



Canadian Agency for
Drugs and Technologies
in Health

RAPID RESPONSE REPORT: SUMMARY OF ABSTRACTS



TITLE: Ambulatory Epidural Analgesia in Obstetrics: Clinical Effectiveness, Safety, and Guidelines

DATE: 08 November 2010

RESEARCH QUESTIONS

1. What is the clinical effectiveness of ambulatory epidural analgesia for obstetric patients during labour?
2. What is the clinical evidence regarding the safety of ambulatory epidural analgesia for obstetric patients during labour?
3. What are the evidence-based guidelines for ambulatory epidural analgesia for obstetric patients during labour?

KEY MESSAGE

Evidence from randomized and non-randomized studies suggests that ambulatory epidural analgesia is effective in maintaining leg strength and motor function, is not associated with serious adverse events, and may lead to a reduction in catheterization and duration of labour in obstetric patients.

METHODS

A limited literature search was conducted on key health technology assessment resources, including OVID Medline, EBSCO CINAHL, the Cochrane Library (Issue 10, 2010), University of York Centre for Reviews and Dissemination (CRD) databases, ECRI (Health Devices Gold), EuroScan, international health technology agencies, and a focused Internet search. The search was limited to English language articles published between January 1, 2000 and October 26, 2010. No filters were applied to limit the retrieval by study type. Internet links were provided, where available.

Disclaimer: The Health Technology Inquiry Service (HTIS) is an information service for those involved in planning and providing health care in Canada. HTIS responses are based on a limited literature search and are not comprehensive, systematic reviews. The intent is to provide a list of sources of the best evidence on the topic that CADTH could identify using all reasonable efforts within the time allowed. HTIS responses should be considered along with other types of information and health care considerations. The information included in this response is not intended to replace professional medical advice, nor should it be construed as a recommendation for or against the use of a particular health technology. Readers are also cautioned that a lack of good quality evidence does not necessarily mean a lack of effectiveness particularly in the case of new and emerging health technologies, for which little information can be found, but which may in future prove to be effective. While CADTH has taken care in the preparation of the report to ensure that its contents are accurate, complete and up to date, CADTH does not make any guarantee to that effect. CADTH is not liable for any loss or damages resulting from use of the information in the report.

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The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.

RESULTS

Rapid response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and evidence-based guidelines.

One systematic review, 15 randomized controlled trials, and four non-randomized studies were identified regarding the clinical effectiveness and safety of ambulatory epidural anesthesia during labour. No relevant health technology assessments or evidence-based guidelines were identified. Additional articles of potential interest can be found in the appendix.

OVERALL SUMMARY OF FINDINGS

Twenty articles,¹⁻²⁰ four^{2,3,10,11} reporting outcomes from the Comparative Obstetric Mobile Epidural Trial (COMET), were identified pertaining to ambulatory epidural analgesia for women in labour. Outcomes of these articles are summarized in Table 1.

The conclusions regarding the effects of ambulatory epidural and ambulation on the length of labour were varied. Two studies^{7,17} reported decreased length of labour in the ambulatory group, one study¹⁸ reported decreased length of labour in the control group, and three studies^{4,9,13} reported no difference between groups. Five studies^{2,8,9,12,19} reported maintenance of leg strength and motor function with ambulatory epidural. Maintenance of the ability to void, and therefore avoid catheterization, was reported in three studies.^{3,4,14} None of the included studies reported adverse effects resulting from the use of ambulatory epidural and no relevant evidence-based guidelines were identified.

Table 1: Outcomes reported in included articles			
Study	Study Type	Intervention	Outcomes
Mayberry et al. (2002) ¹	SR	Epidural analgesia during labour	No specific conclusions regarding ambulatory epidurals presented in the abstract.
Wilson et al. (2009) ²	RCT - COMET	High-dose epidural or CSE or LDI	Significantly more women in the ambulatory groups maintained normal leg strength compared to the high-dose group. Leg power continued longer in the CSE group.
Wilson et al. (2009) ³	RCT – COMET	High-dose bupivacaine or CSE or LDI	Women in ambulatory groups were more able to void spontaneously, decreasing the need for catheterization. The CSE group regained normal sensation more quickly than the control group.
Frenea et al. (2004) ⁴	RCT	Recumbent or ambulation	All patients given ambulatory epidural and randomized to walk or stay in bed. No difference observed in length of labour or pain scores between groups. The walking group received less

Table 1: Outcomes reported in included articles

Study	Study Type	Intervention	Outcomes
			bupivacaine and oxytocin and retained a greater ability to void, resulting in less catheterization.
Calimaran et al. (2003) ⁵	RCT	Lidocaine-epinephrine test dose or epidural saline after CSE	After 30 minutes the lidocaine-epinephrine group had impaired ability to perform physical tests. At 60 minutes fewer patients in the test group could step on a stool. The test dose may interfere with motor ability.
Camorcia et al. (2003) ⁶	RCT	Levobupivacaine or ropivacaine or bupivacaine, plus sufentanil	Pain relief and ability to walk were similar between all three groups. The analgesic effect of bupivacaine did not last as long as the other treatments.
Karraz (2003) ⁷	RCT	Ambulatory or non-ambulatory	There was no difference in oxytocin requirement between groups. Patients in the ambulatory group had a significantly shorter duration of labour..
Parker et al. (2002) ⁸	RCT	Fentanyl + hydromorphone or fentanyl + saline after lidocaine-epinephrine test dose	Addition of hydromorphone resulted in no lengthening of analgesia duration or increase the patient's ability to walk. The authors concluded the addition of hydromorphone to epidural analgesia cannot be recommended.
Rolfseng et al. (2002) ⁹	RCT	Bupivacaine test dose followed by bupivacaine + sufentanil or bupivacaine + fentanyl	Overall satisfaction was high in both treatment groups. All patients in both groups could stand and most could walk unaided. No serious adverse effects were reported. No clinical difference was observed between groups.
Wilson et al. (2002) ¹⁰	RCT – COMET	High-dose bupivacaine or CSE or LDI	The CSE group had faster onset of analgesia, lower mean pain scores, and a significant reduction in bupivacaine dose through labour.
COMET Study Group (2001) ¹¹	RCT – COMET	High-dose bupivacaine or CSE or LDI	Normal vaginal delivery was 35.1% for high-dose, 42.7% for CSE, and 42.9% for LDI. Low-dose techniques showed benefits for delivery outcomes.
Connolly et al. (2001) ¹²	RCT	Lidocaine-epinephrine test dose + fentanyl followed by bupivacaine + fentanyl or saline	Mean duration of anesthesia was greater in bupivacaine + fentanyl group. No motor block was observed in either group and there side effects were similar between groups.
Vallejo et al. (2001) ¹³	RCT	Ambulatory or non-ambulatory	All patients received ambulatory epidural analgesia and were randomized to move around or stay in bed. Ambulatory patients did not experience shortened labour duration.
Campbell et al. (2000) ¹⁴	RCT	Bupivacaine + fentanyl or ropivacaine +	All patients in the ropivacaine group ambulated compared to 75% in the bupivacaine group. Ability to void was

