NAVIGATING THE WATERS: BALANCING PATIENT CARE AND COSTS IN A COMMON OBSTETRICAL DILEMMA

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Case for consideration:
A woman at 40 weeks’ gestation presented to her Ob/Gyn due to suspected amniotic fluid leakage. After examining the patient (pooling, nitrazine and ferning), the physician determined no amniotic fluid was present and discharged the patient.

The following day, the woman once again presented with suspected premature rupture of membranes (PROM). Upon examination, a second Ob/Gyn observed green mucus, prompting the doctor to admit her for induction.

The child was infected at birth and suffered from cerebral palsy and developmental delay.

What would you do? Of course given hindsight, this outcome never would have happened on your watch. But are you really that confident in your traditional PROM diagnostics when the patient presents without that obvious gush or that convincing story? I am not, nor am I alone. This critical diagnosis continues to be one of the most challenging in Obstetrics. A landmark study by Neil and Wallace demonstrated that when patients presented with suspicion of PROM, in about 50% of cases the attending physician was uncertain about the diagnosis based upon history and physical examination alone. Accurately diagnosing PROM at initial presentation, regardless of gestational age, is key to optimizing management decisions for these patients. The “gold standard” for diagnosing PROM, intra-amniotic infusion of indigo carmine dye, is highly invasive and not readily accessible. And traditional diagnostics have proven unreliable in cases of uncertain PROM. Clinician uncertainty often leads to both unnecessary intervention and added costs for risk management reasons. So what are we as clinicians to do?
**TECHNOLOGICAL ADVANCEMENTS**

Objective evaluation of traditional testing methods (pooling, nitrazine, ferning and AFI) has shown each to be easy to use but relatively inaccurate.\(^5\)\(^\text{\textsuperscript{8}}\) This issue led to the investigation of numerous biomarkers with the goal of identifying an effective biomarker for PROM. The AmniSure® ROM Test detects placental alpha microglobulin-1 (PAMG-1) and has been an FDA-cleared diagnostic option since 2004. AmniSure is 99% accurate\(^3\) and superior to standard clinical assessment.\(^9\) Further, since October 2013, biomarker tests have been included in ACOG’s PROM guidelines with specific reference to the PAMG-1 test (AmniSure).\(^10\)

Subsequent to the most recent publication of ACOG’s PROM guidelines, a published multi-center study of 140 patients comparing the AmniSure ROM Test with intra-amniotic infusion of indigo carmine dye demonstrated 99% correlation.\(^11\) The solution to our “PROM dilemma” is easily accessible now, so why is it not a universally used test?

**THE COST OF CARE EQUATION**

As a medical community, we often have trouble dealing with the higher cost of advanced diagnostics, even as we celebrate their increased effectiveness in practice. Not surprisingly, a rapid immunoassay costs more than a fern slide or nitrazine paper. However, the clinical utility of the AmniSure test really lies in its accuracy and how it is used in practice. Traditional diagnostic methods used alone or in combination are associated with increased cost as result of their poor accuracy, especially in non-obvious cases.\(^12\)

As is evident from our opening case, failure to diagnose PROM puts the patient at risk and eliminates the opportunity to implement timely and salutary obstetric measures. Conversely, a false positive PROM diagnosis can lead to unnecessary hospital admissions and inductions. Both of these situations can result in profound medical and financial implications for all involved.

Recently published evidence has investigated the costs of diagnosing PROM using AmniSure as compared to standard clinical assessment (SCA). Eleje et al found that, despite the higher material costs of the AmniSure test, the overall cost of SCA was 45% greater than that of the AmniSure test due to the longer time taken to perform SCA and the added costs of managing false-positive and false-negative cases.\(^13\) This echoes the conclusions from Birkenmaier and colleagues’ 2012 study comparing SCA to the AmniSure test. The study found that, when compared to clinical evaluation, an overall cost reduction of 58.8% could be realized by using only the AmniSure test.\(^4\)

Further, Echebiri et al conducted an extensive theoretical analysis to compare the cost-benefit of AmniSure versus SCA in patients at 34 to <37 weeks presenting with suspicion of PROM. AmniSure was found to be the most cost-beneficial diagnostic method, especially when the probability of rupture was <38%. Additionally, the model demonstrated through probabilistic sensitivity analysis with Monte Carlo simulations that using the AmniSure test leads to an optimal strategy with a frequency of 89% regardless of rupture probability.\(^14\)

Given the increased material cost of the AmniSure test, it makes economic sense that it should not be used in all cases when patients present with signs and symptoms of rupture. If the patient is obviously ruptured, there is no need for such an advanced diagnostic. However, in those non-obvious cases, clinical practice can benefit from the accuracy and the cost effectiveness of the AmniSure test. Bottom line, the AmniSure test is the most accurate non-invasive method of PROM diagnosis available today, and when used appropriately, the AmniSure test will provide optimal clinical utility.
NOT ALL PROM BIOMARKERS ARE EQUAL

Of note, not all biomarkers for PROM yield the diagnostic accuracy of the AmniSure test. The ROM Plus® Test is based on a combination of biomarkers (AFP and IGFBP-1) and demonstrates a poor specificity (75%) as noted in the warning on its FDA clearance. False positive ROM Plus test results may lead to unnecessary and costly patient admissions, transfers or inductions. Further, there is no reference to the ROM Plus Test or its specific biomarker technology in ACOG’s Guidelines for Management of PROM, and clinical evidence has demonstrated diagnostic performance comparable to SCA. From a clinical utility standpoint, it does not make sense to use a more costly biomarker test in lieu of SCA unless the biomarker test’s performance is far superior to SCA.

The highly accurate and consistent clinical performance of the AmniSure ROM Test and its cost efficacy have been well demonstrated. In the words of Dr. Federico Mariona, “we must remain alert and responsive to useful changes and innovations in our field of practice.” As technology evolves, we as clinicians must evolve with it. Do not let your practice and your patient care linger in the 1940s with SCA. With the AmniSure ROM Test, we now have a better and more cost effective option to better guide our clinical decisions for optimal patient care.

1. PROM or Protein C: Which caused injury? OBG Management 2005 May;17(5).