

ANESTHESIA FOR THE TWIN DELIVERY

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ANESTHESIA is of special importance in twin deliveries since more than half the infants are born prematurely. In addition, the mortality for twins is three times that for single births. Furthermore, delivery is significantly more hazardous for twin B than for twin A as demonstrated by higher mortality rates (1, 2, 3) and prolonged breathing and crying times. Taking these facts into consideration, we may consider the delivery of twin A the same as that of any group of single births heavily weighted with prematures. On the other hand, twin B deserves further consideration in that he suffers greater losses than does the first-born sibling. The more prolonged duration of anesthesia to which he is exposed may be a contributing factor.

There are many discrepancies in the literature with regard to the ideal anesthetic for the various types of delivery. In evaluating anesthesia for the safe delivery of twins, some have found conduction techniques to be preferable (4) while others hold that general anesthesia is desirable (5). Aaron and Halpern (6) found a mortality in second twins of 17.7 per cent with inhalation anesthesia, 7.0 per cent with conduction anesthesia and 13.8 per cent with local anesthesia. Conversely, Guttmacher (5) reported second twin mortality rates of 11.7 per cent with inhalation, 17.4 per cent with conduction and 10.3 per cent with general and conduction anesthesia combined. It has been shown, moreover, that cord blood levels of cyclopropane were almost twice as high in twin B when compared to those of twin A delivered five to eight minutes earlier (4).

Some attention has been given to the ideal anesthetic for operative procedures in the delivery of twin B. The importance of relaxation has been emphasized by Nesbitt (7). Caudal anesthesia was felt by Hingson and Hellman (4) to be ideal, with cyclopropane superimposed if relaxation was needed for version and extraction of the second twin. Titus (8), on the other hand, stated that version and extraction could be accomplished easily in twin deliveries without the need for deep inhalation anesthesia. Obvious contradictions exist in the literature with respect to the administration of anesthesia for the safe delivery of the second twin. It is also evident that further investigation and clarification is necessary.

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METHODS AND RESULTS

In order to evaluate the effect of anesthesia upon the results of twin B deliveries, all twin births at the Sloane Hospital for Women during the period of July 1947 to July 1957 were studied. A total of 417 such deliveries occurred resulting in 805 liveborn infants and 29 stillbirths (15 twin A and 14 twin B deaths). An additional 49 neonatal deaths occurred (14 twin A and 34 twin B deaths) resulting in an over-all perinatal mortality of 9.2 per cent. In all there were 7.2 per cent A deaths and 11.5 per cent B deaths.

The effect which anesthesia might have on the relatively marked mortality rate of twin B was studied, among other things, with respect to type of anesthetic, method of delivery, infant weight, and the dura-

TABLE 1
THE EVALUATION OF THE NEWBORN INFANT
METHOD OF SCORING

Sign	0	1	2
Heart rate	Absent	Slow (below 100)	Over 100
Respiratory effort	Absent	Slow Irregular	Good Crying
Muscle tone	Limp	Some flexion of extremities	Active motion
Response to catheter in nostril (tested after oro- pharynx is clear)	No response	Grimace	Cough or sneeze
Color	Blue Pale	Body pink Extremities blue	Completely pink

Sixty seconds after the complete birth of the infant (disregarding the cord and placenta) the following five objective signs are evaluated and each given a score of 0, 1 or 2. A score of 10 indicates an infant in the best possible condition.

tion of the administration of cyclopropane, the general inhalation agent most frequently used here. Infant scores, as determined in 189 twin B cases according to the method described by Apgar (9), and outlined, with her permission, in table 1, were studied in an attempt to substantiate this data. Since scores of 0 to 4 denote the "depressed infant" on the Apgar scale, it was felt wise to group the scores for purposes of comparison (10). Mortality rates and the percentage of 0 through 4 scores for each agent were tabulated and some of these data are presented in table 2.

