Community Use of Paracervical Block in Labor

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Although controversy surrounds obstetric use of paracervical block, few articles report experience from community hospitals. Medical records of 883 obstetric patients at a community hospital were examined to determine frequency and efficacy of paracervical block as well as associated changes in electronic fetal monitor tracings, infant Apgars, and length of hospital stay. Nearly two thirds of laboring women received paracervical anesthesia, three fourths of whom obtained noticeable pain relief. Partial relief was obtained by another 20%. Infants delivered after paracervical block were compared with those unexposed to this therapy and found to be similar in regard to Apgar scores and length of hospital stay. Fetal monitor tracings showed highly concerning alterations in 6% of patients after the block. It is concluded that paracervical block done by the technique described remains an effective and low-risk form of obstetric anesthesia in most obstetric patients in a community hospital.

After a favorable first impression in the American medical literature,[1] the use of paracervical block anesthesia in obstetrics has developed proponents[2] and detractors.[3,4] Through the use of electronic fetal monitoring, bradycardia (and, to a lesser degree, other fetal heart rate changes) has become the major indicator of fetal compromise following paracervical block.[5–13] In 1978, Cibils and Santonja-Lucas[2] summarized much of the literature and proposed several mechanisms whereby paracervical block may cause alterations in fetal heart rate; yet they concluded that paracervical anesthesia was "safe for any type of patient" if injected correctly.

In the past few years, several publications have carried reports urging caution regarding paracervical block[14] or even stating that it is contraindicated[15] and should be abandoned for use in obstetrics.[16] Many of the studies report small numbers of patients selected for extremely low-risk status.[6,7,9,10] The physician is left to question the safety of paracervical block in the low- to moderate-risk patients found in private practice. Most articles have evaluated paracervical block in relation to fetal monitor alterations or Apgar scores, but have not included variables beyond the immediate perinatal period.

This paper expands the study of paracervical block anesthesia by reporting an investigation of its effectiveness and its safety. The length of the infant's hospitalization was measured in addition to associated fetal heart rate alterations and Apgar scores. The sample was drawn from patients who presented for obstetric care at a community hospital that is also a regional referral center for obstetrics and neonatology.

METHODS

Paracervical block is the form of obstetric anesthesia most frequently employed in the study community. It is used in the active phase (dilatation 5 to 9 cm) of the first stage of labor. Women who are allergic to the agent or who are considered to be at high risk for fetal distress are not given paracervical block. The physician injects a small amount of the anesthetic submucosally, and the block may be repeated after 1 hour. The physicians who perform paracervical block inject 5 to 10 mL of a 1% amide-linked anesthetic agent at one or two locations on each side of the cervix. Sixty-eight percent of blocks were done with lidocaine, 13% with prilocaine, and 19% utilized mepivacaine. In the current study, total injected anesthetic ranged from 50 to 200 mg with most between 100 and 150 mg.

Of the 1421 obstetric deliveries between July 1, 1984, and June 30, 1985, there were 1166 women who labored

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TABLE 1. PHYSICIAN PERFORMING PARACERVICAL BLOCK

Physician Status	Number	Adjusted Percent
First-year family practice resident	482	64
Second-year family practice resident	102	14
Third-year family practice resident	67	9
Family physician	24	3
Obstetrician	75	10
Not listed	35	
Totals	785	100

TABLE 2. PERCENTAGE OF MOTHERS WITH ADDITIONAL RISK FACTORS

Risk Factor	Patients not Receiving Paracervical Block	Patients Receiving Paracervical Block
Oxytocin	28	38
Meperidine	28	36
Tobacco use	24	33
Meconium	16	18
Premature rupture of membranes	8	7
Preeclampsia	5	4
Under 37 weeks' gestation	7	4
Over 42 weeks' gestation	0	2
Diabetes (all types)	0	2

with single pregnancies. These women were eligible for the current study; the 33 who had multiple births and 214 with planned cesarean sections were not considered eligible for the study. None of the eight still-born fetuses was delivered after paracervical anesthesia, so their charts were also excluded.

