Caudal Epidural Block for Minor Gynecologic Procedures in Outpatient Surgery

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Background: Caudal epidural block (CEB) has become increasingly important for pediatric analgesia in recent years. However, data regarding CEB in adult ambulatory surgery are scarce. The aim of this study was to verify whether CEB could be applied as a simple, safe and economic method of anesthesia for adult patients undergoing minor gynecologic procedures (MGP).

Methods: One hundred and seventy-two female patients were enrolled in this study. Each patient received a 20-mL bolus of 1.5% lidocaine caudal epidural injection. The efficacy of CEB was evaluated. Types and duration of surgery, success rate, sensory level of analgesia, caudal epidural depth, complications and duration in the postanesthesia care unit (PACU) were also under investigation.

Results: No side effects occurred and only few hemodynamic changes were noted in the study. All patients experienced excellent surgical anesthesia except seven patients, who required rescue supplement opioids (4.1% of failure rate). The success rate of CEB was 95.9% (165/172). Duration of anesthesia and surgery were 46.66±11.76 min and 23.08±9.54 min, respectively. The highest sensory dermatome level reached below T10. The average epidural depth was 3.06±0.23 cm. No postoperative anti-emetic was given in the study. Only three patients required postoperative narcotics. Four patients had spontaneous voiding before discharge. The average PACU stay was 74.30± 10.80 min.

Conclusion: Single-dose CEB with 1.5% lidocaine 20-mL was an easy and simple technique. It provided satisfactory anesthesia for MGP and did not prolong patients' discharge time. CEB may be another choice of anesthetic technique in such cases of clinical practice.

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Key words: **caudal epidural block, minor gynecologic procedures.**

Outpatient surgery offers a number of advantages for both the patients and the healthcare system. The percentage of minor surgery carried out on an outpatient basis has increased rapidly in recent years. However, anesthesia that can provide predictable efficiency, smooth and fast recovery, that is safe for the patient is mandatory. Although general anesthesia remains the most popular technique, an increas-

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ing percentage of cases are being performed under regional anesthesia. The anticipated advantages of regional anesthesia included less nausea and vomiting, greater potential for postoperative analgesia, reduced risk of aspiration pneumonitis, reduced postoperative nursing workload, and enhanced ability to communicate with the patient both intraoperatively and postoperatively.[1] Mingus stated that most anesthesiologists would prefer regional anesthesia due to the rapid recovery advantages in comparison with general anesthesia.[2]

There have been many studies about the use of caudal anesthesia for pediatric patients.[3-8] Children possess lesser amounts of presacral fat, noncalcified sacral ligament and having a considerably wider hiatus than adults. Thus, caudal epidural block (CEB), supplementing general anesthesia, in infants and children is a common and accepted anesthetic technique. Although CEB have been well documented in children, there are still few studies of CEB in adults. As for adult patients, the sacrum is the most variable bone which makes the sacral hiatus not easily identifiable in this region.[9] We report our observational study in patients who underwent minor gynecologic procedures (MGP) using caudal anesthesia.

METHODS

The study was conducted in 172 patients scheduled for MGP from January 1998 through December 2002. After the ethics committee of our hospital approved the study, informed anesthesia consent was obtained from all patients. We also discussed the procedures of caudal epidural block with the selected patients. Patients with morbid obesity, history of sacral injury or deformity, preexisting neurological disease, sepsis, sacral hiatus that was difficult to palpate or refusal of the blocks were excluded from this study. The enrolled patients were ASA class I or II with no other medical diseases.