Table 1: Outcomes reported in included articles

Study	Study Type	Intervention	Outcomes
		fentanyl	also maintained.
Cohen et al. (2000) ¹⁵	RCT	Various concentrations and combinations of ambulatory epidural analgesia	Bolus of 0.135% bupivacaine + sufentanil without a test dose was determined to be optimal in regard to analgesia and ambulation.
Connelly et al. (2000) ¹⁶	RCT	Lidocaine + epinephrine test dose followed by sufentanil or fentanyl	Mean analgesia duration and side effects were similar in both groups. Analgesic effect of epidural fentanyl is comparable to that of sufentanil.
Rao et al. (2010) ¹⁷	NRS	Bupivacaine + tramadol or on-demand analgesia	Rate of satisfaction was high and length of labour was significantly less in patients receiving ambulatory anesthesia.
de la et al. (2006) ¹⁸	NRS	Ambulatory epidural with 0.0625% bupivacaine versus recumbent analgesia with 0.125% or 0.25% bupivacaine (control)	Patients in the ambulatory group walked an average of 60 minutes. Significantly fewer instrumental vaginal deliveries were required in the ambulatory group. The control groups had shorter mean duration of labour. The authors concluded walking epidural was safe for mother and baby.
Connelly et al. (2003) ¹⁹	NRS	Lidocaine-epinephrine + fentanyl 2 mL, 10 mL or 20 mL	No patients experienced detectable motor block. The authors concluded the volume of epidural fentanyl does not affect analgesia or ambulation.
Davie et al. (2002) ²⁰	NRS	Labouring women given CSE or pregnant and non-pregnant controls	Balance was tested using the Balance Master 6.1. Non-pregnant women scored significantly better in 6 of 13 balance function parameters compared to both pregnant groups. The CSE group did not show any more impairment than the pregnant control group.

COMET = Comparative Obstetric Mobile Epidural Trial; CSE = combined spinal epidural; LDI = low-dose infusion; NRS = non-randomized study; RCT = randomized controlled trial; SR = systematic review

REFERENCES SUMMARIZED

Health technology assessments

No literature identified.

Systematic reviews and meta-analyses

1. Mayberry LJ, Clemmens D, De A. Epidural analgesia side effects, co-interventions, and care of women during childbirth: a systematic review. *Am J Obstet Gynecol.* 2002 May;186(5 Suppl Nature):S81-S93. [PubMed: PM12011875](#)

The purpose of this article is to profile research findings targeting the intrapartum care implications of the most common side effects and co-interventions that go along with the use of epidural analgesia during labor. Randomized, controlled trials published in English from 1990 to 2000 that addressed each of the targeted side effects and 3 specified co-interventions were evaluated for inclusion in this report. Side effects such as pruritus, nausea, and hypotension during labor are common, but they are usually mild and necessitate treatment infrequently. However, even with the advent of newer low-dose epidurals, the extent of impaired motor ability remains variable across studies. **The incidence of "walking" epidurals during labor is likely to be complicated by multiple factors, including individual patient desires, safety considerations, and hospital policies.** In response to risks for a decrease in uterine contractions that could prolong labor, oxytocin augmentation is likely to be administered after epidural analgesia. The use of "delayed" pushing may be an effective way to minimize the risk for difficult deliveries. Upright positioning even when confined to bed may be advantageous and desirable to women; however, additional research to determine actual outcome benefits with epidurals is needed. Implications for further research linked to epidural analgesia also include informed consent, modification of caregiving procedures, and staffing/cost issues.

Randomized controlled trials

2. Wilson MJ, MacArthur C, Cooper GM, Shennan A, COMET Study Group. Ambulation in labour and delivery mode: a randomised controlled trial of high-dose vs mobile epidural analgesia. *Anaesthesia.* 2009 Mar;64(3):266-72. [PubMed: PM19302638](#)

Compared to high-dose epidurals where mobility is impossible, mobile epidurals have been shown to reduce instrumental vaginal delivery rates. The mechanism for this benefit may depend on women walking or adopting upright postures during labour. **We investigated maternal motor power and ambulation of 1052 primiparous women randomised to high-dose epidural (Control), Combined Spinal Epidural (CSE) or Low-Dose Infusion (LDI) as a pre-specified, secondary outcome of the Comparative Obstetric Mobile Epidural Trial.** Modified Bromage power scores and the level of mobility a woman actually achieved were recorded each hour after epidural placement during first and second stage, until delivery. **Relative to control, significantly more women maintained normal leg power throughout labour in both mobile groups and significantly more women with CSE maintained superior leg power for longer than with LDI.** Observational analysis did not demonstrate an association between the level of ambulation a woman actually achieved after epidural placement and delivery mode.

3. Wilson MJ, MacArthur C, Shennan A, COMET Study Group. Urinary catheterization in labour with high-dose vs mobile epidural analgesia: a randomized controlled trial. *Br J Anaesth.* 2009 Jan;102(1):97-103. [PubMed: PM18987057](#)

BACKGROUND: Dense perineal block from epidural analgesia increases the risk of urinary catheterization in labour. Mobile epidurals using low-dose local anaesthetic in combination with opioid preserve maternal mobility and may reduce the risk of bladder dysfunction. **We conducted a three-arm randomized controlled trial to compare high-dose epidural pain relief with two mobile epidural techniques.** **METHODS:** A total of **1054 primiparous women were randomized to receive high-dose bupivacaine, epidural analgesia (Control), combined spinal epidural (CSE), or low-dose infusion (LDI).** The requirement for urinary catheterization during labour and postpartum was recorded. Both end points were pre-specified secondary trial outcomes. Women were evaluated by postnatal interview, when their bladder function had returned to normal. **RESULTS: Relative to Control, more women who received mobile epidural techniques maintained the ability to void urine spontaneously at any time (Control 11%, CSE 31% and LDI 32%) and throughout labour (Control 3.7%, CSE 13% and LDI 14%), for both mobile techniques P<0.01.** There was no difference in the requirement for catheterization after delivery. **Women in the CSE group reported a more rapid return of normal voiding sensation, relative to high-dose Control (P=0.02).** **CONCLUSIONS: Relative to conventional high-dose block, mobile epidural techniques encourage the retention of normal bladder function and reduce the risk of urinary catheterization in labour.**

