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Application of the Cardiff Count-to-Ten Method for Fetal Well-Being Assessment in Oligohydramnios: A Case Report

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Abstract

Introduction: The severity of amniotic fluid reduction can affect fetal movement. To determine the well-being of the fetus, fetal movement can be counted daily.
Methods: This study is a case report involving one case with the aim of determining fetal movement in a pregnant woman G2P1A0 with oligohydramnios. Data was collected through patient medical records and observation of adherence to filling out fetal movement stickers.
Results: The results showed that the average fetal movement count ranged from 22 to 29 per day. This number is normal because the value of fetal movement is more than 10 times in a duration of 12 hours. It can be concluded that there was no decrease in fetal movement during the patient pregnancy period. Fetal movement monitoring is a subjective method performed by the mother. This becomes inaccurate because mothers who are too busy and do not concentrate on recording can report errors in fetal movement.
Discussion/Conclusion: Fetal movement counting also needs to be followed by other examinations such as cardiotocography and biophysical profile to be able to accurately assess fetal well-being, especially in pregnant women at risk.

Keywords: Fetal Movement, Fetal Well-Being, Oligohydramnios, Pregnant Women.

INTRODUCTION

Oligohydramnios is a condition of less than normal amount of amniotic fluid in pregnant women. The Amniotic Fluid Index (AFI) helps to semiquantitatively measure amniotic fluid. Amniotic fluid can protect the fetus from mechanical trauma, provide nutrients and help fetal growth, and help stabilize temperature to protect the fetus from extreme temperature changes (Shamsnajafabadi & Soheili, 2022). Volume of amniotic fluid during pregnancy is the result of water exchange between the mother, fetus, and placenta. Disruption of this regulatory process can lead to polyhydromnios and oligohydramnios. These disorders may arise from abnormal fetal or maternal conditions and can significantly impact fetal well-being. An adequate volume of amniotic fluid is essential to allow normal fetal movement and growth (Bansal, 2022).

Amniotic fluid volume increased from 1.5 ml at 7 weeks to 25 ml at 10 weeks and 100 ml at 13 weeks (Weissman, Itskovitz-Eldor, & Jakobi, 1996). At 11 weeks, the amniotic fluid volume is about 70 mL and continues to rise, reaching 800 mL by 28 weeks. This is followed by a slower increase, peaking at approximately 1000 mL at 34 weeks. Over the final six weeks of pregnancy, the volume gradually decreases to about 800 mL at 40 weeks (Wladimiroff & Eik-Nes, 2009).

The normal Amniotic Fluid Index is 5-25 cm and then said to be oligohydramnion if the AFI is less than 5 cm (Megan. L, Sarah. M, & Martha. K., 2022). Furthermore, the AFI is categorized into normal AFI (8.1–12 cm), moderate Oligo (5.1–8 cm), and severe Oligo (<5 cm) (Dalal & Malhotra, 2019).

Amniotic fluid volume changes during pregnancy until 34-36 weeks of gestation (Courtney. K., & Anthony. L, 2022). The condition of insufficient amniotic fluid (oligohydramnios) is associated with increased risk of fetal distress, fetal death, small for gestational age infants, cesarean delivery, infants with low APGAR scores, and increased risk of NICU (Neonatal Intensive Care Unit) admission (Bansal, 2022; Dubil & Magann, 2013; Dickinson, 2019). Oligohydramnios is a common obstetric complication, which is about 1-5% of full-term pregnancies worldwide. However, the prevalence increases to more than 12% in term pregnancies. Research reports that 1 in 10 pregnant women in Africa who seek hospital care experience oligohydramnios during pregnancy (Twesigomwe et al., 2022). The severity of amniotic fluid reduction is associated with changes in general fetal movement, moderate fluid reduction can reduce the amplitude of fetal movement while more severe amniotic fluid reduction can reduce the speed and amplitude of fetal movement. Therefore, it is necessary to record fetal movements to monitor intrauterine fetal conditions in pregnant women with oligohydramnion.

