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Obstetrical anaesthesia at Winnipeg Women's Hospital 1975-83: anaesthetic techniques and complications

The obstetrical anaesthesia experience of the Winnipeg Women's Hospital from 1975 to 1983 was reviewed (n = 22,925 infants). Use of narcotics in labour for analgesia decreased from 38.7 to 18.3 per cent of the deliveries. For analgesia during spontaneous vaginal deliveries, epidural anaesthesia increased from 6.0 to 24.0 per cent, inhalational analgesia decreased from 53.7 to 3.2 per cent while "no anaesthetic intervention" rose from 40.3 to 72.8 per cent. Use of epidural anaesthesia for Caesarean section increased from 58.7 to 82.6 per cent. The most common acute complications of anaesthesia were hypotension and inadvertent dural puncture during epidural catheterization. The incidence of hypotension decreased from 28.3 to 17.4 per cent during the nine-year period. Dural puncture decreased from 4.7 to 1.1 per cent of all epidural administrations. Postpartum complaints (that were thought to be related to anaesthesia) were mainly headache, back pain and sore throat. The incidence of these complaints also decreased over the study period.

Key words

ANAESTHESIA: obstetrical; ANAESTHETIC TECHNIQUE: epidural; ANAESTHESIA: complications; COMPLICATIONS: headache, hypotension.

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Provision of analgesia to parturients during labour and delivery is a major component of anaesthetic practice. Although periodic surveys of obstetrical anaesthesia from different institutions have previously indicated changing patterns of practice over time¹⁻³ there is only limited data on this aspect in the last ten years from well-defined general obstetrical populations. Over the last decade, the practice of obstetrics has undergone significant changes with increasing emphasis on technology such as electronic monitoring,⁴⁻⁶ ultrasonic assessment and procedural interventions such as Caesarean section.⁷⁻⁹ On the other hand, many women giving birth have demanded more "natural" approaches and less reliance on medications. These opposing demands have led to a shift in the requirements for obstetrical anaesthesia. We have reviewed our experience at the Winnipeg Women's Hospital from 1975 to 1983 to assess how the practice of obstetrical anaesthesia has varied over the nine-year period.

Methods

An Obstetrical Anaesthesia Follow-up Program was in operation at the Winnipeg Women's Hospital from 1975 to 1983. This hospital serves as one of two tertiary referral hospitals for a population of about 1.5 million and also functions as a community hospital for women in the adjacent neighbourhoods. The Department of Anaesthesia provides 24-hour coverage with an anaesthetist on duty in the hospital at all times.

A specially trained anaesthesia nurse (the same individual throughout the nine-year period) reviewed the obstetrical patient's hospital chart and interviewed those who received an anaesthetic to identify complications possibly associated with anaesthesia. The chart review included the antepartum record, labour and delivery records, and the anaesthesia record. The variables recorded by the nurse are listed in Table I. Specific conditions (the definition of which did not vary over the study period) complicating the pregnancy or delivery were identified. The nurse informed the anaesthetist if significant problems or complications had occurred, so that appropriate

action could be taken. The information was subsequently prepared for computer processing. Cochrane-Mantel-Haenzel statistic¹⁰ was used to determine if there was a significant trend over time in any of the study variables (statistical significance accepted at the $p \leq 0.05$ level).

Results

From 1975 to 1983, data were collected on 22,986 infants, representing 76 per cent of all infants delivered at the hospital (Table II). Prior to 1982, those not included were mainly cases delivered while the nurse was not on duty (there was no funding for a replacement nurse). The nurse was assigned additional duties in 1982 and as a result saw a smaller proportion of the total deliveries. A further 0.3 per cent of the cases were excluded from the analysis due to coding or transcription errors leaving 22,925 cases in the study. Forty-one per cent of the parturients in this period were primiparas. The proportion of mothers with preeclampsia was 11.5 per cent, diabetes mellitus 2.0 per cent, heart disease 0.9 per cent, Rh immunization 0.5 per cent and antepartum haemorrhage 4.2 per cent. The proportion of mothers in the study who had at least one antepartum medical condition was about 19 per cent (Table II). These proportions did not change appreciably over time and reflect the tertiary referral nature of the hospital.