4. Frenea S, Chirossel C, Rodriguez R, Baguet JP, Racinet C, Payen JF. The effects of prolonged ambulation on labor with epidural analgesia. *Anesth Analg.* 2004 Jan;98(1):224-9. [PubMed: PM14693624](#)

Ambulation during labor is becoming more popular, although its impact on the progress of labor and on pain intensity remains unclear. **We wondered whether prolonged ambulation with epidural analgesia had a possible effect on duration of labor and pain.** **In this prospective, randomized trial, 61 parturients with uncomplicated term pregnancies were allocated to be recumbent (n = 31) or to ambulate (n = 30).** Epidural analgesia was provided with intermittent administrations of 0.08% bupivacaine-epinephrine plus 1 microg/mL of sufentanil. **Of the 30 women assigned to the ambulatory group, 25 actually walked.** Their ambulating time was 64 +/- 34 min (mean +/- SD), i.e., 29% +/- 16% of the first stage. **There were no differences between the two groups in the length of labor and in pain visual analog scale scores. However, the ambulatory group received smaller doses of bupivacaine (6.4 +/- 2.2 mg/h versus 8.4 +/- 3.6 mg/h; P = 0.01) and of oxytocin (6.0 +/- 3.7 mUI/min versus 10.2 +/- 8.8 mUI/min; P < 0.05). A greater ability to void was also found in the ambulatory group (P < 0.01).** Although the duration of labor and pain relief was unchanged, these findings support that ambulation during labor may be advantageous. **IMPLICATIONS: This study compared the duration of labor and pain relief between parturients receiving epidural analgesia who were ambulated or were recumbent. Whereas walking had no impact on either duration of labor or pain relief, it was associated with a reduction in both bupivacaine and oxytocin requirements.**

5. Calimaran AL, Strauss-Hoder TP, Wang WY, McCarthy RJ, Wong CA. The effect of epidural test dose on motor function after a combined spinal-epidural technique for labor

analgesia. *Anesth Analg*. 2003 Apr;96(4):1167-72. [PubMed: PM12651678](#)

Labor analgesia initiated with intrathecal bupivacaine and fentanyl, without a local anesthetic epidural test dose, provides effective analgesia and allows ambulation. In this study, **we sought to determine the effect of a lidocaine-epinephrine test dose administered immediately after the initiation of combined spinal-epidural (CSE) analgesia with bupivacaine 2.5 mg and fentanyl 25 micro g on parturients' hemodynamic stability, posterior column function, motor strength, and subjective ability to walk.** Parturients (n = 153) were randomized to receive either 3 mL of epidural saline or lidocaine 1.5% with epinephrine 1:200,000. Hemodynamic variables, proprioception, straight leg raise, and the modified Bromage score were analyzed in 110 parturients who completed the study protocol and were not different between groups. **Vibratory sense, the ability to perform a partial deep knee bend and to step up on a stool, and the subjective ability to walk were impaired in a larger number of parturients in the lidocaine-epinephrine group at 30 min (P < 0.05). At 60 min, there were no differences between the groups except that fewer parturients in the lidocaine-epinephrine group could step up on a stool.** The straight leg raise against resistance and the modified Bromage scale did not correlate well with other tests of motor strength (Spearman's rho, 0.273-0.405). These data suggest that the test dose should be avoided immediately after initiation of CSE analgesia when early ambulation is desired. **IMPLICATIONS: A lidocaine-epinephrine epidural test dose (3 mL of lidocaine 1.5% with epinephrine 1:200,000), injected immediately after the initiation of combined spinal-epidural labor analgesia with bupivacaine 2.5 mg and fentanyl 25 microg, may interfere with the ability to perform simple tests of motor function and ambulation.**

6. Camorcia M, Capogna G. Epidural levobupivacaine, ropivacaine and bupivacaine in combination with sufentanil in early labour: a randomized trial. *Eur J Anaesthesiol*. 2003 Aug;20(8):636-9. [PubMed: PM12932065](#)

BACKGROUND AND OBJECTIVE: To evaluate the efficacy, delay and duration of analgesia of three equianalgesic epidural doses of levobupivacaine, ropivacaine and bupivacaine during the first stage of labour. **METHODS:** One hundred and twenty-nine healthy primigravida in spontaneous labour who requested epidural analgesia were enrolled in a randomized observer-blinded study. **Parturients were allocated to receive epidural levobupivacaine 0.0625%, ropivacaine 0.1% or bupivacaine 0.06259%. Sufentanil 10 microg was added to all solutions; the total volume of epidural solution was 20 mL.** Pain was measured using a 100 mm visual analogue pain scale immediately before the epidural block, and at 5, 10, 15, 20 and 30 min thereafter. Motor block was evaluated using a modified Bromage scoring system. The adequacy of motor function for ambulation was also evaluated. Delay of analgesia was the time interval between the injection of the solution and the first painless contraction. Duration of analgesia was the time from the first painless contraction to the parturients' requests for further analgesia. **RESULTS:** Twelve parturients failed to complete the study. Eleven parturients had inadequate analgesia (four in Group Levobupivacaine, four in Group Ropivacaine and three in Group Bupivacaine; P > 0.05). **Data was analysed from 34 parturients in Group Levobupivacaine, from 37 in Group Ropivacaine and from 35 in Group Bupivacaine. There were no differences in the delay of analgesia or in the number of parturients who were able to walk unaided.** Levobupivacaine and ropivacaine produced more prolonged analgesia than bupivacaine (114 and 119 min,

respectively, versus 89 min; $P < 0.01$). **CONCLUSIONS: During early labour, equipotent low concentrations of levobupivacaine, ropivacaine and bupivacaine, all with the addition of sufentanil 10 microg, produced similar pain relief and motor block, but levobupivacaine and ropivacaine produced a longer lasting analgesia.** About 10% of parturients had inadequate analgesia with a single bolus of the tested solutions.

