

Uterine Fasciculation-Like Signals: *A novel pattern of uterine bioelectric activity*

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Introduction

- Here we present a novel uterine electromyography (uEMG) signal (Figure 1), *Fasciculation-Like Signals*
- This signal indicates prolonged uterine muscle activity rather than phasic activity

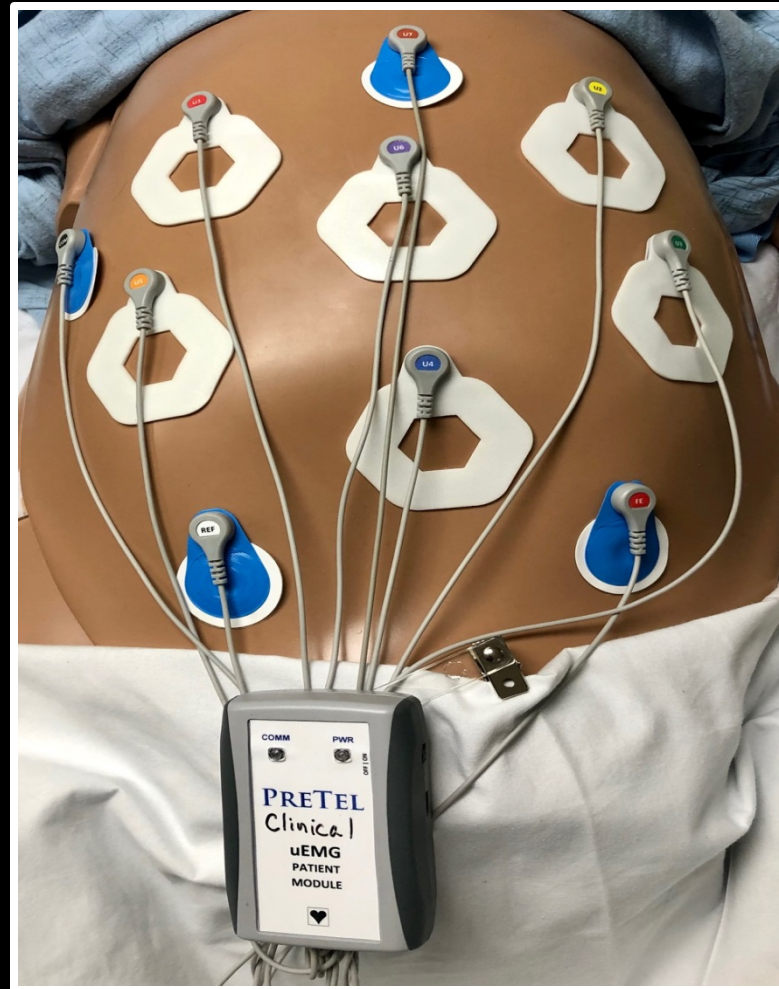
Methods

- Prospective observational study; singletons
- 30w0d to 36w6d GA
- Six-channel uEMG recordings were obtained using directional EMG sensors for > 60 minutes
- Uterine signals were isolated using a bandpass filter between 0.15 and 1.2 Hz

Methods

- *The 10 minute period of the recording with the greatest bioelectrical activity was identified visually.*
- *A computer algorithm was then used to identify the total length of time where root mean squared (RMS) exceeded resting RMS by 2.5-fold.*
- *The FLS duration for each channel was calculated by subtracting the duration of contraction-associated, if any, within the window.*

Study subject application of hexagonal uEMG area sensors and ECG sensors. Each area sensor corresponds to a specific uEMG channel as designated by the associated letter number combination.



Objective

The objective of this study is to determine the prevalence of FLS in patients presenting with contractions

Results

- Eight subjects were included, with one subject studied twice at 32w0d and 33w5d (total n=9 studies).
- None of the patients delivered within 7 days of their evaluation. All 7 recordings performed < 36w0d had an FLS > 2.
- One subject with FLS score=2 delivered preterm.
- Complete outcomes data is shown in Figure 2.

