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Factors Associated with Back Pain after Childbirth

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Background: Back pain after childbirth is a frequent complaint. The purpose of this study was to determine the incidence of back pain 1-2 months post partum and to identify the factors, including epidural anesthesia for labor and delivery, that may predispose to it.

Methods: Women delivering a viable singleton infant were interviewed 12-48 h after delivery for a history of back pain that occurred before, during, or both before and during the recent pregnancy and for details of their delivery experience. Two months later, the women interviewed were sent a follow-up questionnaire regarding the occurrence of back pain 1-2 months post partum.

Results: Follow-up data were available for 1,042 (88%) of the 1,185 women originally interviewed. The incidence of post partum back pain in women who received epidural anesthesia was equivalent to those who did not (44% vs. 45%). Through stepwise multiple logistic regression, post partum back pain was found to be associated with a history of back pain, younger age, and greater weight. However, *new-onset* post partum back pain was found to be associated with greater weight and shorter stature. No statistically significant association was found between post partum back pain and epidural anesthesia, number of attempts at epidural placement, duration of second stage of labor, mode of delivery, or birth weight.

Conclusions: The overall incidence of back pain 1-2 months post partum in this population was 44%. Predisposing factors were a history of back pain, younger age, and greater weight. Predisposing factors for *new-onset* post partum back pain were greater weight and shorter stature. Epidural anesthesia for labor and delivery did not appear to be associated with back pain 1-2 months post partum. (Key words: Pain, obstetric; back; postdelivery. Anesthetic techniques: epidural. Anesthesia: obstetric.)

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BACK pain after childbirth is a frequent complaint. As the use of epidural anesthesia for labor and delivery increases, obstetric anesthesiologists are often faced with the belief on the part of their post partum patient that the back pain was caused, in some way, by the epidural anesthesia administered for labor or delivery. The existence of this alleged causal relation has been suggested by one study,¹ contradicted by two other studies,^{2,3} and supported by another.⁴

Back pain occurring in the days after delivery has been reported in 30-45% of women receiving epidural anesthesia during labor.¹⁻² Grove, in an in-hospital interview study of 155 women who had singleton deliveries, found that back pain occurred in 40% of women who delivered without epidural anesthesia and that the back pain was gone within 6 days post partum.³ MacArthur *et al.*, in a postal questionnaire study involving 11,701 deliveries, suggested that the main factor predisposing to "long-term backache" after delivery was epidural anesthesia used for vaginal delivery.⁴ Long-term backache was defined as a backache of at least 6 weeks' duration beginning within 3 months of delivery. New-onset long-term backache occurred in 19% of women who received epidural anesthesia for vaginal delivery and 10% of women who did not. Potential problems with MacArthur *et al.*'s⁴ study include: data were obtained from only 11,701 patients of 30,000 (39%) deliveries over the study period, and patients were asked to report back pain voluntarily after a delivery that occurred 1-9 years previously (recall bias).

In a recent study by Russell *et al.*, postal questionnaire or phone interview data were collected from 1,015 women who delivered their first babies during a defined period.⁵ They found a 12% incidence of new-onset post partum back pain in women who delivered without epidural anesthesia and 18% incidence in women who had epidural anesthesia. Unlike the study by MacArthur *et al.*,⁴ all patients delivering during the study period were contacted, the response rate was 68%, and the data were collected within 18 months of delivery, thereby decreasing recall bias.

The purpose of this prospective study was to determine the incidence of back pain 1–2 months post partum and to evaluate the relation between post partum back pain and epidural anesthesia, if any, by methods that avoid the design problems of some previous studies.