Of the 1166 eligible cases, 883 were randomly obtained by the Medical Records Department personnel for this study. Limits of time and money curtailed the study. Though not all charts were examined, the unstructured method of chart retrieval implies that the sample is a representative one. From these records, the use of narcotics, oxytocin, and paracervical block was noted. Also recorded was tobacco use, meconium, premature rupture of membranes, gestational age, parity, diabetes, and knotted or nuchal cord. Apgar scores, discharge diagnoses, and lengths of hospital stay were then obtained from the infants' charts. In this group of 883 women, 552 (62.5%) received at least one paracervical block. Of these 552 women, 65% (360) received one block, 29% (158) received two blocks, while only 5% (27) and 1% (7) received three and four blocks, respectively. A total of 785 paracervical blocks were given to the group of women studied. Most blocks were injected by family practice residents (Table 1). Ninety-four percent (521) of the patients who received paracervical anesthesia gave birth vaginally. Six percent (31) of these women required cesarean section because they failed to progress. Fetal distress was not seen preceding any of the abdominal deliveries.

The 883 women had a number of other medical conditions, both chronic and pregnancy related, that could affect the outcome of labor. Table 2 compares the maternal risks of women who had at least one paracervical block with those who received none. The vast majority of those who had no blocks were healthy women who labored without incident and who either requested no analgesia or asked for medication after they were dilated 9 cm, when blocks are not given.

For this study, electronic fetal monitor tracings were examined for 20 minutes before and after each paracervical block. The tracings were evaluated using criteria for baseline and periodic alterations defined in several recent articles.[5,7,17–19] Using the same criteria, the tracings were then coded to indicate the likelihood of fetal distress (reassuring vs concerning).[7] The criteria used and the number of patients in each group before the first paracervical block was given are listed in Table 3. Poor technical quality rendered the permanent tracing unreadable for 48 (6.1%) of the blocks, requiring these cases to be excluded from results that used heart rate alterations as an outcome variable. Effectiveness of the block in treating labor pain, length of hospital stay, and Apgar scores were included as measures of outcome for all patients regardless of whether the monitor tracing was readable. In addition, associated risk factors and concurrent medication were studied for their confounding effects on the relationship of paracervical anesthesia to outcome variables. Results were examined for statistical significance using the chi-square test.

RESULTS

The first evaluation concerned the effectiveness of the paracervical block in relieving labor pain. Four hundred fifty-nine (74%) patients obtained excellent or good pain relief as recorded by the nurse in the chart. One hundred twenty-three (20%) had moderate or partial improvement, and 39 women received little or no benefit. No statement regarding effect was found in 164 cases. Scrutiny of these last cases revealed that additional analgesia was seldom ordered, which implies an adequate effect of the paracervical anesthesia.

Infant morbidity from paracervical blocks was evaluated initially by comparing the length of hospital stay of neonates. Thirteen percent of newborns not exposed to paracervical block and 10% of the infants delivered after block stayed longer than expected (Table 4).

The Apgar scores of all infants were used as a second measure of the effect of paracervical block on neonates. Results are shown in Table 5. At 5 minutes, 1.5% of infants in the paracervical block group had scores of 6. All other infants in the group scored 7 or higher. The infants

TABLE 3. NUMBER OF PATIENTS WITH DIFFERENT FETAL HEART PATTERNS BEFORE THE FIRST PARACERVICAL BLOCK

Heart Tracing Group	Criteria	Number
Reassuring	Normal* or Mild variable decelerations†	450
Concerning	Moderate variable decelerations‡ or mild bradycardia§ or decreased variability or tachycardia	75
Highly concerning	Marked variable decelerations‖ or late decelerations or marked bradycardia¶ or prolonged bradycardia#	1
Very highly concerning	Decreased variability with late deceleration or bradycardia	0
	Tracing unreadable	26
Total		552

Baseline 120 to 150 beats per minute; variability 5 to 10 beats per minute; +/− early decelerations
†*Nadir 80 to 100 beats per minute any duration or 70 to 80 beats per minute lasting under 60 seconds*
‡*Nadir 70 to 80 beats per minute lasting over 60 seconds or nadir under 70 beats per minute lasting under 60 seconds*
§*Baseline decrease of 20 beats per minute lasting over 90 seconds or baseline rate under 100 beats per minute lasting under 90 seconds*
‖*Nadir under 70 beats per minute lasting over 60 seconds*
¶*Baseline rate under 100 beats per minute lasting equal to or over 90 seconds*
#*Baseline decrease of 30 beats per minute lasting over 150 seconds*