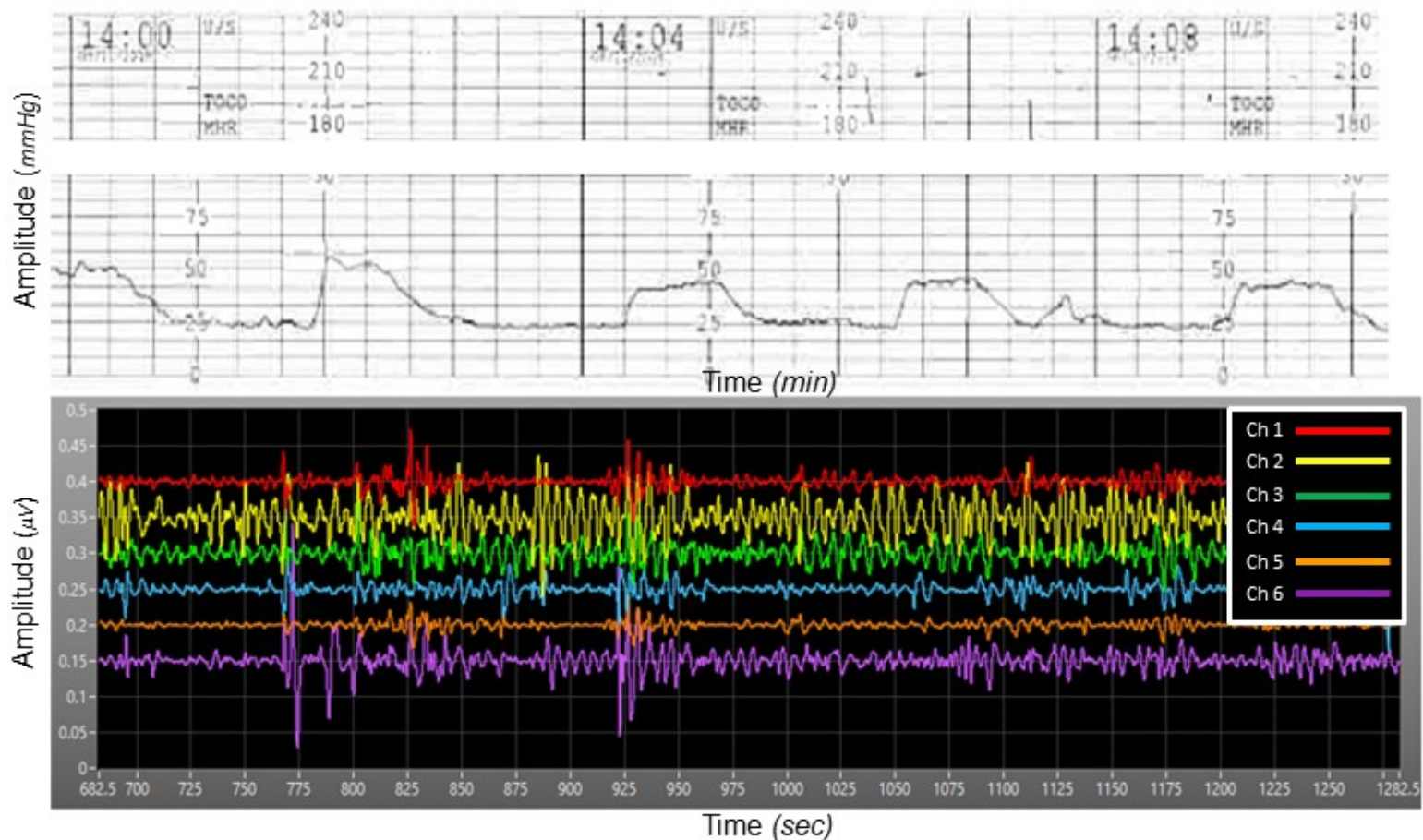


Figure 1. Fasciculation-Like Signal (FLS) seen in a subject at 32 weeks. FLS is observed as a prolonged oscillatory burst. In this subject, FLS are observed in uEMG channels 2, 3, and 6.