Materials and Methods

The protocol for this prospective study was reviewed and approved by the Committee on Clinical Investigations of Beth Israel Hospital, Boston, Massachusetts. In this study, conducted over a 6-month period, subjects were women who had delivered viable infants after a singleton pregnancy. The exclusion criteria were multiple births and still births. In the initial contact, patients were asked if they would assist with a survey of the incidence of back pain after childbirth. After giving informed consent, patients were interviewed 12–48 h post partum by a single investigator using a standardized questionnaire. Information collected pertained to back pain before and during the pregnancy, analgesia during labor, mode of delivery (vaginal or cesarean section), duration of the second stage, neonatal birth weight, and demographic variables of height, weight and age. Two months later, a follow-up questionnaire was sent to all patients interviewed. The questionnaire asked if patients were currently experiencing back pain; those reporting back pain were asked to grade their pain as mild or severe. The patients who did not return their questionnaires within 3–4 weeks were sent a second questionnaire. If the second questionnaire was not returned within another 3–4 weeks, the patient was contacted by telephone to complete data collection.

The outcomes of interest were the incidence of post partum back pain 1–2 months after childbirth and the presence of factors presumably predisposing to post partum back pain, in particular epidural analgesia for labor pain relief.

The labor epidural technique used at this institution during the study period was continuous epidural by constant infusion. The majority of epidural catheters are placed by residents although some are placed by staff. In this institution the standard technique for placement of an epidural catheter is local skin infiltration with 1% lidocaine, followed by the identification of the epidural space with a 17-G Tuohy needle *via* a midline approach with loss of resistance to air or saline. The standard labor epidural

anesthetic agent was a solution of bupivacaine 0.04%–0.125% and fentanyl 1–2 $\mu\text{g}/\text{ml}$ with or without epinephrine 1:600,000. This combination was titrated to achieve patient comfort and on occasion was supplemented with bupivacaine 0.125%–0.5% as an intermittent bolus. Delivery doses were not used, and occasionally the epidural infusion was turned off at the request of the obstetrician to increase the expulsive efforts. Anesthetics used for cesarean section were at the discretion of the anesthesiologist and included epidural anesthesia with 2% lidocaine, 0.5% bupivacaine, or 3% 2-chloroprocaine or spinal anesthesia with 0.75% hyperbaric bupivacaine or hyperbaric lidocaine.

According to policy at this institution, patients labor and deliver (vaginally) in one room. Vaginal deliveries are performed with the patient in a birthing bed, usually in the lithotomy position, with the patient or a birth attendant supporting the legs. Occasionally stirrups are used. Cesarean sections are performed in an operating room with the patient supine with a right hip wedge.

Statistical Methods

One thousand one hundred eighty-five patients were recruited into the study. Follow-up data were obtained from 1,042 patients (88%), of whom 754 (72%) returned the questionnaire and 288 (28%) were contacted and interviewed by phone. Statistical analysis was carried out only on data from these patients (“responders”). Demographic and clinical characteristics of the 1,042 responders are compared with those of the 143 “nonresponders” in table 1.

The database consisted of multiple demographic and clinical variables for 1,042 participants. Continuous variables were tested for normality, and their descriptive statistics computed. Eight variables were entered into stepwise multiple logistic regression with post partum back pain as dependent variable and age, height, weight, mode, birth weight, epidural anesthesia and history of back pain as independent variables. Variables found to be associated with post partum back pain by multiple regression were evaluated by trend analysis when continuous and by chi-squared and risk analysis when dichotomous.⁶ The clinical characteristics of the responders were compared with those of the nonresponders by appropriate two-sample comparison tests, in order to evaluate the possible effect of the missing data on outcome.

BACK PAIN AFTER CHILDBIRTH

Table 1. Demographic and Clinical Characteristics of Responders Versus Nonresponders

	Responders (n = 1,042)	Nonresponders (n = 143)	P
Mean age (yr)	30 ± 6	26 ± 6	<0.001
Mean weight (lb)	170 ± 31	172 ± 33	0.36
Height (in)	65 ± 3	63 ± 6	0.03
Epidural anesthesia	589 (57%)	77 (54%)	0.30
History of back pain	737 (71%)	94 (66%)	0.13
Mean birth weight (g)	3,427 ± 540	3,324 ± 504	0.01
Delivery by C-section	243 (24%)	24 (17%)	0.05
Vaginal deliveries			
All	799 (76%)	119 (83%)	0.05
With epidural anesthesia	440 (42%)	55 (38%)	0.22
Without epidural anesthesia	359 (34%)	64 (45%)	0.01
Mean duration of second stage of labor (min)	49 ± 55	30 ± 39	<0.001

Values are mean ± SD.

