Placental Alpha Microglobulin-1 Detection in Cervico-vaginal Secretions in the Diagnosis of Preterm Premature Rupture of The Membranes

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Abstract
Objective: This study aimed to evaluate the value of detection of placental alpha macroglobulin-1 (PAMG-1) in cervicovaginal discharge as a diagnostic test for Premature Rupture of Membranes (PROM) compared with traditional methods.
Methods: A comparative study was conducted on 60 pregnant women 20-37 weeks of gestation in Cairo University Maternity Hospital, Egypt. PROM was evaluated using U/S, Ferning test, Nitrazine test, pooling, and PAMG-1 immunoassay. The studied women were divided into two groups based on the presence or absence of PROM. Confirmed diagnosis of PROM was based an artificial gold standard. Sensitivity, specificity, positive and negative predictive values and overall accuracy of the diagnostic tests were calculated.
Results: PAMG-1 was superior to other tests regarding sensitivity (96%), specificity (97.14%), positive predictive value (96%), negative predictive value (97.14%) and accuracy (96.67%).
Conclusion: PAMG-1 has a higher accuracy than the traditional methods, with high sensitivity and specificity and is easy to use.

Key words: Placental alpha macroglobulin-1; cervico-vaginal secretions; premature rupture of membranes
1. Introduction

Membrane rupture is one of the most common disorders during pregnancy. It may occur at any time in the pregnancy. It may happen appropriately with the onset of labor at term, or prematurely, prior to the onset of labor. When occurring prior to the onset of labor for more than 24 hours at term, it is referred to as premature rupture of membranes or PROM. Alternatively, it may occur in a preterm gestation, less than 37 weeks and is referred to as preterm premature rupture of membranes or PPROM (Deering, et al., 2007). Regardless of when membrane rupture takes place, the method of diagnosis is the same.

PROM occurs in approximately 10% of all pregnancies after 37 weeks gestation and in 2-3.5% of pregnancies before 37 weeks gestation. PROM constitutes a major etiological factor of prenatal and postnatal complications. It is a significant cause of premature delivery and other maternal and neonatal complications (Simhan, et al., 2005).

The management of a patient with PROM and PPROM is expensive and difficult as the clinician attempts to balance the risk of prolonging pregnancy against the risks of acquiring intrauterine and maternal infection and the immaturity of lung development. Therefore, correct and timely diagnosis of this disorder is critical (Hofmeyr, et al., 2014).

Membrane rupture, either PROM or PPROM, can be conducted when the following symptoms/conditions occur: i) Vaginal secretions increase or become watery, especially in women at the risk of preterm delivery or after an insult to the abdomen, as a fall, strike or shake of the stomach, leading to potential rupture of fetal membranes. ii) Visible or unnoticed leakage of amniotic fluid (Caughey, et al., 2008).

Evaluation of the patient begins with full history taking, full general and local examination. Then a sterile speculum examination is done, from which three signs of membrane rupture are sought; pooling, positive Ferning test, and positive Nitrazine test. Additionally, oligohydramnios (low amniotic fluid level) may be detected by sonographic examination suggestive of amniotic fluid loss secondary to membrane rupture but not conclusive (Medina & Hill, 2006).

In diagnosing PROM, the history and physical examination alone often are inadequate to confirm the status of the membranes. Fluid may not be present in the vagina for evaluation; the fluid may be contaminated with urine, cervical mucus, vaginal discharge, blood, or meconium. Because of these difficulties, multiple cytological, biochemical, colorimetric and sonographic methods have been developed for detection of ruptured membranes. Despite significant advances in technology, no one test has been found to be completely accurate, and the diagnosis still requires an integration of historic factors, physical examination, and laboratory testing (Caughey, et al., 2008).

Noting that pooling strongly supports the diagnosis of Rupture of Membranes (ROM) (Alexander, et al., 2000). However, this finding is not always present in a patient with ROM (Wiberg-Itzel, et al., 2005). Amniotic fluid produces a delicate ferning pattern, in contrast to the thick and wide arborization pattern of dried cervical mucus. However, the method of “Ferning” has been associated with false positive results described secondary to contamination with fingerprints on a slide or contamination with semen and cervical mucus. False negatives may be caused by inadequate amniotic fluid on swabs or contamination with blood (Mercer & Lewis, 1997). The strength of the fern test to differentiate between amniotic and non-amniotic fluid in vaginal discharge was investigated in the laboring and non-laboring patient with noted differences in sensitivity and specificity. Sensitivity and specificity in the laboring group were 98.0% and 88.0%. In the non-laboring group, sensitivity and specificity were only 51.4% and 70.8%, respectively (De Haan, et al., 1994).