Even at close examination the apparent detriment of caudal and epidural anesthesia, as evaluated by mortality rate, could not be explained. With respect to mortality, all other agents and techniques

seemed to present equal risks. On viewing the percentage of 0-4 scores for each individual agent, one notes the relative infrequency of these depressed infants in the local-pudendal and nitrous oxide groups. Saddle and spinal, caudal and epidural, and cyclopropane anesthesia seemed to carry approximately equal perils. Not included because of insufficient data were such agents as chloroform, thiopental and trichloroethylene and cases in which no anesthesia was administered.

TABLE 2
SECOND TWIN MORTALITY AND SCORES BY TYPE OF ANESTHESIA

Type of Anesthesia	Number of Infants	Percentage Mortality		Per cent Having 0-4 Scores
		Uncorrected	Corrected*	
Cyclopropane	178	10.7	6.8	33.3
Nitrous oxide (only)	61	4.9	1.0	20.0
Caudal—Epidural	39	23.7	13.3	30.4
Saddle—Spinal	38	5.3	0.0	28.6
Local—Pudendal	15	20.0	8.4	11.1
Ether	37	10.8	5.9	—

* Correction denotes deletion of infants weighing less than 1500 Gm.

Correction for fetal weight did not alter the relative merits of the various anesthetic agents as determined by mortality rates. The apparent safety of saddle block and spinal anesthesia, as well as nitrous oxide inhalation, may be more apparent than real since very few of these cases were associated with complicating features. Where operative manipulations were necessary, other forms of anesthesia (most frequently cyclopropane) were usually added.

TABLE 3
SECOND TWIN MORTALITY AND SCORES IN INHALATION AND CONDUCTION ANESTHESIA

	Per Cent Mortality		Per Cent Having 0-4 Scores	
	Uncorrected	Corrected	Uncorrected	Corrected
All conduction anesthesia	14.6	6.6	22.8	18.9
All inhalation anesthesia*	11.1	7.0	34.7	34.0

* Includes cyclopropane, ether, chloroform, and trichloroethylene, but excludes those cases receiving nitrous oxide only.

By placing most of the complicated cases solely into the cyclopropane group, we were in essence weighting these data in favor of conduction anesthesia. Despite this, the mortality was greatest in the caudal-epidural group. Corrections for fetal weight, for stillbirths, for infants born with anomalies incompatible with life, for second twins in which the first-born sibling also died, and for complicated delivery procedures, did not change the relatively poor mortality rate

TABLE 4
SECOND TWIN MORTALITY AND SCORES BY DURATION OF CYCLOPROPANE ANESTHESIA

Duration Anesthesia in Minutes	Per Cent Mortality		Per Cent 0-4 Scores
	Uncorrected	Corrected	
0-2.4	17.7	0.0	8.3
2.5-4.9	15.0	6.3	20.0
5.0-7.4	4.8	2.5	33.3
7.5-9.9	0.0	0.0	36.4
10.0+	14.3	12.8	50.0

in the caudal-epidural group. It remained, as before, higher than in the cyclopropane group. The reasons for this are not apparent in this analysis.

In grouping local infiltration, pudendal, caudal, epidural, spinal, and saddle block under-conduction anesthesia and all inhalation procedures, exclusive of nitrous oxide, under inhalation anesthesia, one found that the mortality rates were nearly equal (table 3). However, when we scrutinized the number of 0-4 scores in these two categories there was an impressively greater percentage of depressed infants in the general anesthesia group.

