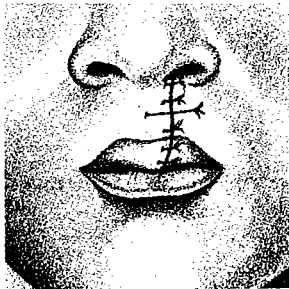
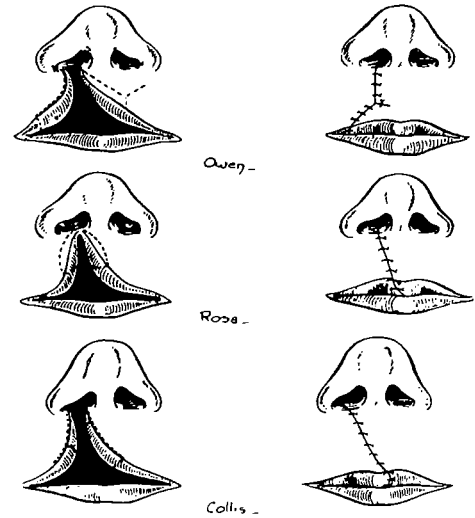


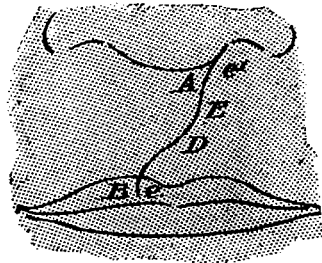
# 10. Constructing a Cupid's Bow

## ARTISTS ASSIST

THROUGH the years, medical artists when portraying the surgeon's final cleft lip result invariably constructed a symmetrical cupid's bow with their pen or brush. This possibly increased their popularity with the surgeons, but any similarity to the true postoperative result was quite unreal. Here are a few reproductions of artists' concepts of the final result of methods that unequivocally destroyed the bow, yet shown with the cupid's bow still standing in all its glory.



By E.S.C. for Brophy, 1928



Collis for Binnie 1918



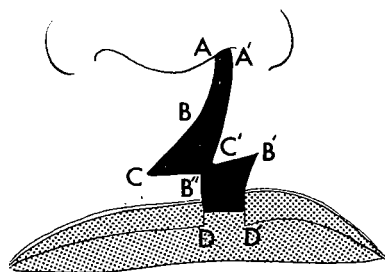
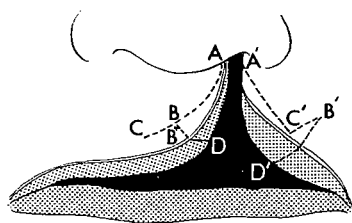
Blair by K. Bell for Padgett 1938

By Holdsworth's artist, Joan Farmer 1951

## FINALLY THE SURGEON DOES IT

Thus it was an important breakthrough in cleft lip surgery when the surgeon actually created a cupid's bow. The number one

champion of this development was the Canadian A. B. LeMesurier, primarily an orthopedic surgeon working at the Toronto Hospital for Sick Children. As LeMesurier himself acknowledged, his operation, except in detail, was not original. In fact, in 1884, 40 years after Mirault modified Malgaigne, the German Hagedorn designed a quadrilateral flap cleft lip procedure which was so far ahead of his time that it took 50 years and LeMesurier to gain it acceptance.



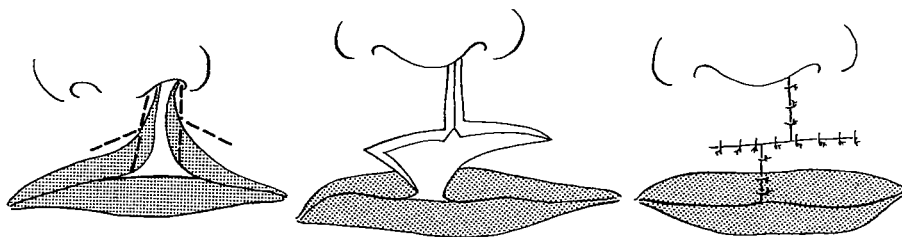
There were quadrilateral flap designs before and after Hagedorn. Actually, Gustav Simon, a Heidelberg surgeon, in 1864 was the first to introduce a quadrilateral flap operation. His main flap came from the medial side and had some advantages but did not create a cupid's bow and never reached any degree of popularity except as an occasional reproduction in surgical textbooks.

