ORIGINAL ARTICLE

The Relationship Between Patient-Controlled Analgesia and Postcesarean Section Pressure Ulcers: Analysis of Medical Record Data

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Purpose: *In this study, we aim to investigate the relationship between patient-controlled analgesia (PCA) and the incidence of pressure ulcer in postcesarean section mothers.*
Design: *A retrospective analysis was performed among consecutive cesarean section mothers in 2016.*
Methods: *Univariate and multivariate logistic regression was used to analyze the relationship between PCA and postcesarean section pressure ulcers.*
Findings: *One thousand nine hundred eighteen cesarean section mothers were included in the study. Forty-five mothers (2.3%; 95% confidence interval [CI], 1.7%-3.1%) developed stage I pressure ulcer. The pressure ulcers were cured in 2 to 5 days. Eighty percent (1,535) of mothers received PCA after cesarean section surgery. Pressure ulcer incidence was significantly higher in the PCA group compared with non-PCA groups (2.9% vs 0.0%, Fisher's exact* $P < .0001$*). Patient-controlled intravenous analgesia and patient-controlled epidural analgesia showed the same pressure ulcer risk (3.2% vs 2.6%,* $\chi^2 = 0.581$, $P = .446$*). After multivariate analysis by logistic regression, the adjusted odds ratio of PCA for pressure ulcer risk was 33.632, with a 95% CI of 25.061 to 45.134.*
Conclusions: *Our results showed PCA was an independent risk factor for pressure ulcer in postcesarean section mothers. Although the pressure ulcers were all rated as stage I and can be cured in 2 to 5 days, we still recommended some pressure ulcer prevention strategy should be used for these mothers.*

Keywords: *pressure ulcer, cesarean section, patient-controlled analgesia.*

PRESSURE ULCERS OFTEN develop in surgical patients with prolonged surgery. Our previous systematic review showed that the incidence of pressure ulcer in surgical patients over the last 5 years was 15%, with a 95% confidence interval (CI) of 14% to 16%.[1] The most common types of surgery associated with pressure ulcer were cardiac procedures, general/thoracic procedures,

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orthopaedic procedures, and vascular procedures.[2] However, in our clinical practice, we found that pressure ulcers may also develop in postcesarean section mothers. Cesarean section is a simple surgical operation, with a mean length of surgery of about 1 hour. Pressure ulcers should rarely develop in postcesarean section mothers. In our medical center, postcesarean mothers with pressure ulcers received patient-controlled analgesia (PCA) after cesarean section surgery. We hypothesized that PCA is a risk factor for pressure ulcers in postcesarean section mothers.

The relationship between analgesia and pressure ulcer risk has been noted for many years. Early in 1991, Punt et al reported two cases of pressure ulcer after the start of epidural analgesia. The two patients were young and, apart from an overnight fast, their nutritional status was good. They were not dehydrated, were not anemic, and were not bedridden.[3] In 2000, Alexander and Offori and Popham independently reported some cases of pressure ulcer after epidural infusion.[4-7] For cesarean section, Smet et al[8] reported three cases of pressure ulcer observed within 24 hours after the start of patient-controlled epidural analgesia (PCEA). These researchers all believed that pressure ulcer was a possible complication of analgesia. However, these studies were all case reports. No cohorts and case-control studies were found assessing the relationship between PCA and the incidence of pressure ulcer.

In this study, we aim to investigate the relationship between PCA and the incidence of pressure ulcer development in postcesarean section mothers.

Methods

Patient Population

We performed a retrospective analysis by reviewing medical record data. The study was approved by the medical ethics committee of our hospital. Inclusion criteria included (1) consecutive mothers with cesarean section between January 2016 and December 2016, and (2) pressure ulcer was assessed in these postcesarean section mothers. Exclusion criteria included (1) pressure ulcer developed during the cesarean section surgery or pressure ulcer developed before surgery, (2) postcesarean section death during hospitalization, (3) important data missing for the analysis, such as pressure ulcer and PCA information.

Data Collection

A retrospective review of electronic medical records was used to obtain data based on the Hospital Information System (HIS) of our hospital. The data collected were entered into a data entry template designed with EpiData (version 3.1). The template included five parts: (1) demographic characteristics including the mothers' name, hospital number, age, delivery times, gestational age, and body mass index (BMI); (2) health status at admission including admission hemoglobin (Hb), admission albumin (Alb), and pregnancy complications (such as hypertension in pregnancy, complicated with diabetes mellitus [DM]); (3) surgery information including type of surgery (elective surgery or emergent surgery), type of anesthesia (general anesthesia or epidural anesthesia), and length of surgery; (4) PCA information including PCA used or not, PCA type (patient-controlled intravenous analgesia [PCIA], PCEA, patient-controlled nerve analgesia, or patient-controlled subcutaneous analgesia), and PCA usage and dose; (5) postcesarean section pressure ulcer information including pressure ulcer occurrence time (hours after surgery), location (sacrum and coccyx, heel, or ischial tuberosity), stage (The European and US National Pressure Ulcer Advisory panels and Pan Pacific Pressure Injury Alliance [NPUAP-EPUAP-PPPIA] classification system[9]), interventions (turn over, dressing, and pressure-redistribution surface), and treatment outcome (cured or not cured).

We first searched the HIS electronically. If the information could not be found by computer search, we manually searched the medical records according to mothers' name and hospital number. All data were collected by two researchers independently, any differences of data collection were resolved by discussion.

Statistical Analysis

First, we compared baseline characteristics between the PCA group and the non-PCA group. Continuous variables were tested by the Student *t* test and categorical variables were tested by χ^2 test or Fischer exact test. Second, we compared