Changes in type of delivery are seen in Figure 1. Spontaneous vaginal delivery as a proportion of all infants delivered fell from 56 per cent in 1975 to 48 per cent in 1979 but increased more recently to about 58 per cent of all infants delivered. Caesarean section rates increased from 11.5 per cent in 1975 to a high of 22 per cent in 1982; the rate has been declining since. The use of mid-forceps or vacuum decreased from ten per cent in

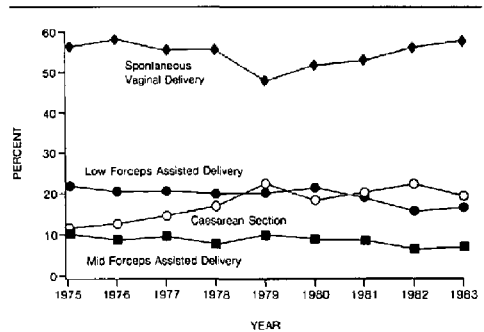


FIGURE 1 Methods of delivery by year from 1975-83.

1975 to about seven per cent in 1983, whereas low forceps or vacuum was used in 22 per cent of infants in 1975 and 16 per cent in 1983. All the time trends were statistically significant ($p < 0.0001$).

There were marked changes in the use of sedative or narcotic medications during labour over the time period (Figure 2). The proportion of infants delivered to parturients using no sedative or narcotic analgesic during labour rose from 44 per cent in 1975 to about 80 per cent in 1982-83. The proportion using narcotics fell from 38.7 per cent in 1975 to about 18 per cent in 1983. Similarly, the proportion receiving sedatives (mainly promethazine) fell from 47.3 per cent in 1975 to 19.2 per cent in 1983 ($p < 0.0001$).

The anaesthetic techniques employed at the time of delivery changed significantly over the nine-year time period ($p < 0.0001$). Women not having any anaesthesia or analgesia during delivery increased from 22 per cent in 1975 to 46 per cent in 1983. Epidural analgesia/anaesthesia

TABLE I Obstetrical follow-up program - variables recorded

<i>Antepartum risk factors</i>	
Age, parity, gestational age, pre-eclampsia, Rh isoimmunization, heart disease, diabetes mellitus, intrauterine growth retardation, antepartum haemorrhage.	
<i>Obstetrical factors</i>	
Cord around neck, cord prolapse, prolonged ruptured membranes, malpresentation, hypertension during labour.	
<i>Drugs used during labour</i>	
Sedatives, analgesics, syntocinon, antihypertensives.	
<i>Mode of delivery</i>	
Spontaneous vaginal delivery, operative vaginal delivery (and indications), Caesarean section (and indications).	
<i>Anaesthetic factors</i>	
Type of anaesthesia, indication, agents used, immediate and delayed complications, analgesia score.	

TABLE II Number of infants delivered and number in anaesthesia follow-up study, Women's Hospital 1975-1983

Year	Total infants delivered	# Infants in follow-up study	Percentage in follow-up study	Percentage in follow-up study having at least one medical disorder*
1975	3507	2085	60	15
1976	3442	3037	88	19
1977	3414	2870	84	19
1978	3330	3031	91	18
1979	3535	3070	87	21
1980	3094	2495	81	18
1981	3229	2586	80	19
1982	3252	2227	63	20
1983	3307	1585	48	21
Total	30,110	22,986	76	19

*Includes preeclampsia, Rh disease, heart disease, diabetes mellitus, intrauterine growth retardation, and antepartum haemorrhage.

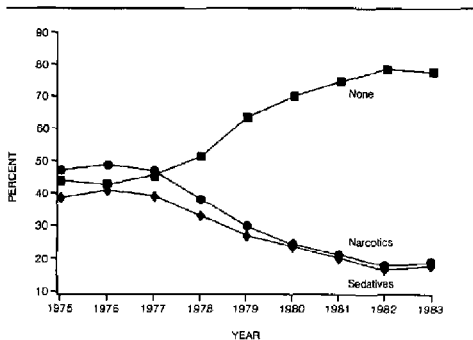


FIGURE 2 Use of sedatives or narcotics during labour.

