

Complications of Cleft Lip Surgery

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Most would agree that the ultimate aim of cleft surgery is that the patient look well, feed well, and speak well. To achieve these goals much attention has been paid in the literature to individual techniques of lip repair, to the clinical results of palatal surgery, to the speech end-product, and occasionally to problems associated with cleft *palate* surgery. However, little, if any, attention has been paid to the study of mortality and morbidity accompanying cleft *lip* operations. The present report attempts to determine the incidence of, and the apparent causative factors in, the complications of cleft lip surgery.

The review covers some 585 cleft lip repairs (Figure 1) performed over a 15-year period, from 1950 through 1964 inclusive, at the Children's Hospital of the University of Pittsburgh. The procedures were all done by qualified plastic surgeons of the University's faculty or by residents under their direct supervision. The immediate operative results have been examined to form a baseline for comparison in the future, not only for ourselves but for others subjecting their cases to critical analysis. In addition, a search was made for factors whereby the operative results may be further improved. The various types of cleft lip pathology are shown in Figure 2.

The morbidity and mortality figures to be presented obviously represent children who have survived to an operative age of at least 10 to 12 weeks, for in this particular medical center the cleft child is not rushed from the delivery room to the operating table. Such practice would seem to have a definite bearing on both the operative mortality and morbidity.

Admittedly, tissues heal well in the newborn, but the child of but 24 hours of age has not yet gone through a 'shake-down cruise' and there has not been sufficient time for the pediatrician to determine accurately what other defects might be present. There is a quite definite incidence of death of the infant (admittedly the more severely involved ones) in the first few weeks of life. Fogh-Andersen (3) reported a mortality rate of these patients during early life (before operation) at about 15%. In

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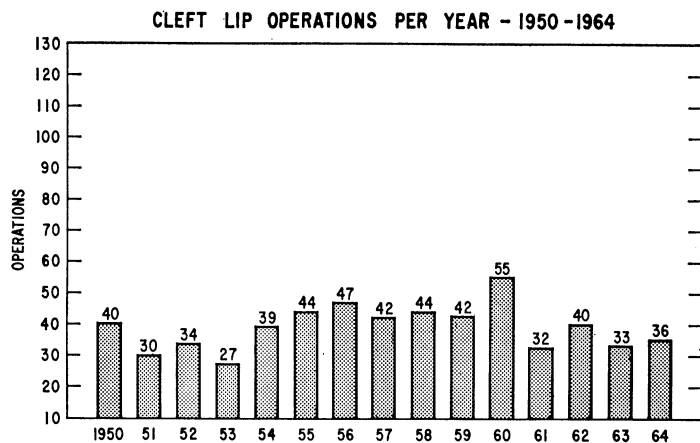


FIGURE 1. Number of primary cleft lip repairs, 1950-1964 inclusive, at the Children's Hospital, University of Pittsburgh.

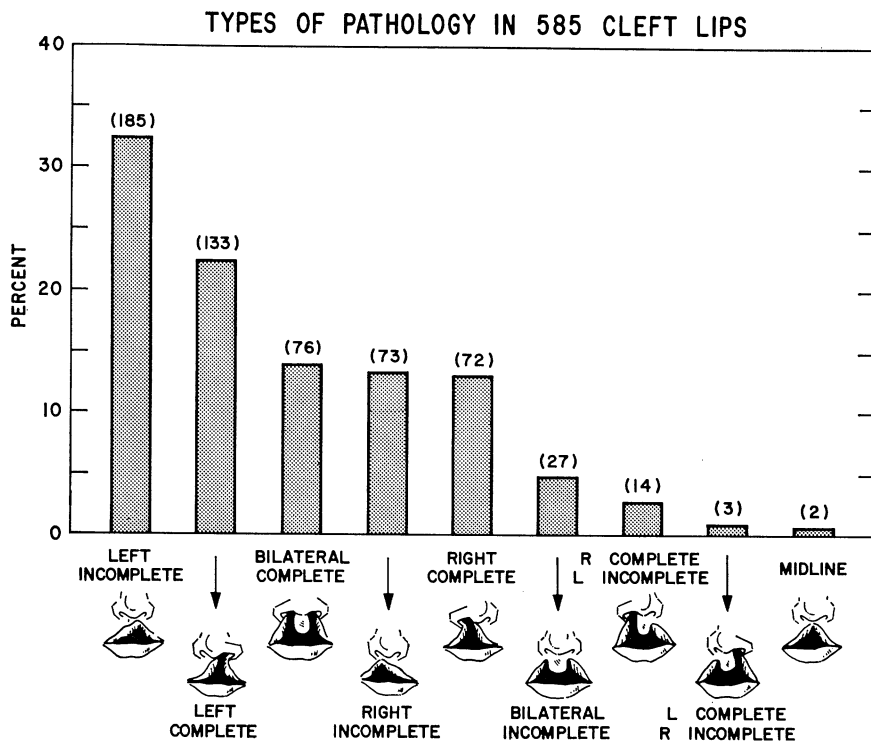


FIGURE 2. Types of cleft lip pathology in 585 primary repairs.

