalence rate of 1.63%. Anomalies of the cardiovascular system were the most common defects, accounting for 40.38% of birth defects followed by CNS anomalies of 25.0% & GIT anomalies of 18.27%.⁵ The surgery rate for delivery for anomaly group 19-22 weeks cases was 11.77%, which is very low when compared to 23-40 weeks anomaly group cases, where the surgery rate was 42.53%. Perinatal morbidity rate is 105.77% and mortality rate is 894.23% in anomaly group which is higher than the normal foetus group where morbidity rate is only 1.59% and mortality rate is 3.60%. In the anomaly group of 19-22 weeks, 88.23% of them were delivered vaginally and there is no foetal morbidity.

Sl. No.	Systems	Congenital Abnormalities								No.	%
		19-22 wks.				23-40 wks.					
		Lethal		Nonlethal		Lethal		Nonlethal			
		Type	No.	Type	No.	Type	No.	Type	No.		
1.	CVS					ASD VSD PDA- PS SV	8 6 25 2 1			42	40.38%
2.	CNS	Hydrocephalus Anencephalus Encephalocoele	3 5 4			Myelomeningocoele Hydrocephalus Microcephaly Spina bifida	6 3 2 3			26	25%
3.	GIT	CDH	2			Duodenal atresia Oesophageal atresia TEF CDH Ileal atresia	4 1 2 2 1	Cleft lip Cleft palate	5 2	19	18.27%
4.	Renal			Post-urethral valve	2	Polycystic kidney	3	Post-urethral valve	1	6	5.77%
5.	Others	Multiple anomalies	1			Down syndrome Choanal atresia Multiple anomalies Anophthalmia	2 1 4 1	Talipes equinovarus	2	11	10.58%

Table 1. USG Diagnosis of Congenital Anomalies in Various Gest. Ages

Liquor Volume	Systems										No.	%
	CVS		CNS		GIT		Renal		Others			
	Type	No.	Type	No.	Type	No.	type	No.	Type	No.		
Polyhydramnios (AFI>8)	ASD VSD PDA	2 3 5	Myelomeningocele Hydrocephalus- Anencephaly	6 4 5	Oeso-atresia TEF Cleft Palate-	1 2 2			Multiple Anomaly	1	31	29.81%
Oligohydramnios (AFI<6)	ASD VSD PDA PS Sv	1 1 1 2 1					Polycystic Kidney	2	Multiple Anomaly	2	10	9.62%
Normal Liquor (AFI 6-8)	ASD VSD PDA	5 2 19	Hydrocephalus Microcephaly Spina bifida, Encephalocoele	2 2 3 4	Duodenal atresia CDH Ileal Atresia, Cleft Lip	4 4 5 1	Polycystic Kidney Posterior Urethral Valve	1 3	Down Syndrome- Choanal Atresia -Talipes- Anophthalmia- Multiple Anomaly	2 1 2 1 2	63	60.58%
Table 2. Distribution of Anomalous Cases According to Liquor Volume												

Table 2. Distribution of Anomalous Cases According to Liquor Volume

As per Table 2 liquor volume has no significant correlation with the incidence of anomalies and 60.58% of anomalies were with normal amount of liquor.

Recommendations: 1. For polyhydramnios- karyotyping, biochemical testing, amnioreduction. 2. For oligohydramnios- counselling for prognosis, vesicoamniotic shunt in foetal obstructive uropathy, amnioinfusion. 3. For normal liquor- followup USG.

Baby Weight	System										No.	%
	CVS		CNS		GIT		Renal		Others			
	Type	No.	Type	No.	Type		Type	No.	Type	No.		
Below 2.6 kg	ASD	4	Myelomeningocele Hydrocephalus Anencephalus	6 6 5	Oeso-atresia	1	Polycystic Kidney	3	Multiple Anomalies	4	55	52.88%
	VSD	3			TEF	2						
	PDA	13			CDH	4						
	PS	2			Ileal Atresia	1						
	SV	1										
2.6 Kg & Above	ASD	4	Microcephaly Spina Bifida Encephalocoele	2 3 4	Duodenal	4	Post-Urethral Valve	3	Down Syndrome Choanal Atresia Talipes Anophthalmia Multiple Anomalies	2 1 2 1 1	49	47.12%
	VSD	3			atresia	5						
	PDA	12			cleft lip	2						
					cleft palate							
Table 3. Distribution of Anomalous Cases in Accordance to Baby Weight												

Table 3. Distribution of Anomalous Cases in Accordance to Baby Weight

Table 3 shows congenital anomalies have no significant correlation with baby weight.

