Original Research: Interval From Loop Electrosurgical Excision Procedure to Pregnancy and Pregnancy Outcomes
Conner et al.

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Background

- **LEEP**: the most common cervical procedure for cervical dysplasia
  - Theoretical increased risks of poor pregnancy outcomes related to cervical integrity
- **Studies on LEEPs and association with pregnancy outcomes**:  
  - Preterm deliveries (PTD): conflicting data  
  - Spontaneous abortions (SAB): lacking data
Objective

• Aim to estimate the effect of length of time between LEEP and subsequent pregnancy risk of PTD and SAB
  – Potentially answer question regarding optimal pregnancy timing after LEEP.
Methods

• 10-year retrospective, multicenter cohort study from 1996 to 2006
  – 596 patient pathology records reviewed
  – Data confirmed via telephone interviews

• Secondary Analysis
Criteria

- Inclusion:
  - All women who had undergone LEEP with subsequent pregnancy

- Exclusion:
  - Multiple gestation
  - Unknown LEEP or delivery date
Exposure

• Time from LEEP to pregnancy
  – <12 mo
  – >12 mo

• Further stratified timing of pregnancy: <6 mo, 6-11 mo, 12-23 mo, ≥24 mo
Outcomes

• Primary outcome:
  – SAB <20wga
    • <12 wga
    • 12-19wga
  – PTD
    • <34 wga
    • <37wga
Statistical Analysis

• Baseline characteristics between 2 groups compared using:
  – $\chi^2$ or Fisher exact test
  – Student $t$ test or Mann-Whitney $U$ test

• OR and 95% Confidence Interval

• Logistic regression
  – Backwards stepwise selection

• P-value < 0.05
Results

- 596 women included in study
  - <12 mo for 56 women (9.4%)
  - ≥12 mo for 540 women (90.6%)
- Primary outcome
  - 6% SAB
  - 8.7% PTD <34wga
  - 18.1% PTD <37wga
Table 1. Baseline Characteristics of the Study Cohort

<table>
<thead>
<tr>
<th>Variable</th>
<th>Less Than 12 (n=56)</th>
<th>12 or More (n=540)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>26.6 ± 5.4</td>
<td>28.3 ± 5.0</td>
<td>.02</td>
</tr>
<tr>
<td>Nulliparity</td>
<td>21 (37.5)</td>
<td>246 (45.6)</td>
<td>.26</td>
</tr>
<tr>
<td>African American</td>
<td>17 (30.4)</td>
<td>187 (34.6)</td>
<td>.56</td>
</tr>
<tr>
<td>Previous preterm birth</td>
<td>6 (10.7)</td>
<td>59 (10.9)</td>
<td>.99</td>
</tr>
<tr>
<td>Smoking</td>
<td>8 (16.3)</td>
<td>89 (17.3)</td>
<td>.99</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>29.5 ± 6.2</td>
<td>31.7 ± 6.7</td>
<td>.04</td>
</tr>
<tr>
<td>Pregnancy-induced hypertension</td>
<td>5 (8.9)</td>
<td>59 (10.9)</td>
<td>.82</td>
</tr>
<tr>
<td>Gestational diabetes</td>
<td>4 (7.1)</td>
<td>32 (5.9)</td>
<td>.77</td>
</tr>
</tbody>
</table>

LEEP, loop electrosurgical excision procedure; BMI, body mass index.
Data are mean ± standard deviation or n (%) unless otherwise specified.
Table 2. Median Time From Loop Electrosurgical Excision Procedure to Pregnancy for the Primary Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>n</th>
<th>Time to Pregnancy (mo)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>596</td>
<td>30.8 (18.4–50.7)</td>
<td></td>
</tr>
<tr>
<td>Spontaneous abortion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(week of gestation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 20</td>
<td>35</td>
<td>20.3 (11.2–40.9)</td>
<td>.01</td>
</tr>
<tr>
<td>Less than 12</td>
<td>30</td>
<td>17.9 (8.9–40.9)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>12–19</td>
<td>5</td>
<td>33.0 (23.4–40.6)</td>
<td>.85</td>
</tr>
<tr>
<td>No spontaneous abortion (reference)</td>
<td>561</td>
<td>31.2 (18.7–51.2)</td>
<td></td>
</tr>
<tr>
<td>Preterm birth less than 37 wk of gestation</td>
<td>108</td>
<td>29.7 (18.2–47.2)</td>
<td>.31</td>
</tr>
<tr>
<td>Term birth (reference)</td>
<td>442</td>
<td>32.5 (19.1–53.4)</td>
<td></td>
</tr>
<tr>
<td>Preterm birth less than 34 wk of gestation</td>
<td>52</td>
<td>30.7 (19.1–50.2)</td>
<td>.92</td>
</tr>
</tbody>
</table>

