

Dr. Usher was one of Canada's pioneering neonatologists. See obituary below. In 1982, when I was a Chief ObGyn resident at McGill U, he supervised my research on Birth Trauma and Asphyxia which led to a 1984 publication that can be found on this site.

This is a manuscript of a 1984 lecture he delivered in Dublin.

### CONDITION AT BIRTH

Main lecture given at the 9th European Perinatal Congress, Dublin, Ireland, September 5th, 1984.

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Robert H. Usher M.D.  
(1929 - 2006)

On May 25, 2006, the MUHC lost one of its most beloved physicians when Dr. Robert H. Usher died of cancer at the age of 76. Dr. Usher's innovative work in neonatal medicine and the treatment of respiratory distress syndrome (RDS) set new international standards.

Dr. Usher was born in Montreal in 1929 at the MUHC's Royal Victoria Hospital, where his father worked as a pediatrician. He enrolled in medicine at McGill University and in 1957 accepted a one-year research position at the Vic, where he studied RDS in prematurely born babies. Dr. Usher's development of the Usher Needle helped reduce the neonatal mortality rate of children with RDS by more than 50 percent. In the 1960s, his breakthrough research into the metabolic processes of RDS led to the widespread introduction of the Usher Regime, the intravenous infusion of dextrose water with sodium bicarbonate. This increased the survival rate even further, a widely celebrated result given the highly publicized 1963 death from RDS of President Kennedy's newborn son, Patrick Bouvier Kennedy, which had made the disease something of a *cause célèbre*.

In 1959, Dr. Usher became the director of the Vic's neonatal intensive-care unit and remained in the post for 41 years. He was also a professor of both obstetrics and pediatrics at McGill. During his illustrious career he received many honours, including being made an honorary fellow of the British Association of Perinatal Medicine in 1991. He was awarded the Prix Letondal of Quebec in 1993, the Neonatal Award of Canada in 1995, and the prestigious Virginia Apgar Award, given annually by the American Academy of Pediatrics, in 2000. In 2006, Dr. Usher received the Ross Award for excellence in the field of pediatric research and child advocacy from the Canadian Pediatric Society. In 1998, McGill University established the Robert Usher Fellowship in Perinatology to fund graduate physicians and scientists intending to follow in Usher's footsteps: a fitting tribute to a true MUHC pioneer.

1.

The importance of condition at birth is easiest to illustrate in the borderline viable child. A birthweight below 1500 grams is compatible with survival in three-quarters of infants who require little or no resuscitation at birth, and almost never in those requiring prolonged resuscitation.

TABLE I Survival in infants weighing 500-1499g by duration of ventilation required at birth, 1978-79.

Duration Ventilation (mins.)	Number Livebirths	% Survival
0	43	74
1- 3	30	77
4-10	25	52
> 10	18	6

The complexity of the problem, or at least of its solution, is demonstrated by analysis of survival following Cesarean section versus vaginal delivery for the under 1500 g infant. Cesarean section, on first analysis, appears to be a simple way to improve condition at birth. It seems to decrease mortality by two-thirds. Further analysis however shows this to be totally dependent on a skewed gestational age distribution, with only the more mature infants being delivered by Cesarean.

TABLE 2 Mortality rate by gestational age and route of delivery in the infant of 500-1499g, 1978 and 79.

Gest. age (wk)	<u>Cesarean birth</u>		<u>Vaginal birth</u>	
	<u>No. livebirths</u>	<u>% mortality</u>	<u>No. livebirths</u>	<u>% mortality</u>
< 26	2	100	23	87
26 & 27	5	20	20	60
28 & 29	7	0	7	14
30 & 31	11	33	9	11
32 +	14	7	3	33
Total	39	18%	62	56%

The role of recent obstetrical advances-particularly the more liberal use of Cesarean section - to avoid birth asphyxia and trauma can be assessed by comparing condition at birth in high risk infants delivered before and subsequent to these developments. Except for the borderline viable infant, mortality is not sufficiently sensitive as a reflector of outcome. Morbidity must become the major endpoint to be examined.

Our studies at the Royal Victoria Hospital, a McGill University teaching unit in Montreal, have employed as a sensitive measure of depression at birth the duration of positive pressure ventilation required to produce sustained spontaneous independent respiratory activity by the newborn. Depression requiring more than 3 minutes of positive pressure ventilation is considered severe. Need for prolonged positive pressure ventilation at birth occurs much less often than low Apgar scores. One minute Apgar scores of less than 4 are found in 67% of infants requiring more than 3 minutes ventilation. This low Apgar score is however found overall in three times the number of infants than those who need prolonged ventilation.

