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Original Contribution

Incidence and characteristics of breakthrough pain in parturients using computer-integrated patient-controlled epidural analgesia☆,☆☆,★

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Abstract
Introduction: The computer-integrated patient-controlled epidural analgesia (CIPCEA) system can automatically adjust the background infusion rate during combined spinal-epidural analgesia based on the parturient's need, as labor progresses.
Objectives: The objective is to identify risk factors associated with breakthrough pain during labor as well as identify obstetric and fetal outcomes that are affected by breakthrough pain.
Design: This is a retrospective review of prospectively collected data.
Setting: The setting is in a delivery room.
Participants: The participants are 280 nulliparous women in early labor (≤ 5 cm cervical dilatation) who received combined spinal-epidural analgesia with CIPCEA.
Interventions: The intervention is CIPCEA.
Measurements: The primary outcome is the incidence of breakthrough pain (≥ 1 episodes of pain or pressure that required supplemental epidural medications) during labor. Relevant demographic, anesthetic, obstetric, and fetal characteristics were also measured. Univariate and multivariate analyses were performed to identify obstetric and anesthetic factors that were associated with increased incidence of breakthrough pain as well as to evaluate the impact of breakthrough pain on obstetric and fetal outcomes.
Results: The incidence of breakthrough pain was 9.6%. Independent factors associated with incidence of breakthrough pain are the presence of dysfunctional labor, increased maternal body mass index, and decreased successful-to-total-bolus-demand ratio. The postlabor characteristics independently associated with breakthrough pain were increased duration of labor, decreased duration of effective analgesia, increased total local anesthetic consumption, and decreased maternal satisfaction.
Conclusions: Low successful to total patient demand bolus ratio was the factor with the strongest association with breakthrough pain. Breakthrough pain was also associated with dysfunctional labor and poorer maternal satisfaction.

1. Introduction

Patient-controlled epidural analgesia is an effective mode of labor analgesia that is associated with better patient satisfaction, less breakthrough pain, and reduced local anesthetic (LA) consumption [1]. Computer-integrated patient-controlled epidural analgesia (CIPCEA) is a novel epidural analgesic delivery system that is currently used in daily practice in KK Women's and Children's Hospital [2-4]. It has enabled us to monitor the infusion pumps through wireless connection to a central monitoring system and, hence, collect pump utilization data electronically (Fig. 1). The CIPCEA system is programmed to analyze the LA usage across the last hour and adjust the background infusion rate according to a preset algorithm. The computer programme titrates the background infusion rate to 5, 10, 15, or 20 mL/h

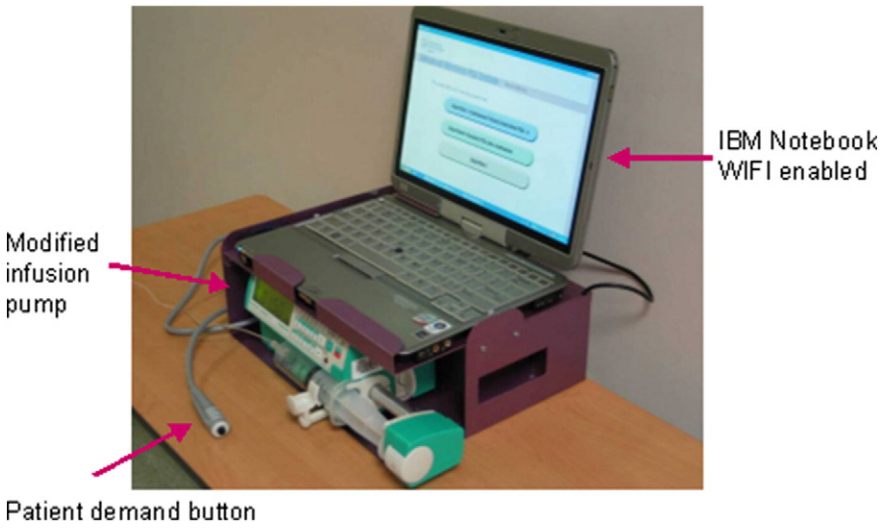

Fig. 1 Computer-integrated PCEA system.