The Nitrazine test is designed only to confirm an alkaline pH in the cervico-vaginal secretion, the pH of the vaginal secretions is generally 4.5-6.0 whereas amniotic fluid usually has a pH of 7.1-7.3. Yet it is the
most common test used to diagnose PROM, it is associated with false-positive results ranging from 1% to 17% that can result from alkaline urine, blood, semen, vaginal discharge in cases of bacterial vaginosis, or Trichomonas infection. Sensitivity and specificity have been reported at 90.7% and 77.2% respectively (Cousins, et al., 2005; ACOG, 2007).

Membrane rupture is suspected to have occurred if any of the above three findings are present and diagnosis is confirmed when all three findings are noted. However, all three findings are not mandatory for the diagnosis of membrane rupture. When two of three are present, clinical correlation is exercised. Frequently, equivocal results are obtained when diagnostic criteria are not met and result in false positive and false negative diagnosis of ruptured membranes (Medina & Hill, 2006).

There are many biochemical tests, which have been studied for the diagnosis of ROM. A good test must be reliable, simple and rapid (Esim, et al., 2002). These biochemical markers include prolactin (Shahin & Raslan, 2007; Kariman, et al., 2012), alpha-feto-protein (AFP) (Shahin & Raslan, 2007), fetal fibronectin (Lockwood, et al., 1991), diamine-oxidase, insulin-like growth factor binding protein-1 (IGFBP-1) (Lockwood, et al., 1994; Gaucherand, et al., 1997), beta-subunit of human gonadotropin (B-HCG) (Esim, et al., 2003; Shahin & Raslan, 2007) and urea-creatinine (Osman & Elghazaly, 2014). However, prolactin and AFP were not useful markers for PROM because of the overlap in concentrations between pregnant women with and without ruptured membranes (Phocas, et al., 1989). Moreover, chorionic release of fetal fibronectin preceding delivery in patients with intact membranes may also lead to false-positive results. IGFBP-1 is a major protein of amniotic fluid, which can be detected by a dipstick method in 5 minutes (Erdemoglu & Mongan, 2004).

When the diagnosis remains unclear, an invasive method may be applied where amniocentesis is done and a dye (Evans Blue or Fluorescein) is injected and leakage from the cervix is visualized. This method is highly invasive and has many complications and can itself induce a PROM and miscarriage. Therefore, a rapid, accurate, inexpensive, and noninvasive test for the diagnosis of PROM is urgently needed (Caughey, et al., 2008).

The use of PAMG-1 detection in cervico-vaginal discharge as a simple, easy, rapid and minimally invasive diagnostic test for PROM is getting popularity nowadays. It has high concentration in the amniotic fluid, low level in blood and extremely low background level in cervico-vaginal secretions with intact fetal membranes (Cousins, et al., 2005).

This study aimed to evaluate the detection of PAMG-1 in cervico-vaginal discharges as a diagnostic test for ROM in comparison with traditional tests.

2. Methodology

This comparative study was carried out in Cairo University Maternity Hospital, Cairo, Egypt from October 2009 to March 2010. The study included 60 pregnant women between 20-37 weeks of gestations who were divided into two groups based on the presence or absence of PROM. The study excluded pregnant women who had active vaginal bleeding or infection, placenta previa, complicated pregnancy, fetal distress or known fetal anomalies.

A written informed consent (in Arabic language) was obtained from all participants. It included all details about the purpose of the study and the method of sample collection.

A full history taking, physical examination, sterile speculum examination and transabdominal ultrasound examination were performed. All participants were assessed using Amniotic Fluid Index (AFI), pooling test, Nitrazine test, Ferning test and PAMG-1 rapid immunoassay test (AmniSure).