Fetal movement counting is a method that aims to reduce perinatal mortality and to assess the condition of fetal well-being, namely the condition of the fetus in a state of well-being, safety, and free from all pathological disorders that threaten its survival. This condition is characterized by normal conditions in fetal activity as measured by heart rate and fetal movements, breathing movements, muscle tone, and the amount of amniotic fluid (Mangesi, Hofmeyr, Smith, & Smyth, 2015). Routine calculation of fetal movement is recommended to start from 26 weeks of gestation in high-risk pregnant women such as oligohydramnion or from 28 weeks of gestation in normal pregnant women (Jagadeeswari & Prasanth, 2020). One method that can be applied to count fetal movements is the 'Cardiff's Count-to-ten' method. This counting method is based on the number of movements with a target of 10 movements in 12 hours (American College of Obstetricians and Gynecologists (ACOG), 2019).

While fetal movement monitoring is crucial in pregnancies with oligohydramnios, studies on the specific application of the Cardiff Count-to-Ten method within this population are limited. This case report aims to provide insights into the applicability of this method in detecting changes in fetal well-being in pregnant women with oligohydramnios. The Cardiff Count-to-Ten method is a widely used technique for fetal movement monitoring. This case report illustrates the application of this method in a case of oligohydramnios, providing observational data on its uses in a specific patient population.

METHODS

This article involves one case of a female patient with an risk pregnancy, G2P1A0, 29 weeks gestation, oligohydramnion. The patient was given a fetal movement sticker attached to her Maternal and Child Health book to be filled in daily, every time the fetus moved until the termination phase of labor arrived (34 weeks). The sticker is evaluated by the health worker during the patient's next ANC (Antenatal Care) visit. On the sticker, each week consists of 7 columns (7 days) which will be filled in with numbers at each time listed, until reaching the target of 10 movements over 12 hours (Adaptation of Cardiff's count to ten) (Figure 1).

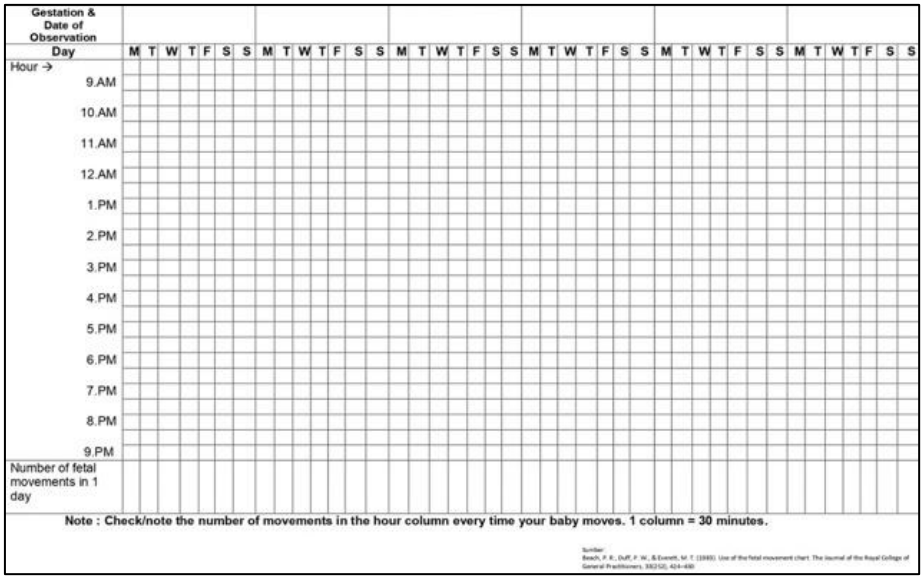

Figure 1. Adaptation Of Cardiff's count to ten

The way to count fetal movements is that each fetal movement is worth one, consecutive fetal movements without a break in time are still valued at one. Patients are instructed to independently monitor fetal movements at home by her self, and the fetal movement chart will be brought during ANC visits and validated by the nurse. The results of fetal movement counting values were averaged every day (Figure 2). Data collection was carried out through patient medical records, as well as observations of compliance with filling in fetal movement stickers. To ensure the accuracy of fetal movement counting, patients were given detailed instructions on how to correctly identify and record each fetal movement. Additionally, during ANC visits, nurses conducted thorough reviews of the fetal movement charts, cross-referencing them with patient reports and clinical assessments to validate the accuracy of the recorded fetal movements.