TABLE 4. PERCENTAGE OF INFANTS WITH PROLONGED HOSPITAL STAY

Diagnosis	Infants not Exposed to Paracervical Block	Infants Exposed to Paracervical Block
Jaundice*	2	4
Prematurity	4	2
Observation	0	1
Infant sepsis	0	1
Maternal diagnosis only	5†	<1‡
Meconium aspiration	0	<1
Other	2§	1‖
Totals	13	10

**Includes all etiologies*
†*Postpartum hemorrhage, mastodynia, fever, hemorrhoids, knee pain*
‡*Subacute bacterial endocarditis, amnionitis, ovarian vein thrombosis*
§*Intracranial hemorrhage, spina bifida*
‖*Fever, respiratory distress syndrome, subarachnoid bleeding, asphyxia, infant of diabetic mother*

delivered without exposure to paracervical anesthesia had slightly lower Apgar scores. Thus, the 5-minute Apgar scores do not reveal any untoward effects of paracervical block anesthesia.

The presence or absence of several conditions was examined to determine whether they had an effect on the Apgar scores. Apgar scores were depressed significantly more often ($P = .023$) in infants whose mothers received meperidine than in those who had not been given this drug regardless of whether paracervical block was used. The greatest statistical significance was noted when Apgar scores of infants exposed to oxytocin, paracervical block, and meperidine were compared with those who had the block but neither of the other two drugs ($P = .01$). In patients who were given paracervical anesthesia, presence of certain conditions was associated with infants who had depressed 5-minute Apgar scores: premature rupture of membranes ($P = .002$), concurrent diabetes mellitus ($P = .026$), and nulliparity ($P = .043$).

Prematurity, postmaturity, cigarette use, preeclampsia, and use of oxytocin without meperidine were not associated with 5-minute Apgar scores below 7 in the group treated with paracervical block.

Besides length of stay and Apgar scores, the fetal monitor tracing was assessed as an indicator of fetal health in paracervical block patients. Number of patients whose tracings met criteria in each of the four heart tracing groups 20 minutes before and after each block is displayed in Table 6. Bradycardia was noted in 5.4% of cases before paracervical block and 8.3% of tracings after the block. Examining individual monitor tracings and comparing the heart tracing group before paracervical block with the heart tracing group assigned to the same patient after the block revealed that the tracing was significantly more likely ($P = .011$) to change in a reassuring direction or stay the same than become more concerning. Patients treated with meperidine were significantly more likely to show worsening of tracings after paracervical block ($P = .018$) than were patients who got the block but no meperidine. Compared with patients laboring spontaneously, patients who received oxytocin were significantly more likely to show changes for the worse in their fetal monitor tracings ($P = .01$). After a block, fetal distress implied by heart rate alteration was not significantly increased by the presence of meconium-stained fluid, nuchal cord, prematurity or postmaturity, cigarette use, diabetes, preeclampsia, or premature rupture of membranes. Use of meperidine and oxytocin, however, was associated with a significantly greater number of tracings containing concerning alterations in women who had paracervical anesthesia ($P = .02$) (Table 7).

As a final method of evaluation, the fetal monitor tracings were compared with Apgar scores. There was no statistically significant association between heart rate alterations (grouped from reassuring to very highly concerning) and Apgar scores.

TABLE 5. APGAR SCORE PERCENTAGES OF INFANTS EXPOSED AND NOT EXPOSED TO PARACERVICAL BLOCK

	Infants not Exposed to Paracervical Block		Infants Exposed to Paracervical Block	
Apgar Scores	1 min	5 min	1 min	5 min
0 to 3	5	1.5	3	0
4 to 6	16	2.5	16	1.5
7 to 10	79	96	81	98.5
Total	100	100	100	100

TABLE 6. NUMBER OF HEART RATE TRACINGS IN DIFFERENT HEART TRACING GROUPS BEFORE AND AFTER EACH PARACERVICAL BLOCK

	Heart Tracing Group Before Block		
Heart Tracing Group After Block	Reassuring	Concerning	Highly Concerning
Reassuring	495	59	7
Concerning	86	44	2
Highly concerning	31	9	3
Very highly concerning			1

DISCUSSION

The medical literature supports the common sense of avoiding medicines in labor when possible. In a series of 40,000 deliveries, Murphy et al[20] showed that the highest Apgar scores were attained by infants whose mothers received no drug intervention. Yet, even in this series, 94% of women were treated pharmacologically. From animal studies it is clear that the stress caused by pain and anxiety can result in reduced uterine blood flow, decreased fetal oxygenation, and a depressed fetal heart rate.[21,22] Thus, there are both scientific and humanitarian reasons to use analgesia when requested.