The intravenous (IV) line was set up in the operating room. Hemodynamics and peripheral oxygen saturations were recorded continuously using available standard monitors, including an automatic noninvasive blood pressure device, electrocardiogram and pulse oximetry. Most of the patients except for the pregnant women were premedicated with IV fentanyl (25-50 μg), low dose diazepam (2-5 mg) or midazolam (1-2.5 mg) for light sedation before the blocks. The patient was turned to the left lateral decubitus position (for the sake of the author's right-handed injection). The skin of the sacrococcygeal area was thoroughly prepared with povidone iodine. Once the sacral hiatus was identified, a short beveled 22-gauge needle (Becton Dickinson, Precision-Glide™ needle, 0.7×38 mm) was then inserted till a "click" was felt as the sacrococcygeal ligament was pierced. After negative aspiration to exclude accidental intrathecal or intravascular insertion, each patient was injected slowly with a 20-mL, single-dose (or single-shot) of 1.5% plain lidocaine. If there was no resistance to correct caudal epidural placement, a total amount of local anesthetic solution was injected easily. Care should always be taken to look for signs of acute toxicity during each caudal injection. After injection, we marked and bent the inserted needle and measured the depth between the skin to the epidural space. The patient was changed to the supine position and then placed in the lithotomic position. No technical problems occurred in this study. Oxygen at 5 L/ min was given via a facemask to each patient. The sensory dermatome level was evaluated by pinprick test 10 minutes after the caudal injection. We used this caudal block as the sole anesthetic technique. When the surgery was completed and the patient satisfied, it was considered as a successful CEB. When there was inadequate surgical analgesia, rescue IV opioid was administered (defined as unsuccessful block). The motor block was considered resolved upon recovery of hip flexion. The highest sensory level of anesthesia, hypotension and hypertension (less or greater than 20% of baseline status), types and duration of surgery, intraoperative or postoperative complications, and duration of the stay after operation were recorded. The patients were treated according to our postanesthesia care unit (PACU) clinical guidelines (discharge criteria: awake with stable vital signs, no surgical pain and bleeding, oriented and steady gait) until the time of discharge. The patients did not wait until complete regression of local anesthetic and were discharged from the hospital with a responsible escort. Each patient was advised by a nurse to follow the instructions on avoiding potentially dangerous activities.

RESULTS

One hundred and seventy-two ASA I and II

Table 1. Demographic Data

Parameter	Values
Age (years)	41.76±12.19
Weight (kg)	54.24± 7.6
Height (cm)	156.40± 3.96
Anesthetic duration (min)	46.66±11.76
Surgery duration (min)	23.08± 9.54

Values are mean±SD

Table 2. Surgical Types of Gynecologic Procedures

Surgical procedures	No. of cases	Percentage(%)
Traditional cone or endometrial biopsy	62	36.0
Marsupialization for Bartholian cyst	40	23.3
Laser therapy for condyloma	26	15.1
Vulvar tumor excision or TCR	23	13.4
Posterior repair of perineum	11	6.4
McDonald cervical cerclage	10	5.8
Total	172	100

TCR: transcervical resectoscopy

Table 3. Caudal Block of Related Variable Events

Parameter	No. of cases	Percentage(%)
Light sedation before block	145	84.3
Without sedation before block	27	15.7
Sensory block (before incision) at T10	64	37.2
Sensory block (before incision) at T12	108	62.8
Good surgical anesthesia	165	95.9
Incomplete blockade	7	4.1
The average needle depth (cm)	3.06±0.23	

Data are mean±SD

Table 4. Recovery Characteristics in the PACU

Parameter	No. of cases	Percentage(%)
Stable vital signs	172	100
Drowsiness	0	0
Anti-emetics therapy	0	0
Intravenous narcotics	3	1.7
Spontaneous voiding	4	2.3
Ambulation ability before discharge	172	100
Average stay-time (min)	74.3±10.8	