We have identified certain high risk groups of patients as follows:

- 1) Full size babies delivering as a breech
- 2) Macrosomic infants
- 3) Twins

We have asked to what degree condition at birth and mortality have improved with modern obstetrics compared with 10-20 years earlier? What problems remain today? Unexpectedly we have also found some adverse effects of modern obstetrical approaches when comparing results in recent years with those pre-dating these changes. Finally we have tried to answer the question: to what degree have overall rates of depression and trauma at birth improved, and what are current rates to be expected with various obstetrical complications?

These studies have been done on a consecutively delivered obstetrical population over 20 years, all of the outcome assignments having been made at the time of discharge by the speaker. Maternal, obstetrical, and neonatal data have been computerized throughout the period. Co-workers included Frances McLean, Robert Funnell, Paul Smith, Mark Boyd, Dawn Johansson, Ronald Cyr, Jeffrey Green and Douglas Bell. Much of the material to be presented has recently been published. (1-4)



One of the issues we addressed was whether we could justify by improved condition at birth the increase in Cesarean sections at our institution from 5% in 1961 to 19% today. Most of this increase occurred between 1974 and 1977, so that our studies compared patients delivered before and after this transition period. At the present time our 19% Cesarean section rate has as the primary indication the following conditions:

TABLE 3 Indications for Cesarean section, 1978-80

Previous Cesarean	7%
Failure to progress	5
Malpresentation	4
Fetal distress	1
Other	2
	<hr/> 19%

The analysis of incidence of depression at birth (need for positive pressure ventilation) showed a worrisome increase in incidence with Cesarean birth.

TABLE 4 Incidence of depression at birth among full size (2500g + ) infants by type of delivery, 1978-80

<u>Delivery</u>	<u>No. Livebirths</u>	<u>% Depressed</u>
<u>Vertex, vaginal</u>		
Spontaneous/low forceps	6459	2
Midforceps	1173	5
<u>Cesarean section</u>		
Vertex: Repeat	673	6
Primary	719	10
Malpresentation	315	13

The increased frequency of depression after elective repeat Cesarean birth was demonstrated to be due to general anesthesia (10% depression), not present in cases delivered under epidural (2% depression). Of particular concern is the high incidence of depression in Cesareans for breech presentation.

#### THE FULL TERM BREECH

Over the past six years it has become the routine in our hospital to deliver by Cesarean infants presenting as breech. We have analysed depression and trauma at birth following full term breech delivery in 1963-73 when only 22% were delivered by Cesarean, and in 1978-79 when 94% were so delivered. Excluding low birthweight and malformed infants, preterm and multiple births, and cases of maternal or fetal disease, there were 595 full term breech deliveries in the early period with the low Cesarean rate, and 175 in recent years with the high rate.

TABLE 5 Full term breech delivery and depression at birth in two periods

	<u>1963-73</u>	<u>1978-79</u>	<u>Prob.</u>
Moderate depression (1-3 min.)	14.5%	15.4%	NS
Severe depression (4 min. +)	1.5%	1.1%	NS

There was no improvement with a liberal Cesarean policy. Of the three perinatal deaths in the early period, two during labor could have been avoided with better monitoring than was then available. There was only one delivery-related death among 595 cases which could have been avoided by Cesarean birth. Seven cases of transient brachial palsy or clavicular fracture among the 595 might also have been similarly prevented.

The conclusion was that depression at birth associated with breech delivery is not reduced by Cesarean section. Delivery of a breech presentation from above as from below is fraught with danger. Delivery related perinatal deaths are extremely rare in the group delivered vaginally. Though no fractures and paralyses occurred in the 175 delivered during the liberal Cesarean period, this does not represent a statistically significant change from the 1.2% incidence of the earlier period. It is difficult to justify as liberal a Cesarean policy as exists here for the full term breech.

## MACROSOMIA

Several questions were asked regarding birth depression and trauma in the macrosomic infant, defined as weighing 4000g or more. What is the incidence of mortality and morbidity and specifically what is the type of morbidity associated with abnormal labor or difficult delivery in the large infant? What type of deliveries tend to produce depressed or injured macrosomic babies? To what degree has an increased Cesarean rate improved the outcome?

