

Adhesion Assessment at First Repeat Caesarean Section With or Without Prior Adhesion Barrier Use

Brianne Plante, DO, Sara Sukalich, MD, MEd, John O. Elliott, PhD, MPH

Department of Medical Education, OhioHealth Riverside Methodist Hospital, Columbus OH

Abstract

Objective: To determine if placing a carboxymethylcellulose adhesion barrier material at the time of primary Caesarean section (CS) leads to a reduction in adhesive disease, clinical outcomes, and hospital costs encountered at the time of a first repeat CS.

Methods: We performed a prospective cohort study of women at a large community hospital undergoing a first repeat CS with available prior operative records. A rating scale assessing the location and severity of adhesions (range 0 = no adhesions to 3 = dense and/or vascular adhesions requiring electrocautery) at the time of repeat CS was utilized by obstetric residents blinded to previous adhesion barrier use.

Results: One hundred fourteen women met the criteria for the study and were enrolled; 34 women had been exposed to the carboxymethylcellulose adhesion barrier and 80 had not. Demographics and clinical factors were similar between groups. In women exposed and not exposed to the barrier, there were differences in mean ratings of adhesions between fascia and muscle (1.18 ± 1.00 vs. 1.67 ± 0.83 , $P = 0.012$, Cohen's $d = 0.53$) and the overall adhesion rate (67.6% vs. 91.3%; $P = 0.004$); there were also differences in mean ratings of adhesions between the uterus and omentum (0.00 ± 0.00 vs. 0.19 ± 0.53 , $P = 0.032$, Cohen's $d = 0.51$) and the overall adhesion rate (0% vs. 12.5%; $P = 0.032$). No differences between the groups in time from incision to delivery, operating time, blood loss, or hospital costs were noted at first repeat CS.

Conclusion: Use of a carboxymethylcellulose adhesion barrier is associated with a decrease in adhesions noted at the time of repeat CS. The limited clinical benefits observed do not support use of the material for prevention of adhesions after the first CS.

Résumé

Objectif : Déterminer si la mise en place d'une barrière anti-adhérences en carboxyméthylcellulose au moment de la première césarienne entraîne une réduction des adhérences et des coûts

hospitaliers et une amélioration des résultats cliniques lors de la première césarienne itérative.

Méthodes : Nous avons effectué une étude de cohorte prospective dans un grand hôpital communautaire portant sur des femmes subissant une première césarienne itérative pour lesquelles nous avons accès aux dossiers d'antécédents opératoires. Les résidents en obstétrique ont utilisé une échelle d'évaluation du site et de la gravité des adhérences (de 0 = aucune adhérence à 3 = adhérences denses ou vasculaires nécessitant un électrocautère) au moment de la césarienne itérative sans savoir si une barrière anti-adhérences avait été utilisée précédemment.

Résultats : Cent quatorze femmes répondaient aux critères de l'étude et ont été incluses; 34 femmes avaient été exposées à une barrière anti-adhérences en carboxyméthylcellulose et 80 ne l'avaient pas été. Les caractéristiques démographiques et les facteurs cliniques étaient semblables dans les deux groupes. Des différences ont été observées entre les femmes exposées ou non à la barrière en ce qui a trait aux cotes moyennes des adhérences entre le fascia et le muscle ($1,18 \pm 1,00$ contre $1,67 \pm 0,83$, $P = 0,012$, d de Cohen = 0,53) et au taux d'adhérence général (67,6 % contre 91,3 %; $P = 0,004$). Des différences ont aussi été constatées dans les cotes moyennes des adhérences entre l'utérus et l'épiploon ($0,00 \pm 0,00$ contre $0,19 \pm 0,53$, $P = 0,032$, d de Cohen = 0,51) et le taux d'adhérence général (0 % contre 12,5 %; $P = 0,032$). Aucune différence entre les groupes n'a été observée en ce qui a trait au temps écoulé entre l'incision et la délivrance, à la durée d'opération, aux pertes sanguines ou aux coûts hospitaliers.

Conclusion : L'utilisation d'une barrière anti-adhérences en carboxyméthylcellulose est associée à une diminution des adhérences notées au moment de la césarienne itérative. Les bienfaits cliniques limités observés ne justifient pas l'utilisation du matériel pour la prévention des adhérences après la première césarienne.