CASE

Female, 34 years old with obstetric status G2P1A0, 34 weeks pregnant, cephalic presentation, singleton pregnancy, olighidramnios, post lung maturation, came to the hospital for planned Sectio Caesarea. Previously the patient had regular ANC at a type B hospital and routinely monitored fetal movements using a chart card. During the ANC visit it was said that the fetus tended to be small and the amniotic fluid was reduced. At 32 weeks gestation EFW (Estimated Fetal Weight) 1800 grams and AFI (Amniotic Fluid Index) 6.9. Then the patient came back at 33 weeks with EFW 1846 grams and AFI 2.9. Then the patient was advised to be hospitalized for closer observation. Until at the age of 34 weeks it was said that the EFW was 1800 grams (decreased) and the AFI was exhausted. The patient then underwent Sectio Caesarea. The previous history of childbirth in 2016 the patient gave birth by Sectio Caesarea for induction failure with a baby's birth weight of 2700 grams, male sex.

DISCUSSION

This study used fetal movement counting with the Cardiff Count-to-Ten method. This method was chosen for use because it requires a longer period of time, up to 12 hours in a day. This allows for higher accuracy in assessing fetal well-being. Early anticipation can be taken by pregnant women and their families if, in one day, fetal movement is less than 10 movements, by immediately visiting the nearest health facility to check the fetal condition more comprehensively. Early detection through the Cardiff Count-to-Ten method can minimize the risk of further fetal morbidity and mortality (Mangesi et al., 2015; Bekiou & Gourounti, 2020).

Fetal movement is a sign that the fetus is growing and developing, therefore pregnant women should be taught to count fetal movements periodically. Reduced fetal movement can be a sign that there is fetal distress, so the pregnancy should be further evaluated by a health care facility (hospital) (Bryant J, Jamil RT, 2022). Some of the causes of decreased fetal movement are smoking, alcohol consumption, drug consumption

(benzodiazepines, opiods, bethadone), Intrauterine Growth Restriction (IUGR) and low amniotic fluid volume or oligohydramnion (Bekiou & Gourounti, 2020).

Furthermore, fetal movement counting is a cost-effective and non-invasive approach that empowers pregnant women to actively participate in monitoring their baby's health. By engaging in this practice, women become more aware of fetal activity patterns and can quickly recognize any deviations from the norm. Studies have shown that self-monitoring of fetal movements can lead to timely interventions, reducing adverse perinatal outcomes and improving overall maternal confidence during pregnancy (Niu et al., 2023; Raynes-Greenow, Gordon, Li, & Hyett, 2013; Senapati, Xavier, & D'Silva, 2023).

In addition, integrating the Cardiff Count-to-Ten method into routine antenatal care can enhance communication between healthcare providers and pregnant women. Educating mothers about the importance of fetal movement and how to accurately perform the counting method ensures better adherence and reliability. Healthcare professionals should provide clear guidelines on interpreting fetal movements and emphasize the need for immediate medical consultation if reduced movement is detected. This collaborative approach can strengthen maternal and neonatal healthcare strategies, ultimately leading to improved birth outcomes (Braidi R. Huecker; Radia T. Jamil; & Jennifer Thistle., 2023).

Oligohydramnion and fetal movement

Fetal movement monitoring can be done using the Cardiff Count-to-Ten, Sadovsky, and Mindfetalness methods. Each method has distinct differences, but essentially, these methods require pregnant women to count fetal movements. In the Cardiff Count-to-Ten method, pregnant women are required to count fetal movements for 12 hours until 10 movements are reached. Meanwhile, in the Sadovsky method, pregnant women are required to count fetal movements for one hour after each meal, three times a day (Mangesi et al., 2015). A different approach is found in the Mindfetalness method, where this method focuses on the character, strength, and frequency of movements without counting each movement (Rådestad, Doveson, Lindgren, Georgsson, & Akselsson, 2021). It is performed every day from the 28th week of gestation for 15 minutes. Pregnant women are instructed, from the 28th week of pregnancy onwards, when the baby is awake, to focus on the character, strength, and frequency of movements (without counting each movement) every day for 15 minutes.

At 29 weeks gestation, the patient had an ANC visit and was told that the AFI was starting to decrease (oligohydramnion), the patient began to be educated about monitoring fetal movements to assess the welfare status of the fetus until the delivery phase. The condition of oligohydramnion should be a factor in reducing fetal movement. But contrary to the case of patients who did not experience a decrease in fetal movement. This is also supported by research which says that there is no relationship between the amount of amniotic fluid and fetal movement per minute (Robert Almli, Ball, & Wheeler, 2001). This condition is also reinforced by other studies which say that there is no association between the perception of decreased fetal movement and the amount of amniotic fluid (Sheikh, Hantoushzadeh, & Shariat, 2014). Some of the contributing factors are interobserver and intraobserver variations, gestational age at examination, number of participants, and abnormal amniotic fluid values. The normal amniotic fluid index (AFI) value is between 6 and 25, while oligohydrous amniotic fluid is less than 5 cm based on ultrasound examination (Courtney Keilman, 2022; Anthony L. Shanks, 2022; Megan, Sarah Marino, & Martha Kole, 2022).