Paracervical block anesthesia has been commonly practiced in the study community since 1957. First-year residents become familiar with electronic fetal monitor tracings before they begin duties on the obstetric floor. In addition, they are taught the superficial injection technique promoted by Bloom et al.[23] Table 1 reveals that housestaff are given ample opportunity to practice the procedure during the residency.

The use of paracervical anesthesia in the community of this study is not reserved for women with uncomplicated pregnancy. Indeed, the present study reveals that women who received paracervical block are similar to those who did not (Table 2), except for two general differences. The higher use of meperidine and oxytocin in patients who receive paracervical anesthesia may represent those women who have a difficult labor and require medications of several types. They may receive oxytocin as well as meperidine in the latent phase of the first stage of labor followed by paracervical block after 5-cm dilatation.

In addition to drug usage, there is a difference in the incidence of preterm labor between patients who receive paracervical block and those who do not. Women in labor before 37 weeks are less likely to be treated with paracervical anesthesia. This finding may be a result of labors that are not as painful so require less analgesia or may be due to physician concern about a reported increased incidence of worrisome fetal heart rate changes among preterm infants exposed to paracervical block.[24]

Effectiveness of paracervical block reported previously has been excellent in the majority of patients.[7,8] While studying paracervical block as a new technique, Jensen et al[25] report a rising success rate (from 68% early to 85% good effect later) as practice improved physician skill. These investigators used observation by nurses to evaluate effectiveness, as in the present study, though validity would have been greater had pain relief been rated by the patients themselves. The current results compare favorably with those of most other authors. Length of hospital stay has not previously been reported as a way to measure safety of paracervical block. This study reveals that infants delivered after paracervical anesthesia do not require prolonged neonatal care.

That there were no emergency cesarean sections, fetal mortalities, or notable morbidity subsequent to 785 paracervical blocks deserves comment. Physicians did not reserve this form of anesthesia for women without comorbidities (Table 2), yet some selection likely occurred. Certainly the residents checked for evidence of fetal compromise prior to the injection. The literature on paracervical block suggests that the superficial injection of small amounts of anesthetic is important to minimize fetal risk.[2] That so many women were given a block without major adverse effect supports the retention of the procedure for use in obstetrics.

Although Apgar scores are only a gross indicator of morbidity, the scores obtained after paracervical block are reported by many authors. Most identify a few infants with low (under 7) Apgar scores, even within a carefully selected low-risk sample.[7,10,25] The current study reports small numbers of infants with low Apgar scores after paracervical block in a broad sample of patients from the commuity. Comparison with the obstetric patients from the same hospital who did not receive paracervical anesthesia reveals no adverse effect of the block on infants as measured by Apgar scores.

Certain situations are more commonly associated with low Apgar scores after paracervical block. The infants of mothers who received meperidine prior to paracervical block are most likely to have low scores. It is important to recognize that the association of meperidine and low Apgar scores is seen also in infants who are not exposed to the block, suggesting that meperidine causes neonatal depression independent of paracervical anesthesia. Finally, the extremely strong relationship between low Apgar

scores and the combined use of paracervical block, meperidine, and oxytocin should cause the careful physician to avoid this combination.

While some investigators of paracervical anesthesia do report Apgar scores, most use fetal monitoring alone to evaluate the perceived risk to the fetus.[3,5,6,11] As mentioned previously, there is a tendency in many studies to equate bradycardia with fetal distress. Unfortunately, this view may obscure other causes of bradycardia[17] and other patterns suggestive of fetal compromise. This attention, besides being inordinate, is confused by the dozen different definitions given for bradycardia. This study has adhered to the recommendations of Thiery and Vroman[24] that both absolute and relative criteria be used to define bradycardia. In addition, all alterations from normal were coded according to the likelihood that they represented fetal distress. Definitions and the coding groups for individual tracings are described in Table 3.

Those who condemn paracervical block anesthesia because of associated bradycardia will focus on the 8.3% rate of bradycardia found in this series. If these fetuses were suffering substantial hypoxia, however, their condition at birth should have been worse. While the 8.3% rate is in the middle of the published range, it must be recalled that 5.4% of tracings contained bradycardia before the block. Perhaps these figures and the health of infants delivered in this study will encourage others to look beyond the rate of bradycardia when evaluating paracervical block anesthesia in obstetrics.

