

The Proportioned Philtrum: A Helpful Measurement and Ratio

MICHAEL L. FRANZ, B.A.
ANTHONY B. SOKOL, M.D.
Columbus, Ohio 43210

Introduction

Philtrum construction in children with bilateral cleft lip anomalies has achieved significant cosmetic advance in recent years. It is apparent, however, that certain guidelines are necessary to assist the operator in formation of a correctly proportioned philtrum, Fig. 1. These guidelines, in the form of ratios, if based on the non-altered anatomy of the cleft child, could provide objective values immediately available in the operating suite and not requiring sophisticated equipment nor excessive delays in operating time.

Methods

Our study consists of measurements made on 40 patients. 20 patients were selected from the surgical and medical inpatient wards at Children's Hospital, ages one to four months and 20 patients from the newborn nursery at University Hospital, Columbus, Ohio.

Measurements of newborn babies were delayed for 48 hours to allow facial swelling and distortions to recede. Patients selected from the inpatient services at Children's Hospital showed normal development and were considered to have normal faces.

The following parameters were recorded (Fig. 2):

1. Head Circumference (H.C.) in centimeters
2. Intercanthal (IC) distance between the medial ocular canthi in millimeters
3. Commissural (Comm) distance in millimeters
4. Philtrum (p) in millimeters-expression of intertubercular distance of the red lip.

The measurements were taken while the subjects were sleeping to avoid variation due to facial expression.

Results

Data collected was subjected to a computer analysis using the method of stepwise regression. Mean values and standard deviations of the four

Since this paper was received for publication, Dr. Franz is now serving an internship in Columbus, Ohio and Dr. Sokol has entered private practice in Beverly Hills, California.

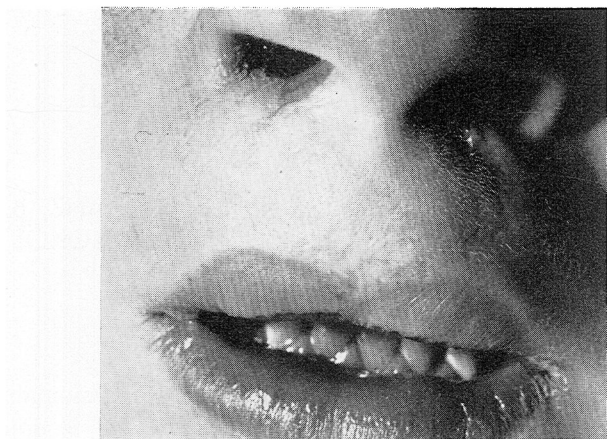


FIGURE 1. Excessive philtral width: Philtral-Commissural Ratio approaching 1:2 (See text). Result is a grotesque, cosmetically unacceptable upper lip.

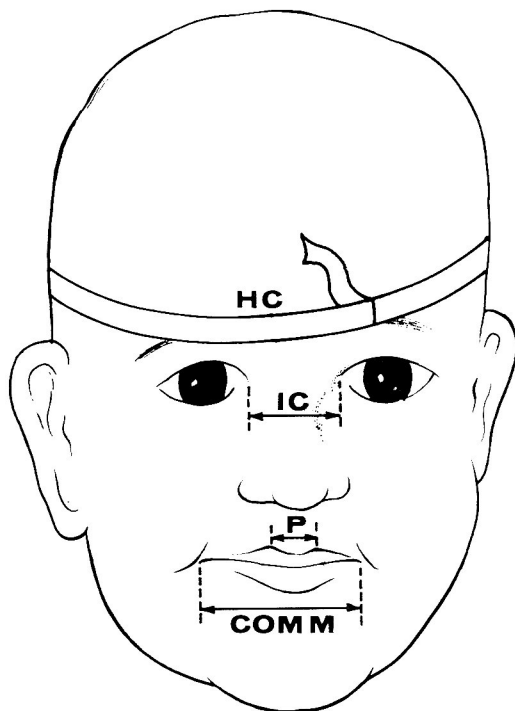


FIGURE 2. Artist's interpretation of anatomical points measured on children. Where H.C. = head circumference; IC = intercanthal distance; p = philtrum and Comm = oral commissure.

variables are shown in Table 1. Initially, values of the two groups were kept separate, however, it became apparent with the computer returns, that no significant differences were noted between the newborn and the four month old child. In the stepwise regression, the commissure showed

TABLE 1. The mean and standard deviations of measured variables.

<i>variable</i>	<i>mean</i>	<i>standard deviation</i>
H.C.	37.82500 cm.	2.31286
IC	22.20000 mm.	1.57614
Comm	26.57500 mm.	2.59186
Phil.	7.07500 mm.	1.10352

TABLE 2. Correlation coefficients (C.C.) and (C.C.)²

<i>correlation</i>	<i>correlation coefficient</i>	(C.C.) ²
Comm/Phil.....	0.4994	25.0%
Comm + H.C./Phil.....	0.5902	34.8%
Comm + H.C. + IC/Phil.....	0.6015	36.0%

TABLE 3. Philtrum prediction equation $p + a + b(\text{H.C.}) + c(\text{Comm}) + d(\text{IC})$.

<i>Computed Constants</i>	<i>Example of Newborn with Bilateral Cleft Lip</i>
a = -2.60177	Head Circumference = H.C. = 37.0 cm.
b = 0.18297	Commissure = Comm = 26.0 cm.
c = 0.18013	Intercanthi = IC = 22.0 mm.
d = -0.09148	

$$p = 2.60177 + 0.18297(37) + 0.18013(26.0) + -0.09148(22) = 6.83894 \text{ mm.}$$

or Less Cumbersome

$$p = 2.6 + 0.18(37) + 0.18(26) + -0.09(22) = 6.76 \text{ mm.}$$

TABLE 4. Philtral-Commissural ratio.

$p = \text{Comm}/3.75$ Example when Commissure = 26.0 mm. $p = 26.0/3.75 = 6.9 \text{ mm.}$

the best single correlation with the philtrum, (Table 2). While the head circumference plus the commissure improved the correlation, the addition of the intercanthus did not show a significant improvement.

The correlation coefficient squared (cc)² equals the percentage of the variability (of the unknown variable) that can be predicted by the known variables. Therefore, by knowing the H.C., Comm and IC, we can predict

36% of the variability of the philtrum (Table 3), and since the standard deviation of the philtrum is 1.10, only a fraction of a millimeter is left unexplained.

The data was also tabulated to derive constants for the prediction equation $p = a + b (\text{H.C.}) + c (\text{Comm})_2 + d (\text{IC})$; where a , b , c , and d are the computed constants and p is the proposed philtrum.

Discussion

It is obvious that few plastic surgeons will use the equation given (Table 3) for the proper philtral width. This is included only for statistical completeness of our study. The actual value of 7.0 mm as the mean of our philtral measurement has assisted us in our planning philtral construction in bilateral cleft patients. For more exact measurement, we have used the philtral-commissure ratio or commissural distance (Comm) divided by a factor of 3.75 to provide the measurement of the proposed philtrum. (Table 4)

Summary

A group of 40 patients from the pediatric services of the Ohio State University Hospital were selected to provide assistance in philtral reconstruction. A correctly proportioned philtral flap to the existing facial landmarks was the purpose of our study. A standard value in mm's and a helpful ratio are proposed to aid in this facet of cleft lip surgery.

Reprints: *Anthony B. Sokol, M.D.*
435 N. Roxbury Drive
Beverly Hills, California 90210