

# The impact of uterine incision closure techniques on post-cesarean delivery niche formation and size: sonohysterographic examination of non-pregnant women



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## Introduction

- **Background:** In the United States, ~31% of deliveries are performed via cesarean. Incomplete healing of the cesarean scar, visualized as a cesarean “niche”, has been associated with poor obstetric outcomes including cesarean scar pregnancies, placenta accreta, and uterine dehiscence/rupture, as well as gynecologic pathology including intermenstrual spotting, pelvic pain, and dysmenorrhea.
- **Aim:** To compare the prevalence and size of residual niche in the non-gravid uterus following cesarean delivery (CD) with different hysterotomy closure techniques

## Methods

- **Study Design:** Retrospective cohort study
- **Population:** Non-pregnant individuals who had a saline infusion sonohysterogram (SIS) performed after their first CD at a single academic institution
- **Exclusion criteria:** unavailable imaging or operative reports
- **Collection:** SIS were performed and reviewed by a single expert physician sonologist
- **Study group:** Technique A – endometrium-free closure technique (EFCT)
- **Control group:** Technique B – routine non-endometrium-free closure
- **Primary Outcomes:**
  - Clinically significant niche (depth >2mm)
  - Niche depth, width, length, and residual myometrial thickness
- **Analysis:** Closure technique groups were compared using  $\chi^2$ , Fischer’s exact, and T-test. The relationship between obstetrical parameters and clinically significant niche was analyzed using logistic regression analysis and two-sided test, with significance at  $p < 0.05$ .