In each period from 1963-65, and 1978-80, almost one thousand infants (10% of all birth) were macrosomic. Cesarean section had increased in frequency 2.5 times between the periods, but at the same time the midforceps rate had also increased.

TABLE 6 Method of delivery of macrosomic infants

	<u>1963-65</u>	<u>1978-80</u>
No. macrosomic infants	955	942
Cesarean section - total	8%	21%
Primips for fail. progress	9%	19%
Multips for fail. progress	2%	2%
Midforceps - primips	19%	29%
multips	7%	11%

There was significant reduction in the frequency of depression at birth, and the frequency of birth trauma had in fact increased.

TABLE 7 Delivery related complications in macrosomic infants.

	<u>1963-65</u>	<u>1978-80</u>	<u>Prob.</u>
Depression at birth (ventilated)	64/1000	45	NS
Postasphyxial encephalopathy	8	4	NS
Meconium aspiration	5	14	NS
Brachial palsy	6	10	NS
Facial palsy	2	6	NS
Clavicular fracture	<u>4</u>	<u>17</u>	<0.01
Any of the above	22	34	NS

Though the perinatal mortality rate had decreased from 9.4 to 5.3 per 1000, none of the deaths in either period were related to birth asphyxia or trauma.

The types of complications which are more frequent among macrosomic infants delivered today are meconium aspiration syndrome, brachial paralysis, and clavicular fracture. These increased progressively with the degree of macrosomia. It is interesting to note no evidence of increased birth asphyxia in the macrosomic infant.

TABLE 8

No. Infants	Birthweight (g) per 1000			Prob.
	2500-3999g	4000-4499g	4500g+	
No. Infants	8452	811	131	
Depression at birth	36	45	46	NS
Post-asphyxic encephalopathy	2	5	0	NS
Meconium aspiration	2	12	23	<.001
Brachial palsy	1	9	15	<.001
Facial palsy	3	6	8	NS
Clavicular fracture	5	14	38	<.001
Total infants severely affected *	15	30	61	<.001

\* Excludes moderate depression and clavicular fracture.

The type of deliveries responsible for the increased risk to the macrosomic are midforceps delivery (increases both asphyxia and trauma), Cesarean section delivery usually for failure to progress or fetal distress (increased birth asphyxia and meconium aspiration syndrome), and deliveries complicated by shoulder dystocia (increases brachial palsy).



TABLE 9 Delivery-related complications in macrosomic infants by type of delivery.

<u>Type of delivery</u>	<u>Number livebirths</u>	<u>Incidence severely affected infants*</u> /1000	<u>Prob.</u>
Spontaneous vertex	919	14	
Low forceps	424	17	
Mid forceps	268	82	<.01
Cesarean section	277	40	<.01
Shoulder dystocia	70	143	<.01

\* Severe depression, encephalopathy, meconium aspiration, brachial or facial palsy.

An unexpected finding was that macrosomic babies delivered from multiparous women for whom Cesarean was seldom employed, had a much higher incidence of brachial palsy, and 60% as much overall morbidity as similar weight infants delivered to nulliparous women.

It was certainly clear from this analysis that freer use of Cesarean section did not reduce the delivery risk to the macrosomic baby, which risk took the form of meconium aspiration syndrome, fractures and palsies. Prediction of excessive fetal size for age prior to term would be of potential benefit. It could lead to induction of labor before the infant became excessively large. Foreknowledge of macrosomia during labor would lead to more appropriate use of Cesarean section for failure of progress, less ready recourse to midforceps delivery, easier acceptance of failed forceps with resort to Cesarean rather than use of dangerous degree of traction, and prediction of an increased risk of shoulder dystocia.

With regard to prediction, it was found that maternal diabetes was not a factor in 98% of macrosomics, but that three common risk factors played large roles. These were: 1) Prepregnant weight above 70 kg, (10% of mothers) 2) Weight gain in pregnancy of more than 20 kg (11% of mothers), and 3) Post-date pregnancy of 7 days or more (18%).



TABLE 10 Risk factors for macrosomia

	<u>Incidence of macrosomia</u>
No risk factors	5%
One risk factor	15%
Two or three risk factors	32%

Since macrosomia is present in only 2% of infants at 37 weeks, 12% at term, and 21% by 42 weeks, the role of judicious induction of labor for infants who on late pregnancy ultrasonography are found to be large for date is evident.