The patient was diagnosed with oligohydramnion since 29 weeks of gestation despite a known AFI of 6.9 (normal) at 32 weeks. This may be a contributing factor to the absence of fetal movement changes. Because a decrease in fetal movement (less than 10 times a day) occurs in conditions of AFI less than 5, according to Bekiou & Gourounti (2020). The patient experienced an oligohydramnion condition with an AFI value of 2.9 at 33 weeks of gestation and the AFI was exhausted at 34 weeks just before termination of pregnancy. During the period of 33 to 34 weeks, there was also no decrease in fetal movement (Figure 2). The patient's condition is contrary to the theory that oligohydramnion can cause decreased fetal movement.

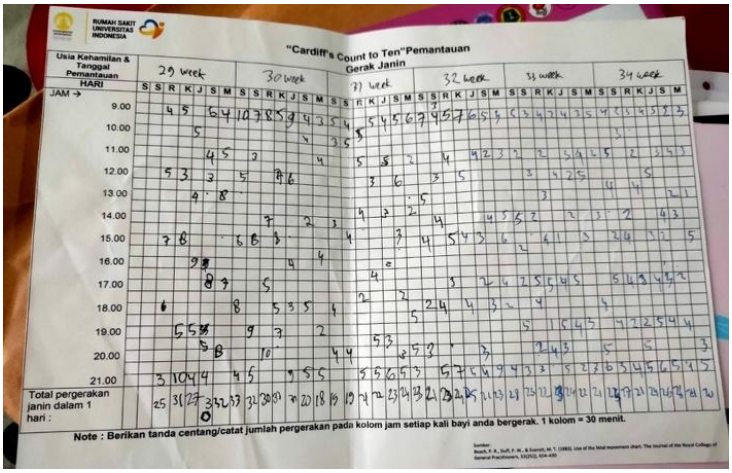

Figure 2. Results of Fetal

The absence of changes in fetal movement in the patient may be due to the patient's subjective bias in the calculation. Fetal movement counting is a subjective method that is assessed from the mother's perception. Every mother who will count fetal movement is instructed to pay attention to fetal activity. The mother is in a quiet room and takes careful notes. Mothers who are busy and not concentrating on fetal activity often report misperceptions of fetal movement (Royal College of Obstetricians and Gynaecologists, 2011). The patient's activity condition during fetal movement counting could not be monitored and controlled by the researcher (Figure. 2). This causes the calculation of fetal movement to be inaccurate which may occur in patients. Although education and follow-up regarding the calculation of fetal movement is carried out by nurses at each patient's ANC visit and by telephone, it cannot thoroughly monitor how patients calculate movements while at home.

In addition, the absence of changes in fetal movement may be due to the patient's AFI being classified as moderate oligohydramnios. According to Sival, Visser, & Prechtl, (1990) significant changes in fetal movement typically occur when AFI has decreased to a severe level. Furthermore, the absence of significant changes in fetal movement may also be potentially due to the fetus adapting to the reduced amniotic fluid volume, where the fetus may have developed a more efficient movement pattern that requires less space and energy, thus maintaining a perceived normal level of activity (Lai, et al, 2016; Sival, Visser, & Prechtl, 1990). It could also be that while the frequency of movements remained consistent, the quality or intensity of those movements may have changed, leading to smaller, less noticeable movements that are still being counted by the patient. Furthermore, individual variability in fetal response to oligohydramnios may play a role, where some fetuses demonstrate resilience and maintain their activity levels despite reduced amniotic fluid. The impact of oligohydramnios on fetal movement could also depend on its duration and severity, if the condition is mild or of recent onset, the fetus may not yet be significantly affected, resulting in a maintained perception of normal fetal activity.

