Role of Ultrasonography and Colour Doppler in Early Diagnosis and Follow up of Amniotic Fluid Abnormalities Regarding the Fetal Maturity and the Associated Fetal Congenital Anomalies

Thesis

Submitted for Partial Fulfillment of M.D. Degree in
Radiodiagnosis

By

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2011

ABSTRACT

This thesis study the amniotic fluid abnormalities, the associated fetal congenital anomalies and the fetal maturity. Eighty seven pregnancies with AF abnormalities were examined by 2D US, color Doppler and 4D US . Our results demonstrate that there are different etiologies causing AF abnormalities, however the presence of congenital anomalies was the most common etiology. It also demonstrates statistically significant growth disturbance association as, 39.1% fetuses showed IUGR, 56.3% fetuses showed normal development and 4.6% showed macrosomia. Our study resulted in, the five traditional parameters for prediction of fetal maturity; lung echogenicity compared to the liver echogenicity, colonic hustra, ossification centers, liquor turbidity and placental grading, are highly sensitivite, however, of very low specificity.

Our results predict pulmonary hypoplasia at TLV less than or equal to 23.92 , Rt. And Lt. lung length less than or equal to 5.6 and 5.22 cm respectively. We found also a significant positive association between the Rt. Lung Length and TLV, Lt. lung length and TLV, Rt. Lung length and Lt. lung length.

Key words: Amniotic fluid abnormalities, congenital anomalies, fetal lung volume, prenatal diagnosis and pulmonary hypoplasia.

Acknowledgment

First and foremost, thanks to ***Allah***

In all gratitude, I would like to express my great appreciation and sincere thanks to Prof. Dr. ***Doria Salim****, Professor of Radiodiagnosis, Faculty of Medicine, Cairo University, for her wise guidance and precious advices Prof. Dr.* ***Maged Ahmed Abd El Raouf****, Prof. of Obstetrics & Gynecology, Faculty of Medicine, Cairo University, for his immense help and continuous support & Prof. Dr.* ***Soha Talaat Hamed****, Professor of Radiodiagnosis, Faculty of Medicine, Cairo University for her wise advices and guidance ,Working under their supervision has been a great honor to me.*

Very special thanks to Prof. Dr. Rasha Kamal , Professor of Radiodiagnosis, Faculty of Medicine, Cairo University Prof. Dr. Dalia Mohamed Ahmed, Assist. Professor of Community medicine, ,Dr. Mohamed Abd El Hafiz, Msc. Neotatology , Dr. Sarah Ibrahim , Msc. Radiodiagnosis ,for their generous co-operation and guidance which have been of great value throughout this work.

I also feel deeply thankful to everyone that helped, encouraged, and participated willingly and kindly to get this work to come to existence.

Thanks to my wonderful family for their love and belief in me.

Elham

Dedication

To my parents, my husband, my sisters and

My family, with love, for their love

To my parents, for their never-ending

support

Elham

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LIST OF ABBREVIATIONS

AC	Amniotice cavity
ACE	Angiotesnin-converting enzyme
AF	Amniotic fluid
AFI	Amniotic fluid index
AFV	Amniotic fluid volume
AL	Allantios
CF	Chorion frondosum
CL	Chorion leave
CRL	Crown rump length
CS	Connecting stalk
CS	Cesarean section
DA	Duodenal atresia
DV	Decidua vera
E	Embyro
ECS	Extrachroionic space
EEC	Extrachorionic embryonic coelom
EEM	Extrachorionic embryonic mesoderm
EVS	endovaginal sonography
FHR	Fetal heart rate
IGF-BP1	Insulin-like growth factor binding protein 1
IUFD	Intra uterine fetal death
IUGR	Intrautrine growth restriction
L/S	Lecithin sphingomyelin ratio
LVP	Largest vertical pocket
MSAFP	Maternal serum alpha feto-protein
MSD	Mean sac diameter
MSHCG	Maternal serum human chorionic gonadotropin
OM	Omphalomesentric duct

PG	Primary gut
PH	Pulmonary hypoplasia
PIH	Pregnancy induced hypertension
PMR	Perinatal mortality rate
PROM	Premature rupture of membrane
RI	Resistivity index
SROM	Spontaneous rupture of the membrance
TLV	Total lung volume
TOF	Tracheo oesophageal fistula
TTS	Twin-to-twin transfusion
TVS	Transvaginal sonography
US	Ultrasound
USG	Urine specific gravity
vd	Vitelline duct
VOCAL	Virtual Organ Computer Aided Analysis
y_1	Primary yolk sac
y_2	Secondary yolk sac
ys	Yolk sac
2D	Two dimensional
3D	Three dimensional
4D	Four dimensional

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INTRODUCTION

Amniotic fluid is an important part of pregnancy and fetal development. This watery fluid is inside a casing called the amniotic membrane (or sac) and fluid surrounds the fetus throughout pregnancy. Normal amounts may vary, but, generally, women carry about 500 ml of amniotic fluid. Amniotic fluid helps protect and cushion the fetus and plays an important role in the development of many of the fetal organs including the lungs, kidneys, and gastrointestinal tract. Fluid is produced by the fetal lungs and kidneys. It is taken up with fetal swallowing and sent across the placenta to the mother's circulation. Amniotic fluid problems occur in about 7 percent of pregnancies (**Brace RA, Resnik R, 1999).**

Too much or too little amniotic fluid is associated with abnormalities in development and pregnancy complications. Differences in the amount of fluid may be the cause or the result of the problem **(Abdel-Fattah et al., 1990).**

Too much amniotic fluid can cause the mother's uterus to become over distended and may lead to preterm labor or premature rupture of membranes. Hydramnios is also associated with congenital anomalies in the fetus. When the amniotic sac ruptures, large amounts of fluid leaving the uterus may increase the risk of placental abruption (early detachment of the placenta) or umbilical

cord prolapse (when the cord falls down through the cervical opening) where it may be compressed **(Abdel-Fattah et al., 1990).**

Fetal abnormalities associated with polyhydramnios include neonatal macrosomia, fetal or neonatal hydrops with anasarca, ascites, pleural or pericardial effusions, and obstruction of the gastrointestinal tract (eg, esophageal, duodenal, and proximal small bowel obstruction), musculoskeletal malformations also can occur; these include congenital hip dislocation, clubfoot, and limb reduction defect **(Biggio et al., 1999).**

Amniotic fluid is important in the development of fetal organs, especially the lungs. Too little fluid for long periods may cause abnormal or incomplete development of the lungs called pulmonary hypoplasia. Intrauterine growth restriction is also associated with decreased amounts of amniotic fluid. Oligohydramnios may be a complication at delivery, increasing the risk for compression of the umbilical cord and aspiration of thick meconium (baby's first bowel movement) **(Phelan et al, 1987).**

Fetal causes of oligohydramnios include fetal urinary tract anomalies, such as renal agenesis, polycystic kidneys, or any urinary obstructive lesion (e.g., posterior urethral valves). Maternal causes include Placental insufficiency, as seen in pregnancy induced hypertention (PIH), maternal diabetes, or postmaturity syndrome when the pregnancy extends beyond 42 weeks' gestation. Maternal use of prostaglandin synthase inhibitors or angiotensin-converting