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Vacuum-Assisted Delivery of the Fetal Head at Cesarean Section

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Introduction

The cesarean section rate continues to climb. In the United States in 2003, 27.6 percent of all births were by cesarean section, a marked rise of 6 percent over the all-time high rate in 2002. However, this surgical procedure is not without risk; one such risk is the traumatic or deliberate extension of the uterine incision while attempting to deliver the fetal head. Techniques to effect delivery under these circumstances have included pressure on the uterus, the use of a forceps blade/s, or additional incisions in the uterus; all of which can be traumatic to both mother and fetus. The use of the vacuum extractor to assist in delivery of the fetal head at cesarean section has been increasing in the recent years.

We sought to compare the safety and efficacy of delivery of the fetal head at cesarean section using the vacuum extractor (Kiwi® OmniCup®, Clinical Innovations, Inc) and the traditional method of manual extraction.

Methods

A cohort design was used in this study. Women at term, with singleton gestations and requiring a cesarean section for delivery, were recruited to participate in this study. All women approached agreed to participate in the study and allow the use of the Kiwi® OmniCup® to assist delivery of the fetal head. The comparison group, all having undergone a "traditional" cesarean section (manual extraction of the fetal head), was retrospectively selected from medical records by matching maternal demographics.

The primary outcome measures included estimated blood loss for the procedure, evidence of uterine/cervical lacerations, neonatal APGAR scores, and neonatal trauma (including evidence of scalp abrasions, bruising, cephalohematoma, subgaleal or intracranial hemorrhage). In addition, position at the time of cup application and the number of cup detachments were recorded in the study group.

Statistical analysis included Student t test for continuous variables and X2 test for categorical variables. The Fisher exact test was used when the expected cell frequencies were equal or less than 5. $P < 0.05$ was considered statistically significant. Statistical analyses were performed by using SPSS.

Results

A total of 25 women underwent a cesarean section where the Kiwi® OmniCup® was used to assist delivery of the fetal head. An additional 25 women who had undergone cesarean sections (with manual extraction of the fetal head) were retrospectively selected by matching maternal demographics. The estimated blood loss was less in the study group (680.9cc vs. 810.0cc; $P < 0.04$).

In the manual extraction group, 4 of 25 women had uterine extensions, and 1 of the 25 had a cervical laceration documented at the time of surgery. There were no uterine extensions or cervical lacerations evident in the study group (use of the Kiwi® OmniCup®). Neonatal outcomes revealed no

Groups in APGAR scores or birth weight (7.67 lbs vs. 7.85 lbs; $P < 0.62$), but there were slightly more scalp effects (bruising, abrasion, and chignon) in the study group.

Conclusions

Over the past decade, the cesarean section rate has increased tremendously. However, the technique for this procedure has undergone very little change. Delivery of the infant at time of cesarean section can be difficult, depending on the size and station of the fetal head. Even unengaged and mid-pelvic stationed infants can present difficulties when attempting to deliver the head through the hysterotomy. Lateral extensions in the uterine incision and even lacerations down to the cervix may occur. Thus, Using a vacuum device to minimize the space requirements for the hysterotomy can reduce the incidence of these unwanted extensions and lacerations.

The 3 reported scalp effects in the study group were all minor and spontaneously resolved within 1 week without treatment. The scalp effects (2 abrasions and 1 bruise) were due to malplacement of the cup and subsequent pop-offs during the delivery. Those cups that were appropriately placed over the flexion point (three centimeters anterior to the posterior fontanelle along the sagittal suture) had no pop-offs and revealed no evidence of scalp effects. Thus, the minor scalp effects can be largely avoidable if the cup is appropriately placed over the flexion point. The new hand-held vacuums, such as the Kiwi® OmniCup®, decrease the chance of contamination of the surgical field due to their all-in-one design.

This study showed that the use of the vacuum extractor at time of cesarean section is a safe and effective method to affect delivery of the fetal head. It limits the traumatic extensions of the hysterotomy and provides a less invasive alternative for the surgeon. Given the increasing rate of cesarean sections worldwide, it is important to evaluate alternative techniques for this antiquated method of delivery.