AFI was calculated by 4 quadrants method during the ultrasound examination. This consists of the sum of the vertical diameters of the largest pockets seen in each of the four quadrants of the uterus. The AFI
is considered normal between 8.1 and 18 cm, low between 5.1 and 8.0 cm, very low ≤5 cm, and high >18 cm. For optimum accuracy, the mean of three AFI measurements was calculated, when the AFI is <10 cm (Nabhan & Abdelmoula, 2008).

The Nitrazine test was carried out by swapping the posterior vaginal fornix with a Litmus paper. A positive result was interpreted as a change of the Litmus paper colour into dark blue indicating alkaline pH of the amniotic fluid.

For doing the Ferning test, a drop of vaginal secretion from the posterior fornix was collected by a sterile syringe and put on a dry clean glass slide. Then waiting for 3 minutes to dry and microscopic examination was done. A positive fern test is defined as visualization of arborization (the tree like pattern) is observed (ACOG, 2007).

Detection the presence of PAMG-1 in cervicovaginal discharge was carried out using the Amnisure kits (Lee, et al., 2007). Rapid immunoassay of PAMG-1 was performed by placing a sterile swab at the posterior vaginal fornix for about one minute. It was then rinsed into a vial containing solvent for another 1 minute and then disposed. The test strip was inserted in the solvent, and the result would be available in 5 minutes. The test was considered negative if only a control line is visible. While if both control and test lines were visible, the test result was positive. If no lines were visible, the test result was invalid (Joong & Errol, 2005).

Blood samples were collected from participants to do CBC for TLC, ESR and CRP.

2.1. Statistical analysis

For the diagnosis of ROM, an artificial gold standard was used. This included the sum of the results of Nitrazine, Ferning, and pooling tests. If two or more out of three were positive, the patient was considered to have a confirmed ROM. If less than two were positive in spite of the positive history of gush of fluid vaginally, this patient was considered not to have ROM; if less than two were positive and the patient had no history of leakage this patient was included in the control group (Cousins, et al., 2005).

The collected data were described in terms of mean ± Standard Deviation (± SD), range, frequencies and percentages as appropriate. Comparisons between the study groups were carried out using the independent Student t-test for quantitative data when normally distributed. The test of proportion (Z-test) was used to compare the proportions of women who had trauma or coitus before the onset of vaginal leak and those who did not. The Chi square (χ²) test and Fisher’s Exact Test (FET) were used to compare more than two proportions as appropriate. Accuracy was represented using the terms sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy. A probability value (p-value) less than 0.05 was considered statistically significant. All statistical calculations were done using computer programs Microsoft Excel 2003 (Microsoft Corporation, NY, USA) and SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) version 15 for Microsoft Windows.

3. Results

A total of 60 pregnant women were evaluated for PROM according to the artificial golden role discussed before. Of these, 25 (41.7%) were positive for PROM and 35 (58.3%) were negative for PROM. Table 1 shows differences between the positive and negative groups for PROM regarding some clinical characteristics. Parity was higher among women who were positive for PROM than those who were negative (P=0.02). There were no significant differences as regard age, duration of marriage, gestational age, gravidity, abortion and history of ROM in previous pregnancies.

There were no significant differences between patient with positive PROM and those with negative PROM as regard to markers of infection (Table 2).
There were no significant differences in the proportions of pregnant women who presented with leaking (n=30) and had history of trauma before leaking or coitus within 48 hours between women who were positive for PROM (n=25) and those who were negative (n=5) (Figure 1).

![Bar Chart](image)

**Figure 1** Comparison between the studied women with leaking (n=30) as regard history of coitus within 48 hrs. and trauma before leaking by the diagnosis of PROM

The number of patients who had positive Nitrazine test, Ferning test, pooling on speculum examination and oligohydraminos on U/S examination was higher among women with positive PROM compared to those who were negative PROM (Table 3). These differences were statistically highly significant at P<0.001. Similarly, PAMG-1 was more likely detected among PROM patients than controls (P<0.001). AFI was higher among control group compared to PROM group with highly significant difference in between (7±3.14 vs. 13.6±4.17; P<0.001).