## KÖNIG



Franz König

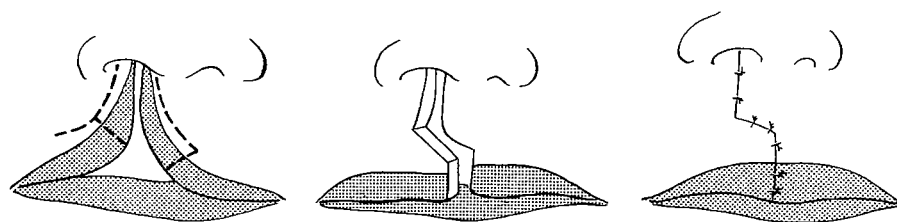
Another early quadrilateral flap maker was Franz König. He trained with Langenbeck and then became Professor of Surgery at Rostock until 1875, when he was summoned to Berlin as Bardeleben's successor. In 1881, three years before Hagedorn, König, to obviate the asymmetrical free border of Malgaigne and to achieve midline apposition, devised a frightening bilateral quadrilateral flap procedure for unilateral clefts. It might be construed as a "black sheep" of the quadrilateral flap family.



When well executed it could promise only poor results, but when miscarried, as shown in this photograph from Plessier's report, its effect was indeed shocking.

Both Binnie, 1911, and Thompson, 1912, referring to von

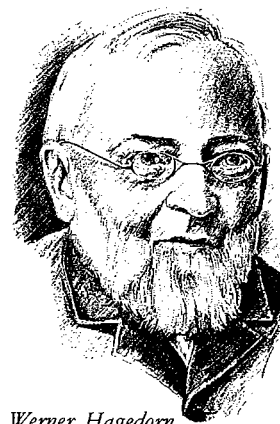
Esmarch and Kowalzig, gave König credit for two cleft lip procedures. The first has been described and was grotesque.



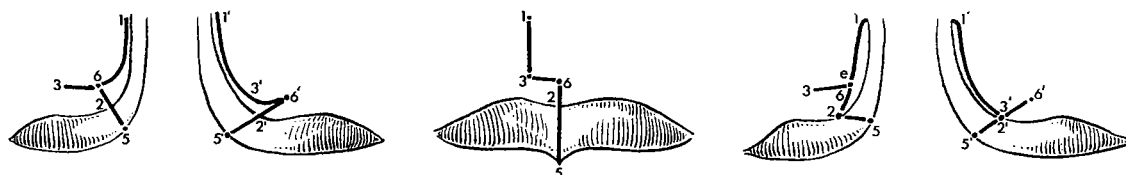
The second was so unlike the first as to be suspect and strangely similar to that of Hagedorn.

### HAGEDORN

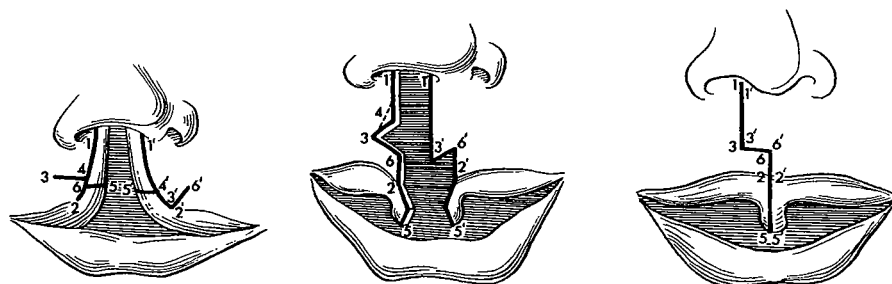
The premier of the quadrilateral lip flap surgeons was Werner Hagedorn. From 1831 to 1894 he lived and worked as a general surgeon in Magdeburg, Germany, and at the age of 53 conceived a design for cleft lip which was less mutilating and actually quite ingenious. In principle it differed from the Mirault concept in that the flap from the cleft side was quadrilateral in shape. This lateral flap was transposed, not along the freshened edge of the medial element as in Mirault, but into the opened oblique full-thickness incision in the free border of the non-cleft element.



Werner Hagedorn



By 1892 Hagedorn had modified his own method but along the same principle.



As a result of the clever cutting and fitting of these flaps, a cupid's bow was actually created.

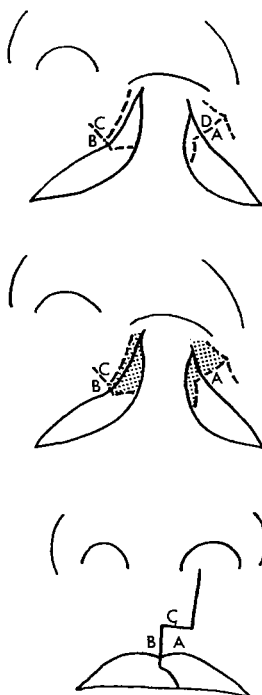
## LeMESURIER

The value of the Hagedorn design was unrecognized until LeMesurier presented his rendition of the quadrilateral flap at a dry clinic during an American Association of Plastic Surgeons meeting in Toronto in 1945. The excellence of the lip conformity in this series stimulated such interest that a pencil sketch made from a diagram by LeMesurier was photographed and sent to those requesting it. Several surgeons became ardently enthusiastic after using the method; LeMesurier was invited to present a detailed description of his operation at the 17th Annual Meeting of the American Society of Plastic and Reconstructive Surgery at White Sulphur Springs, West Virginia, November 1948.