#### FULL TERM TWIN DELIVERY

Next our attention was turned to the delivery of twins where a 4% Cesarean rate in 1963-72 rose to a 46% Cesarean rate in recent years (1978-83). Had this increase benefitted the infants' condition at birth? This increase was predominantly for malpresentations.

TABLE 11 Incidence of Cesarean delivery in twin pregnancy, 1978-83

<u>Presentation</u>	<u>No. pregnancies</u>	<u>Incidence Cesarean (%)</u>
Vertex/vertex	100	16
Vertex/malpres.	64	69
Malpres./vertex	23	91
Malpres./malpres.	34	91

Mortality decreased among livebirths of 29 weeks or greater from 32 to 3 per 1000, but this decrease was primarily due to the almost complete disappearance of RDS as a cause of death in the recent period. Birth asphyxia was not a factor in the death of any twin infant of 29 weeks or greater, either among the 530 infants delivered in 1963-72, nor in 342 delivered in 1978-83. The prevention of RDS death was accomplished by reducing the incidence with steroid prophylaxis, and improved therapy for the condition.

The incidence of depression at birth (need for positive pressure ventilation) in full term twins did not decrease significantly with the increased Cesarean rate in recent years.

TABLE 12 Incidence of depression at birth in full term twin infants.

	1963-72		1978-83		
	Number	Need for	Number	Need for	
	<u>livebirths</u>	<u>ventilation</u>	<u>livebirths</u>	<u>ventilation</u>	<u>Prob.</u>
		%		%	
First twin	152	3.9	101	2.9	NS
Second twin	153	11.1	102	9.1	NS

In part, the failure of Cesarean section to produce its desired effect was due to the contribution of general anesthesia for the operation to depression at birth.

TABLE 13 Depression at birth in full term twins delivered by Cesarean for malpresentation or elective repeat, by type of anesthesia

EPIDURAL		GENERAL		
Number	Need for	Number	Need for	
<u>livebirths</u>	<u>ventilation</u>	<u>livebirths</u>	<u>ventilation</u>	<u>Prob.</u>
70	3%	25	20%	.005

Severe depression did not occur more frequently in the earlier period when few Cesareans were done. There was need for more than 3 minutes of positive pressure ventilation in 2.3% of twins delivered in 1963-72, and in 2.3% of those delivered in 1978-83, among infants of 28 weeks gestation or greater. There was only one instance in the two periods of severe depression occurring among 163 twin infants presenting as a breech or other malpresentation who were delivered vaginally.

It must be concluded that among twins at term depression at birth is not reduced by Cesarean section, that Cesarean when employed should whenever possible be done under epidural anesthesia, and that severe depression is rarely associated with breech delivery by the vaginal route. Birth asphyxia does not pose a major threat to twins delivered vaginally at term.

#### CHANGING PATTERNS OVER 20 YEARS

The births of 1960-62 in our institution were analyzed by John O'Brien and George Maughan for the frequency of various forms of birth asphyxia and trauma, the primary cause of each case, and the obstetrical factors associated with them.<sup>(5)</sup> In order to understand to what degree the obstetrical advances of the past generation have affected this picture, Ronald Cyr and Frances McLean subjected the births of 1978-80 to the same methods of analysis. Once again the criterion for severe birth asphyxia was the need for more than three minutes of positive pressure ventilation after birth.

TABLE 14. Obstetrical management

	<u>1960-62</u>	<u>1978-80</u>
No. livebirths	10995	9901
Cesarean - primary	3%	12%
- repeat	2%	7%
Low forceps	22%	28%
Mid forceps	5%	15%
Electronic fetal monitoring	0%	75%
Opiate analgesia	48%	3%
Epidural analgesia/anesthesia	22%	65%

(% of vaginal deliveries)



The perinatal mortality (500g to discharge) was 22 per 1000 in the early period and 11 in the later. Among infants of 1000g or more, birth asphyxia/trauma was responsible for 2.7 intrapartum fetal deaths per 1000 in the early period and 0.3 recently; for neonatal deaths 2.9 per 1000 in the 1960's and 0.3 now. Perinatal mortality due to birth asphyxia/trauma was therefore all but eliminated decreasing from 5.6 to 0.6 per 1000. The relative contribution of increased use of Cesarean delivery, fetal monitoring, epidural instead of opiate analgesia, and other obstetrical advances in this dramatic improvement is indeterminable.

