Discussion: 'A new method for assessing uterine activity' by Haran et al

In the roundtable that follows, clinicians discuss a study published in this issue of the Journal in light of its methodology, relevance to practice, and implications for future research. Article discussed:

Haran G, Elbaz M, Fejgin MD, et al. A comparison of surface acquired uterine electromyography and intrauterine pressure catheter to assess uterine activity. Am J Obstet Gynecol 2012;206:412.e1-5.

DISCUSSION QUESTIONS

- What was the aim of this study?
- How does uterine electromyography work?
- Who were the study participants?
- Can you comment on sample size and data analysis?
- What were the results?
- What directions might future research take?

From the Department of Obstetrics and Gynecology, Washington University in St. Louis, St. Louis, MO:

Moderator
George A. Macones, MD, MSCE
Mitchell and Elaine Yanow Professor and Head

Discussants
Alison Cahill, MD
Assistant Professor

David M. Stamilio, MD
Associate Professor

Anthony Odibo, MD
Assistant Professor

INTRODUCTION

While external tocodynamometry is useful in gauging the frequency and duration of contractions, the intrauterine pressure catheter (IUPC) determines these more accurately and also measures contraction intensity. However, because the IUPC is invasive, its use is best reserved for selected patients, including women who are having an inadequate response to oxytocin. An innovative system not yet available in the United States might overcome the drawbacks of both methods. Studies to date suggest the electrical uterine myography monitor (OB-Tools, Migdal Ha'emek, Israel) detects contraction onset, time to peak, frequency, duration, and intensity. In a new study, Haran and colleagues evaluated the technique against the IUPC.

George A. Macones, MD, MSCE, Associate Editor

BACKGROUND

Macones: *Can you tell us the aim of this study?*
Cahill: The aim of the study was to compare uterine electromyography to an IUPC as a means for assessing uterine activity. I think it is actually a very good objective. We all consider IUPCs to be the gold standard for uterine activity. External tocodynamometers are, of course, less invasive, but one can't assess intensity with this methodology. The other limitation of an external tocodynamometer is that it may be less accurate in obese women, a population that seems to be on the rise in the United States.
Macones: *Can you tell us about the limitations of IUPCs?*
Cahill: Sure. Rare complications are associated with IUPCs. For example, the device can be placed into or behind the placenta, and there is also a theoretical risk of infection. In addition, membranes need to be ruptured in order to place an IUPC. For these reasons, a study of a noninvasive way to assess contraction frequency, duration, and intensity is of great importance.
Macones: *How does uterine electromyography work?*
Stamilio: The authors describe it quite well, but in short, myometrial contractility can be thought of as an electrical event, spurred by increased coupling and excitability of cells. This electrical activity is measured by placing a series of electrodes on the maternal abdomen. Computer software then takes the signal information and presents it as a contraction wave. The output is in microwatts, and presumably, the higher the microwatts, the greater the intensity.

STUDY DESIGN

Macones: *Who were the study participants?*
Stamilio: The inclusion criteria were simple. Patients had to be beyond 24 weeks and have an IUPC in place. Also, the IUPC needed to be functioning well. The subjects were monitored by both methods—standard IUPC and uterine electromyography—for 30 minutes.
Macones: *Can you comment on sample size and data analysis?*
Odibo: Sure. In terms of sample size, the researchers determined that they needed 41 participants if they were to maintain the probability of an alpha or type I error at 0.05 and a beta or type II error at 0.10 (90% power). The techniques would be considered equivalent if they captured no more than a 5-second difference in onset and duration of contractions and less than a 5% difference in contraction

intensity. These variations were deemed minimal enough to have no clinical significance. I thought this was very reasonable. Analytically, they compared mean times and mean intensity between the 2 methods and also looked at area under the curve for both Montevideo units and microwatts. Correlation coefficients were also used.

Macones: *What were the results?*

Odibo: A total of 47 women were enrolled, which was on target with regards to the sample size estimation. The subjects in the study had a mean body mass index (BMI) of 30 kg/m^2 and were at a mean of 39 weeks' gestation. The earliest labor was at 32 weeks' gestation. Correlation between the methods was fantastic, and this is presented in the figures. In addition, the correlation coefficients for the different parameters ranged from 0.80-0.90, which is excellent.

CONCLUSIONS

Macones: *The concise results make this paper easy to read. Are there any comments on strengths and limitations of this study or suggestions for future research directions?*

Cahill: I view this as a first step in, what I hope will be, a series of research efforts. The focus here was on correlation, and we did see a high degree of correlation. I think a next step should be determination of how well contraction abnormalities, such as tachysystole, are detected by this new method when compared with an IUPC.

Stamilio: I think there are some really interesting potential applications that require additional research. First, I would be very interested to see how well this performs in patients with very high BMIs. Obesity is definitely a problem with external monitors, and if electro-myography worked well in this group, it could be a huge improvement. The other area of great interest would be patients with preterm contractions. Currently, we use cervical change as a way of defining clinically significant contractions, although I recognize that others may use fibronectin levels and transvaginal cervical lengths as well. I think it would be very interesting to see if there were microwatt cutoffs that we could use to assess whether preterm contractions are significant or not. The possibilities of this for screening and diagnosis are endless.

Macones: I agree. This was a well-done first step in the evaluation of a new technology. I am looking forward to seeing more work on this promising instrument. It really has possibilities in clinical care, but a lot of studies must be done. ■