his series, the mortality rate was 12% within the first 10 days of life. In Pennsylvania, Ivy (5) has reported that of the almost 300 cleft patients born each year, approximately 10% do not survive the year.

Obviously, if our goal is to provide surgically as normal a lip as possible with a minimum risk to life, the timing of the surgery becomes a major factor. In our opinion, the optimum time to repair the nostril and lip is when the baby is thriving and weighs at least 10 to 12 pounds. Such a child is usually two and one-half to three months of age. By that time the lip has grown considerably in size, and the surgeon has a better chance for accurate approximation of the lip elements. It is obvious that an error of but one millimeter of the infant's vermilion border may be an error of several millimeters by the time the child has reached school age.

Certainly some of the morbidity encountered can also be attributed to other congenital anomalies. Oldfield (11), while not detailing the defects, reported that other congenital anomalies were associated with the cleft in some 9% of his 1041 cases. In our series, other congenital anomalies were present in approximately 12% (Figure 3). This percentage, like that of Oldfield's, is probably on the low side, since in this retrospective view the statistical data is only as complete as the thoroughness of the original residents' or interns' examinations and recording. Sleeter (14), a pediatrician, has recently reported a much higher percentage of associated congenital defects, with other anomalies present in almost 26% of all cleft children examined at the University of Oregon. His figures included newborns, some of whom did not survive to be operated upon.

11.8 % ASSOCIATED CONGENITAL ABNORMALITIES

ASSOCIATED CONGENITAL ABNORMALITIES DIAGNOSED AT TIME OF SURGERY IN 585 CLEFT LIP PATIENTS		
INGUINAL HERNIA (7)	HYDROCELE (9)	16
UMBILICAL HERNIA		10
HEMANGIOMA		
CONGENITAL HEART DISEASE (4) WITH MULTIPLE CONGENITAL ABNORMALITIES (4)		10
CNS ABNORMALITY (4)	HYDROCEPHALUS (3)	7
RH INCOMPATIBILITY		4
LACRIMAL GLAND OBSTRUCTION (2)		4
LARYNGEAL WEB (2)		
CONGENITAL DEFORMED HANDS AND FEET		3
CONGENITAL EARS		2
HYPOSPADIUS (1)	IMPERFORATED ANUS (1)	2
DERMOID CYST		1
TOTAL		69

FIGURE 3. Associated congenital abnormalities diagnosed at time of surgery in 585 cleft lip patients.

Kitamura and Kraus (7), reporting on their examination of 166 embryos exhibiting cleft lips and/or palates, reported that not a single such specimen with a cleft was free of some other major anomaly. Admittedly they were dealing with the 'rejects'; however it would seem from the recent clinical work of Sleeter and the fetus work by Kitamura and Kraus, that the figure of 12% may be low and that many other anomalies remained undetected.

It has been the practice in our institution that when the baby weighs at least 10 pounds and seems to be thriving it is admitted to a single room isolated from contact with other babies. It is felt that the hemoglobin should be at least 10 gm, the white count less than 10,000, and the child must be afebrile and free of any evidence of infectious disease.

Prior to 1956, general insufflation anesthesia without intubation was used. Since that time, endotracheal tubes have been employed, with ether still the agent of choice. In addition, the local injection of procaine with added vasoconstrictors is routinely used in the repair. This has not only prevented excessive blood loss at the time of surgery, but in addition, it has permitted the anesthetist to carry the baby in a lighter plane of anesthesia. Immediately following surgery, the infant is taken to a well-supervised recovery room. As far as we can tell, the type of lip surgery makes no demonstrable difference in the number or the nature of subsequent complications.