Table 4 shows that PAMG-1 was superior to other diagnostic tests as regard to sensitivity, specificity, positive and negative predictive value and accuracy collectively. PAMG-1 had both high sensitivity (96%) and specificity (97.14%) compared to other tests. Pooling had specificity of 100% but had low sensitivity (88%). While AFI detection by U/S had specificity of 91.3% but low sensitivity (64%). Again, PAMG-1 in cervicovaginal discharge was superior to other diagnostic tests as regard to positive predictive value, negative predictive value and accuracy. Although pooling had positive predictive value of 100% it had less negative predictive value (92%) and less accuracy (95%) than PAMG-1 detection (97.14% and 96.67% respectively).
Table 1 Clinical characteristics of the studied groups

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Positive PROM group (n = 25)</th>
<th>Negative PROM group (n = 35)</th>
<th>Test statistics</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean±SD</td>
<td>Range</td>
<td>Mean±SD</td>
<td>Range</td>
</tr>
<tr>
<td>Maternal age (years)</td>
<td>29.44±6.28</td>
<td>19-41</td>
<td>30.80±7.26</td>
<td>18-44</td>
</tr>
<tr>
<td>Duration of marriage (years)</td>
<td>6.52±4.75</td>
<td>1-19</td>
<td>7.23±5.28</td>
<td>1-20</td>
</tr>
<tr>
<td>Calculated gestational age (weeks)</td>
<td>32.80±2.33</td>
<td>29-36</td>
<td>33.71±2.55</td>
<td>31-36</td>
</tr>
<tr>
<td>Gravidity</td>
<td>2.88±1.86</td>
<td>1-5</td>
<td>3.09±1.77</td>
<td>2-5</td>
</tr>
<tr>
<td>Parity</td>
<td>1.80±1.08</td>
<td>0-4</td>
<td>1.11±1.13</td>
<td>0-4</td>
</tr>
<tr>
<td>Abortion</td>
<td>0.80±1.80</td>
<td>0-3</td>
<td>0.97±1.20</td>
<td>1-2</td>
</tr>
<tr>
<td>History of ROM in previous pregnancy (n=39)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (%)</td>
<td>12 (70.59)</td>
<td></td>
<td>14 (63.64)</td>
<td></td>
</tr>
<tr>
<td>Yes (%)</td>
<td>5 (29.41)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 Results of CBC, ESR and CRP In the studied groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Positive PROM group (n = 25)</th>
<th>Negative PROM group (n = 35)</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>CBC (leukocytosis)</td>
<td>Yes</td>
<td>3</td>
<td>12.00</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>22</td>
<td>88.00</td>
</tr>
<tr>
<td>ESR</td>
<td>Yes</td>
<td>4</td>
<td>16.00</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>21</td>
<td>84.00</td>
</tr>
<tr>
<td>CRP</td>
<td>Yes</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>20</td>
<td>80</td>
</tr>
</tbody>
</table>

*Obtained using the Fisher’s Exact Test
Table 3 Results of Nitrazine test, Fernning test, pooling test, PAMG-1 immunoassay, oligohydraminos and AFI by the diagnosis of PROM in the studied groups

<table>
<thead>
<tr>
<th>Test</th>
<th>Positive group (n = 25)</th>
<th>Positive PROM No.</th>
<th>Positive PROM %</th>
<th>Negative group (n = 35)</th>
<th>Negative PROM No.</th>
<th>Negative PROM %</th>
<th>Test statistic</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrazine test</td>
<td>Positive 23</td>
<td>92.00</td>
<td>5</td>
<td>14.29</td>
<td>30</td>
<td>85.71</td>
<td>χ²=35.39</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Negative 2</td>
<td>8.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferning test</td>
<td>Positive 23</td>
<td>92.00</td>
<td>5</td>
<td>14.29</td>
<td>30</td>
<td>85.71</td>
<td>χ²=35.39</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Negative 2</td>
<td>8.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pooling test</td>
<td>Positive 22</td>
<td>88.00</td>
<td>0</td>
<td>0.00</td>
<td>35</td>
<td>100.00</td>
<td>χ²=48.63</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Negative 3</td>
<td>12.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAMG-1</td>
<td>Positive 24</td>
<td>96.00</td>
<td>1</td>
<td>2.86</td>
<td>34</td>
<td>97.14</td>
<td>χ²=52.05</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Negative 1</td>
<td>4.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oligohydraminos</td>
<td>Yes 16</td>
<td>64.00</td>
<td>3</td>
<td>8.57</td>
<td>32</td>
<td>91.43</td>
<td>χ²=20.70</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>No 9</td>
<td>36.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AFI (cm)</td>
<td>Mean± SD; 7±3.14; (3-15)</td>
<td></td>
<td>13.6±4.17; (6-25)</td>
<td></td>
<td></td>
<td></td>
<td>t=6.67</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Table 4 Comparison between the studied groups as regard the results of PAMG-1, Nitrazine test, Ferning test, pooling test and AFI.

