Original article:

Significance of Ultrasonographic Soft Tissue Marker In Fetal Outcome- A Prospective Observational study

[1]DrThakare Pravinkumar Yuvaraj, [2]Dr Chaitanya Sadashiv Gaikwad,

[1]Assistant Professor ,Department of Obstetrics and Gynecology, S.B.H. Government Medical College, Dhule,Maharashtra.
[2]Assistant Professor ,Department of Obstetrics and Gynecology, S.B.H. Government Medical College, Dhule ,Maharashtra
Corresponding Author: DrThakare Pravinkumar Yuvaraj

Abstract:

Introduction:-This study was planned to determine significance of ultrasonographic soft markers of and their association with fetal abnormalities, also impact of these markers on development of organ systems and significance in fetal outcome.

Material and methods-A Prospective observational study will be conducted in Shri Bhausaheb Hire medical college , Dhule over a period of one year in which all pregnant women delivered >35 weeks of gestational age and whose obstetrics ultrasound examination between 16 to 20 weeks of gestation show ultrasonographic soft tissue markers will be included in study.

Results- There was no statistically significant difference in postnatally seen major malformation and ventriculomegaly diagnosed on antenatal ultrasonography. There was no statistically significant difference in postnatally seen major malformation and single umbilical artery diagnosed on antenatal ultrasonography.

Conclusion- Overall presence of certainultrasonographic soft tissue markers were not significant in fetal outcome.Though incidence of major malformation in association with these marker was very less in study but detail evaluation during pregnancy and early postpartum period was required.

INTRODUCTION

A great hallmark in obstetrical history began in the second half of 20th century with ability to image the pregnant uterus and its contents. Beginning with sonographic imaging, obstetrical practice revolutionized and gave birth to specialty of fetal medicine.

Sonography has been instrumental in the prenatal diagnosis of fetal structural defects[1.]Major structural anomalies are straightforward to identify and have a reasonably well-defined prognosis. With improvements in technology, however, we are faced with sonographic findings that are not anatomic defects but variations in anatomy that can have a normal or an abnormal outcome. These findings have a more subjective quality to their identification and can vary with fetal position and transducer settings, and they even may change over the course of gestation[1.] In addition, many may carry a wide variety of potential outcomes, ranging from children who are completely normal to those with karyotypicsubnormalities and impaired mental function.

A second trimester ultrasound scan is usually done between 16 to 20 weeks[2]. Two types of sonographic markers suggestive of aneuploidy can be observed in second trimester. Major structural abnormalities comprise first type of markers and second type of markers is known as 'soft markers' of aneuploidy[2]. Anatomic survey of fetus serves to identify structural abnormalities but also plays critical role in detection of chromosomal abnormalities through

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identification of either major anomaly associated with certain aneuploidy conditions or called soft markers for aneuploidy. These soft markers are sonographic findings that are widely regarded as variants of normal. These are non-specific, often transient and can be readily detected during the second trimester ultrasound. The most commonly studied soft markers of aneuploidy include fetal pyelectasis, thickened nuchal fold, echogenic intracardiac focus, choroid plexus cyst, ventriculomegaly, single umbilical artery, echogenic bowel[2]

Recognition of a major structural malformation with a known link to autosomal trisomy or identification of multiplicity of soft markers is likely to prompt a diagnostic test. But Interpretation of isolated marker significance requires some correlation with other risk factors, such as maternal age, obstetrics or family history and maternal serum testing results.

This study is planned to determine significance of ultrasonographic soft markers of aneuploidy like Choroid plexus cyst, echogenic intracardiac focus, renal pyelectasis, increased nuchal fold thickness, ventriculomegaly, single umbilical artery in the general population and their association with fetal abnormalities, also impact of these markers on development of organ systems and significance in fetal outcome.

AIMS AND OBJECTIVES

1) To determine significance of certainultrasonographicsoft tissuemarkers like choroid plexus cyst, echogenicintracardiac foci, ventriculomegaly,pyelectasis, single umbilical artery during Level 2 scan in relation to fetal outcome.

2) To find correlation between presence of soft tissue marker during Level 2 scan and major malformation diagnosed at birth.

MATERIALS AND METHODS

INCLUSION CRITERIA

Delivered patient >35weeks of gestation and level II anomaly scan suggestive of any one ultrasonographic soft tissue markers (choroid plexus cyst, Echogenic intracardiac focus, renal pyelectasis, Ventriculomegaly, Single umbilical artery, Echogenic bowel)

Patients who have already delivered and been discharged, their records will be accessed. The rest of the patients who will deliver after the ethics committee approval will be approached for their consent to access their medical records.

EXCLUSION CRITERIA

1. Patient not followed regularly in antenatal duration or neonate unavailable for follow up.
2. Pregnancy with multiple malformation detected on anomaly scan.
3. Multiple Fetal gestation.