Data are mean±SD

female patients, aged 21-70 years old, undergoing elective MGP were enrolled in the study. The patients' demographics data, the average duration of anesthesia and surgery are shown in Table 1. Types of surgery are listed in Table 2. We did not record the time to complete each CEB. The average time consuming of anesthesia and surgery duration (about 24 min) included the time for performing the block, patient positioning, and sterilization. Variable events related to CEB are shown in Table 3. One hundred and forty-five (84.3%) of the caudal blocks were performed under light sedation. The sensory level in all of the patients reached below T10 (108/172 < T12). The overall success rate of caudal blocks was 95.9%. Stable hemodynamic changes after CEB were found. Seven patients (4.1%) developed hypertension and tachycardia due to incomplete block and four patients had hypotension after IV sedatives were given. There were very few changes in blood pressure and heart rate. Few changes of respiratory rate and pulse oxygen saturation were noted. The depth of needle insertion was 3.06±0.23 cm. Three patients required postoperative narcotics because of longer surgical duration (more than 40 min). Only four cases had spontaneous voiding before discharge. There were no major complications such as nausea/vomiting, seizures or harmful neurological symptoms of prolonged paresthesia, lower extremities weakness, radiating back pain or delayed ambulation. The duration of observation in the PACU was 74.30±10.80 min (Table 4). No special unpleasant or distressing postoperative symptoms were reported on the follow-up appointments.

DISCUSSION

The primary mechanism of caudal epidural anesthesia is the spinal root block. It is a simple and quickly done procedure, allowing short turnover time while providing good surgical anesthesia and postoperative analgesia. When performed correctly there is little danger of neurological deficits. Caudal anesthesia can be used successfully during sacroperineal surgery. Some authors reported that caudal anesthesia was a useful technique for minor anal surgery.[10,11] Abouleish also stated that CEB was used safely as a laboring analgesia.[12] In Taiwan, Chen et al.[13] first reported the use of caudal block during a vaginal delivery. However from our former experience, we have found that it was not easy to identify the sacral hiatus and there was a high failure rate in parturient because the patients had greater amounts of presacral fat in this region at the time of the third trimester (or neer term).

The patients often tolerated the caudal needle insertion with cooperation. However, the majority of female patients had fears regarding the caudal block. To make the CEB comfortable, light sedation with low dose short acting lipophilic fentanyl (25-50 μg) and/or a small dose of midazolam was given to the patient (145/172). In the report by Crighton, there was a 10% rate of technical failure because of an absent sacral hiatus due to wide anatomic variation in this region.[9] We suggest that patients should be carefully selected and given light sedation before the blocks. The maximum time for surgery was not to exceed 45 minutes. Furthermore, accurate and correct needle insertion[14,15] with skilled and experienced hands seemed very important in this technique. These resulted in a high success rate (95.9%) in our study. Although we had seven cases (4.1%) of insufficient anesthesia, only rescue supplementation of IV opioid was required.

The average depth of the inserted needle was 3.05±0.23 cm, so a beveled 22-gauge needle always satisfied the length of CEB. For pediatric patients, care should be taken not to insert the needle too far as the dura lies at or below the S2 level in children.[16] We must avoid errors of subcutaneous, periosteal, and interosseous caudal injections. It is also essential that every effort be made to minimize the potential risks for nerve damage and intravascular injection. Our previous clinical experience included a patient that presented with seizures attacks during caudal intravascular injection. The absence of blood during aspiration does not guarantee that venous puncture has been avoided. We also had a patient who developed persistent leg weakness and paresthesia for 5 hours after one anal surgical procedure.

Dural transfer of local anesthetic solution may be affected by its volume (i.e. total dosage) and different concentrations of local anesthetics with or without adding caudal adjuvant. The use of different local anesthetics (e.g. lidocaine, mepivacaine, ropivacaine or bupivacaine), and the addition of caudal adjuvant (e.g. adrenaline, clonidine, ketamine, neostigmine, narcotics or alkalization with sodium bicarbonate)[17-23] must be evaluated for their efficacy and drug effects. All of these factors affect the level of analgesia, onset of action, and duration of sensory and/or motor blockade. Different concentrations (1%, 1.5% and 2%) of lidocaine had been studied.[24,25] A high concentration of lidocaine produced a more intense sensory and motor blockade.[23] The addition of caudal additives accelerated both the onset and a caudal spread of local anesthetic. The blockade was more profound in its extents and the effects lasted longer. No caudal additives were added for these ambulatory patients because we hoped that they could recover from CEB quickly. In our study, 1.5% lidocaine 20-mL had no systemic toxicity, cardiotoxicity, or respiratory depression. A high concentration in larger volume of local anesthetic has produced vasodilatation by sympathetic blockade that resulted in decrease in blood pressure, but this reaction seldom occurs after caudal block. In our study, hypotension only occurred in four cases after additional IV sedation before surgical incision, which was easily corrected using IV fluid. The suggested dosages for adults are 20-30 mL for blocks of the lower abdomen and 15-20 mL for blocks of the lower limb and perineum.[26] We precluded the use of a high concentration in a large volume of local anesthetic for the MGP. We found that the caudal block produced minimal hemodynamic changes with moderate rapid onset of surgical anesthesia and early recovery of motor blockade. Fast-track caudal anesthesia allows short-term postoperative surveillance or nursing care. Meanwhile, considering air pollution with mask inhalation anesthesia and maximizing operating room utilization with rapid patient transfer to recovery room for care, CEB offers an effective, safe and reliable option in anesthesia for ambulatory patients.