### *The West Virginian shoot-out*

To an audience of plastic surgeons always eager for a better cleft lip method, LeMesurier presented his procedure. Prominent in the crowd were the old champions of the Mirault principle. Blair was ailing, but Barrett Brown was there, as was Frank McDowell. Both were ready for the confrontation. LeMesurier fired both barrels:



The flap is cut from the lateral side of the cleft [A] and we have found it simpler and, in some ways, better to cut this flap in a more or less quadrilateral shape and after swinging it down and over, to make it fit on the medial side into a notch formed by the spreading apart of the two edges of a cut [B and C]. If the flap is made to extend far enough up the side of the cleft it will reach the mid-line and the suture line will be in the centre of the lip, which is an advantage. The opening up of the cut on the medial side turns down the muco-cutaneous line here, and the swinging down of the quadrilateral flap does the same on the lateral side. A cupid's bow is thus formed which can be made of almost any height and, what is more important, can, with care, be made symmetrical on the two sides, with the two parts of the muco-cutaneous line meeting accurately.

All was quiet in the lecture hall as LeMesurier proceeded to show slides of his results for it was obvious to almost all in

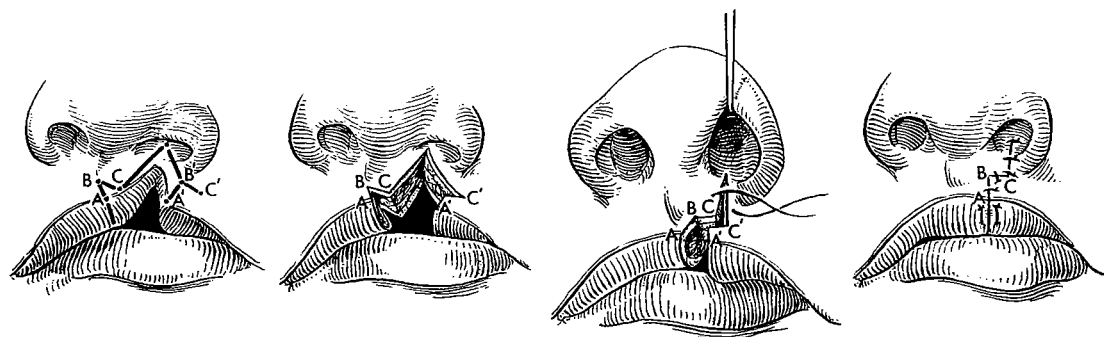
attendance that these were the best results yet achieved. As he himself acknowledged, the nasal results left much to be desired, but indeed for the first time the postoperative result of a unilateral cleft lip now sported a symmetrical cupid's bow.

The audience then turned in anticipation toward the opposition, which for years had reigned supreme without challenge. The air was charged with the tenseness of the rivalry as first Brown and then McDowell stood up and fired shots back in defense of their position with the simplified Mirault principle. The first shots fired by LeMesurier with a series of cupid's bows had already hit their mark and set in motion a lip trend that was destined to gain momentum.

In fact, Wallace Steffensen came forward at this very moment. Three years previously he had been present during LeMesurier's demonstration of cases in Toronto. Since then, guided by one of the photographs of LeMesurier's rough sketch and with a wood-carver's dexterity, he had developed two modifications, which he now proposed. The first was a triangular wedge excision instead of a mere incision in the medial lip element to facilitate the fitting. The second was an attempt to improve the nasal



*Wallace Steffensen*



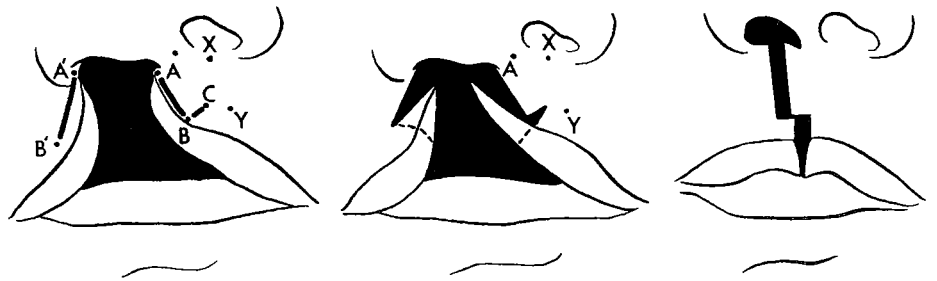
distortion. He advised the Smith dissection of the skin from the alar cartilage through a paramarginal incision and the sectioning of the chondromucosal lining from the septum and through the junction of the medial and lateral crus of the alar cartilage to allow better nostril adjustment.

