The Difference between Three Dimensional Ultrasound Volumetry of Gestational and Amniotic Sac Volume as Predictor For Miscarriage in Women With Threatened Abortion

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Ahmed El-Saied Nosier

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List of Abbreviations

APAS	:	Antiphospholipid antibody syndrome
HSG	:	Hysterosalpingogram
MRI	:	Magnetic resonance imaging
APS	:	Antiphospholipid syndrome
LAs	:	Lupus anticoagulant
aCL	:	Anticardiolipin antibodies
anti-beta-2GPI	:	Anti-beta2 glycoprotein I
SLE	:	Systemic lupus erythromatosus
CMV	:	Cytomegalovirus
LMWH	:	Low molecular weight heparin
MTHFR	:	Methylene tetrahydrofolate reductase
IUGR	:	Intrauterine growth restriction
IUFD	:	Intrauterine fetal demise
PIH	:	Pregnancy-induced hypertension
LPD	:	Luteal phase deficiency
NK	:	Natural killer
PGD	:	Preimplantation genetic diagnosis
MI	:	Mechanical Index
2D	:	Two-dimensional
3D	:	Three -dimensional
CRL	:	Crown-rump length
EV	:	Embryo volume
GSFV	:	Gestational sac fluid volume
GSV	:	Gestational sac volume
ASV	:	Amniotic Sac Volume

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Introduction

Abortion is a matter of concern because of its impact on maternal morbidity and mortality in public health **(Jibril et al., 2014)**. It is not generally associated with serious physical morbidity or mortality, but very often has a significant social and psychological impact on the mother **(Cecilia et al., 2013)**. Physical impact may involve sudden considerable pain, blood loss. Psychological impact may also include depressive symptoms, anxiety and development of obsessive-compulsive disorder. Such decline in mental health can last up to six months or more after miscarrying **(Lim et al., 2013).**

Miscarriage defined as the loss of pregnancy before 24 weeks of gestation, and it is the most common serious pregnanc complication **(Cecilia et al., 2013).** The term "threatened abortion" applies to any pregnancy of less than 20 weeks with abnormal bleeding, pain or contractions, with a closed cervix. Bleeding occurs in up to 27% of pregnancies, with the subsequent risk of miscarriage approximately 12% **(Barton et al., 2014).** Threatened abortion become inevitable when dilatation of the cervix occurred. Typically, the vaginal bleeding is worse than with

a threatened abortion, and more cramping is present, no tissue has passed yet **(Jibril et al., 2014).**

Sonography is an excellent and a preferred modality for first trimester pregnancy evaluation. Ultrasonography has an essential role in determining the progress of pregnancy and predicting prognosis. first trimester ultrasound is now a mean of predicting an abnormal fetal outcome not only in the presence of a live embryo but also before visualization of the embryo itself **(Okeke et al., 2014).**

Aim of the work

The purpose of this study is to assess the role of the difference between gestational sac volume and amniotic sac volume as measured by three-dimensional ultrasound in prediction of abortion in women with first- trimester threatened abortion.

Research question:

Is the difference between transvaginal three dimensional ultrasound volumetry of gestational sac and amniotic sac a significant predictor of abortion in women with first-trimester threatened abortion?

Research hypothesis:

Women with threatened abortion pregnancies with a small GSV or a small ASV, as measured by three dimensional transvaginal are at greater risk of abortion.

Miscarriage

Miscarriage is a matter of concern because of its impact on maternal morbidity and mortality in public health. It is not only an important issue of reproductive health, but also a health risk factor for mothers' well-being. The occurrence of a spontaneous abortion is a tragic loss and can be associated with significant psychological problems for women, their partners and families in general.