A Prospective observational study will be conducted in Shri Bhausaheb Hire medical college , Dhule over a period of one year in which all pregnant women delivered >35 weeks of gestational age and whose obstetrics ultrasound examination between 16 to 20 weeks of gestation show ultrasonographic soft tissue markers will be included in study.

Patient fulfilling the inclusion criteria will be included in study. Each one of them will be evaluated by detailed history which will include past, present, family, obstetric history and clinical examination.

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All data regarding history, details of malformation scan of each patient will be noted. All the scans performed at a later gestation prior to birth will be recorded. Obstetric scan repeated after specific interval to study of same marker, seen on Level 2 ultrasonography will be noted. If other special investigations for chromosomal abnormality or related to the soft tissue markers done such as amniocentesis, chorionic villus sampling, fetal 2D Echo, color doppler, biophysical profile will be noted and post-delivery neonatal scan, neonatal 2D echo, neonatal X ray or any other investigation, if advised to rule out abnormality, will be noted to find correlation with antenatal USG soft tissue markers. Neonate will be followed till discharged from hospital, up to 10 th day of life.

Soft markers included in study are:

1)choroid plexus cyst

2) Echogenic intracardiac focus

3) Renal Pyelectasis

4) Ventriculomegaly

5) Single Umbilical Artery

Results

1. 31.4% of participants were of age group between 26 and 30. Only 10% participants were of age group of >35 yrs. Mean age was 29.3 yrs.
2. 84.3% of participants were delivered between 37.1-40 weeks of gestation. Mean gestational age at delivery was 38.3 weeks.
3. majority of babies (85.7%) delivered with birth weight >/= 2.5kg.
4. 38 out of 70 participants done maternal screening test either Dual marker/ Triple marker/Quadruple marker test, 35 participants reports suggestive low risk for aneuploidy, 3 reports suggestive of high risk for Trisomy 21. 32 participants not done test
5. 12 participants done amniocentesis in antenatal period and with normal reports.
6. On anomaly scan by USG ,Among 70 participants, 64 were with presence of isolated soft tissue marker and 7 were with multiple soft tissue markers. Renal pyelectasis was present in 32 patients. Intracardiac echogenic focus present in 25. Choroid plexus cyst seen in 14, Ventriculomegaly was present in 3 participants, Single Umbilical artery present in 3 participants
7. Among 70 cases, majority (97.1%) were not associated with malformation at birth. 2 cases (2.8%) of major malformation seen at birth and not diagnosed on antenatal scan.
8. more than 26% had renal pyelectasis<7 and 12% had 7-9 and 8% had >9 according to PelvicalycealDilatation.In 3 cases of mild pyelectasis showed spontaneous resolution in 3rd trimester scan. In cases moderate and severe pyelectasis, findings were persistent in 3rd trimester scan. Renal pyelectasisobersvered in majority of male fetuses (68.75%).

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9. on postnatal ultrasonography majority of cases of renal pyelectasis (62.5%) showed mild PCS fullness, 1 case diagnosed for pelvi-ureteric junction obstruction, 2 cases diagnosed for posterior urethral valve, 1 case for vesico-ureteric reflux, and 6 cases showed complete resolution. 2 cases which showed complete resolution on 3rd trimester scan not repeated scan after birth.
10. 21.87% cases of renal pyelectasis required NICU admission,Majority of cases (78.12%) not required NICU admission.
11. In cases with renal pyelectasis diagnosed Antentally, in postnatal period 2 cases diagnosed with major malformation. 1 case diagnosed for Tracheo-oesogeal fistula and 1 case diagnosed for Dandy Walker Syndrome.
12. There was no statistically significant difference (p>0.24) in postnatally seen major malformation and renal pyelectasis diagnosed on antenatal ultrasonography.
    only 9% cases required surgery rest managed with observation and medicine.71% required hospital stay less than 7 days only 9 required more than 7 days.
13. 35%(25)Percentage of participants with intracardiac echogenic focus. on 3rd trimester scan , 80% cases had persistent intracardiac echogenic focus and in 20% get resolved. Neonatal 2D Echo finding was normal in 92% cases and persistent echogenic focus in 8%.All case needed Hospital stay<7 days.Postnatal intracardiac echogenic focusnot associated with malformation/ Dysmorphic features.