<table>
<thead>
<tr>
<th>Test</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Positive predictive value (%)</th>
<th>Negative predictive value (%)</th>
<th>Accuracy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAMG-1</td>
<td>96.00</td>
<td>97.14</td>
<td>96.00</td>
<td>97.14</td>
<td>96.67</td>
</tr>
<tr>
<td>Nitrazine test</td>
<td>92.00</td>
<td>85.71</td>
<td>82.14</td>
<td>93.75</td>
<td>88.33</td>
</tr>
<tr>
<td>Ferning test</td>
<td>92.00</td>
<td>85.71</td>
<td>82.14</td>
<td>93.75</td>
<td>88.33</td>
</tr>
<tr>
<td>Pooling test</td>
<td>88.00</td>
<td>100.00</td>
<td>100.00</td>
<td>92.11</td>
<td>95.00</td>
</tr>
<tr>
<td>AFI (cm)</td>
<td>64.00</td>
<td>91.30</td>
<td>84.21</td>
<td>78.04</td>
<td>80.00</td>
</tr>
</tbody>
</table>

4. Discussion

PROM is a condition, which occurs in pregnancy when the amniotic sac ruptures before the onset of labor. PPROM is a condition where the amniotic sac leaks fluid before 37 weeks of gestation (Deering et al., 2007). Correct diagnosis of PROM has great importance because failure of diagnosis can lead to unwanted obstetric complications like chorioamnionitis. On the other hand over diagnosis can lead to unnecessary interventions like hospitalization and preterm birth (Kim, et al., 2005).

Diagnosis of PROM is easy when the rupture is obvious but difficult and indeed impossible when the leaking is minimal. Therefore, there is a growing need to discover a reliable, simple and rapid biochemical test for the diagnosis of ROM (Esim et al., 2002). A number of biochemical markers for the diagnosis of ROM have been studied. However, none of them was proved to be a gold standard marker for routine diagnosis, so it
was necessary to discover a new marker for the diagnosis of PROM.

PAMG-1 protein was isolated from amniotic fluid in 1975. It can be measured in amniotic fluid using immunochemical methods. PAMG-1 was selected as a marker of fetal membrane rupture due to its unique characteristics; high concentration in the amniotic fluid, low level in blood, and extremely low background level in cervicovaginal secretions with intact fetal membranes (Cousins, et al., 2005). Furthermore, small quantities of amniotic fluid in vaginal secretions could be detected by the use of a combination of monoclonal antibodies. By setting its sensitivity threshold at 5 ng/ml, detection of PAMG-1 minimizes the probability of false-positive and false-negative results. In addition, the increased levels of PAMG-1 in vaginal secretions is highly predictive of ROM (Mulhair, et al., 2009).

In this study, PAMG-1 detection in cervicovaginal discharge by AmniSure was compared to an artificial gold standard for diagnosis of ROM. The latter included the sum of results of Nitrazine, Ferning, and Pooling tests.

The results of this study revealed that the sensitivity, specificity, positive predictive value, negative predictive value and accuracy of Nitrazine test were 92%, 85.71%, 82.14%, 93.75%, and 88.33% respectively. These results are in line with those mentioned in the study by Gaucherand, et al. (1997) who reported a sensitivity and specificity of 90.7% and 77.2% respectively. They stated that Nitrazine evaluation was associated with false-positive results up to 17.4% secondary to cervicitis, vaginitis (bacterial vaginosis or trichomonas), alkaline urine, blood, semen, and antiseptics. A significant false negative rate (12.9%) for Nitrazine test was observed.