7. Karraz MA. Ambulatory epidural anesthesia and the duration of labor. *Int J Gynaecol Obstet.* 2003 Feb;80(2):117-22. [PubMed: PM12566183](#)

OBJECTIVES: Ambulatory epidural analgesia has become a common option for women in labor in France. **We tested the hypothesis that a method of epidural analgesia that allowed women to walk had specific advantages regarding mode of delivery, consumption of local anesthetic, oxytocin requirement, and labor duration.**

METHODS: Two hundred and twenty-one women with uncomplicated pregnancies who presented in spontaneous labor between 36 and 42 weeks of gestation or who were scheduled for induced labor were randomly divided into two groups, ambulatory and non-ambulatory. All were given intermittent epidural injections of 0.1% ropivacaine with 0.6 microg/ml sufentanil for analgesia during labor ($P < 0.05$ was considered significant). None of the women had previous cesarean delivery. **RESULTS: There were no significant differences between the two groups in mode of delivery, consumption of local anesthetic, or oxytocin requirement. However, a significant difference was noted in labor duration (173.4+/-109.9 min vs. 236.4+/-130.6 min; $P=0.001$).** **CONCLUSIONS: Walking with ambulatory labor analgesia shortens labor duration but has no other effect on the progress and outcome of labor.**

8. Parker RK, Connelly NR, Lucas T, Faheem U, Rizvi AS, El-Mansouri M, et al. The addition of hydromorphone to epidural fentanyl does not affect analgesia in early labour. *Can J Anaesth.* 2002 Jun;49(6):600-4. [PubMed: PM12067873](#)

PURPOSE: Epidural fentanyl after a lidocaine and epinephrine test dose, provides adequate analgesia and allows for ambulation during early labour. **The current study was designed to determine the influence of hydromorphone added to an epidural fentanyl bolus (e.g., whether there is an increase in duration of analgesia).**

METHODS: Forty-four labouring primigravid women, at less than 5 cm cervical dilation, who requested epidural analgesia were enrolled in this randomized, double-blind study. **After a 3 mL test dose of lidocaine with epinephrine, patients received fentanyl 100 microgram (in 10 mL volume). They randomly received the fentanyl with either saline or hydromorphone (300 microgram).** After administration of the initial analgesic, pain scores and side effects were recorded for each patient at ten, 20, and 30 min, and every 30 min thereafter, by an observer blinded to the technique used. **RESULTS:** The patients were taller in the hydromorphone group ($P < 0.04$). There were no other demographic differences between the two groups. The mean duration prior to re-dose was not significantly different in the group that received hydromorphone (135 +/- 52 min) compared to the control group (145 +/- 46 min). Side effects were similar between the two groups. No patient in either group experienced any detectable motor block.

CONCLUSION: In early labouring patients, the addition of hydromorphone (300 microgram) to epidural fentanyl (100 microgram after a lidocaine and epinephrine test dose) neither prolongs the duration of analgesia nor affects the ability to ambulate, and cannot be recommended according to the current study.

9. Rolfseng OK, Skogvoll E, Borchgrevink PC. Epidural bupivacaine with sufentanil or fentanyl during labour: a randomized, double-blind study. *Eur J Anaesthesiol*. 2002 Nov;19(11):812-8. [PubMed: PM12442931](#)

BACKGROUND AND OBJECTIVE: Epidural analgesia with bupivacaine plus either sufentanil or fentanyl is widely used during labour, but it is not clear which opioid is to be preferred. The study compared these opioids at equianalgesic doses in terms of analgesia, onset time and side-effects. **METHODS:** Ninety females in active labour were entered into the randomized, double-blind trial. A test dose of bupivacaine was given into the epidural space. Parturients in Group S received sufentanil 8 mL as a bolus dose, followed by an infusion at a rate of 5 mL h⁻¹ of a mixture containing sufentanil 1 microg mL⁻¹ and bupivacaine 1 mg mL⁻¹. Patients in Group F received fentanyl 8 mL as a bolus, followed by an infusion at 5 mL h⁻¹ of a solution containing fentanyl 3.5 microg mL⁻¹ and bupivacaine 1 mg mL⁻¹. Additional boluses of 5 mL were of the relevant solution were given if necessary. **RESULTS:** In a ratio of 1.0:3.5 (sufentanil 1 microg versus fentanyl 3.5 microg), both groups reported the same analgesia with the same onset time. The onset time to obtain 50% of the initial visual analogue score was 10 and 11 min for Groups S and F, respectively. Mean visual analogue scores in Groups S and F respectively declined from 77 and 82 before epidural blockade, to 29 and 27 during the first stage of labour, and to 69 and 59 respectively during the second stage. **Overall satisfaction among parturients was high (98 and 96%), particularly during the first stage (98 and 98%), and also to a large degree during the second stage of labour (74 and 79%).** Furthermore, only a few extra bolus doses were required (mean 0.9 and 1.2, Groups S and F, respectively). **All the females could stand on their own, and almost all (81% Group S; 79% Group F) could walk 20 m without help. There were no serious adverse effects.** Moderate side-effects occurred equally often with the possible exception of less nausea and vomiting in the fentanyl group. **CONCLUSIONS: Epidural analgesia for ambulatory parturients with bupivacaine plus either sufentanil or fentanyl (ratio 1.0:3.5) provides good analgesia with a low frequency of modest side-effects.** No clinical differences were found between the opioids.

10. Wilson MJ, Cooper G, MacArthur C, Shennan A, Comparative Obstetric Mobile Epidural Trial (COMET) Study Group. Randomized controlled trial comparing traditional with two "mobile" epidural techniques: anesthetic and analgesic efficacy. *Anesthesiology*. 2002 Dec;97(6):1567-75. [PubMed: PM12459686](#)

BACKGROUND: The authors recently showed that "mobile" epidural analgesia, using low-dose local anesthetic-opioid mixtures, reduces the impact of epidural analgesia on instrumental vaginal delivery, relative to a traditional technique. The main prespecified assessment of pain relief efficacy, women's postpartum estimates of labor pain after epidural insertion, did not differ. **The detailed analgesic efficacy and the anesthetic characteristics of the techniques are reported here.** **METHODS: A total of 1,054 nulliparous women were randomized, in labor, to receive boluses of 10 ml 0.25% bupivacaine (traditional), combined spinal-epidural (CSE) analgesia, or low-dose infusion (LDI), the latter groups utilizing 0.1% bupivacaine with 2 microg/ml fentanyl.** Visual analog scale pain assessments were collected throughout labor and delivery and 24 h later. Details of the conduct of epidural analgesia, drug utilization, and requirement for anesthesiologist reattendance were recorded. **RESULTS:** A total of 353 women were randomized to receive traditional epidural analgesia, 351 received CSE, and