Risk Factors:

Age and success of previous pregnancies are two independent risk factors that affect the loss rate, many authors have observed an increasing risk of fetal death, in particular spontaneous abortion, with increasing maternal age **(Salim et al., 2003).**

The association of **age** of the mother and the increased likelihood of chromosomal abnormalities is manifested by the age related increase of trisomy 21 and cytogenetic studies on preimplantation embryos **(Salim et al., 2003).**

Outcome of previous pregnancies is another decisive factor in the risk of pregnancy loss. For young women who have never experienced a loss, the rate of a clinical

miscarriage is as low as 5% **(Patel et al., 1997).** The risk increase to approximately 30% for women with three or more losses but with a previous live-born infant and up to 50% for women without alive-born infant **(Shortle and Jewelewicz, 1989).**

From these data, it is evident that some women are at particular risk for losing their pregnancy and that there must be an underlying cause for it. Before dealing with possible mechanisms of recurrent miscarriage, it should be remembered that investigations are necessarily confounded by the fact that the same mechanisms are those in sporadic miscarriage can be involved. The same uncertainty applies for the evaluation of any treatment. It is estimated that approximately 33% of women with so called recurrent miscarriage will have had three consecutive sporadic miscarriage by chance **(Li et al., 2000).**

Etiology:

Parental chromosomal abnormalities and thrombotic complications of the antiphospholipid antibody syndrome (APAS) are the only disputed causes of recurrent abortion. However, collectively these abnormalities account for less than 10% to 15% of RPLs. Although the exact proportion

of patients diagnosed with a particular abnormality may vary among the populations studied, other associations have been made with anatomic abnormalities (12%-16%), endocrine problems (17%-20%), infections (0.5%-5%), and immunologic factors, including those associated with the APAS (20%-50%). other miscellaneous factors have been implicated and account for approximately 10% of cases. Even after a thorough evaluation, however, the potential cause remains unexplained in about one third to half of cases **(Rai and Regan, 2006).**

1) Genetic factors:

1.1. Recurrent aneuploidy

The major cause of clinically recognized abortions is genetic. In order of frequency, the main chromosomal abnormalities are autosomal trisomies, polypoidy, and monosomy X. Most trisomies show a maternal age effect, with chromosome 16 and 22 most commonly involved. Triploidy and tetraploidy account for 30% of chromosomally abnormal spontaneous abortions. Triploid fetuses are usually 69, XXY or 69, XXX and result from dispermic fertilization. Some triploid conceptuses present as a partial mole, characterized by a large gestational sac

and cystic degeneration of the placenta. Tetraploidy rarely progresses beyond 4 or 5 weeks of gestation. Monosomy X is the single most common chromosomal abnormality among spontaneous abortions, accounting for 15% to 20% of all abortions. chromosomal abnormalities are less likely to occur in spontaneous abortions for women younger than age 36 with a history of recurrent abortion **(Stephenson et al., 2002).**

Numeric chromosomal abnormalities, however, might be involved in both recurrent and sporadic losses. couples who are prediposed toward chromosomal abnormal conceptions will also be at increased risk for aneuploid live-born infants. In fact, women with a previous trisomy 18 or 21 pregnancy have an increased risk for a subsequent affected fetus. Data from preimplantation embryos support the concept of recurrent aneuploidy in women with recurrent abortion **(Rubio, 2000).**

1.2.Structural chromosomal abnormalities

Chromosomal translocation is the most common structural rearrangement involved in recurrent miscarriage. Cytogenetic screening of couples with recurrent abortion reveals that the prevalence of translocation in either parent

is 3% to 5%, with the wife being affected twice as frequently as the husband **(Stenchever et al., 2001).** Pregnancy loss and fetal abnormalities depend on the size, location, and type of structural rearrangement.

1.3. Mendelian and polygenic factors

Single-gene or polygenic factors involved in fundamental cellular and reproductive proccesse, are rarely detected, but could be causing recurrent euploid losses. Skewed X inactivation, defined as 90% inactivation of one specific parental allele, has also been found more frequently in women with recurrent abortion. This is only one example of how mutant genes could be involved in repetitive losses of pregnancy **(Lanasa et al., 2001).**

2. Uterine anomalies:

Four major categories of uterine anomaly have been reported to be associated with recurrent miscarriage.

2.1. Congenital uterine abnormalities

Lack of agreement over nomenclature and diagnostic strategies has made it difficult to establish accurate incidence Figures. The major evidence supporting a causal role for congenital uterine anomalies is the higher prevalence observed in women with recurrent miscarriage.