LeMesurier and the quadrilateral flap had won the day. His success was not temporary because in the ensuing years many more began to use his method and others modified it.

*Personal experience with the LeMesurier method*

As the first half of 1950 came to an end, I left St. Louis with two students of plastic surgery from South America, Robert Milan of São Paulo and Guillermo Rojas of Bogotá. We three drove north, crossed into Canada and made our way to Toronto. Here we had the good fortune to meet LeMesurier, a distinguished-looking and most pleasant gentleman, who allowed us to watch him do one of his lip procedures. It was thrilling to see the author perform. Yet for us, who were trained in the meticulous detail of wound closure, he seemed more like a general surgeon, using larger sutures widely spaced.

During the second half of 1950, in Detroit on a fellowship with Claire Straith, I learned the practical details of the quadrilateral flap. With his plastic surgical technique it might be said that Straith out-LeMesuried LeMesurier.



*A chance to try*

In 1951 as senior resident at Jefferson Davis Hospital in Houston, Texas, under Drs. Cronin, Hardy, Wise, Brauer and Freeman, I finally had the opportunity to treat two primary cleft lips with the LeMesurier technique. One of the patients, a pleasant teen-aged black girl, caught the eye of Dr. Truman Blocker, who had come up from Galveston to inspect our residency program for board approval. He turned to his friend Cronin:

“Tom, do you get results like that? I’m not sure I do with the triangular flap.”

The discussion that followed favored the quadrilateral flap, and Blocker indicated that he would influence his residents to use the LeMesurier method but admitted, "For myself I plan to finish out my twenty-year series with Brown's triangular flap."

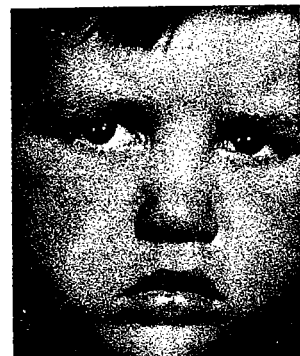
The second primary LeMesurier I did was on a remarkable woman of 35 years who happened to come into Jefferson Davis Hospital one day to see an ailing friend. When she laughed, which she did quite often, with good lighting you could see her tonsils. I must have revealed my lust to cut a quadrilateral flap on her just short of actual salivation for she laughed and said, "Better doctors than you have tried, son," and flatly refused surgery. The paucity of complete clefts in the residency at this time caused me to take her arm. She agreed to come with me to talk over the possibilities and when asked how she was getting along she reported: "Fine, been married twice! Had to divorce the first because of his continual drinking." "You have to admit he had a point!" I gambled, and although she laughed it was not so enthusiastically. Somewhere between there and the admitting office she reversed her decision.

The LeMesurier operation improved her appearance and function, and although I was disappointed in the artistry of the result she was elated. As soon as the stitches were out, she gave a party in her little Texas town and sent me an invitation. Although I was unable to get off duty that evening, it was reported later that 300 others came from all the ranches round about exclaiming she was now every bit as fine-looking as her sister.

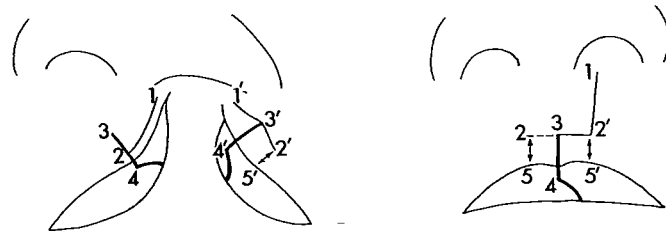
During 1952-1953, while writing *The Principles and Art of Plastic Surgery* with Gillies, I had the opportunity to demonstrate the LeMesurier method on an incomplete unilateral cleft to Sir Harold. He observed and listened carefully, and when the operation was finished he commented:

Very nice, dear boy, but I leave all those fancy markings to you. You know, I do not get many primary lip clefts any more. Shall we use this one in our book?

We did.