Mortality in the general inhalation group, despite the greater numbers of obstetrical complications included, was surprisingly low. The percentage of 0-4 infant scores, nevertheless, was relatively high. These cases were more carefully examined with regard to the actual duration of anesthesia, and although we are aware that depth of anesthesia and related factors are probably of greater importance, an interesting correlation was detected between the duration of anesthesia administration and twin B mortality and scores (table 4). Cyclopropane anesthesia continued for more than ten minutes was associated

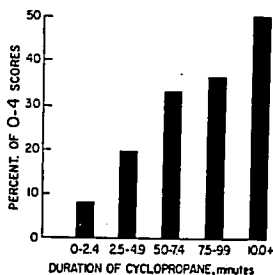


FIG. 1. The percentage of 0-4, scores with respect to the duration of cyclopropane administered. There is an increase in the percentage of 0-4 scores with an increase in the duration of anesthesia.

with considerably greater mortality in second twins. Moreover, when we evaluated the scores in 102 cyclopropane anesthetics, we found the percentage of 0-4 scores to increase in a direct relationship with the duration of cyclopropane administered (fig. 1).

Anesthesia and infant weight (table 5) were not closely correlated in that the weights apparently determined the mortality irrespective

TABLE 5
SECOND TWIN MORTALITY BY ANESTHESIA AND INFANT WEIGHT

Infant Weight (grams)	Per Cent Mortality	
	All Inhalation (except N ₂ O)	Conduction
2,500+	3.8	0.0
2,000-2,499	6.6	6.1
1,500-1,999	18.2	21.4
1,000-1,499	55.6	37.5
Under 1,000	100.0	100.0

of the type of anesthesia. The death rates are nearly identical for both conduction and inhalation groups in the various weight categories.

When we analyzed the relationship between anesthesia and the operative procedures of podalic version and breech extraction (table 6), we noted evidence which disproved the contention that this operative

TABLE 6
MORTALITY IN REFERENCE TO VERSION-EXTRACTION AND ANESTHESIA

Type of Anesthesia	Per Cent Mortality	
	Uncorrected	Corrected
Inhalation (except N ₂ O)	6.0	3.9
Nitrous Oxide	20.0	20.0
Conduction	33.3	27.3

procedure may be safely performed without deep inhalation anesthesia. It was obvious that infant losses were relatively greater when versions and extractions were attempted with nitrous oxide or conduction anesthesia. It would seem that adequate uterine relaxation as supplied by deep surgical inhalation anesthesia was essential for the safe delivery of the second twin by version and extraction.

DISCUSSION

It is the policy and organization of this institution for a qualified anesthesiologist to be available for every delivery. The agent, technique, and time of the administration of anesthesia are determined jointly by the obstetrician and anesthesiologist. This apparently ideal distribution of decisions and duties does not lead to ideal results in all cases as shown by the data presented. Nonetheless, figures do suggest a course of action for the administration of anesthesia which might decrease the hazard in the delivery of the second twin.

Because of the high incidence of prematurity, evidence that prolonged general anesthesia is accompanied by relatively large numbers of fetal deaths and depressed infants, and the apparently poor results with caudal anesthesia, delivery of the first twin is probably best performed utilizing local infiltration, pudendal block or nitrous oxide anesthesia. If operative measures are necessary in the delivery of twin B, deep inhalation anesthesia should then be substituted. In any event, the administration of cyclopropane for ten minutes or longer, prior to the delivery of twin B, should be avoided. This approach, combined with obstetrical skill, may help to curtail the lamentable end results seen with the second twins.

SUMMARY

In an attempt to ascertain the possible role anesthesia plays in the mortality of second twins, a review of the literature and an analysis of the experience at the Sloane Hospital for Women from 1947 to 1957 are reported. It is found that all anesthetic agents are accompanied by nearly equal risks to twin B except for an inexplicable high mortality with caudal anesthesia. Inhalation anesthesia is accompanied by larger numbers of "depressed infants" than is conduction anesthesia. Cyclopropane anesthesia prolonged beyond 10 minutes yields impressively larger numbers of fetal deaths and depressed infants. Anesthesia and fetal weight are not found to be closely correlated. Risk to life in the second twin is markedly increased when version and extraction are attempted without suitable uterine relaxation obtained by deep inhalation anesthesia. A *modus operandi* which is perhaps more ideal is suggested in the hope of improving the poor results in second twins.

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