Complications have been arbitrarily divided into two categories: major and minor (Figures 4 and 5). In the former category were pneumonia, breakdown of the lip repair, and post-operative hemorrhage. In the minor category were placed diarrhea, otitis media, the milder upper respiratory infections, and partial separation of the suture line—any one of which prolonged the child's hospital stay past the usual 10 days. The pro-

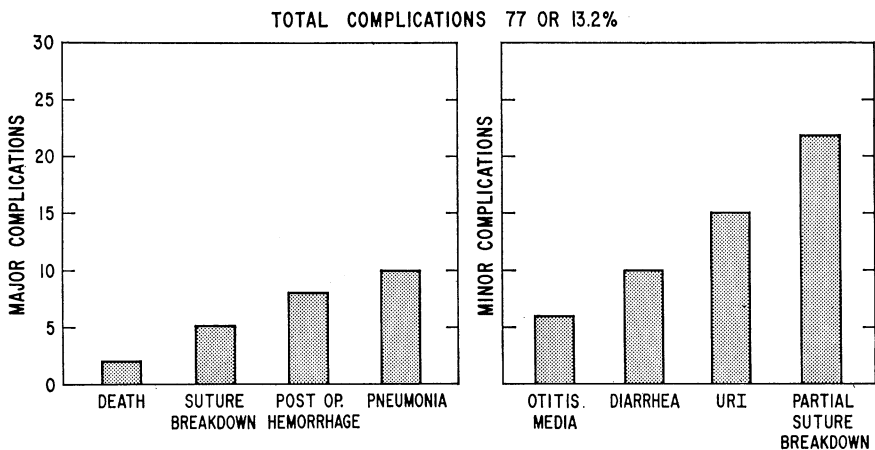


FIGURE 4. Complications in 585 cleft lip repairs, subdivided into major and minor groups.

**COMPLICATIONS IN 585 PRIMARY
CLEFT LIP OPERATIONS**

	PRIMARY REPAIR 585 OPERATIONS
MAJOR COMPLICATIONS	25 (4.3%)
MINOR COMPLICATIONS	52 (8.9%)
TOTAL COMPLICATIONS	77 (13.2%)

FIGURE 5. Percentage comparison of major and minor complications.

phylactic use of antibiotics made no significant difference in the number of complications.

In discussing the morbidity associated with cleft lip surgery, it should be pointed out that every attempt is made to prevent these complications. Obviously, no surgeon elects to operate on a sick child. However, he can easily be trapped unwittingly into such a pitfall if he depends entirely on physical examination and temperature alone. Certainly these are important, but other essential standards as previously mentioned should weigh heavily in the surgeon's decision to operate or postpone the surgery.

There are those who would look upon such pre-operative standards as being unnecessarily rigid. Reidy (13) wrote recently, 'This mysterious figure of 10 lb. should disappear as a requirement for good cleft lip surgery.' Obviously all rules are subject to exceptions, and in many instances our surgeon *would* elect to go ahead if the baby seemed all right, even though one of the requirements was slightly off. The authors were surprised to discover that when the 10-10-10 rule was waived, that is, when the hemoglobin was under 10 gm, the weight under 10 pounds, or the white cell blood count *above* 10,000 per cubic mm, that complications on the primary repairs were *five* times more prevalent than when all of the requirements were rigidly adhered to (Figure 6).

Little attention has been paid to the morbidity associated with lip surgery, but several authors have reported their operative mortality. Most have grouped their results into one single category and have discussed their operative mortality essentially as a combined mortality for lips and palates together. In the present series, there have been two deaths, an overall mortality figure of 0.34%. This compares favorably with mortality figures from studies as listed (Figure 7) (1, 2, 4, 6, 8, 10, 11, 12, 15).

The first death occurred in 1953 in a three-month-old white male born with a left complete cleft lip along with multiple congenital anomalies of

CORRELATION OF PRE-OPERATIVE STANDARDS
VS. POST-OPERATIVE COMPLICATIONS

HEMOGLOBIN \uparrow 10.0 grams - WBC \downarrow 10,000 - WEIGHT \uparrow 10 lbs
"10 - 10 - 10 RULE"

	10-10-10 CRITERIA COMPLIED WITH	10-10-10 STANDARDS NOT MET
PRIMARY CLEFT LIP OPERATIONS (TOTAL 589)	476	109
POST-OP. COMPLICATIONS (TOTAL 77)	36 (7.6%)	42 (38.4%)

FIGURE 6. Correlation of pre-operative standards versus post-operative complications.

the extremities. His pre-surgical examination indicated an essentially healthy child with a normal temperature, a hemoglobin of 10.5 gm, a white count of 6,200, and a weight of 13 pounds. The patient died suddenly on the second post-operative day shortly after his temperature rose from 100° to 102° F. Postmortem examination revealed an acute viral pneumonia of influenzal type.