Turning to neonatal morbidity, the improvement is less evident. There was no decrease in incidence of severe depression at birth, though post-asphyxic encephalopathy with or without seizures was reduced by 60%.

TABLE 15 Incidence of severe depression at birth and of post-asphyxic encephalopathy in two periods (rates per 1000)

	<u>1960-62</u>	<u>1978-80</u>	<u>Prob</u>
Birthweight 2500g+			
Severe depression	5.2	4.8	NS
Abnormal cerebral signs	5.4	2.0	< 0.05
Convulsions	1.8	0.7	< 0.05
1000-2499g			
Severe depression	56	47	NS
500- 999g			
Severe depression	500	595	NS

The incidence of severe depression (ventilation required for more than 3 minutes) was intimately related to birthweight, with 10 fold increases between weight categories. The incidence approximated 1 in 200 births of 2500g or more, 1 in 20 of 1000-2499g, and 1 in 2 of 500-999g. These rates were not affected by the 20 years of obstetrical advances. It was reassuring to find however, that post-asphyxic encephalopathy which carries with it a risk of permanent cerebral damage was reduced by more than half.

Birth trauma showed no improvement, but an unexpected increase in frequency over the interval.

TABLE 16 Incidence of birth trauma in two periods (rates per 1000)

	<u>1960-62</u>	<u>1978-80</u>	<u>Prob</u>
Skull fracture	0.2	0.9	.05
Clavicular fracture	1.0	5.8	.05
Brachial palsy	1.5	3.0	.05
Facial palsy	<u>2.4</u>	<u>4.1</u>	<u>NS</u>
Infant <sup>s</sup> traumatized	4.8	13.0	.05
	(1 in 208)	(1 in 77)	

Many of the infants suffering trauma were also severely depressed at birth, developed encephalopathy, or had meconium aspiration.

Post-asphyxic encephalopathy rarely developed in infants requiring little or no ventilation after birth, but became increasingly frequent as ventilation required exceeded 3 minutes.

TABLE 17 Duration of positive pressure ventilation at birth and post-asphyxic encephalopathy in the neonatal period

<u>Duration of ventilation (mins)</u>	<u>Number of livebirths</u>	<u>Incidence of encephalopathy</u>
0	9032	0.04%
1- 3	294	2%
4- 5	28	11%
6-10	11	27%
11+	6	100%

The 6 infants requiring more than 10 minutes of ventilation at birth produced four of the seven infants in this population of some 10000 who convulsed.

The primary obstetrical cause of severe depression or encephalopathy in infants of 2500g or more delivered recently was most often midforceps delivery, fetal distress of unknown cause, cord loops, prolapsed cord, shoulder dystocia, or general anesthesia with elective Cesarean section. In one-eighth of the cases, fetal pathology was the cause. These differ from primary cause assignment in 1960-62 when many were due to prolonged labor (CPD), and some to opiates, though the contribution of midforceps delivery was similar then to now.

Among infants of low birthweight, primary cause of severe depression in recent years was often hypertensive disease of pregnancy, antepartum hemorrhage, intrauterine infection, or fetal malnutrition. Comparatively there was a more frequent contribution of malpresentation or opiate analgesia in the 1960's.

The role of midforceps delivery in all types of morbidity except meconium aspiration was very apparent.

TABLE 18 Neonatal morbidity with type of vaginal vertex delivery, 2500g or more, 1978-80

Type of delivery	Number livebirths	Severe depression/ encephalopathy	Meconium aspiration	Fractures skull	Fractures clavicle	Palsies brachial	Palsies facial	Total of infants affected
Spontaneous	4355	1.8	3.4	0	3.3	0.7	1.8	10.3
Low forceps	2094	2.9	2.4	0	10.0*	2.9*	2.4	17.2*
Mid forceps	1171	11.1*	4.3	6.0*	16.2*	15.4*	20.4*	62.3*

\* Different from spontaneous delivery,  $P < .05$

It was considered likely that the increased damage resulting from midforceps delivery in recent years might be due to inexperience of recent obstetrical trainees. This generation had never needed to cope with the limited Cesarean rate requiring great skill with forceps when descent or rotation was slow. Analysis of results in recent years by experience of the accoucheur showed this explanation to be erroneous. There was even a reverse tendency with increasing morbidity found in association with greater number of years in practice.