became the technique most widely used, increasing from 28 per cent of all deliveries in 1975 to 45 per cent in 1983. Conversely, the percentage of deliveries under nitrous oxide or methoxyflurane inhalational analgesia fell from 40 per cent in 1975 to only four per cent in 1983. General anaesthesia (including that used after a failed epidural) was used in about four to five per cent of all deliveries. The anaesthetic techniques employed for spontaneous vaginal delivery are seen in Figure 3. There has been a shift from delivery with inhalational analgesia (53.7 per cent in 1975 versus 3.2 per cent in 1983) to delivery with epidural (six per cent in 1975 versus 24 per cent in 1983), or no anaesthesia (40.3 per cent in 1975 versus 72.8 per cent in 1983). For deliveries assisted with vacuum or forceps (Figure 4), there has been an increase in the use of epidural (54.5 per cent in 1975 to 70.6 per cent in 1983), a decrease in general anaesthesia (3.9 per cent in 1975 to 0.3 per cent in 1983) and in the use of inhalational analgesia (29.1 per cent versus 7.2 per cent in 1983). The proportion using no analgesia/anaesthesia other than local infiltration increased from 12.2 per cent

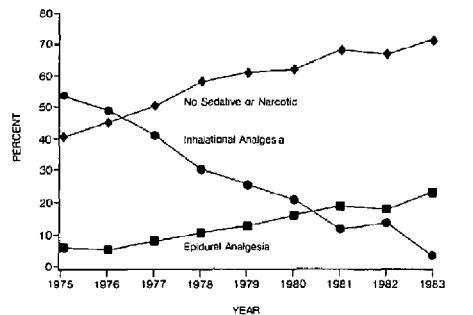


FIGURE 3 Analgesia techniques during spontaneous vaginal delivery.

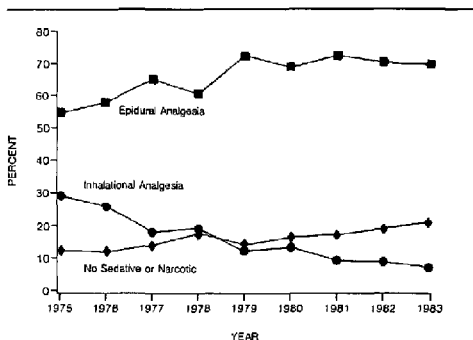


FIGURE 4 Analgesic techniques during forceps/vacuum assisted vaginal deliveries.

in 1975 to 21.6 per cent in 1983. Finally, for Caesarean section (Figure 5), epidural anaesthesia became the most frequently employed technique. In 1975, 58.7 per cent of sections used epidural anaesthesia and this increased to 82.6 per cent in 1983. Conversely, general anaesthesia fell from 32.9 per cent of cases in 1975 to 12.0 per cent in 1983. There were fewer failed epidurals over time falling from a peak of 14.3 per cent in 1976 to only 3.3 per cent of Caesarean sections in 1983.

Complications during anaesthesia occurred infrequently (Table III). The main complication occurring during the administration of the anaesthetic was hypotension and this was seen virtually only with epidural anaesthesia. The frequency of hypotension decreased over time from 28 per cent in 1975 to 17 per cent in 1983. Other complications including vomiting, aspiration, convulsions, hypertension or tachycardia occurred in only 33 patients in total (0.13 per cent of all women receiving an anaesthetic) in the nine-year period. The frequency of inadvertent dural puncture fell from 4.7 per cent of all

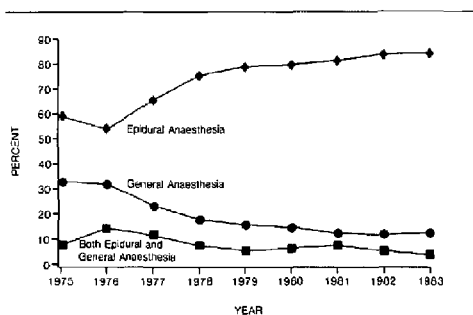


FIGURE 5 Anaesthetic techniques during Caesarean sections.

TABLE III Complications occurring during anaesthesia (per cent of women receiving anaesthetics)

Year	No. of women who received anaesthetic procedures						
		None	Hypotension†	Vomiting or aspiration	Convulsions	Tachycardia‡	Dural puncture*
1975	700	69.5	28.3	0.14	0.14	0.28	4.7
1976	1033	77.1	21.7	0.09	0	0.38	2.9
1977	1135	74.1	23.6	0.62	0.09	0.18	4.1
1978	1217	78.6	19.6	0.25	0.09	0.33	3.1
1979	1552	77.7	20.6	0	0	0	3.7
1980	1189	80.4	18.3	0.08	0	0	2.8
1981	1296	81.5	17.4	0	0	0.08	2.2
1982	1073	79.3	19.5	0	0	0	2.8
1983	798	82.0	17.4	0.14	0	0	1.1

*Per cent of epidurals only.