Table No. 1- Distribution of participants according to presence of soft tissue marker in anomaly scan

Anomaly Scan	**N**	**%**
Renal Pyelectasis	32	45.7%
Intracardiac Echogenic Foci	25	35.7%
Choroid Plexus Cyst	14	20.0%
Ventriculomegaly	3	4.3%
Single Umbilical Artery	3	4.3%

Table No 2-Major malformation and renal pyelectasis

Renal Pyelectasis	**Malformation/dysmorphic features seen**		**Total**
Renal Pyelectasis	**No (n-68)**	**Yes (n-2)**	
< 7	18	0	18
< 7	100.0%	0.0%	100.0%
7 to 9	7	1	8
7 to 9	87.5%	12.5%	100.0%
> 9	5	1	6
> 9	83.3%	16.7%	100.0%
None	38	0	38

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None	100.0%	0.0%	100.0%
Total	68	2	70
p- value - 0.24			

Table No**3-Postnatal intracardiac echogenic focus associated with malformation/ Dysmorphic features seen**

Intra-cardiac Echogenic Foci	**Dysmorphic Features**		**Total**
Intra-cardiac Echogenic Foci	**No (n-68)**	**Yes (n-2)**	
Yes	25	0	25
Yes	100.0%	0.0%	100.0%
No	43	2	45
No	95.6%	4.4%	100.0%
Total	68	2	70
p- value - 0.748			

Table No 4-Postnatal Choroid plexus cyst associated with malformation/ Dysmorphic features seen

Choroid Plexus Cyst	**Dysmorphic Features**		**Total**
Choroid Plexus Cyst	**No (n-68)**	**Yes (n-2)**	
Yes	14	0	14
Yes	100.0%	0.0%	100.0%
No	54	2	56
No	96.4%	3.6%	100.0%
Total	68	2	70
p- value - 0.47			

Table 5- Postnatal ventriculomegaly associated with malformation/ Dysmorphic features seen

Ventriculomegaly	**Dysmorphic Features**		**Total**
Ventriculomegaly	**No (n-68)**	**Yes (n-2)**	
Yes	3	0	3
Yes	100.0%	0.0%	100.0%
No	65	2	67
No	97.0%	3.0%	100.0%
Total	68	2	70
p- value - 1.0			

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Table No 30-Postnatal single umbilical artery associated with malformation/ Dysmorphic features seen

Single Umbilical Artery	Dysmorphic Features		Total
Single Umbilical Artery	**No (n-68)**	**Yes (n-2)**	
Yes	2	1	3
Yes	66.7%	33.3%	100.0%
No	66	1	67
No	98.5%	1.5%	100.0%
Total	68	2	70
p- value - 0.084			

DISCUSSION

Sonography has been instrumental in the prenatal diagnosis of fetal structural defects. Major structural anomalies are straightforward to identify and have a reasonably well-defined prognosis. Soft markers are sonographic findings that are widely regarded as variants of normal. A problem now exists, it is the gap between easiness of detection of these markers and the understanding of the significance of their presence, and this creates a great deal of improper counseling which leads to anxiety and confusions. There are controversies between presence of soft tissue marker on antenatal scan and additional abnormalities after birth.

The study was done on 70 women delivered >35 weeks of gestational age and whose obstetrics ultrasound examination between 16 to 20 weeks of gestation show ultrasonographic soft tissue markers.

In present study, mean gestational age at delivery was 38.3 weeks. Majority of participants that is 85.7% delivered at term. Only 14.3% were delivered preterm, <37weeks of gestation. In this study, no association found between presence of soft tissue marker on antenatal scan and preterm delivery.

In this study, among 70 low risk participants, 64 were showing presence of isolated soft tissue marker on Level 2 scan and 6 were with multiple soft tissue markers. Renal pyelectasis was present in 32 cases. Intracardiac echogenic focus was seen in 25 participants. Choroid plexus cyst seen in 14, Ventriculomegaly was present in 3 participants; Single Umbilical artery was present in 3 participants.

In present study, Fetal pyelectasis was classified as mild if the anteroposterior renal pelvis diameter measured >5 mm-< or= 7 mm, moderate >7-< or = 9 mm and severe as >9 mm. Persistent fetal pyelectasis was defined as >7 mm in the third trimester. During the study period fetal pyelectasis was identified in 32 women. Mild pyelectasis was identified in 18/32 (56.25%), moderate pyelectasis in 8/32(25%) and severe pyelectasis in 6/32(18.75%). 9.3% of mild pyelectasis were resolved in third trimester.

In present study, there was no statistically significant difference (p- 0.24) between presence of renal pyelectasis on antenatal USG and major malformation after birth. In study by **G. Ahmad et al**[3], fetal pyelectasis was identified in 74 women. 6 were excluded, as case records were not available. Mild pyelectasis was identified in (56.7%), moderate pyelectasis in 20/67(29.8%) and severe pyelectasis in 9/67(13.4%). In study done by**A Havutcu et al**[4]

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concluded that risk of aneuploidy associated with isolated FP in a low-risk, unselected population is so small that it should not be an indication for invasive prenatal karyotyping.