350 received LDI. **CSE was associated with a more rapid onset of analgesia, lower median visual analog scale pain scores than traditional in the first hour after epidural insertion, and a significant reduction in bupivacaine dose given during labor. Pain scores reported by women receiving LDI were similar to those in the traditional group throughout labor and delivery.** Anesthesiologist reattendance was low but greater with each mobile technique. **CONCLUSIONS: Relative to traditional epidural analgesia, LDI is at least as effective and CSE provided better pain relief in the early stages after insertion. The proven efficacy of mobile epidurals and their beneficial impact on delivery mode make them the preferred techniques for epidural pain relief in labor.**

11. Comparative Obstetric Mobile Epidural Trial (COMET) Study Group. Effect of low-dose mobile versus traditional epidural techniques on mode of delivery: a randomised controlled trial. *Lancet*. 2001 Jul 7;358(9275):19-23. [PubMed: PM11454372](#)

BACKGROUND: Epidural analgesia is the most effective labour pain relief but is associated with increased rates of instrumental vaginal delivery and other effects, which might be related to the poor motor function associated with traditional epidural. New techniques that preserve motor function could reduce obstetric intervention. **We did a randomised controlled trial to compare low-dose combined spinal epidural and low-dose infusion (mobile) techniques with traditional epidural technique.** **METHODS:** Between Feb 1, 1999, and April 30, 2000, we randomly assigned 1054 nulliparous women requesting epidural pain relief to traditional (n=353), low-dose combined spinal epidural (n=351), or low-dose infusion epidural (n=350). Primary outcome was mode of delivery, and secondary outcomes were progress of labour, efficacy of procedure, and effect on neonates. We obtained data during labour and interviewed women postnatally. **FINDINGS: The normal vaginal delivery rate was 35.1% in the traditional epidural group, 42.7% in the low-dose combined spinal group (odds ratio 1.38 [95% CI 1.01-1.89]; p=0.04); and 42.9% in the low-dose infusion group (1.39 [1.01-1.90]; p=0.04).** These differences were accounted for by a reduction in instrumental vaginal delivery. Overall, 5 min APGAR scores of 7 or less were more frequent with low-dose technique. High-level resuscitation was more frequent in the low-dose infusion group. **INTERPRETATION: The use of low-dose epidural techniques for labour analgesia has benefits for delivery outcome. Continued routine use of traditional epidurals might not be justified.**

12. Connelly NR, Parker RK, Lucas T, El-Mansouri M, Komanduri V, Nayak P, et al. The influence of a bupivacaine and fentanyl epidural infusion after epidural fentanyl in patients allowed to ambulate in early labor. *Anesth Analg*. 2001 Oct;93(4):1001-5. [PubMed: PM11574373](#)

Epidural fentanyl after a lidocaine and epinephrine test dose provides adequate analgesia and allows for ambulation during early labor. **This study was designed to determine the influence of an epidural infusion of bupivacaine plus fentanyl administered after initiation of epidural labor analgesia with fentanyl.** Specifically, we evaluated whether there is an increase in motor block or an increased time to request for further analgesic medication. Fifty-one laboring primigravid women at <5 cm cervical dilation who requested epidural analgesia were enrolled. **After a 3-mL epidural test dose of 1.5% lidocaine with epinephrine (5 microg/mL), patients received fentanyl 100 microg via the epidural catheter. They then randomly received either an infusion (10 mL/h) of**

0.0625% bupivacaine with fentanyl (3 microg/mL) or an infusion of preservative-free saline. After the administration of the initial analgesic, pain scores and side effects were recorded for each patient at 10, 20, and 30 min, every 30 min thereafter, and at the time of request for additional analgesic medication, by an observer blinded to the technique used. There were no demographic differences between the two groups. **The mean duration of analgesia (time from initial dose to request for additional analgesia) was increased in the group that received a continuous infusion of bupivacaine and fentanyl compared with the Saline group (198 +/- 86 vs 145 +/- 50 min; P < 0.009). Side effects were similar between the two groups. No patient in either group experienced any detectable motor block. Fourteen patients chose to ambulate in the Saline group, and 12 patients chose to ambulate in the Infusion group.** In early laboring patients, a continuous infusion of 0.0625% bupivacaine infusion with fentanyl (3 microg/mL) prolonged the duration until top-up was required, after epidural fentanyl 100 microg after a lidocaine and epinephrine test dose, and did not cause any clinically detectable motor block. **IMPLICATIONS: A 0.0625% bupivacaine and fentanyl (3 microg/mL) infusion, when added to epidural fentanyl (100 microg), prolongs the analgesic duration without increasing motor block in women in early labor.**

13. Vallejo MC, Firestone LL, Mandell GL, Jaime F, Makishima S, Ramanathan S. Effect of epidural analgesia with ambulation on labor duration. *Anesthesiology*. 2001 Oct;95(4):857-61. [PubMed: PM11605924](#)

BACKGROUND: Ambulatory epidural analgesia (AEA) is a popular choice for labor analgesia because ambulation reportedly increases maternal comfort, increases the intensity of uterine contractions, avoids inferior vena cava compression, facilitates fetal head descent, and relaxes the pelvic musculature, all of which can shorten labor. However, the preponderance of evidence suggests that ambulation during labor is not associated with these benefits. **The purpose of this study is to determine whether ambulation with AEA decreases labor duration from the time of epidural insertion to complete cervical dilatation.** **METHODS:** In this prospective, randomized study, **160 nulliparous women with AFA were randomly assigned to one of two groups: AEA with ambulation and AEA without ambulation.** AEA blocks were initiated with 15-20 ml ropivacaine (0.07%) plus 100 microg fentanyl, followed by a continuous infusion of 0.07% ropivacaine plus 2 microg/ml fentanyl at 15-20 ml/h. Maternal measured variables included ambulation time, time from epidural insertion to complete dilatation, stage II duration, pain Visual Analogue Scale scores, and mode of delivery. APGAR scores were recorded at 1 and 5 min. Results are expressed as mean +/- SD or median and analyzed using the t test, chi-square, or the Mann-Whitney test at P < or = 0.05. **RESULTS: The ambulatory group walked 25.0 +/- 23.3 min, sat upright 40.3 +/- 29.7 min, or both. Time from epidural insertion to complete dilatation was 240.9 +/- 146.1 min in the ambulatory group and 211.9 +/- 133.9 min in the nonambulatory group (P = 0.206).** **CONCLUSION: Ambulatory epidural analgesia with walking or sitting does not shorten labor duration from the time of epidural insertion to complete cervical dilatation.**