To simplify the basic plan of this quadrilateral flap design I have charted a numerical equation which offers some security toward the production of a symmetrical cupid's bow. The key to the bow making depends on the incisions cutting the distance from 2' to 5' slightly less than from 3' to 4' and the distance 2 to 5 equal to 2' to 5' and 3 to 4 equal to 3' to 4'.



$$2'-5' = 2-5 < 3-4 = 3'-4'$$

Meanwhile back in Texas, there was Raymond Brauer, who had learned the LeMesurier technique quite early, in 1946, from Fred McCoy, who, in turn, had learned it from Wallace Steffensen. Brauer introduced the method to Cronin in Houston and modified the design, winning an Honorable Mention prize in the Foundation Essay Contest. He advocated using the vertical length of the normal side to calculate the length of the cleft side of the lip, which he marked with ink points on an applicator stick to take the guesswork out of the marking. During his essay presentation in 1953 in England, Brauer recalled the reaction of pleasure by the British Association of Plastic Surgeons when they stamped their feet in response to an exceptionally fine color close-up of a single cleft operation by his method taken with the baby under *heavy* sedation.



Thomas Bauer

Also in 1953 in Indianapolis, the compulsive and dexterous Thomas Bauer, with Trusler and Glanz, raced into the LeMesurier design but, as an interesting adjunct in wide maxillary clefts, suggested using mucous membrane flaps turned from the cleft edges to line the upper lip.



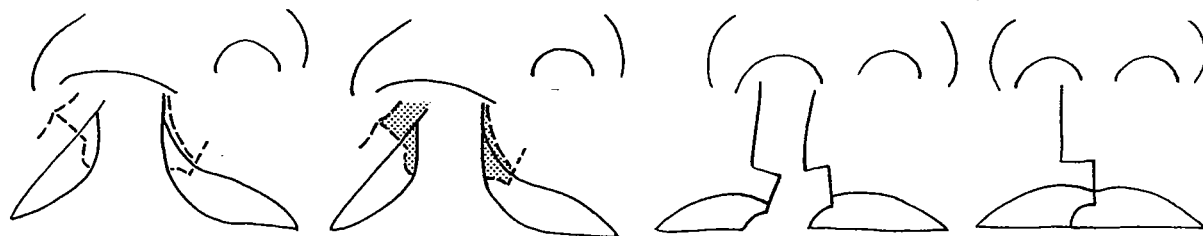


Finally, in 1962, the wise and unpretentious A. B. LeMesurier published his pleasant and personal little book, *HARE-LIPS and Their Treatment*, in which he presented, out of 1,444 cleft cases (more than half of which he had operated on himself), 14 long-term unilateral results. He divided the lip clefts into complete and almost complete, the halfway clefts and the minor notches, and he outlined designs for each type.

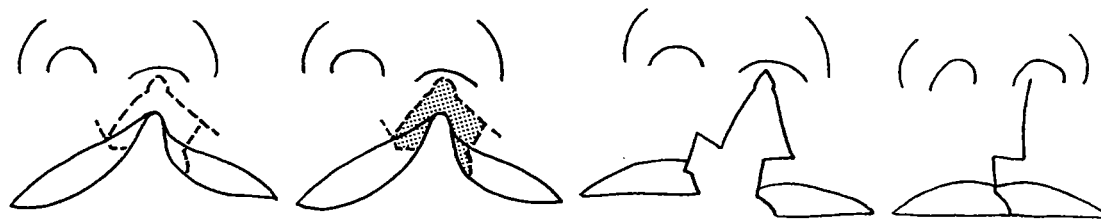


A. B. LeMesurier

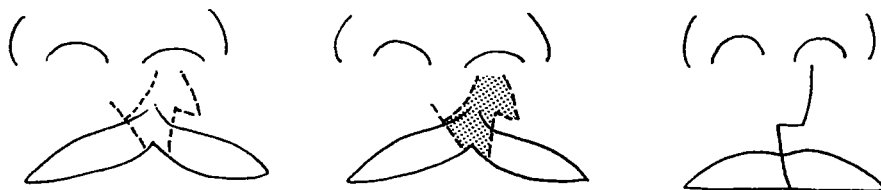
*For complete clefts*



*For halfway clefts*



*For minor notches*



*Too much discard*

*and again!*

After 20 years' experience, LeMesurier reminisced:

... practically all the [1,444] operations were done on the same general principles. I was in a position, first as a junior and later as a senior, to see, or at least to hear about, any changes that were tried and any unusual results that were obtained. Many changes were tried, but during the whole twenty years, surprisingly few were adopted and all these were of a minor nature.