In present study, 25 cases (35.7%) with intracardiac echogenic focus were found. On 3rd trimester scan 20% of cases were showed spontaneous resolution. In early postpartum period, neonatal 2D Echo done and found that 92% of cases resolved. In 8% cases, on neonatal 2D Echo persistence of intracardiac echogenic focus. At birth cases with intracardiac echogenic focus were not associated with any malformation. There was no statistically significant difference (p- 0.24) between presence of intracardiac echogenic focus on antenatal USG and major malformation after birth. In study done by **G. Gupta et al[5],** 38 cases were found with isolated intracardiac echogenic focus. Outcomes of 28 fetuses were known and all neonates were reported to be normal at birth.

In this study, 14 cases (20%) with choroid plexus cyst found on second trimester anomaly scan. On 3rd trimester scan 9 /14(64.28%) cases showed spontaneous resolution, 5/14(35.71%) cases with persistent findings. After birth neonatal USG Skull finding showed 11/14(78.57%) cases with spontaneous resolution and 3/14(21.43%) cases with persistent choroid plexus cyst. At birth cases with choroid plexus cyst were not associated with any malformation. There was no statistically significant difference (p- 0.47) between presence of choroid plexus cyst on antenatal USG and major malformation after birth. In study done by **R. Teresa et al**, found nine of 10 cases with serial sonograms 2-21 weeks after the initial study, the cysts were no longer present. One fetus had a small cyst persisting at term. The only phenotypic abnormality in the 11 cases with clinical follow-up was a small hemangioma of the chest wall. Most researchers have indicated that isolated CPC is not associated with higher risk of aneuploidy, whereas **few studies[6]** have demonstrated a correlation between isolated CPC and chromosomal abnormalities.

In present study, 3 cases (4.3%) of mild ventriculomegaly(10-15mm) were found on second trimester scan and severe ventriculomegaly with major malformation excluded. On 3rd trimester scan, 1 case of ventriculomegaly showed spontaneous resolution. In early postpartum period neonatal USG skull was done for these cases, all cases with normal findings. No major malformation or dysmorphic features seen at birth. There was no statistically significant difference (p- 1.0) between presence of mild ventriculomegaly on antenatal USG and major malformation after birth. In study done by

In this study, 3 cases (4.3%) of single umbilical artery were found on second trimester scan. Findings were same at birth. 1 case with single umbilical artery showed major malformation (Dandy Walker Syndrome) and also associated with renal pyelectasis. Significance between presence of single umbilical artery and major malformation at birth was calculated by chi-square test. There was no statistically significant difference (p- 1.0) between presence of single umbilical artery on antenatal USG and major malformation after birth.

CONCLUSION

Overall presence of certainultrasonographic soft tissue markers like choroid plexus cyst,echogenicintracardiac foci, ventriculomegaly,pyelectasis, single umbilical artery during Level 2 scan were not significant in fetal outcome.Though incidence of major malformation in association with these marker was very less in study but detail evaluation during pregnancy and early postpartum period was required.

BIBLIOGRAPHY

1. Elsevier: Ultrasound of Fetal Syndromes, 2nd Edition: Benacerraf [Internet]. [cited 2015 Dec 25]. Available from: http://www.elsevier.ca/toc.jsp?isbn=9780443066412
2. Fetal Medicine 2nd edition - ISBN: 9780443104084| US Elsevier Health Bookshop [Internet]. [cited 2015 Dec 26]. Available from: http://www.us.elsevierhealth.com/ob-gyn/fetal-medicine-hardcover/9780443104084/
5. Ahmad G, Green P. Outcome of fetal pyelectasis diagnosed antenatally. J Obstet Gynaecol [Internet]. 2005;25(2):119–22. Available from: http://www.ncbi.nlm.nih.gov/pubmed/15814386
4. Havutcu AE, Nikolopoulos G, Adinkra P, Lamont RF. The association between fetal pyelectasis on second trimester ultrasound scan and aneuploidy among 25,586 low risk unselected women. Prenat Diagn [Internet]. 2002;22(13):1201–6. Available from: http://www.ncbi.nlm.nih.gov/pubmed/12478633.
5. Gupta G, Aggarwal S, Phadke SR. Intracardiac echogenic focus and fetal outcome. J Clin Ultrasound. 2010;38(9):466–9.
6. Bradley KE, Santulli TS, Gregory KD, Herbert W, Carlson DE, Platt LD. An isolated intracardiac echogenic focus as a marker for aneuploidy. Am J Obstet Gynecol [Internet]. 2005;192(6):2021–6; discussion 2026–8. Available from: http://www.ncbi.nlm.nih.gov/pubmed/15970883Obstet Gynecol. 2000;15:114–7.