Data are median (interquartile range) unless otherwise specified.
<table>
<thead>
<tr>
<th>Outcome</th>
<th>LEEP-to-Pregnancy Interval (mo)</th>
<th>OR (95% CI)</th>
<th>Adjusted OR (95% CI)*</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less Than 12</td>
<td>12 or More</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>56 (9.4)</td>
<td>540 (90.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spontaneous abortion at less than 20 wk of gestation</td>
<td>10 (17.9)</td>
<td>25 (4.6)</td>
<td>4.5 (2.0–9.9)</td>
<td>5.6 (2.5–12.7) &lt;.01</td>
</tr>
<tr>
<td>Spontaneous abortion at less than 12 wk of gestation</td>
<td>10 (17.9)</td>
<td>20 (3.7)</td>
<td>5.7 (2.5–12.8)</td>
<td>7.3 (3.1–17.1) &lt;.01</td>
</tr>
<tr>
<td>Spontaneous abortion at 12–19 wk of gestation</td>
<td>0 (0)</td>
<td>5 (0.9)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Preterm birth at less than 37 wk of gestation</td>
<td>11 (26.2)</td>
<td>97 (19.1)</td>
<td>1.5 (0.7–3.1)</td>
<td>1.5 (0.7–3.1) .31</td>
</tr>
<tr>
<td>Preterm birth at less than 34 wk of gestation</td>
<td>6 (16.2)</td>
<td>44 (9.7)</td>
<td>1.8 (0.7–4.6)</td>
<td>1.8 (0.7–4.5) .25</td>
</tr>
</tbody>
</table>

LEEP, loop electrosurgical excision procedure; OR, odds ratio; CI, confidence interval.
Data are n (%) unless otherwise specified.
* Adjusted for age, body mass index, previous spontaneous abortion (or previous preterm birth), race (for preterm birth only), and smoking dropped out of the model.
<table>
<thead>
<tr>
<th>Outcome</th>
<th>LEEP-to-Pregnancy Interval (mo)</th>
<th>Less Than 6</th>
<th>6–11</th>
<th>12–23</th>
<th>24 or More</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td></td>
<td>7 (1.2)</td>
<td>49 (8.2)</td>
<td>165 (27.7)</td>
<td>375 (62.9)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Spontaneous abortion</td>
<td></td>
<td>3 (42.9)</td>
<td>7 (14.3)</td>
<td>9 (5.5)</td>
<td>16 (4.3)</td>
<td></td>
</tr>
<tr>
<td>OR (95% CI)</td>
<td></td>
<td>16.8 (3.5–81.6)</td>
<td>3.7 (1.4–9.6)</td>
<td>1.3 (0.6–3.0)</td>
<td>Ref</td>
<td>—</td>
</tr>
<tr>
<td>Preterm birth at less than 37 wk of gestation</td>
<td></td>
<td>1 (33.3)</td>
<td>10 (25.6)</td>
<td>27 (17.4)</td>
<td>70 (19.8)</td>
<td>.46</td>
</tr>
<tr>
<td>OR (95% CI)</td>
<td></td>
<td>2.0 (0.18–22.6)</td>
<td>1.4 (0.6–3.0)</td>
<td>0.9 (0.5–1.4)</td>
<td>Ref</td>
<td>—</td>
</tr>
<tr>
<td>Preterm birth at less than 34 wk of gestation</td>
<td></td>
<td>0 (0.0)</td>
<td>6 (16.2)</td>
<td>11 (7.9)</td>
<td>33 (10.4)</td>
<td>.39</td>
</tr>
</tbody>
</table>

LEEP, loop electrosurgical excision procedure; OR, odds ratio; CI, confidence interval; Ref, reference. Data are n (%) unless otherwise specified.
Conclusion

• Women with shorter time interval from LEEP to pregnancy are at increased risk for spontaneous abortion but not preterm birth.
Question 1

- Prior to reading this article, how did you counsel women about the risks to their pregnancy regarding:
  - A. having a LEEP procedure during a current pregnancy
  - B. having had a LEEP procedure before a current pregnancy
  - C. the optimal time to interval to get pregnant following a LEEP procedure?
Question 2

• What is the key study exposure and how is it defined?
  – In your view, is it adequately defined?
  – Why or why not?
Question 3

• What are the known risk factors for each study outcome
  – SAB?
  – PTD?
Question 4

• List the common biases that can be present in retrospective cohort studies.
  – Discuss whether or not concerns related to each bias are adequately addressed by the study.
Question 5

• Do the findings in Table 1 and the reported incidence rates of SAB and PTD reflect our patient population?
  – Why or Why not?
Question 6

• Does Table 1 include information on all important baseline characteristics?
  – If not, what other baseline information would you like to see?
  – Why?
Question 7

- On Table 3: Why is there not a confidence interval listed for SAB at 12-19wga?
Question 8

- Comment on whether this study has sufficient power to address the key study questions regarding SAB and PTD.
Question 9

After reviewing this study, will you change your counseling? Why or why not?
Questions?

- Thank you