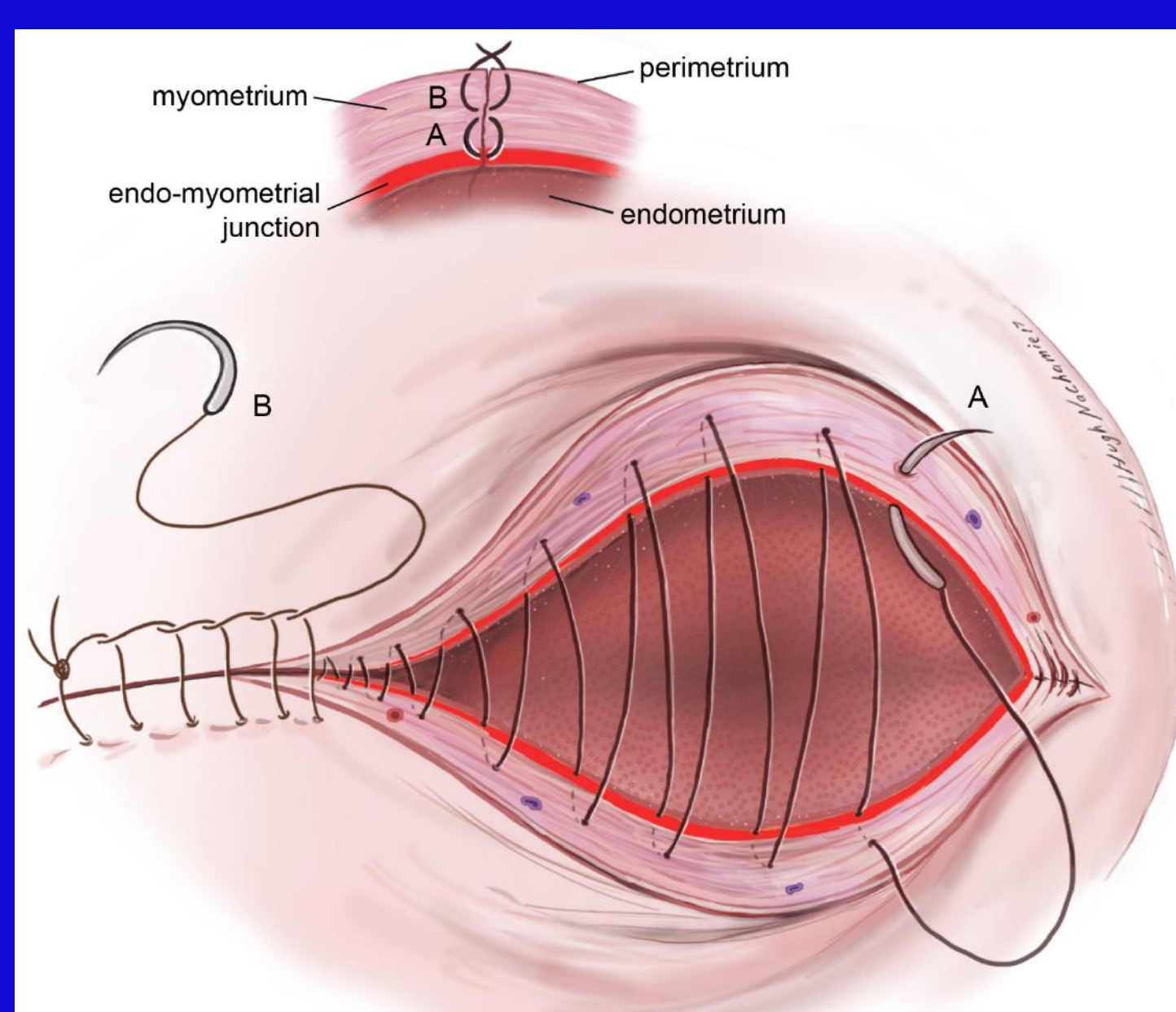


Figure 1. EFCT

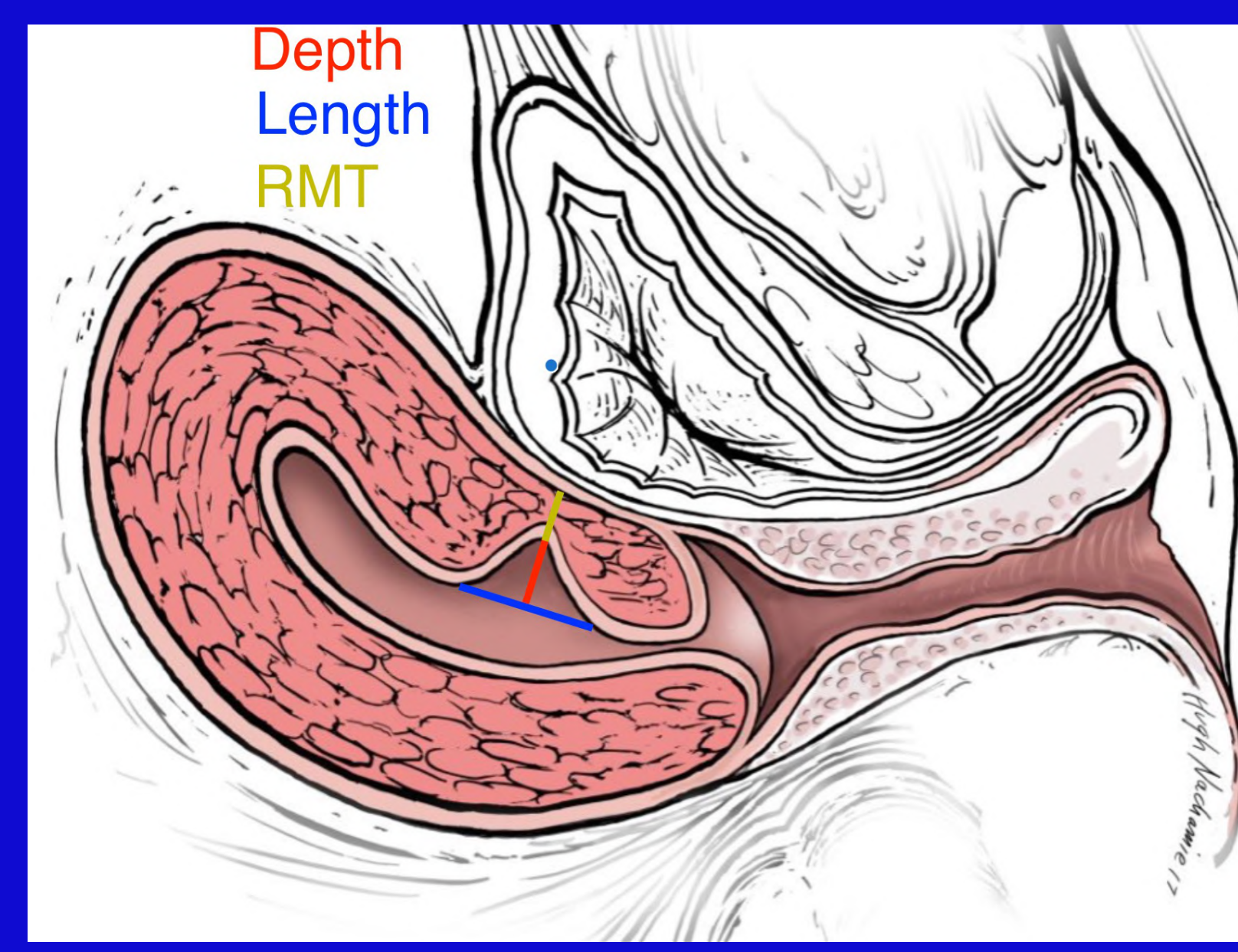


Figure 2. Niche measures  
RMT = Residual myometrial thickness

## Uterine hysterotomies repaired utilizing an endometrium-free closure technique (EFCT) were less likely to develop a clinically significant niche.

Exclusion of the endometrium at time of hysterotomy closure may help reduce development of cesarean niches and their associated adverse sequelae.



## Results

- 45 women with one prior CD had SIS performed; 25 had uterine closure with Technique A, and 20 with Technique B
- Groups differed by average interval time from CD to SIS (13.6 vs. 74.5 months,  $P=0.006$ ), but were otherwise similar
- 20 niches were identified, 85% of which were significant; 5 following Technique A and 12 following Technique B ( $p=0.015$ )
- Hysterotomy closure via Technique B was significantly associated with development of a clinically significant niche compared to Technique A (OR 6.0, 95%CI 1.6-22.6,  $p=0.008$ ). This persisted after controlling for SIS interval on multivariate analysis (OR 4.4, 95%CI 1.1-18.3,  $p=0.04$ ).
- Average niche depth was 2.4mm and 4.9mm following Technique A and B, respectively ( $p=0.005$ )

|                              | Technique A:<br>EFCT<br>(n=25) | Technique B:<br>routine closure<br>(n=20) | P value |
|------------------------------|--------------------------------|---|---------|
| <b>Demographics</b>          |                                |   |         |
| Age                          | 37.4 ±4.3                      | 35.8 ±8.43                                | 0.414   |
