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SPECIAL ARTICLE

Update on Amniocentesis

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ABSTRACT

Amniocentesis is a common prenatal diagnostic procedure. All steps before, during and after the procedure are essential and should be carefully performed. Moreover, there are several interesting and update aspects. This article aims for updating of amniocentesis in pregnant women with specific conditions, such as those infected with human immunodeficiency virus (HIV), those taking antiplatelet medications (such as aspirin), those who are obese, those who are infected with hepatitis B, and those experiencing a twin pregnancy.

Keywords: amniocentesis, human immunodeficiency virus, obese, hepatitis B, twins.

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Introduction

Amniocentesis is a common prenatal diagnostic procedure. The amniotic fluid is transabdominally withdrawn from the gestational sac and used for diagnosis of abnormal fetal conditions. In Thailand, the procedure was first performed in the year 1978, aiming to evaluate the number of fetal chromosomes[1]. Currently, most amniocentesis procedures are performed under continuous ultrasonographic guidance and the complication-related amniocentesis rate in singleton pregnancies is approximately 0.1%[2]. All steps before, during and after the procedure are essential and should be carefully done, including patient and family counselling, patient preparation, the procedure itself, immediate and late post-procedural management and complication-related procedural monitoring. Initially, a reasonable indication must be provided for each individual pregnant woman. Common indications for amniocentesis are described as follows:[3]

1. A pregnant woman who has a high risk of abnormal fetal aneuploidy (trisomy 13, 18 or 21): The

risk may be found by analyzing maternal history or background risk (maternal age, previous child affected by aneuploidy), maternal serum assessment (first-trimester combined test, quadruple test), abnormal ultrasonographic fetal structures or positive non-invasive prenatal testing, etc.

2. A pregnant woman who has a high risk of having a fetus affected by a single-gene disorder such as thalassemia

3. Intrauterine infection diagnosis

4. Therapeutic relief of discomfort symptoms in a pregnant woman who is affected by polyhydramnios or therapeutic reduction of amniotic fluid in a pregnant woman with twin-to-twin transfusion syndrome

After the indication has been identified, the pregnant woman and her partner must be counselled about her individual amniocentesis indication. Partner involvement during antenatal counselling is preferred because our previous study found that a partner's involvement in antenatal genetic counselling resulted in a higher proportion of participants who increased their knowledge score when comparing the score prior to and immediately after antenatal genetic counselling[4]. With regard to counselling methods, several techniques were introduced, including group or individual counselling, reading leaflets by oneself and computer-assisted instruction. Our previous study found that both reading leaflets by oneself and computer-assisted instruction methods improved pregnant women's knowledge and satisfaction and reduced pain and anxiety. In combination with individual counseling, reading leaflets by oneself was more effective than computer-assisted instruction in improving pregnant women's knowledge before second-trimester genetic amniocentesis[5]. In any case, all pregnant women should be asked to provide informed consent before the procedure.

In our opinion, the most interesting issue in this update on amniocentesis is amniocentesis in pregnant women with specific conditions, such as those infected with human immunodeficiency virus (HIV), those taking antiplatelet medications (such as aspirin), those who are obese, those who are infected with hepatitis B, and those experiencing a twin pregnancy

Amniocentesis for pregnant women infected with human immunodeficiency virus (HIV)

In the past, vertical HIV transmission has been reported at rates of around 15-40% without antiretroviral (ART) drugs[6], and amniocentesis was prohibited because of the concern that maternal blood exposure during amniocentesis may increase the risk of mother-to-child transmission[6]. However, the proper administration of highly active antiretroviral therapy (HAART) has led to an effective reduction of the viral load in both maternal blood and amniotic fluid[7]. Therefore, the recommendations for amniocentesis in HIV-positive women have changed. Most of the recent literature suggests that it is safe to perform amniocentesis in women on HAART with undetectable viral loads[8-9]. In the literature, rates of 0/20 and 1/7 vertical HIV transmission after amniocentesis with and without HAART therapy, respectively, have been reported[10]. However, placental injury should be avoided[8]. For HIV-positive women who are not undergoing HAART and have an unknown viral load, the procedure must be postponed[10]. In any case, in our practice, we still avoid amniocentesis in HIV-positive women as much as possible. Non-invasive prenatal investigation is more preferred because we believe that the number of reported cases may be not enough to warrant definite safety confirmation.

Amniocentesis for pregnant women taking aspirin

The benefit of using daily low-dose aspirin from the late stages of the first trimester to prevent or delay the onset of preeclampsia has been proven and is widely accepted[11]. Therefore, some amniocentesis-indicated pregnant women will be taking low-dose aspirin, and concern about the potential risk of bleeding complications is warranted. Moreover, an increased risk of nonreportable cell-free DNA results in pregnant women taking low-dose aspirin has been reported[12]. Until now, there have been no studies or

case reports which have demonstrated that aspirin usage during amniocentesis is either safe or dangerous. There is no definite evidence that discontinuing aspirin before amniocentesis is clinically reasonable. In other minor procedures, aspirin discontinuation is done in a range of 5 to 7 days before the procedure (>10 days is too early; </= 3 days is too late)[13-14]. Our preference is to discuss the bleeding risk and thrombotic risk with the pregnant women. The management of the risk is decided together. If discontinuation is decided, doing it 5 to 7 days before the procedure is our suggestion.

Amniocentesis for pregnant women who are obese

Obesity is a significant problem during pregnancy. In Europe, 20 to 40 percent of pregnant women excessively gained weight, beyond the recommended GWG, and were affected by additional obstetric complications[15]. The limitations of ultrasonographic image exposure and procedural technical difficulty are important aspects of concern. Gentle pressure on the abdominal wall to collapse the abdominal wall thickness accompanied with a special long spinal needle is our suggestion for easier passage through the amniotic sac. A maternal fetal medicine specialist should be consulted in the most difficult cases.

Amniocentesis for pregnant women infected with hepatitis B

The overall vertical transmission rate of hepatitis B in pregnant women who have undergone amniocentesis is higher than the rate in pregnant women who have not undergone amniocentesis (6.35 vs. 2.53%)[16], especially in those with a high viral load (>/=7 log10 copies/mL) or positive HBe antigen[17]. Thus, the suggestion is to decrease the viral load and avoid placental injury during the needle puncture[18].

Amniocentesis for women experiencing a twin pregnancy

The tendency of fetal loss after amniocentesis in twin pregnancies has been found to be higher than in singleton pregnancies. Our previous retrospective descriptive study reported that the rate of fetal loss within 14 days after second-trimester amniocentesis was 1.4%[19]. The important initial step before amniocentesis in twin pregnancies is chorionic determination. Then, decisions are made on the location of the puncture site and the number of sac punctures needed. In dichorionic twin pregnancies, sampling of both sacs is preferred. Indigo carmine may be injected into the first sac, allowing the operator to identify if the second sample is from the same sac or not[16].

In monochorionic, diamniotic twins, the number of sacs sampled depends on fetal anatomy and ultrasonographic evaluation of growth. Two-sac sampling may be indicated in cases of discordant fetal growth or anatomy[16].

Conclusion

In conclusion, amniocentesis is a common prenatal invasive diagnosis. However, medical professionals should get up to date on several specific conditions due to recent scientific knowledge improvements.

Potential conflicts of interest

The author declares no conflicts of interest.

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