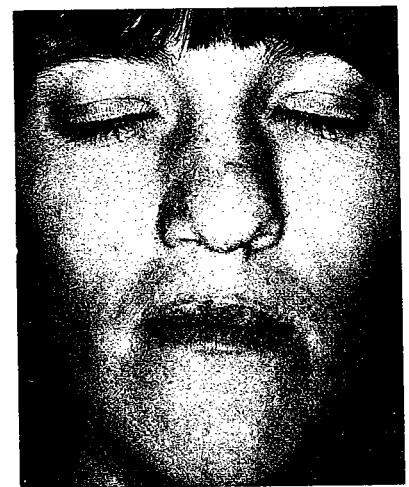
Here are two cases operated on by LeMesurier in the 40's, chosen at random by H. G. Thompson, at Toronto's Hospital for Sick Children, who noted in the boy:

A very adequate result with a tidy cupid's bow, good lip length and symmetry throughout.



For the girl Thompson pointed out:

The degree of cleft severity is slightly increased but the red/white lip junction has not been married uniformly. This has left the cleft portion of the cupid's bow high and is probably due to the fact that the tip of the flap was the same, or narrower, than the base. This left the young lady with a pleasing result but a notch in the red/white junction.



The method, while producing an *artificial* cupid's bow, requires the sacrifice of much valuable tissue. This discrepancy was defended by Steffensen:

The amount of tissue which is discarded appears great at first glance, but careful analysis of this tissue reveals that it is not satisfactory for utilization in the repair, nor is it necessary to effect the repair.

In clefts in which tissue is already missing any discard of further tissue is too costly. It is on this discrepancy of tissue discard that I attack the basis of Musgrave's 1964 proposition that

The LeMesurier procedure must still be considered a good operation for the *very* wide and *very* severe cleft lip.

If, he adds,

... the measurements are carefully made to keep the lip "short."

He offers as a teaser:

It is not always necessary to discard some of the medial portion of the lip nor to insist that the flap must reach the midline of the lip.

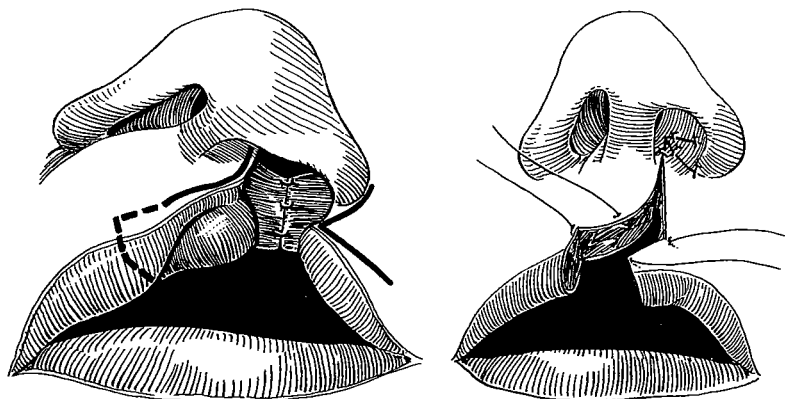
Of course, this begins no longer to be the LeMesurier method.

## MAY

For years, Hans May of Philadelphia used the Axhausen technique for cleft lip, and with the revival of the Hagedorn quadrilateral flap method by LeMesurier he combined the two principles in 1955. E. V. McNett's illustrations outlined his design with the marking of incisions, construction of the nasal floor, rotation of the alar base and finally fitting of the quadrilateral flap in the lip closure. This combination had the advantages of both but destroyed some of the natural cupid's bow and did so with an unnatural scar line of union.



Hans May



## THOMPSON



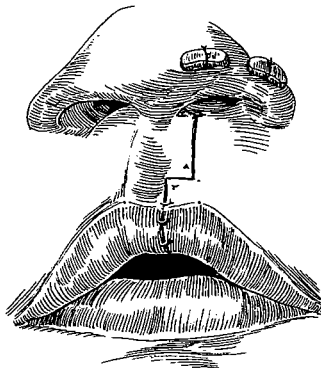
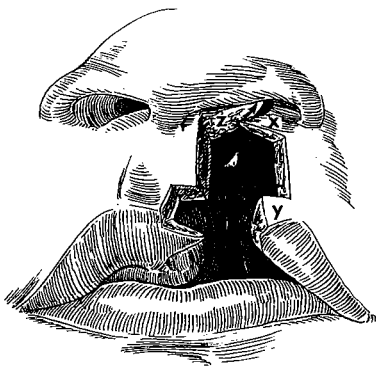
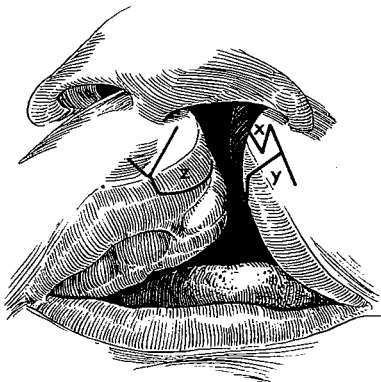
*Hugh Thompson*

Hugh G. Thompson of Toronto, trained in cleft lip surgery by LeMesurier, recalls how the grand gentleman often walked into the operating room with a lighted cigarette hanging from his lips and his eyes squinting from the smoke. According to Thompson, in 1972,

The basis for Dr. LeMesurier's lip repairs was always founded on excess fullness of the leading edge of the repaired lip. This included white and red but particularly red. He attempted to create the central red lip excess and, indeed, labeled this "Marlene's blob" . . . and when evaluating a late cleft lip repair he referred to it as either "pretty" or "not pretty"—There were never gradations.