Results

Incidence

Four hundred sixty (44%) of all women reported post partum back pain, including 68 (6.5%) with severe back pain. The incidence of post partum back pain in women who had epidural anesthesia was equivalent to those who did not (44% vs. 45%). The incidence of post partum back pain in women who delivered vaginally was equivalent to those who delivered by cesarean section (45% vs. 42%).

Associations Detected by Multiple Regression

Stepwise multiple logistic regression showed a positive association between post partum back pain and a history of back pain occurring before or during the pregnancy ($P < 0.001$) and weight ($P = 0.008$), and a negative association between post partum back pain and age ($P = 0.026$). Factors not predictive of post

partum back pain were height, mode of delivery, neonatal birth weight, and epidural anesthesia.

Associations

History of Back Pain. The association between post partum back pain and history of back pain was statistically significant at $P < 0.001$ by the chi square statistic. The relative risk of post partum back pain in patients with a history of back pain was low (2.15) but statistically significant (95% confidence interval 1.61 – 2.88).

Weight and Age. The associations between post partum back pain and weight and age, detected by multiple regression, were evaluated by computing the percent incidence of women with post partum pain for each 11.25-kg increment of weight and each decade, with the results given in tables 2 and 3. The observed positive trend of percent incidence with weight and the negative trend with age were statistically significant by trend analysis at the $P = 0.001$ and $P = 0.03$ levels, respectively.

Components of a History of Back Pain. As defined earlier, history of back pain included back pain before

Table 2. Association between Postpartum Back Pain and Weight

Weight (lb)	n	Patients with Postpartum Back Pain (%)
≤125	33	30
126–150	234	44
151–175	408	41
176–200	226	45
201–225	80	54
226–250	40	55
251–275	21	62

Table 3. Association between Postpartum Back Pain and Age

Age (yr)	n	Patients with Postpartum Back Pain (%)
≤20	59	58
21–30	446	45
31–40	511	42
>41	26	35

Table 4. Association between New-onset Postpartum Back Pain and Height

Height (in)	n	Patients with New-Onset Postpartum Back Pain (%)
≤62	61	34
63, 64	91	32
65, 66	90	26
≥67	62	15

pregnancy or back pain during the pregnancy. To evaluate the dependence of post partum back pain on each component separately, the multiple regression was repeated twice, with back pain before pregnancy and back pain during pregnancy entered as the respective back pain variable. In addition to the associations found in the initial regression between post partum pain and weight and age, these regressions also detected positive associations between post partum back pain and back pain before pregnancy ($P < 0.00001$), and back pain during pregnancy ($P < 0.0001$). The relative risk of post partum back pain in patients with back pain before pregnancy (1.29) was no greater than in patients without back pain before pregnancy (95% confidence interval 0.71 – 2.30), whereas the relative risk of post partum back pain in patients with back pain during pregnancy (1.67) was low but statistically significant (95% confidence interval 1.22 – 2.28).

New-onset Post Partum Back Pain

Three hundred five (29%) patients did not have a previous history of back pain; of these, 82 (27%) developed new-onset post partum back pain. Stepwise multiple regression detected an inverse association between new-onset post partum back pain and height ($P = 0.003$) and a positive association between new-onset post partum back pain and weight ($P = 0.006$). Factors not associated with new-onset back pain 1–2 months post partum included age, mode of delivery, neonatal birth weight, and epidural administration.

Association with Height and with Weight. The association between new-onset post partum back pain with height (table 4) showed a negative trend, by trend analysis, with a statistical significance of $P = 0.08$. The association with weight showed a positive trend (table 5) that was statistically significant at $P = 0.038$.