14. Campbell DC, Zwack RM, Crone LA, Yip RW. Ambulatory labor epidural analgesia: bupivacaine versus ropivacaine. *Anesth Analg*. 2000 Jun;90(6):1384-9. [PubMed: PM10825325](#)

Dilute concentrations of bupivacaine combined with fentanyl have recently been used to

initiate labor epidural analgesia in an attempt to balance adequate analgesia and minimal maternal motor blockade. Similar concentrations of ropivacaine have not been evaluated. **This prospective, randomized, double-blinded study was designed to compare the efficacy of 20 mL of either 0.08% bupivacaine plus 2 microg/mL fentanyl or 0.08% ropivacaine plus 2 microg/mL fentanyl to initiate ambulatory labor epidural analgesia.** Forty nulliparous women in early (≤ 5 cm) established labor received either 20 mL of 0.08% bupivacaine plus 2 microg/mL fentanyl (BF) or 0.08% ropivacaine plus 2 microg/mL fentanyl (RF) to initiate epidural analgesia. One woman (BF) required supplemental analgesia, and two (one BF and one RF) had visual analog scale scores > 0 but < 20 at 20 min. The time (mean \pm SD) to visual analog scale score = 0 was BF (n = 18): 12.0 \pm 4.5 min and RF (n = 19): 12.4 \pm 4.0 min ($P > 0.05$). Spontaneous micturition was observed in 65% (13 of 20) BF compared with 100% (20 of 20) RF ($P < 0.01$), and **ambulation was demonstrated in 75% (15 of 20) BF compared with 100% (20 of 20) RF** ($P < 0.03$). The incidence of forceps delivery was 35% (7 of 20) BF compared with 10% (2 of 20) RF ($P < 0.04$). **The results of this study indicate that dilute ropivacaine combined with fentanyl effectively initiates epidural analgesia while concurrently preserving maternal ability to void and ambulate.** Implications: **As compared with a similar dilute concentration of bupivacaine, 20 mL of dilute (0.08%) ropivacaine combined with fentanyl (2 microg/mL) effectively initiates epidural analgesia in nulliparous women in early, established labor while preserving their ability to micturate and ambulate.** Of importance, it appears that a true ambulatory epidural analgesic for women in labor is now possible.

15. Cohen SE, Yeh JY, Riley ET, Vogel TM. Walking with labor epidural analgesia: the impact of bupivacaine concentration and a lidocaine-epinephrine test dose. *Anesthesiology*. 2000 Feb;92(2):387-92. [PubMed: PM10691224](#)

BACKGROUND: Regional analgesia techniques for labor that permit ambulation are popular among parturients. **This study evaluated the influence of bupivacaine bolus concentration and a 3-ml 1.5% lidocaine-epinephrine test dose, on analgesic effectiveness and the ability to walk after block placement.** **METHODS:** Using a randomized double-blind study design, epidural analgesia was initiated in 60 parturients undergoing labor as follows: Group TD/B.0625 received a 3-ml lidocaine-epinephrine test dose + 12 ml bupivacaine, 0.0625%; group TD/B.125 received a 3-ml test dose + 12 ml bupivacaine, 0.125%; group B.0625 received 15 ml bupivacaine, 0.0625% (no test dose); and group B.125 received 15 ml bupivacaine, 0.125% (no test dose). Initial boluses in all groups contained 10 microg sufentanil. Bupivacaine, 0.0625%, with 0.33 microg/ml sufentanil was infused throughout labor at 13.5-15 ml/h. Analgesia balance, proprioception, motor block, and patient ability to stand and walk were evaluated at various intervals. **RESULTS: A bolus of 0.125% bupivacaine containing sufentanil, without a previous test dose, proved to be optimal with respect to analgesia and early ambulation.** When a test dose was given before bupivacaine, 0.125%, fewer women walked within 1 h of block placement. Bupivacaine, 0.0625%, with sufentanil, with or without a test dose, provided inadequate analgesia, necessitating additional bupivacaine, which impaired the ability to walk. A high percentage of women in all groups (73-93%) walked at some stage during labor. **CONCLUSIONS: Omitting a lidocaine-epinephrine test dose and using 0.125% bupivacaine for the initial bolus should permit ambulation in the early postblock period for most parturients who elect this option.**

16. Connelly NR, Parker RK, Vallurupalli V, Bhopatkar S, Dunn S. Comparison of epidural fentanyl versus epidural sufentanil for analgesia in ambulatory patients in early labor. *Anesth Analg*. 2000 Aug;91(2):374-8. [PubMed: PM10910851](#)

Epidural sufentanil, after a lidocaine and epinephrine test dose, provides adequate analgesia and allows for ambulation during early labor. Epidural fentanyl has not been evaluated in this setting. **The current study was designed to determine whether there is an analgesic difference between epidural fentanyl and epidural sufentanil in laboring patients.** Forty-six laboring nulliparous women, at <5-cm cervical dilation, who requested epidural analgesia were enrolled. **After a 3-mL test dose of lidocaine with epinephrine, patients were randomized to receive either sufentanil 20 microg or fentanyl 100 microg.** After administration of the analgesic, pain scores and side effects were recorded for each patient at 5, 10, 15, 20, and 30 min and every 30 min thereafter, by an observer blinded to the technique used. There were no demographic differences between the two groups. Pain relief was rapid for all patients. **The mean durations of analgesia were similar between the sufentanil group (138 +/- 50 min) and the fentanyl group (124 +/- 42 min). Side effects were similar between the two groups.** In early laboring patients, epidural fentanyl 100 microg, after a lidocaine and epinephrine test dose, provides analgesia comparable to that of sufentanil 20 microg. Implications: **In early laboring patients, epidural fentanyl 100 microg, after a lidocaine and epinephrine test dose, provides analgesia comparable to that of sufentanil 20 microg.**

Non-randomized studies

17. Rao ZA, Choudhri A, Naqvi S, Ehsan UH. Walking epidural with low dose bupivacaine plus tramadol on normal labour in primipara. *J Coll Physicians Surg Pak*. 2010 May;20(5):295-8. [PubMed: PM20642918](#)

