# IV. Progress by Analysis

# 17. Benefits of a Mathematical Blueprint

I T gradually became apparent that, although many were accepting the rotation-advancement method, others were being scared off by the "cut as you go" quality of freedom. From the beginning it had been suggested:

For a start let's set aside AA', BB', CC', bent wires and other blueprints. Caliper addicts may cling to their crutch but as in all art it is usually the freehand "fiddling" that creates the best work.

In *Plastic and Reconstructive Surgery,* June 1960, in an attempt to win over those requiring a more exact charting of the incisions, I outlined a numerical plan:

For those who are mathematically minded a set of points can be measured and marked to guide the incisions. The distance from 1 to 2 is measured from 2 along the mucocutaneous junction line and mark 3 is sited. From point 3 mark along the edge of the cleft curving under the base of the columella and extend to point 4 which will allow point 3 to drop to a level which lengthens the distance from 3 to 5 until it is equal to the distance from 1 to 6. Point 7 is to be the leading point of the advancement flap of the lateral lip element. In incomplete clefts point 7 will be in Simonart's band, and in complete clefts will be marked up in the nasal floor on the cleft side. To develop the lateral flap a transverse incision extends across under the alar base to point 8 until, with the aid of lateral undermining, point 7 will advance to point 4. The distance from 7 to 8 does not necessarily equal the distance from 4 to 5 nor does 5 join 8 in most cases. Usually 5 stops short of 8 in its nostril sill formation. The lateral cleft edge is freshened from 7 to point 9 which should equal the distance from 4 to 3.
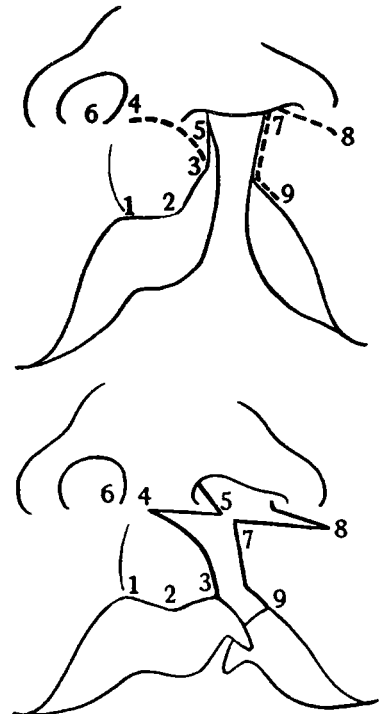


Rotation-Advancement Equation

$$1 - 2 = 2 - 3 \qquad 3 - 5 = 1 - 6$$
$$3 - 4 = 9 - 7 \qquad 4 - 5 < 7 - 8$$

*This paragraph still puts me to sleep ... zzzz*

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## FLAWS APPEARING

The rotation-advancement principle had more art than science in its original design. Numbering set points and lining these up with exact measurements to provide a semblance of a mathematical pattern made it apparent that certain discrepancies were present. Once noted, they then could be corrected by relatively minor logical adjustments. These were outlined in detail, first as "refinements" in 1964 and later as "extensions" in 1968. All refinements, extensions and more recent improvements will be described in this book.

## RUSSIAN AID

Alexander A. Limberg of Leningrad, a grand premier plastic surgeon of Russia, whose early fundamental contributions have been somewhat shaded from the outside world by the Iron Curtain, wrote a handbook for surgeons in 1963. This work was a mathematical dissertation on local plastic operations, demonstrating with paper models the movement of flaps and the reaction to their action in the adjacent tissue by the production of standing and lying cones. One of his simpler diagrams, portraying an aspect of the principle and including a little Z wizardry, elucidated:
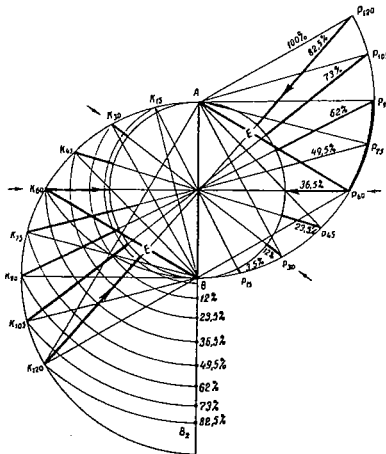
Geometrical selection of symmetrical forms of convergent triangular flaps shows decrease in width and growth in length at the ends of the diagonals.

My feeling about this exacting treatise was:

And all along I thought I had a clear idea of what I was doing!

Limberg's reaction to my "cut as you go" approach was:

For example Millard and Skoog use triangle flaps without a geometrical plan.

He then proceeded to try to make geometry out of my operation.

The horizontal portion of the rotation incision frees the medial part of the lip and permits flap A to be turned downwards. For the filling of the

gaping open angle of the medial part of the lip, a lateral incision frees up the advancement flap B, filling in the gaping angle. Flaps B and C correspond to the opposed transposition of two triangular flaps, in which one can determine the short and long diagonal.

Unfortunately for the strict mathematicians, there is just enough art in rotation and advancement to prevent geometry from being able to tell the whole story.

## YET 2 + 2 STILL = 4

The same basic mathematical logic that Randall and Sawhney have applied to the Tennison procedure can be useful in the rotation-advancement execution. In other words, the difference in the height of the two peaks of the cupid's bow on the medial element is the exact distance the higher peak must be lowered into normal position, which is also the distance the cleft edge of the medial element must be lengthened or the exact width of the gap that the releasing incision must measure or the amount of opening below the columella that the rotation incision must achieve. This, in turn, is also the exact distance that the interdigitating flap must measure across its widest point so as to supply a mathematically sufficient amount of tissue to maintain completely the release. It is possibly true that a rotation with its variable "back-cut" and the advancement are slightly more ethereal than a transverse gash and a transposed flap, but the principle of measurements is the same and can be made into a mathematical equation.

The difference in the vertical height of 2 and 3 = amount of release necessary from incision 3–5 + $x$ = the width of the point of flap 8–9–10 necessary to fill the rotation gap.

It must be acknowledged that measurements increase the chances of accuracy. The latest sketches of Operation Rotation-Advancement, therefore, will be measured, marked and numbered in Chapters 27, 28, 29, 37 and 38 so that very little but the final millimeter is left to the eye and the imagination.
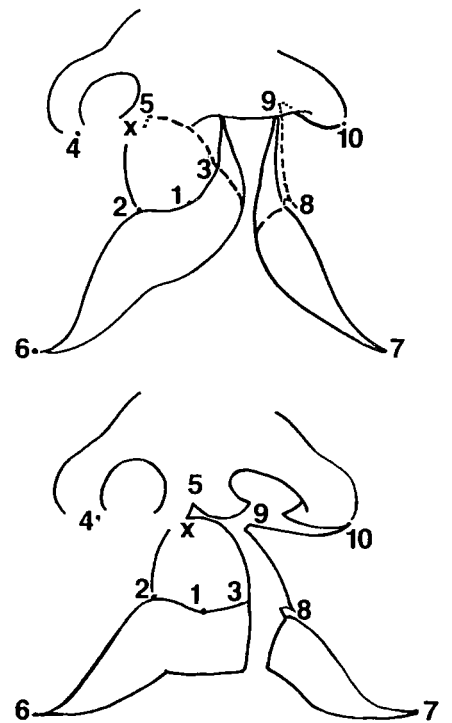


Most Recent Rotation-Advancement Equation

| | |
|---|---|
| $1 - 2 = 1 - 3$ | $2 - 4 = 8 - 10$ |
| $2 - 6 = 7 - 8$ | $3 - x = 8 - 9$ |