Demographics and Clinical Characteristics by Mode of Delivery

Other demographic and clinical characteristics of interest in this population are presented in table 6 by

Table 5. Association between New-onset Postpartum Back Pain and Weight

Weight (lb)	n	Patients with New-onset Postpartum Back Pain (%)
≤150	74	26
151–175	124	23
176–200	67	24
201–225	24	38
>226	15	53

mode of delivery. In the 581 patients with epidural anesthesia, an association was found by chi square analysis between the number of attempts at epidural placement and post partum back pain ($P = 0.06$), but not new-onset post partum back pain ($P = 0.90$). Of the patients who delivered vaginally ($N = 799$), mean duration of the second stage of labor (table 1) was equivalent for women with and without post partum back pain and new-onset post partum back pain.

Nonresponders

One hundred forty-three (12%) women did not respond to numerous phone calls and therefore were excluded from the study. Demographic and clinical characteristics of responders *versus* nonresponders are compared in table 1.

Discussion

The principal findings of the study are as follows. (1) The incidence of back pain 1–2 months post partum was 44%; (2) post partum back pain occurred with

Table 6. Demographic and Clinical Characteristics of Responders by Type of Delivery

	Vaginal Delivery (n = 799)	Cesarean Section (n = 243)
Age (yr)	30 ± 6	31 ± 5
Weight (lb)	168 ± 29	176 ± 35
Height (in)	65 ± 2	64 ± 3
Prior back pain	553 (69%)	184 (76%)
Anesthesia		
None/local	359 (34%)	—
Epidural	440 (42%)	141 (58%)
Spinal	—	83 (34%)
General (±other)	—	19 (8%)
Forceps/vacuum delivery	83 (10%)	—

Values are mean ± SD.

BACK PAIN AFTER CHILDBIRTH

equal frequency in women who did and did not receive epidural anesthesia; (3) post partum back pain was equally distributed between vaginal delivery and cesarean section patients; (4) the most significant predictor of post partum back pain 1–2 months after delivery was back pain during the pregnancy; (5) the development of new-onset post partum back pain was not associated with epidural anesthesia for labor or delivery; and (6) both post partum and new-onset post partum back pain were associated with greater body weight. In the following discussion, the term "post partum back pain" is shortened to "back pain."

The reported incidence of back pain has varied among studies. MacArthur *et al.* found a 23% incidence of back pain overall and a 14% incidence of new-onset back pain.⁴ Russell *et al.* found similar results, and both studies found that 18% of the women who had epidural anesthesia had back pain, whereas 10% of the women who did not have epidural anesthesia also had it.⁵ Ostgaard *et al.* found a 26% incidence of back pain at the time of delivery and by 18 months later a 7% incidence of "serious" back pain.⁷ In this study, we found a 44% incidence of back pain and a 26% incidence of new-onset back pain of which 6.5% was reported to be "severe."

Factors noted by Ostgaard *et al.* that related to back pain after delivery included history of back pain, the frequency of previous back pain, monotonous work, heavy work, sick leave for back pain, and younger age.^{7,8} MacArthur *et al.*⁴ found the following major risk factors (In order of importance): epidural anesthesia; nulliparity; Asian race; younger maternal age; no episiotomy; spinal anesthesia; longer duration of the second stage; spontaneous onset of labor; and social class III, IV, or V. (Social classes I and II are professional and managerial; III, IV, and V are office, service, and manual labor, respectively.) They excluded from the study patients with back pain before pregnancy. Of these, the current study identifies two factors: a history of back pain and younger age.