OBJECTIVE: To determine the obstetric outcome in terms of duration of labour and mode of delivery between the walking epidural analgesia with 0.1% Bupivacaine + 0.5% tramadol and routine labour practice. **STUDY DESIGN:** Non-randomized controlled trial. **PLACE AND DURATION OF STUDY:** Department of Anaesthesia, Military Hospital, Rawalpindi, from August 2004 to July 2007. **METHODOLOGY:** **Consecutive 50 primiparous patients, ASA-I, coming to antenatal clinic for routine delivery were included in control group-A, and consecutive 50 primiparous ASA-I, coming to antenatal clinic and requesting for painless delivery were included in group-B.** In group-A, only injection Nalbuphine 10 mg intramuscular was given when pain was unbearable, on patient's request as a routine practice. In group-B epidural analgesia was given with 15 ml of 0.1% Bupivacaine + 0.5 mg/ml Tramadol. First stage, second stage and total duration of labour were noted. Mode of delivery was also recorded in both groups. Patient satisfaction was assessed by interviewing the parturient at evening round after delivery. **RESULTS:** In group-A, first stage duration of labour was 6.72 + or - 1.16 hours and in group-B, it was 4.03 + or - 1.00 hours, ($p < 0.001$). Second stage of labour in group-A was 0.55 + or - 0.35 hours and in group-B it was 0.67 + or - 0.33 hours; ($p=0.072$). **Total duration of labour, in group-A was 7.57 + or - 1.13 hours and in group-B it was 4.77 + or - 1.21 hours, ($p < 0.001$).** In group-A 46/50 (92%) patients were delivered spontaneously, while 4/50 (8%) required instrumental assistance. In group-B 36/50 (72%) patients were delivered spontaneously and instrumental deliveries were 13/50 (26%) ($p=0.015$). One patient developed fetal distress and went through cesarean section in group B. **Patient satisfaction was excellent in 88% of group-B parturients.**

CONCLUSION: Epidural analgesia with combination of low concentration of Bupivacaine, injection Tramadol and ambulation markedly reduce the duration of labour.

18. de la Chappelle A, Carles M, Gleize V, Dellamonica J, Lallia A, Bongain A, et al. Impact of walking epidural analgesia on obstetric outcome of nulliparous women in spontaneous labour. *Int. J. Obstet. Anesth.* 15(2):104-8. [PubMed: PM16434183](#)

BACKGROUND: To explore the effects of walking epidural analgesia on obstetric and neonatal outcomes, we performed a case-control study. **METHOD:** Each nulliparous woman receiving walking epidural analgesia using 0.0625% bupivacaine (n = 44) was matched to two nulliparous historical controls receiving 0.125% or 0.25% bupivacaine (n = 88 each) for epidural analgesia while recumbent. **RESULTS:** Maternal and obstetric parameters, fetal status and presentation, and oxytocin use were comparable among groups. **Those receiving walking epidural analgesia walked for a mean of 60 min (range: 20-75 min). In the control groups the mean total durations of labour were shorter (58 min in the 0.125% group and 99 min in the 0.25% group, P < 0.05). Significantly fewer walking epidural analgesia cases than controls required instrumental vaginal delivery (P < 0.05). No other differences in obstetric or fetal outcome were observed and no mother fell or stumbled while walking.**

CONCLUSION: Although it was associated with a prolonged first stage of labour, walking epidural analgesia appeared safe for nulliparous women and their babies.

19. Connelly NR, Parker RK, Pedersen T, Manikantan T, Lucas T, Serban S, et al. Diluent volume for epidural fentanyl and its effect on analgesia in early labor. *Anesth Analg.* 2003 Jun;96(6):1799-804. [PubMed: PM12761015](#)

Epidural fentanyl after a lidocaine and epinephrine test dose provides adequate analgesia and allows for ambulation during early labor. **We designed the current study to determine the influence of the diluent volume of the epidural fentanyl bolus (e.g., whether it has an effect on the onset and duration of analgesia).** Sixty laboring primigravid women received a 3-mL epidural test dose of lidocaine with epinephrine and then received a fentanyl 100- micro g bolus in either a 2-mL, 10-mL, or 20-mL volume. Pain scores and side effects were recorded for each patient. The onset of analgesia was similar in all three groups. The mean duration before re-dose was not significantly different in the 2-mL group (108 +/- 40 min), the 10-mL group (126 +/- 57 min), or the 20-mL group (126 +/- 41 min). **No patient in any group experienced any detectable motor block; one patient (2-mL group) complained of mild knee weakness and was not allowed to ambulate.** In early laboring patients, the volume in which 100 micro g of epidural fentanyl (after a lidocaine-epinephrine test dose) is administered does not affect the onset or duration of analgesia, nor does it affect the ability to ambulate. **IMPLICATIONS: In early laboring patients, the volume in which 100 micro g of epidural fentanyl (after a lidocaine-epinephrine test dose) is administered does not affect the onset or duration of ambulatory analgesia.**

20. Davies J, Fernando R, McLeod A, Verma S, Found P. Postural stability following ambulatory regional analgesia for labor. *Anesthesiology.* 2002 Dec;97(6):1576-81. [PubMed: PM12459687](#)

BACKGROUND: The safety of mobilization following low-dose regional analgesia in

parturients remains controversial. Previous studies have demonstrated preserved balance function despite clinically elicited sensory deficits. **The aim of this study was to use the Balance Master 6.1, a device capable of real-time analysis of ambulation, to score the performance of basic maneuvers following initiation of low-dose combined spinal-epidural analgesia in laboring women compared with pregnant and nonpregnant controls.** METHODS: Using the Balance Master, balance function during the performance of several simple tasks, including walking and standing up from a sitting position, was evaluated in a prospective, controlled, observational study with 50 laboring women after combined spinal-epidural analgesia compared with 50 pregnant and 50 nonpregnant controls. RESULTS: **Nonpregnant women scored significantly better results in 6 of the 13 measured balance function parameters compared with both the combined spinal-epidural and pregnant control groups.** Compared with the nonpregnant subjects, the pregnant groups generated less force standing up from the sitting position ($P < 0.0001$), walked more slowly ($P = 0.0067$), and took shorter steps ($P < 0.0001$). They also took longer to step up onto and over a 20-cm-high obstacle ($P < 0.0001$), and they generated less force while stepping up. **Initial spinal analgesia in laboring women did not significantly affect performance in comparison to the pregnant controls. Thirty-four percent of women in the combined spinal-epidural group required supplemental epidural analgesia following the initial spinal injection (n = 17) before testing; they had significantly impaired balance function in four tests compared with those receiving a spinal injection only (n = 33).** CONCLUSIONS: **Being pregnant at term significantly affects balance function, although initial low-dose spinal-epidural analgesia does not impair function further.** Subsequent supplemental epidural analgesia may have a detrimental effect on balance, but properly designed studies are awaited to confirm this. **This study supports the practice of allowing laboring women with initial low-dose spinal-epidural analgesia to ambulate, but indicates that further studies need to be conducted on the effects of subsequent epidural supplementation.**