Recommendations: 1. For babies 2.5 kg & below- genetic karyotyping, followup USG, induction based on karyotyping, USG abnormality & gestational age.^{6,7} 2. For babies 2.6 kg & above- followup USG, induction based on liquor volume & gestational age.

GDM												
System												
	CVS-		CNS-		GIT		Renal		Others		No.	%
	Type	No.	Type	No.	Type	No.	Type	No.	Type	No.		
With GDM	ASD VSD PDA PS SV	6 4 15 2 1	Myelomeningocele Hydrocephalus, Microcephaly Spina bifida Anencephaly Encephalocoele	5 4 2 3 3 3			Polycystic Kidney	1	Multiple Anomaly	1	50	48.08%
Without GDM	ASD VSD PDA	2 2 10	Myelomeningocele Hydrocephalus Anencephaly Encephalocoele	1 2 2 1	Duodenal Atresia Oeso-atresia TEF CDH ILEAL Atresia Cleft Lip Cleft Palate	4 1 2 4 1 5 2	Polycystic Kidney Post- urethral Valve	2 3	Down Syndrome- Choanal Atresia Talipes Anophthalmia Multiple Anomaly	2 1 2 1 4	54	51.92%

Table 4. Distribution of Anomalous Cases in Accordance to GDM

Table 4 shows GDM alone is not a risk factor for anomalies.

Recommendations: 1. With GDM- Repeat biochemical testing, preconceptional counselling, control of metabolic state, targeted USG & detailed evaluation. 2. Without GDM- Decision based on type of anomaly.⁸

Counselling has been given

For cases diagnosed: 1. For lethal anomalies- termination. 2. For nonlethal anomalies- followup USG, on care pathway & obstetric decision making. 3. For all cases diagnosed- about chances of recurrences, preconception control of metabolic state and necessity for targeted USG examination.

Mode of Delivery-Anomaly Group						
Gestational Age at Diagnosis-Weeks	No.	%	Vaginal Delivery No.	%	LSCS No.	%
19-22	17	16.35	15	88.23	2	11.77
23-26	4	3.85	-	-	4	100
27-30	4	3.85	-	-	4	100
31-34	20	19.23	14	70	6	30
35-38	30	28.85	21	70	9	30
39 & Above	29	27.89	15	51.72	14	48.28
Total	104	100	65	62.5	39	37.5

Table 5. Mode of Delivery

Mode of Delivery- Anomaly Group 23-40 Weeks						
Gest. Age-wks.	No.	%	Vaginal Delivery		LSCS	
			No.	%	No.	%
23-40 wks.	87	83.65	50	57.47	37	42.53

Mode of Delivery- Normal Foetus Group						
Gestational age-Weeks	No.	%	Vaginal Delivery-No.	%	LSCS No.	%
19-22	840	13.38	825	98.21	15	1.79
23-26	1010	16.09	598	59.21	412	40.79
27-30	1216	19.38	604	49.67	612	50.33
31-34	1412	22.49	709	50.21	703	49.79
35-38	980	15.63	314	32.04	666	67.96
39 & Above	818	13.03	402	49.14	416	50.86
Total	6276	100	3452	55	2824	45

Table 5 shows that in 19-22 weeks, vaginal delivery occurred in 88.23% and surgery rate is 11.77% and in 23-40 weeks it is 57.47% and 42.53% correspondingly. This decreases the maternal morbidity & mortality.

This shows the targeted USG (18-22 weeks USG) significantly decreases the maternal morbidity and mortality by reducing the surgery rate.⁹

Anomaly Group- Perinatal Mortality & Morbidity						
Gestational age at diagnosis-weeks	No.	%	Perinatal Mortality		Perinatal Morbidity	
			No.	%	No.	%
19-22	17	16.35	17	100	-	-
23-26	4	3.85	4	100	-	-
27-30	4	3.85	4	100	-	-
31-34	20	19.23	17	85	3	15
35-38	30	28.85	26	86.67	4	13.33
39 & above	29	27.89	25	86.21	4	13.79
Total	104	100	93	89.42	11	10.58

Table 6. Perinatal Morbidity and Mortality

Anomaly Group-Perinatal Mortality & Morbidity from 23- 40 Weeks						
Gest. Age	No	%	Perinatal Mortality		Perinatal Morbidity	
			No	%	No	%
23-40	87	83.65	76	87.36	11	12.64