Regional anesthesia related adverse effects such as seizure, neurological injury, back pain, and prolonged motor blockade were not found in this study. Nausea and vomiting, dizziness, postoperative pain, and prolonged motor blockade are common complications that result in patient discomfort and lead to prolonged stay in the PACU.[27] In our study, patients reported slight discomfort and were generally alert. None of the patients experienced vomiting and no anti-emetics were needed. This might highly decrease the amount of recovery nursing labor needed to manage an emesis episode. Only three patients required postoperative narcotics. Hence the use of CEB may reduce the overall intake of medication, recovery unit resources, and facility costs.

Caudal anesthesia was found to have no definite correlation with the incidence of postoperative urinary retention in a retrospective study by Pappas et

al.[28] The urge to urinate may be less while the caudal block is working. Ability to urinate is not one of the criteria necessary for discharge from our hospital. Only four cases had spontaneous voiding before leaving the PACU. Although some patients experienced numbness over the sacroperineal regions before discharge, the patients experienced decreased surgical pain and had little effect on lower limbs.[26]

In conclusion, with the consideration of efficacy (technical simplicity, rapid onset as recovery from it) and safety (no respiratory problem with less hemodynamic changes and no clinically adverse outcomes), CEB offers adequate anesthesia for MGP without increasing the PACU stay.

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尾椎硬脊膜外腔神經阻斷術應用於門診簡易婦科的手術

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背 景： 近年來尾椎硬脊膜外腔神經阻斷術應用於兒科止痛上漸趨重要性，可是有關成人門診手術使用此法的資料卻相當少。我們的目的就是要提出簡易婦科手術 (MGP) 可使用此種簡單、安全符合經濟原則的麻醉方式。

方 法： 172位女性患者接受此研究，每位患者皆注射20毫升單劑量尾椎硬脊膜外腔1.5% lidocaine (沒有添加劑)。尾椎硬脊膜神經阻斷術 (CEB) 的效能予以評估。手術種類及時間、麻醉成功率、麻醉高度、尾椎針穿刺深度、副作用及恢復室停留時間皆爲本文所探討的範圍。

結 果： 本研究並沒有任何副作用產生且病患血動力狀況變化微少。所有手術病患皆有不錯的止痛作用；但7位需增加止痛劑 (失敗率爲4.1%)；然而成功率卻高達95.9% (165/172)；麻醉及手術所需時間分別爲46.66±11.76及23.08±9.54分鐘。麻醉最高可達T10之感覺範圍；尾椎硬脊膜穿刺深度爲3.06±023公分；術後只有3位需用止痛劑；4位出院前可自解小便；本研究沒有使用任何止吐劑，恢復室停留時間爲74.30±10.80分鐘。

結 論： 使用1.5% lidocaine之20毫升單劑量 (CEB) 於 (MGP) 的病患，被認爲是一種安全、簡單的麻醉方法；它能提供MGP滿意的麻醉且病人不會延遲出院時間。對於此類病患，CEB可以作爲另一種不同麻醉方式的選擇，使用於臨床麻醉上。

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關鍵字： 尾椎硬脊膜外腔神經阻斷術，簡易婦科手術。

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