Even in the absence of noticeable changes in fetal movement, as professional nurses, we must educate all pregnant women about fetal movement monitoring. This practice of counting fetal movements not only helps detect potential issues but also enhances mother-baby bounding, promotes maternal readiness, and alleviates postpartum anxiety (El-Sayed Mohamed El-Sayed, Hassan, Abdel Hakeem Hanseen Aboud, Al-Wehedy Ibrahim, & Al-Wehedy, 2018; Owens & Libertus, 2022).

Other fetal well-being checks

Fetal well-being can be assessed through non-stress tests, contraction stress tests, doppler ultranosography, biophysical profiles, and fetal movements (ACOG, 2019). A simple fetal well-being assessment that can be done by pregnant women at home is to count fetal movements (Lai et al., 2016). However, fetal movement counting alone may not be sufficient to comprehensively determine fetal well-being, especially in high-risk pregnancies. Risk pregnancies can contribute to neonatal morbidity and mortality if not monitored early, making additional examinations crucial. While fetal movement counting serves as an initial step, it should be complemented with

advanced assessments such as cardiotocography, ultrasonography, and biophysical profile evaluations to ensure accurate monitoring (ACOG, 2019).

Cardiotocography is an electronic method of assessing the fetal heart rate using ultrasound transducers. One transducer is placed on the mother's abdomen for the fetal heart rate, and the other transducer is placed over the fundus of the gravid uterus to record uterine contractions. This makes cardiotocography useful during the antepartum and intrapartum periods (Lai et al., 2016). The aspects measured are fetal heart rate, baseline rate, baseline variability, acceleration, and deceleration. Cardiotocographic examination is excellent for determining fetal well-being as many aspects are analyzed including the relationship between fetal movements and contractions (Jain & Acharya, 2022). Another examination that can identify fetal well-being is the biophysical profile.

Biophysical profiling is an examination that combines ultrasonography with cardiotocography (non-stress test) to assess the well-being of the fetus in the womb (Johns hopkins, 2023). The parameters used for biophysical profile assessment are non-stress test, fetal respiratory movements, fetal body movements, fetal muscle tone, and amniotic fluid bag assessment, each aspect of which is given a score of 2 (Jain & Acharya, 2022). Biophysical profile is very well used to detect uteroplacental insufficiency, as fetal hypoxia is one of the leading causes of fetal death (Jain & Acharya, 2022). Cardiotocography and biophysical profile assessments should be performed in the hospital by an authorized physician. This makes it an accurate but complex assessment of fetal well-being. If the patient wants to monitor fetal well-being at home, fetal movement counting can be done, which is a simple method that can be done anywhere but with low accuracy and subjective value. Therefore, the examination of fetal well-being should not only be fetal movement counting but should combine all examination methods from simple methods to complex methods, in order to avoid complications and intrauterine death.

CONCLUSION

The findings of this study provide valuable insights into fetal movement patterns and their assessment in cases of oligohydramnios. However, these findings may be limited to specific contexts, such as the characteristics of the study population, clinical settings, and the methodology used for fetal movement monitoring. Differences in maternal perception, healthcare practices, and technological availability may affect the applicability of these results to broader populations.

In this case, reduction of fetal movement in patients diagnosed with oligohydramnion from 29 to 34 weeks of gestation does not occur. This is due to the incorrect diagnosis of oligohydramnion. The patient was diagnosed with oligohydramnion since 29 weeks of gestation with an AFI value more than 5 (moderate oligo). Meanwhile, the diagnosis of severe oligohydramnion is an AFI value less than 5. This occurred at 33 weeks gestation with an AFI of 2.9 and immediate termination at 34 weeks. The absence of changes in fetal movement may be due to the patient's AFI being classified as moderate oligohydramnios.

In addition, the absence of fetal movement can be influenced by the subjectivity of the patient's calculation. Furthermore, the lack of significant changes in fetal movement may also be attributed to the fetus adapting to the reduced amniotic fluid volume. In such cases, the fetus may develop a more efficient movement pattern that requires less space and energy, thus maintaining a perceived normal level of activity.

While the Cardiff Count-to-Ten method provides a simple and accessible approach for fetal movement monitoring, it has limitations in accurately determining fetal well-being in cases of oligohydramnios. Therefore, additional objective assessments such as ultrasound, cardiotocography, and biophysical profile are recommended. Future research recommendations could combine fetal movement monitoring methods with biophysical profiles in at-risk pregnant women. This is done to prevent fetal morbidity or mortality.

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