Normal Foetus Group-Perinatal Mortality & Morbidity						
Gestational age at Diagnosis-Weeks	No	%	Perinatal Mortality		Perinatal Morbidity	
			No	%	No	%
19-22	840	13.38	10	1.19	-	-
23-26	1010	16.09	32	3.17	-	-
27-30	1216	19.38	22	1.81	34	2.79
31-34	1412	22.49	23	1.62	128	9.07
35-38	980	15.63	11	1.12	45	4.59
39 & above	818	13.03	2	0.24	19	2.32
Total	6276	100	100	1.59	226	3.60

In the anomaly group, perinatal morbidity rate is 105.77%, perinatal mortality rate is 894.23%. In the normal foetus group, in the same period the perinatal morbidity rate is 36%, the perinatal mortality rate is 16%, these values clearly show the perinatal morbidity and mortality is higher in the anomalous group which can be reduced by targeted USG at 18-22 weeks and decision making which in this study is with nil morbidity.

DISCUSSION

Each year, 7.9 million children are born worldwide with congenital anomalies, of which 3.3 million die. Survivors may be mentally and/or physically disabled.

The prevalence of birth defects is comparable all over the world;

1. 1.3% in the United States.
2. 2.2% in India.
3. 2% to 3% in the United Kingdom.
4. 1.4% in Tamilnadu.
5. 1.63% in MGMGH, Trichy.

1. The most prevalent conditions include congenital heart defects, orofacial clefts, Down syndrome, and neural tube defects.^{5,10,11}
2. Age distribution of mothers in the study was 57 patients in 19-29 years, 30 patients in 30-39 years, and 17 patients above 39 years. Mothers were assessed for Hb% and the study shows 45 mothers with <4 g%, 35 mothers with 4-9 g% and 24 mothers with >9 g%.
3. In this study, 36 babies were male, 68 were female, sex ratio was 1:1.9. Birth weight of babies- 62 babies with <2.5 kg, and 42 babies with weight between 2.6-4 kg.
4. Surgery was done in the newborn period for 20 babies: surgery for duodenal atresia 4 cases, VP shunting 2 cases, CDH Correction 2 cases, cleft lip repair 5 cases, cleft palate repair 2 cases, surgery for posterior urethral valve 3 cases, surgery for ileal atresia 1 case. The perinatal morbidity rate is 105.77%. Mortality occurred in 15 lethal cases diagnosed at 19-22 weeks and 77

lethal cases diagnosed between 23-40 weeks and 1 case of cleft palate repair done in the postoperative period (total-93 cases) making perinatal mortality rate 894.23%. These show the higher perinatal morbidity and mortality than the general population.¹²

5. Delay of delivery could have been avoided by Targeted USG. In 19-22 weeks, vaginal delivery occurred in 88.23% and surgery rate is 11.77%. And in 23-40 weeks, it is 57.47% and 42.53% correspondingly. This shows the targeted USG (18-22 weeks USG) significantly decreases the maternal morbidity and mortality by reducing the surgery rate and also the perinatal morbidity and mortality.

CONCLUSION

The results of this study show that babies admitted to a Newborn Special Care Unit had congenital abnormalities and that the commonest forms seen were mainly CVS birth defects. Based on the study the incidence of CVS congenital anomalies was found to be more common. In order to diagnose early and to reduce the perinatal mortality, we need an 18-22 weeks antenatal targeted ultrasound with complete anatomical survey.

Antenatal ultrasound is a non-invasive highly sensitive, accurate and cost-effective imaging technique which gives good results in experienced hands. Meticulous screening for pregnant ladies by ultrasound, especially in 2nd trimester and followup of anomaly cases if required is recommended.

Public awareness about preventable risk factors like anaemia, GDM is to be created and early prenatal diagnosis and management of common anomalies is strongly recommended.

Followup USG after targeted USG, Doppler ultrasound examination, genetic karyotyping, counselling regarding the nature, prognosis, management options, recurrence rate, detailed evaluation with 3D, 4D ultrasound, MRI, counselling about termination of pregnancy, continuation of pregnancy and induction at optimum time and its benefits.^{9,13,14} are to be done.

The following are the recommendations to reduce Foetal and Maternal morbidity and mortality-

1. Need for targeted USG and the need for further study by foetal echo, Doppler, triple and quadruple test routinely, especially in high risk cases.
2. Need for one or more USG examinations, followup, need for high resolution USG, foetal echo, need for specialist care, (Radiologist, Obstetrician, Paediatrician, Paediatric surgeon, Neurosurgeon, Cardiologist, etc.) in decision making to reduce foetal and maternal morbidity and mortality.^{15,16}
3. Need for counselling regarding continuation of pregnancy (non-lethal) and termination of pregnancy (lethal).
4. The limitations are due to operator expertise, quality of instrument, amount of liquor, method of termination in public health setup.

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