†Systolic b.p. of 90 mmHg or less or a fall of 30% or more below resting values. ‡120 or more beats·min⁻¹.

epidural administrations in 1975 to a low of 1.1 per cent in 1983.

Delayed complications (judged by the anaesthesia nurse as attributable to anaesthesia) also occurred very infrequently (Table IV). The most commonly seen late complication was back pain, followed by sore throat and headache. The frequency of back pain decreased over the years from ten per cent of mothers in 1976 to about 3.1 per cent in 1983. The frequency of sore throat also decreased, but the proportion with headache declined only slightly.

Discussion

Our follow-up data indicate that over the 1975–83 period, dramatic changes in the practice of obstetrical anaesthesia have occurred in our hospital. These trends probably reflect the impacts of two diametrically opposite forces, namely, technology and “natural” childbirth. Increased emphasis on technology and medical interventions produced an increase in epidural anaesthesia, electronic

fetal monitoring and Caesarean section. On the other hand, the influence of “natural” childbirth teaching and concerns about the effect of medications on the baby caused a significant decrease in demands for analgesics and sedatives during labour and a significant increase in spontaneous vaginal deliveries.

The rise in the Caesarean section rate is consistent with the general trend in Europe and North America over the same 1975–83 period.^{3,7–9,12} There is, however, one major difference in our experience. We found that the increase in Caesarean sections was matched by the decrease in vacuum or forcep-assisted vaginal deliveries. In contrast, the experience from the Montreal Royal Victoria Hospital³ indicated that both Caesarean sections and forceps deliveries increased from 1960–62 to 1978–80. Cyr *et al.*³ questioned whether epidural anaesthesia might have contributed to the increase in forceps deliveries. This concern has also been raised by others.^{15,16} Our experience would not support this hypothesis. While we found an increase in the rate of all vaginal deliveries

TABLE IV Delayed complications associated with anaesthesia (per cent of women receiving anaesthetics)

Year	No. of women who received anaesthetic procedures						
		None	Headache	Neurological symptoms	Sore throat	Back pain	Muscle pain
1975	700	87.3	2.0	0.9	1.4	8.0	0.4
1976	1033	85.8	1.2	0.5	1.8	10.5	0.2
1977	1135	88.4	1.6	0.4	1.2	8.1	0.3
1978	1217	89.9	1.2	0.5	1.5	6.7	0.2
1979	1552	91.1	1.1	0.3	0.8	6.7	0
1980	1189	90.4	0.8	0.6	0.4	7.7	0.1
1981	1296	93.3	0.7	0.5	0.6	4.9	0
1982	1073	94.3	1.2	0.1	0.3	4.1	0
1983	798	95.4	0.4	0.1	0.9	3.1	0.1

using epidural anaesthesia (from 23 to 37 per cent), in the same time period, the proportion of all vaginal deliveries that required forceps declined from 37 to 29 per cent. Similarly we found an increase in the use of epidural anaesthesia for all deliveries (from 28 to 46 per cent), but the proportion of deliveries not requiring intervention (whether forceps or Caesarean section) remained about the same (56 per cent in 1975 and 58 per cent in 1983). The probable factor responsible for this result was the emphasis by obstetricians, nurses and patients on spontaneous vaginal delivery whenever possible.

The reduction in popularity of narcotic analgesics seen here is similar to the experience at other institutions.^{1,3} There appeared to be a substitution of epidural anaesthesia for narcotics in the Cardiff Births Survey¹ and Montreal Royal Victoria Hospital³ as the sums of narcotic analgesia and epidural anaesthesia remained similar over time. In our experience, the number of deliveries with no analgesic medication or regional anaesthesia increased in the vaginal delivery cases.

Hellman¹¹ reported increased rates of epidural anaesthesia and decreased rates of general anaesthesia for vaginal deliveries and Caesarean sections at the New Mount Sinai Hospital, Toronto from 1956 to 1964. During that time, use of epidural anaesthesia increased from 36.7 to 91.1 per cent of all deliveries while general anaesthesia decreased from 54.4 to 4.7 per cent. The largest difference existed in the use of anaesthetics for vaginal deliveries. By 1983, 72.8 per cent of the women having spontaneous vaginal deliveries at the Winnipeg Women's Hospital did not require any anaesthetic intervention compared to the 90.5 per cent rate of epidural anaesthesia for vaginal deliveries at the Toronto Mount Sinai Hospital. The variation in practice patterns may be temporal in nature, since our report is more current.