| SIS interval (months)        | 13.6 ±20.4                     | 74.5 ±103.1                               | 0.006   |
| Gravida                      | 1.8 ±1                         | 2.85 ±2.58                                | 0.068   |
| Double layer closure         | 25 (100)                       | 16 (80)                                   | 0.069   |
| <b>Niche Characteristics</b> |                                |   |         |
| Presence                     | 8 (32)                         | 12 (60)                                   | 0.115   |
| Clinically significant       | 5 (20)                         | 12 (60)                                   | 0.015   |
| Depth (mm)                   | 2.4 ±1.1                       | 4.9 ±2.1                                  | 0.005   |
| Width (mm)                   | 7.3 ±2.6                       | 10.1 ±2.5                                 | 0.041   |
| Length (mm)                  | 5.8 ±2.6                       | 9.0 ±3.1                                  | 0.026   |
| RMT (mm)                     | 9.5 ±2.9                       | 6.1 ±3.5                                  | 0.033   |

**Table 1:** Study population demographics and niche characteristics  
Data are n (%) or mean ±SD  
RMT = residual myometrial thickness

## Conclusion

- This study demonstrates the importance of uterine closure technique in the resulting prevalence of post-cesarean delivery niche formation and size.
- Future studies will aim to examine the resulting niche in patients with more than one CD, and if an endometrium-free closure in a subsequent pregnancy can salvage a niche created with a routine closure technique in the prior pregnancy.