Factors in addition to paracervical block may have had an effect on fetal heart rate patterns. Thirty-eight percent of women who received paracervical block were also treated with oxytocin (Table 2). This combination was significantly associated with greater numbers of fetal monitor tracings in the concerning ranges. Examination of these tracings revealed that in many cases the oxytocin was turned off shortly after the block and resumed when the heart tracing had reverted to normal. In women needing both augmentation and anesthesia, this order might logically be reversed. It would prolong the labor very little if the rate of oxytocin infusion was decreased a few minutes before the block; such practice might reduce the incidence of worrisome alterations.

The relationship between meperidine and low Apgar scores has been discussed. Use of meperidine is also strongly correlated with more concerning fetal monitor tracings after paracervical block. The observation that diabetes, postmaturity, and preeclampsia had no significant association with concerning heart rate alterations was unexpected. Other authors have listed these factors as relative contraindications for paracervical anesthesia.[2,4,5] The absence of a relationship found in this study suggests that even in some situations where placental function is suspect (diabetes, postmaturity, preeclampsia), paracervical block can be used cautiously when needed in patients who show no marked evidence of fetal distress.

The lack of significant association between the fetal monitor tracing and Apgar scores emphasizes the inappropriateness of considering the tracing as an absolute indicator of fetal well-being. The high Apgar scores certainly do not prove that the infants delivered after paracervical anesthesia have avoided any transient compromise, but the scores and the diagnoses of infants with prolonged hospitalizations reveal no evidence of morbidity associated with paracervical block.

TABLE 7. PERCENTAGE OF FETAL MONITOR TRACINGS IN DIFFERENT HEART TRACING GROUPS ACCORDING TO DRUGS USED BESIDES PARACERVICAL BLOCK

Heart Tracing Group	None	Oxytocin	Meperidine	Both
Reassuring	84	74	75	71
Concerning	13	21	17	20
Highly concerning	3	5	9	9
Very highly concerning	0	0	0	1
Total	100	100	101*	101*

** Because numbers were rounded, columns total greater than 100%.*

Authors who condemn paracervical anesthesia very often recommend epidural block in the same article as the preferred regional anesthetic.[1,3,14,15,26] Though epidural anesthesia has been associated with prolonged labor needing oxytocin in two thirds of patients,[27] forceps use five times that of patients not given epidural,[27] and pathologic periodic fetal heart patterns in 40%[28] to 56%[29] of cases, proponents accept these outcomes; they consider paracervical block riskier because of the unacceptable rate of bradycardia. Whereas bradycardia heard by auscultation between contractions was considered a clear indication of fetal distress, continuous electronic fetal monitoring may detect bradycardia in 20% of patients.[24] It has also been shown that moderate fetal bradycardia (baseline heart rate 100 to 119 beats per minute) is not associated with fetal acidosis.[30] Bradycardia following paracervical anesthesia cannot, therefore, be equated with fetal distress. Certainly no regional anesthetic is innocuous; but treatment decisions need to be based on a legitimate analysis of risks and benefits among available methods.

Many articles on paracervical block compare one anesthetic agent with another using frequency of fetal heart rate alteration as the outcome variable. The satisfactory experience obtained with three different amide agents runs contrary to the opinion of at least one author, who contends that amide anesthetics should be rejected in favor of ester-linked types.[9] Probably more important than the type of anesthetic is the technique of injection. Several authors[2,6,7,10,12,25] acknowledge the importance of shallow injection. Others accept up to 1 cm[9] or do not report the depth,[5,8] and one notable review contains the statement that injections up to 2 cm deep are acceptable.[24] The residents who performed paracervical block anesthesia in this study were instructed carefully in the method of submucosal injection (feel the wheal).[23] This one fact alone may be responsible for the safety of paracervical block in the community of study.

CONCLUSIONS

Most women will request some pharmacologic analgesia during labor. This study reveals that patients who receive paracervical block appear to obtain substantial pain relief. Although the group of patients receiving paracervical anesthesia as a whole revealed no significant rate of morbidity, use of paracervical block in women who have already been treated with oxytocin or meperidine is correlated with a significant incidence of worrisome changes in fetal heart tracings and low Apgar scores. This study shows that at the community hospital level, the careful use of paracervical block with small amounts of local anesthetic injected submucosally carries minimal risk to the infant and is of substantial benefit to the mother.

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