As for Ferning, the results of the present study detected that the sensitivity, specificity, positive predictive value, negative predictive value and accuracy were 92%, 85.71%, 82.14%, 93.75%, and 88.33% respectively. These corresponds to Rosemond, et al. (1990) who mentioned that Ferning has been associated with false-positive results in 5 to 30% of patients; the result was described secondary to contamination with fingerprints on the slide or contamination with semen and cervical mucus. False-negative results (5 to 12.9%) might be caused by dry swabs, contamination with blood and heavy discharge. In the non-laboring group, sensitivity and specificity were 51.4% and 70.8%, respectively (De Haan, et al., 1994).

As for pooling, the results of the present study detected that the sensitivity, specificity, positive predictive value, negative predictive value and accuracy were 88%, 100%, 100%, 92.11 and 95% respectively.

Indeed Lee et al. (2007) stated that the traditional diagnostic methods using nitrazine/pH, assessment of pooling, and microscopic ferning testing lack reliability and become progressively less accurate with passage of time since membrane rupture. Thus in cases of prolonged PROM, these tests provide no better diagnostic information than that obtained by simple clinical examination.

In this study, AFI was proved to be significantly lower in the group positive for ROM. These findings confirm the results of the study done by Frigo et al. (1998) who suggested that U/S examination was an important tool for the diagnosis of PROM. On the other hand, Kafali and Oksuzler (2007) concluded that there was no significant statistical difference between women with confirmed diagnosis of PROM, as indicated by positive Nitrazine and pooling tests, those with suspected PROM and controls regarding AFI. However, amongst the studied tests, AFI showed the least sensitivity (64%), positive predictive value (84%), negative predictive value (78%) and accuracy (80%). These results are in contrast with those reported by Erdemoglu and Munganl (2004) who found that the sensitivity, and accuracy of AFI were 94%, and 92% respectively.

The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of detection of PAMG-1 in cervicovaginal discharge in detecting ROM were 96%, 97.14%, 96%, 97.14%, and 96.67% respectively. These results are consistent with those reported by Cousins et al. (2005) who stated that the AmniSure diagnostic test demonstrated a sensitivity of 98.9%, specificity of 100%, positive predictive value of 100%, and a negative predictive value of 99.1%.
Lee et al. (2007) performed a prospective observational study in consecutive patients with signs or symptoms of rupture membranes. Of a total 183 patients, 157 (87%) had rupture of membranes at their initial presentations using the same gold standard employed in the present study. PAMG-1 immunoassay was proved to have a sensitivity of 98.7%, specificity of 87.5%, positive predictive value of 98.1%, and negative predictive value of 91.3%. A false-positive test (defined as a positive placental immunoassay in women who were subsequently determined not to have ROM) was documented in three cases.

Chen and Dudenhausen (2008) compared two rapid strip tests for the detection of amniotic fluid, based on the detection of insulin-like growth factor-binding protein-1 (IGFBP-1) and of PAMG-1. Samples of amniotic fluid were taken from 20 pregnant women between 31 and 41 gestational weeks at elective Cesarean section before delivery of the newborn. These samples were diluted with 0.9 % saline solution in a dilution series down to the concentrations of 1:320. Comparison between the two tests was carried out to evaluate their ability to detect different concentrations of amniotic fluid. The test based on PAMG-1 proved to be superior in 15 cases by detecting amniotic fluid at least at one descending concentration below the test based on IGFBP-1. Thus, it was concluded that the rapid strip test based on PAMG-1 is a more sensitive bedside test compared with the test based on IGFBP-1 for the detection of amniotic fluid. Furthermore, PAMG-1 immuno assay was recommended as a promising and noninvasive test for the diagnosis of ROM (Caughey, et al., (2008); Duff, (2009)).

Lee et al. (2009) concluded that a positive Amnisure test is present in about one-third nulliparous women at term presenting in labor with intact membranes; and patients with a positive Amnisure test had a shorter admission-to-delivery interval than those with a negative test. This may imply restriction of the use of the test in preterm patients. In fact, this is the group of patients expected to really benefit from such testing where the decision making regarding active intervention may really make a difference.

To summarize, PAMG-1 detection in cervicovaginal discharges by the use of Amnisure test is a useful method for the diagnosis of PROM as it was more accurate than the traditionally available tests, with high sensitivity and specificity, and easy to use as mentioned previously.

References