The second death occurred in 1954 and was also a three-month-old

MORTALITY RATES - PRIMARY CLEFT LIP REPAIR

AUTHOR	NO. OF CLEFT LIP OPERATIONS	NO. OF DEATHS	% MORTALITY
JUNKIN 1932	1250	4	0.32
FOGH-ANDERSON 1946	726	31	4.3
	623 (PRIM.)	31	5.0
	103 (SEC.)	0	0
FOGH-ANDERSON 1948	1043	36	3.5
OLDFIELD 1949	224	4	1.8
OLDFIELD 1958	530	4	0.75
REIDY 1959	225	4	1.56
	166 (PRIM.)	3	1.80
	89 (SEC.)	1	1.1
McCLELLAND 1962	102	0	0
WHALEN 1963	219	0	0
PRESENT SERIES 1964	585	2	0.34

FIGURE 7. Mortality rates reported by several surgeons.

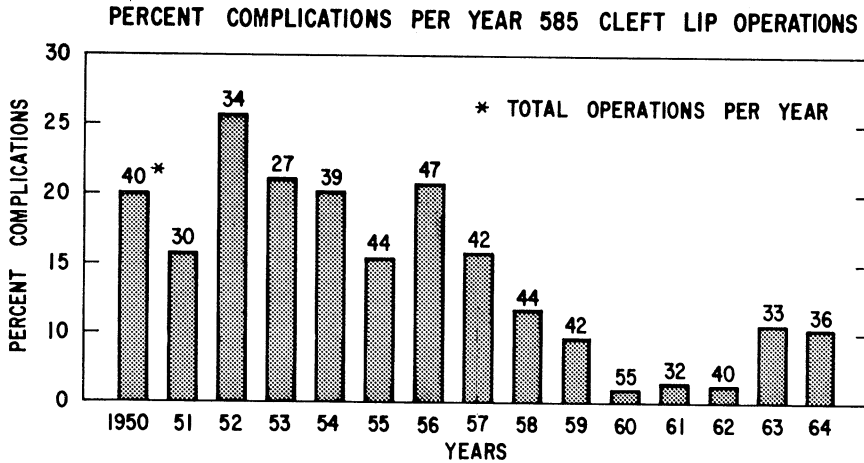


FIGURE 8. Percentages of post-operative complications, by year.

white male who died fairly suddenly within two hours after repair of a unilateral complete cleft lip. Pre-operative temperature was normal, hemoglobin was 10.8 gm, W.B.C. was 6,000, and weight was 11 pounds. At autopsy, his lungs exhibited an acute purulent bronchopneumonia, the organisms proving to be *staphylococcus albus* and *streptococcus viridans*.

The last 435 primary lip operations over a 10-year period have not resulted in any deaths; inspection of Figure 8 demonstrates the decrease in complications. The overall percentage complications for this 15-year series is 13.4%. However, the figures for the past five years show an average of only 5.6%. This improvement most certainly is attributable to the strictest attention to pre-surgical criteria, the most careful selection of the time of surgery, the introduction of endotrachea anesthesia, better anesthesia personnel, and the improved care in the immediate post-operative period in the recovery room.

It is widely agreed (4) that there is a relative rise in the incidence of cleft lip and palate and a promising decrease in birth mortality. This, along with an increase in population, will mean more cleft lip children coming to surgery each year. Only by the strictest attention to detail and the highest standards of selection can we hope to add further to the success of future cleft lip operations.

Summary

While much attention has been paid in the literature to individual techniques of lip repair, to the clinical results of palatal surgery, to the speech end-product, and to problems associated with cleft *palate* surgery, little if any attention has been paid to the mortality and morbidity accompanying cleft *lip* operations.

At the University of Pittsburgh's Children's Hospital there were 585 primary cleft lip operations during the period 1950 to 1964 inclusive with an overall complication rate of 13.4%. Major complications, such as pneumonia, breakdown of lip repair, and post-operative hemorrhage, occurred in 4.3%. Minor complications included diarrhea, otitis media, the milder upper respiratory infections, and partial separation of the suture line, any one of which prolonged the child's hospital stay past the usual 10 days. Such complications occurred in 52 patients (8.9%).

Pre-operative standards of the 10-10-10 rule were emphasized, that is, a 10 pound baby, a hemoglobin greater than 10 gm, and a white blood cell count less than 10,000. Where for some reason the 10-10-10 rule was not rigidly adhered to, complications were five times more prevalent than in the rest of the primary cleft population undergoing similar surgery.

Two deaths occurred among the 585 infants undergoing primary lip repairs, representing a mortality rate of 0.34%. There have been no deaths in the last 435 primary lip operations and there has been a definite improvement in the morbidity figures during the last five years.

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