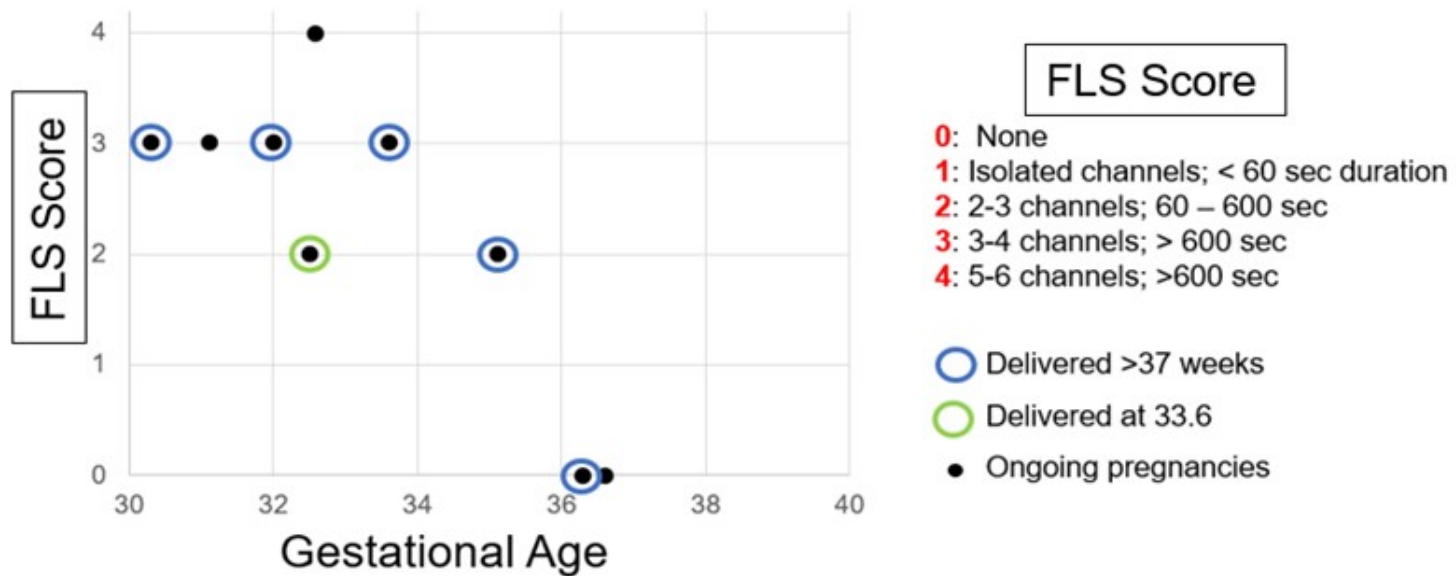


Figure 2. Scoring for Fasciculation-Like Signals (FLS) by gestational age. Scale is from 0 to 4, where 0 represents no FLS seen, and 4 represents 5 to 6 channels simultaneously reporting FLS. Each black dot represents a pregnant subject; colored circles indicate gestational age at delivery.

Key Take Home Points

- Fasciculation-Like Signals are a newly described pattern of uterine bioelectric activity
 - These signals may explain the biomechanics of prodromal contractions, especially if similar signals were not seen during labor.
- *If confirmed, the presence of FLS may serve a novel test to rule-out preterm labor*

Uterine Fasciculation-Like Signals: A novel pattern of uterine bioelectric activity

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Background

- Fasciculation-Like Signals (FLS) are a novel uterine electromyographic (uEMG) patterns (Figure 1)
- Signals denote prolonged uterine muscle activity rather than phasic activity (i.e. "contractions")

Objective

We sought to determine the prevalence of FLS in patients presenting with contractions

Methods

- Prospective observational study of singleton pregnancies 30w0d to 36w6d gestational age
- Six-channel uEMG recordings were obtained using directional EMG sensors for ≥ 60 minutes



Figure 2: Schematic diagram of open-area hexagonal uEMG sensors and ECG pad placement on the gravid abdomen.

Each hexagonal sensor (u1-u6) corresponds to a specific uEMG channel (1-6) (Figure 1). ECG pads were used for grounding and reference.



Fasciculation-Like Signals are a newly described pattern of uterine bioelectric activity

The presence of FLS may have value as a novel test to rule-out preterm labor



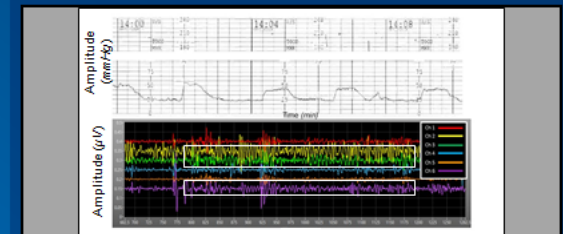
Scan QR code for additional study information including how the FLS scale was derived



Results

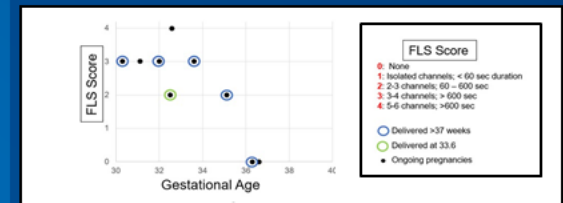
- Eight subjects were included, with one subject studied twice at 32w0d and 33w5d (total n=9 studies)
- None of the patients delivered within 7 days of their evaluation
- All 7 recordings performed before 36w0d
 - Example of a recording with FLS present shown in Figure 1
- All patients had and FLS score > 2 (Figure 3)

Figure 1: Example of FLS in a 32 week subject



- FLS are characterized as a prolonged oscillatory burst
- FLS are observed in channels 2, 3, and 6 (boxes) rather than the expected contraction-associated signals

Figure 3: FLS scores by gestational age



- Scale is from 0 to 4: 0 represents no FLS seen; 4 represents 5-6 channels simultaneously reporting FLS
- Black dots represent pregnant subjects; colored circles indicate GA at delivery