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INTRODUCTION

Caesarean section (CS) is the most common surgical procedure performed in the United States,¹ accounting for nearly one third (32%) of all births in 2007.²

Key Words: Adhesions, caesarean section, outcomes, hospital costs

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Previous research suggests that 24% to 73% of women have intra-abdominal adhesions at the time of their second CS,^{3–5} resulting in increased operating time and the occurrence of complications including small bowel obstruction, infertility, chronic pain, and dyspareunia.⁶

Seprafilm (Genzyme Corp., Cambridge, MA), a product approved for reducing surgical adhesions, consists of a hydrophilic bioabsorbable adhesion barrier membrane made of sodium hyaluronate (a component of connective tissue) and carboxymethylcellulose, an inert compound. The carboxymethylcellulose adhesion barrier material is carefully placed over organs and tissues at the end of abdominal surgery before wound closure. The sheets adhere to the tissue surface and form a physical barrier that prevents tissue contact and subsequent adhesion formation. In 1–2 days, the membrane becomes a thick gel as it absorbs water; then over the course of the first postoperative week, it is reabsorbed by the body.⁷

Nonrandomized and randomized controlled trials of the carboxymethylcellulose material in a variety of general surgical procedures have demonstrated a reduction in adhesion formation.^{8–12} The gynaecologic literature on adhesion prevention with the carboxymethylcellulose material (Seprafilm) during pelvic surgery is less robust. There have been several review articles on the subject,^{6,13–18} a randomized pilot study of laparoscopic myomectomies,¹⁹ and a nonrandomized prospective trial that found a reduction in the extent and density of pelvic adhesions in women with epithelial ovarian cancer undergoing primary cytoreductive surgery with radical oophorectomy.²⁰

The paucity of data regarding the effect of a carboxymethylcellulose adhesion barrier on adhesion formation after CS and its frequent use by a number of clinicians at our institution prompted the current investigation. Based on the previous research, we hypothesized that women who had the carboxymethylcellulose adhesion barrier placed at the time of primary CS (the exposed group) would have fewer and/or less dense adhesions at the time of first repeat CS than women who did not have the adhesion barrier placed (the not exposed group). We also hypothesized that this reduction in adhesions might translate into differences in clinical outcomes (i.e., operating room time) and hospital costs at the first repeat CS.

METHODS

We conducted a prospective cohort study of women undergoing first repeat CS at our institution between April 2012 and March 2013. OhioHealth Riverside Methodist

Hospital is a large community-based, tertiary center in Columbus, Ohio, with more than 6000 deliveries per year.

Since the amount of adhesive disease is associated with the number of Caesarean sections,^{3,4} we required that women be undergoing a first time repeat CS for inclusion in the study. In order to verify exposure to the carboxymethylcellulose adhesion barrier material, we also required that the patient's previous CS was performed within our health system. Women younger than 18 years of age who did not have a guardian present to sign consent and the Health Insurance Portability and Accountability Act authorization, women with any previous pelvic infections or surgical procedures (either open or laparoscopic before the primary CS and/or between the primary and the first repeat CS) or endometriosis, and women who were not English speaking were excluded.

Women undergoing a first time repeat CS during the study period were prescreened via their electronic medical records. Trained research staff and obstetrics and gynaecology residents on the labour and delivery service then obtained consent from eligible patients prior to their CS procedure. After obtaining consent, the CS proceeded as scheduled with no protocol-directed change in surgical technique. Immediately after the CS, the obstetrics and gynaecology resident involved in the case scored the patient's adhesions. The residents were blinded to whether the carboxymethylcellulose adhesion barrier was used at the primary CS.

The adhesion scoring sheet for this study (Figure 1) was adapted from several previous scoring methods.^{3,5,21} To address subjectivity in the previous measures, we modified the anchors to reflect the surgical method used to dissect them. To establish reliability and validity of the adhesion score sheet, either two residents or the resident and the attending consultant on the case were asked to evaluate and score adhesions on the first 10 patients enrolled in the study, each blinded to the other's score. The overall correlation between the total adhesion rating score was high ($r = 0.80$, $P = 0.002$) and had sufficient Kappa agreement by location (0.52 to 1.00). Overall, this preliminary evaluation suggested we could continue with enrolment using the evaluation scoring.

Demographic and clinical information were collected via chart review. These data included parity, age, race/ethnicity, history of previous CS or other abdominal surgeries, and history of previous pelvic adhesions or endometriosis. The details of the previous CS were also reviewed; such details included whether or not the peritoneum was closed and the reason for the patient's primary CS because these may be involved in the development of abdominal adhesions.⁵

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