Russell *et al.*⁵ found long-term backache associated with unmarried status, younger age, and more likely to report antenatal headache and abdominal pain. In their study, attempts were made to examine each patient who complained of backache. Of the 156 women with new-onset backache, 92 could be contacted, of whom 60 made clinic appointments. Of the 60 only 36 attended. The typical complaint was of a dull ache across their lower back that started shortly after childbirth, exacerbated by lifting and bending. The 32

women who did not make appointments said their backache was improved. The study by Russell *et al.*⁵ does not suffer from selection bias as does that by MacArthur *et al.*, yet it too demonstrated an increased incidence of back pain after epidural anesthesia. Possible explanations for the difference between our study and theirs include differences in anesthetic technique or a bias of the subjects themselves. As suggested by Russell *et al.*, "mothers who receive epidural analgesia expect to develop backache,"⁵ a prejudice not as widely held among American women.

Although previous studies have reported the negative association with age,^{4,5,7,8} the positive association with weight,^{9,10} and the association with a history of back pain that were found in the present study, the association between new-onset post partum back pain and height and the trends of post partum back pain with age, weight, and height have not previously been reported. The implication of height and weight as factors associated with the presence of post partum back pain suggests a musculoskeletal rather than iatrogenic etiology for post partum back pain.

Although the details of the anesthetic used in the cited studies are not known, it has been suggested that the more profound sensory block associated with the use of bupivacaine 0.25%–0.5% (the most common anesthetic used during the time of MacArthur *et al.*'s⁴ study) can cause the patient to assume an unnatural position that she would not assume if she were not anesthetized, especially during the second stage of labor. The most common anesthetic used during this study ranged from low-dose (bupivacaine 0.125%) to ultra-low-dose (bupivacaine 0.04%), the latter of which allows patients to move freely and comfortably without a dense sensory block.¹¹

When the patients with a history of back pain were subdivided into those who only had back pain before pregnancy and those who only had back pain during pregnancy, it was found that those who had back pain during pregnancy were at increased risk of developing post partum back pain whether or not the back pain existed before pregnancy, whereas those who only had back pain before the pregnancy and not during the pregnancy were at no increased risk. A possible explanation for this finding is that any back pain that is revealed or exacerbated by the pregnancy might be expected to continue into the post partum period, whereas back pain that existed before the pregnancy and that is not exacerbated by the pregnancy may be considered as having completely resolved, thereby

placing the woman in a risk group similar to those who never had a history of back pain. Other studies have found that the most common association with post partum back pain was undifferentiated preexisting back pain.^{4,5,7,8} Two of these studies then eliminated patients with a history of back pain and concentrated on the analysis of new-onset back pain.^{4,5} The present study distinguishes between the two types of back pain included in history of back pain and demonstrates the importance of pregnancy back pain, as distinguished from prepregnancy back pain, in the etiology of post partum back pain.

One possible source of bias that might have influenced the outcome of this study is the group of 143 nonresponders. The primary reason for these subjects not responding to the questionnaire was that they had moved, a factor without clinical implications and presumably random in distribution. As shown in table 1, the nonresponders tended to be younger and to have smaller babies, shorter labors, and fewer cesarean sections. However, it is unlikely that these patients would have altered regression outcomes had they been included in the analyses, because the best predictor of post partum back pain was a history of back pain, in which the nonresponders did not differ significantly from the responders (66% *vs.* 71%). Of the other two predictors, weight and age, the two groups did not differ significantly in weight although the nonresponders tended to be younger. Of the patients with new-onset back pain, mean weight did not differ significantly between the two groups although the nonresponders tended to be shorter. We postulate that their inclusion probably would not have changed overall outcome but might have increased the statistical significance of age in the post partum back pain regression and of height in the new-onset back pain regression.

To control for all possible sources of bias that might affect the relation between epidural anesthesia for labor and post partum back pain would require a randomized

double-blinded study, which is not possible in our hospital in today's health care environment. Lacking that, we conclude from this nonrandomized, nonblinded prospective study of 1,042 patients that post partum back pain is a common occurrence after delivery, affecting 44% of the population. Epidural anesthesia during labor and delivery was not found to be a predisposing factor to back pain 1–2 months post partum. The predisposing factors to back pain in this group of patients appeared to be a history of back pain during pregnancy, greater weight, younger age, and shorter stature.

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