The decreased usage of inhalational analgesia may be peculiar to our hospital. The Cardiff Births Survey showed "gas only" and "drugs and gas" types of analgesia were used in over 70 per cent of vaginal deliveries in both 1970-74 and 1975-79. The excellent analgesic effects of epidural anaesthesia and increased confidence in the safety of epidural anaesthesia probably led to the change in practice here. There is insufficient data in the literature to indicate whether this trend might also have occurred in other institutions.

The increased utilization of epidural anaesthesia and decreased popularity of general anaesthesia for Caesarean section continued a trend established in the last two decades. In an analysis of Caesarean sections in two hospitals in the Seattle area, Lamke¹³ found that general anaesthesia was used in over 90 per cent of the Caesarean sections performed in the two periods, 1943-49 and

1950-56. A 1975 survey by Hicks *et al.*² reported that 43 per cent of the Caesarean sections in obstetrical anaesthesia training centres in the U.S. were carried out under general anaesthesia. This was similar to the prevalence of general anaesthesia for Caesarean section reported by a 1970 study of all maternity centres by the American College of Obstetricians and Gynecologists.¹⁴ In our study, from 1975 to 1983, general anaesthesia for Caesarean sections decreased from 33 per cent to 12 per cent. A major incentive to the parturient for having a regional anaesthetic technique is the ability to interact with the newborn infant shortly after birth.

It is encouraging to find decreases in complications during labour and postpartum complaints related to anaesthesia. The reductions in both the incidence of hypotension and inadvertent dural puncture likely reflected an increasing level of competence of the medical and nursing staff in establishment and management of epidural anaesthesia. Previously reported rates of dural puncture associated with epidural anaesthesia for obstetrical patients varied from 0.8 to 3.2 per cent.¹⁶⁻¹⁸ As a teaching institution, with interns and residents performing epidural catheterizations under supervision, our 1.1 per cent rate in 1983 compared quite favourably.

The assessment of postpartum complaints is relatively subjective. As we have had the same nurse performing the interviews and data collections throughout the study period and maintaining the same criteria for evaluation, the trends are probably real. The complaints recorded were those volunteered by the patient. Certainly a different nurse or a more structured interview may have found different results. However, the reduction in complaints were consistent with the decrease in objective indicators of anaesthesia-related complications such as inadvertent dural puncture.

In summary, we have found significantly increased use of epidural anaesthesia and Caesarean sections in the obstetric practice at Winnipeg Women's Hospital from 1975 to 1983. At the same time, there was a decreased requirement for narcotic analgesia in labour, decreased use of anaesthetic medications during spontaneous vaginal delivery and decreased rates of complications related to anaesthesia.

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Résumé

L'expérience de l'anesthésie obstétricale du Women's Hospital de Winnipeg de 1975 à 1983 est revue (n = 22,925 enfants). L'utilisation des narcotiques pour l'analgesie lors du travail diminua de 38.7 à 18.3 pour cent. Pour l'analgesie lors de l'accouchement vaginal spontané, l'anesthésie epidurale augmenta de 6.0 à 24.0 pour cent, l'analgesie par agent d'inhalation diminua de 53.7 à 3.2 pour cent alors que pour le groupe où aucune intervention anesthésique ne fut nécessaire le pourcentage augmenta de 40.3 à 72.8 pour cent. L'utilisation de l'anesthésie épidurale pour les césariennes augmenta de 58.7 à 82.6 pour cent. Les complications aiguës les plus communes de l'anesthésie furent l'hypotension et la ponction involontaire de la dure-mère lors de la cathétérisation de l'espace épidural. L'incidence de l'hypotension diminua de 28.3 à 17.4 pour cent au cours de cette période de neuf ans. La ponction de la dure-mère diminua de 4.7 à 1.1 pour cent pour toute injection épidurale. Les plaintes en période de postpartum (qu'on pense reliées à l'anesthésie) étaient surtout les maux de tête, les dorsalgies et les maux de gorge. L'incidence de ces plaintes diminuèrent aussi à travers la période de l'étude.