Guidelines and recommendations

No literature identified

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APPENDIX – FURTHER INFORMATION:

Systematic reviews and meta-analyses

21. Roberts CL, Algert CS, Olive E. Impact of first-stage ambulation on mode of delivery among women with epidural analgesia. *Aust N Z J Obstet Gynaecol.* 2004 Dec;44(6):489-94. [PubMed: PM15598282](#)

BACKGROUND: New techniques for administering epidural analgesia allow increased mobility for labouring women with epidurals. **Aim: To determine the effect of ambulation or upright positions in the first stage of labour among women with epidural analgesia on mode of delivery and other maternal and infant outcomes.** **METHODS:** We undertook a systematic review and meta-analysis of randomised controlled trials (RCT) of ambulation or upright positions versus recumbency in the first stage of labour among women with effective first-stage epidural analgesia in an uncomplicated pregnancy. Trials were identified by searching Medline, Embase and CINAHL databases and the Cochrane Trials Register to March 2004. Trial eligibility and outcomes were prespecified. Group tabular data were obtained for each trial and analysed using meta-analytic techniques. **RESULTS:** There were five eligible RCT, with a total of 1161 women. There was no statistically significant difference in the mode of delivery when women with an epidural ambulated in the first stage of labour compared with those who remained recumbent: instrumental delivery (relative risk (RR) = 1.16, 95% confidence interval (CI) 0.93-1.44) and Caesarean section (RR = 0.91, 95% CI 0.70-1.19). There were no significant differences between the groups in use of oxytocin augmentation, the duration of labour, satisfaction with analgesia or Apgar scores. There were no apparent adverse effects of ambulation, but data were reported by only a few trials. **CONCLUSIONS: Although ambulation in the first stage of labour for women with epidural analgesia provided no clear benefit to delivery outcomes or satisfaction with analgesia, neither were there are any obvious harms.**

Review articles

22. Vercauteren M. Obstetric spinal analgesia and anesthesia. *Curr Opin Anaesthesiol.* 2003 Oct;16(5):503-7. [PubMed: PM17021503](#)

PURPOSE OF REVIEW: The present overview will try to summarize the most important recent studies performed on spinal analgesia for labor pain treatment and spinal anesthesia for Cesarean section. **RECENT FINDINGS:** Attention is focused on pharmacological and technical topics. The interest in demonstrating the benefits of the new local anesthetics over bupivacaine seems to have faded. The search for other adjuvant drugs continues, but it is not clear whether opioids need to be replaced or combined with other adjuvants. A large number of studies are still dealing with vasopressor treatment of hypotension during Cesarean section. There is growing evidence that ephedrine is no longer the vasopressor drug of choice and that phenylephrine should take its place. **In technical studies, discussion on combined spinal-epidural versus epidural continues, but it remains difficult to provide definitive evidence that combined spinal-epidural is more advantageous. Also the increased possibility of ambulation has not resulted in benefits other than enhanced maternal satisfaction.** Finally, spinal techniques seem to have lost their reputation as being a dangerous choice in patients with severe preeclampsia or cardiac

disease. SUMMARY: The new local anesthetics have established their position in obstetric regional anesthesia, but it remains difficult to demonstrate a superior outcome as compared with bupivacaine. The same is true for combined spinal-epidural and ambulation. Phenylephrine seems to have become the vasopressor of choice in the treatment of hypotension following spinal anesthesia. A more appropriate treatment of hypotension combined with a low-dose technique may enhance the safety of spinal anesthesia in preeclamptic patients or cases of severe cardiac disease.

23. Drysdale SM, Muir H. New techniques and drugs for epidural labor analgesia. *Semin Perinatol*. 2002 Apr;26(2):99-108. [PubMed: PM12005474](#)

Several new techniques and medications are available for epidural labor analgesia. Two significant additions are ropivacaine and levobupivacaine. **This article reviews the current applications of these drugs on the labor ward. The clinical implications of patient controlled epidural analgesia and ambulatory epidural techniques are discussed. The controversies surrounding epidural test dose and fluid preloading are examined.**

Additional references

24. Preston R. Walking epidurals for labour analgesia: do they benefit anyone? *Can J Anaesth* [Internet]. 2010 Feb;57(2):103-6. Available from: <http://www.springerlink.com/content/p646q222243xpl42/>. [PubMed: PM20052628](#)
25. Kuczkowski KM. Ambulation with combined spinal-epidural labor analgesia: the technique. *Acta Anaesthesiol Belg*. 2004;55(1):29-34. [PubMed: PM15101144](#)

The combined spinal-epidural labor analgesia technique (CSEA) has attained wide spread popularity in obstetric anesthesia worldwide. The onset of analgesia is rapid and reliable, and maternal satisfaction is high. While there still remains some concern about dural puncture, the CSEA technique offers many advantages to the parturient. **For ambulatory labor analgesia the CSEA technique offers the possibility of combining rapid onset of subarachnoid analgesia with the flexibility of continuous epidural analgesia. This approach with the application of low-dose local anesthetic and/or opioid can provide a very selective sensory block with minimal motor blockade, allowing parturients to ambulate.** This article will attempt to assess the validity of some strongly held opinions of whether CSEA offers any advantages for ambulatory labor analgesia as well as highlight some selected technical aspects and controversies of the CSEA specifically applicable to ambulatory labor analgesia.

26. Kuczkowski KM. Ambulatory labor analgesia: what does an obstetrician need to know? *Acta Obstet Gynecol Scand*. 2004 May;83(5):415-24. [PubMed: PM15059151](#)

A simple statement that describes the degree of the patient's satisfaction with the pain relief from her labor epidural analgesia has often assessed the quality of labor analgesia as perceived by the patient. Many laboring parturients, midwives, obstetricians and anesthesiologists are increasingly concerned by the limitations of traditional epidural labor analgesia. **In general, women dislike the inability to void, the often-dense motor block, the feeling of numbness of the lower body, the total lack of the urge to bear down, and the complete perineal anesthesia.** Continuous search

for balanced labor analgesia that provides relief from pain, while preserving motor function, has led to the development of an ambulatory labor analgesia technique. **This article assesses the validity of various strongly advocated opinions as to whether parturients benefit from ambulation in labor and also reviews the current trends in ambulatory labor analgesia.**