Thompson is making a name for himself, having become known as a "terror" among residents during Canadian Board examinations. In 1971, as he was working in LeMesurier's old milieu at the Hospital for Sick Children, he was delegated by Grabb to describe with clarity the quadrilateral flap method. Previous descriptions had been vague, and Thompson claims that he merely

parroted LeMesurier's efforts with nothing original other than the fact that all measurements were exact and you can use compasses and come up stage by stage with the exact in vivo concept.



Actually his diagrams showed a Collis nasal floor flap and a triangular buccal-gingival flap Z taken from the medial side based on the premaxilla. This was transposed across the cleft to fill the triangular raw area resulting from the lateral vestibular releasing incision used to free the alar base and lateral lip from attachments to the pyriform fossa. The alar cartilages were freed from the skin in the Brown-McDowell dissection and temporarily fixed with mattress sutures. Thompson pointed out with candor and examples the typical unsatisfactory results with this method: (1) long cleft segment, (2) flat cupid's bow, (3) notched or double cupid's bow, (4) reversed cupid's bow, (5) wide nasal floor, (6) redundant red lip.

I was fascinated to hear from Thompson in 1972 that:

When I originally started in practice eleven years ago, several of my patients had a quadrilateral flap repair but I then became enchanted with the Tennison-Randall-Thompson modification, and this we have used to a somewhat exclusive nature ever since.

### *Critical assessment*

There is little doubt that the quadrilateral flap fitted into an incision on the non-cleft side as popularized by LeMesurier was a great improvement over previous methods and did indeed create a symmetrical cupid's bow when the operation was well executed. As LeMesurier admitted himself:

Not all results have been as good as those in the photographs shown [in my book] but the high proportion of what could be called really good late results makes it seem justifiable for us to continue to do the same operations and to try to persuade others to do them.

Apart from its excessive tissue sacrifice, the theory of the Hagedorn-LeMesurier principle assumes the same dubious suppositions as did the Mirault principle: first, that the defect was actually in the lower portion of the lip and, second, that the main flap should be taken from the already deficient cleft side. Both suppositions are unsound.

From a practical viewpoint, the two most commonly expressed complaints of this approach over the years have been outlined by Washio in Stark's *Cleft Palate*:

(1) The scar in the midline of the upper lip is unnatural and therefore noticeable; (2) as the child grows, the lip on the cleft side becomes longer than on the normal side.

DeHaan also outlines the drawbacks:

Measurements made from the cleft side are arbitrary. Even a slight miscalculation in the size of the quadrilateral flap can make the lip too long or too short on the cleft side. . . . Yet we know of no other repair in which a greater amount of tissue is sacrificed. . . . Finally, what appears to be a good primary repair may later be disappointing since unequal growth on the two sides may cause the lip on the cleft side to be too long vertically.

Musgrave also admits this same unpredictable development



of excess vertical length on the cleft side and gave me several examples to prove it.

In 1970 A. A. Kolesov of the Moscow Stomatological Institute dismissed the method of Hagedorn and LeMesurier with

The lengthening of the lip is obtained by the transposition of a quadrilateral flap, patterned on the cleft side. LeMesurier suggested a series of calculations for determining the length and width of the flap, depending on the degree of deformation of the tissues of the lip caused by the cleft. The method is anatomically inadequate. A quadrilateral flap is not very mobile and is inconvenient for an incomplete unilateral cleft, when great lengthening of the lip is not required.

Reichert of Germany noted in 1971 his and Widmaier's observations:

At our plastic surgery department in Stuttgart we used the LeMesurier's Technique because of its accuracy in producing a nicely shaped cupid's bow. But after a few years' follow-up, we nearly always observed a lengthening effect of the rotated square-angled flap at the lower border of the lip, which was rather difficult to correct.