TABLE 19 Experience of the accoucheur and midforceps related severe birth asphyxia/trauma for infants of 2500g+, 1978-80

<u>Years of experience</u>	<u>No. deliveries</u>	<u>Primary Cesarean rate (%)</u>	<u>Midforceps rate (% vaginal)</u>	<u>Incidence of severe asphyxia/trauma (% midforceps del.)</u>
14+	2737	12.7	15.3	8.5
6-13	3035	10.7	15.7	7.0
0- 5	2532	13.2	18.7	5.3

Another possible explanation for the increased use of midforceps and the increased trauma rate in recent years is the use of epidural analgesia/anesthesia in most vaginal deliveries. If the second stage of labor is slowed thereby, midforceps may be used to expedite delivery even in the absence of fetal distress. The duration of second stage was therefore examined in 72 deliveries where midforceps - related severe asphyxia/trauma occurred in the absence of fetal distress. The mean duration was 73 minutes in nullipara and 35 minutes in multipara. In only 9 of the 72 did the obstetrician wait "upper limit" of two hours in nullipara or 1 hour in multipara.

With regard to the contribution of forceps delivery to neonatal asphyxia / trauma, the following conclusions were drawn: "On the other hand, the vast majority of forceps deliveries (98% of low forceps and 94% of midforceps) produced healthy uninjured babies. Asphyxia and trauma caused by forceps use are presumably the result of excessive force and do not occur when low forceps or midforceps delivery can be performed gently. To reduce birth asphyxia and trauma in the full size baby, forceps deliveries must be used less often and more carefully. Improved training for childbirth and greater psychological support during labor could reduce the 65% incidence of patients requesting pain relief. The temptation to expedite delivery by use of midforceps when second stage is slowed should be resisted unless a precarious fetal state demands it. When forceps delivery is attempted but is difficult to perform, Cesarean for failed forceps should not be considered as a professional defeat but as a more acceptable alternative than forceful rotation and extraction". (Cyr's conclusions)

For the other factors possibly affecting the incidence of birth asphyxia and trauma, the following was found. A large fetus contributed to clavicular fracture, brachial palsy, facial palsy, and meconium aspiration. Fetal size was not a factor in producing severe depression or encephalopathy, or in skull fracture.

Nulliparous mothers' infants had more frequent fractures and palsies, but the same incidence of depression, encephalopathy, and meconium aspiration as those born to multipara.

Maternal age was not a factor.

Males had increased risk due solely to their higher birthweight.

Post-term infants were at higher risk, again solely because of their larger size.

Followup of infants with postasphyxic encephalopathy by Diana Willis and Gordon Watters showed that those with abnormal cerebral signs were seldom damaged while those who convulsed in the newborn period were usually retarded or neurologically abnormal in infancy and childhood.

TABLE 20 Followup at two years of infants with post-asphyxic encephalopathy as newborns

<u>Neonatal signs</u>	<u>No. followed</u>	<u>No. abnormal</u>
Abnormal cerebral signs alone	15	1
Convulsions <u>+</u> abnormal signs	<u>6</u>	<u>4</u>
	21	5

The toll taken by birth asphyxia/trauma in recent years can then be summarized as: 6 perinatal deaths and 5 brain damaged infants in 9901 consecutive deliveries.

From all of these studies, what conclusions can be drawn with reference to efficacy of modern obstetrical practice?

1. The severest forms of birth asphyxia resulting in death or permanent brain damage have been reduced to about one per 1000 births combined. Closer fetal monitoring may have played the major role in this improvement.

2. Cesarean sections have contributed little to reduction of asphyxia or trauma during delivery and at the present time are employed much more often than can be justified.

3. Cesareans should not be performed under general anesthesia if epidural is possible.

4. Forceps deliveries have a cost and should not be employed indiscriminately. Midforceps deliveries especially should be performed when there is evidence of fetal or maternal distress, and if criteria for safe forceps application have been met.

5. Cesarean delivery for failed forceps is highly preferable to forceful forceps extraction when difficulties are encountered with forceps delivery.

6. Epidural analgesia/anesthesia may be responsible for slowing the progress of second stage labor. If so, it may also be responsible for forceps-related injuries if impatience leads to unnecessarily frequent use of midcavity forceps applications.

7. Modern obstetrics has created a much safer experience for the baby being born, but it has also brought with its technology some new hazards that need to be carefully monitored. Eternal vigilance is the price of safety.



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