## MORE RADICAL MODIFICATIONS OF LeMESURIER

### *Trauner*

In the old university town of Graz, Austria, which enjoys the charm of having a mountain rise out of its center capped by the remains of a nineteenth-century castle, there is Professor Richard Trauner, a poetic, sensitive, warmhearted man skilled in both oral and plastic surgery. He admitted:

I saw elder patients dreadfully disturbed because of their cleft disfigurations. It is natural that one should enjoy to do such work making lovable young creatures happier and to see them growing up joyous and not full of complexes.

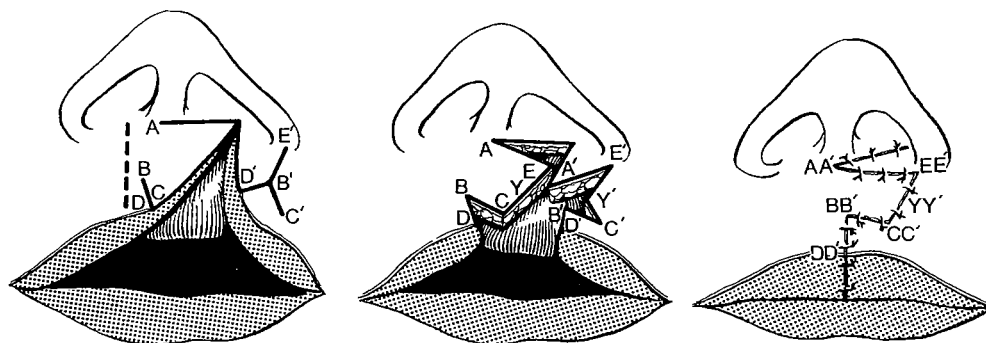


*Richard Trauner*

Trauner, like most European surgeons, used Veau's lip procedure for many years. About 1940, discontented with the shortness of this straight-line closure, the drifting of the ala and the

shortness of the columella, he first developed his "Z-plasty at the entrance of the nose" as a corrective secondary procedure. The Trauner flap was cut along the vertical axis lateral to the cleft scar with its base superior and transposed horizontally across the nasal floor and columella base.

At the International Congress in Stockholm in 1955, Trauner presented his primary cleft lip method, which incorporated his transposition flap across the entrance of the nose plus the Hagedorn-LeMesurier principle in the lower portion of the lip.



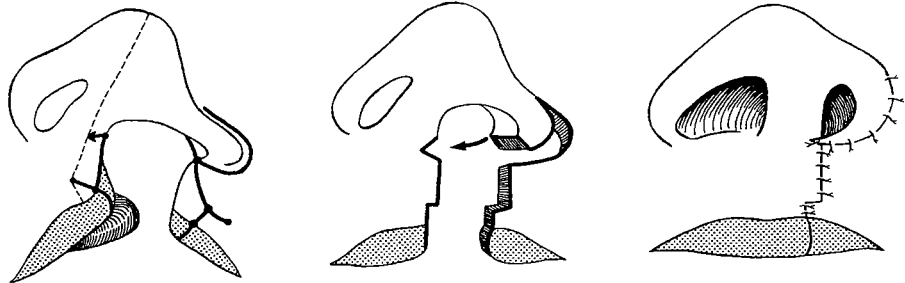
There were assets in this radical tissue shifting, but these seem outweighed both by the completely unnatural position of the many scars and by the destruction of the normal vestige of a cupid's bow.

### *Grignon*

There is one Frenchman still infatuated with the quadrilateral flap of LeMesurier in the lower portion of the lip. Jean-Lucien Grignon of Hôpital St.-Antoine, Paris, calls this the inferior lock in his "double lock" technique. At the 1973 Copenhagen Cleft Palate Congress he presented his modification after 12 years' evaluation noting that changes between the time of lip closure and puberty in the area of the septum and alveolar border had precipitated variation in design.

This brought us to mark the lip and the ala of the nose a little higher on the cleft side, creating a hypercorrection of the rolling-up of the nostril during the first operation. . . . Disconnect the ala base with nasal mucoperiosteum from the maxilla at the pyriform fossa. . . . This technique could be summarized as a "disinsertion" with a hyper rolling-up of the

ala, fixed in a notch at the base of the columella, associated with a transposition flap for the lower portion of the lip. . . . Moreover, the variable depth of the sub-columella notch would allow to change upon request and without any previous geometrical calculations the desired height of the white lip.



Grignon in all honesty does admit:

It solves not all our problems and we experienced disappointing results in some cases . . . [15%].

His valiant effort to correct the flaring alar base shortcoming of the LeMesurier method is commendable and would be even more so were the quadrilateral flap worth the effort. Although his zealous "overkill" advancement of the flaring ala in the final diagram may appear slightly reminiscent of a Grand Guignol theatrical, his later results shown after puberty revealed reasonable symmetry with only a minimal overcorrection of the cleft-side nostril.

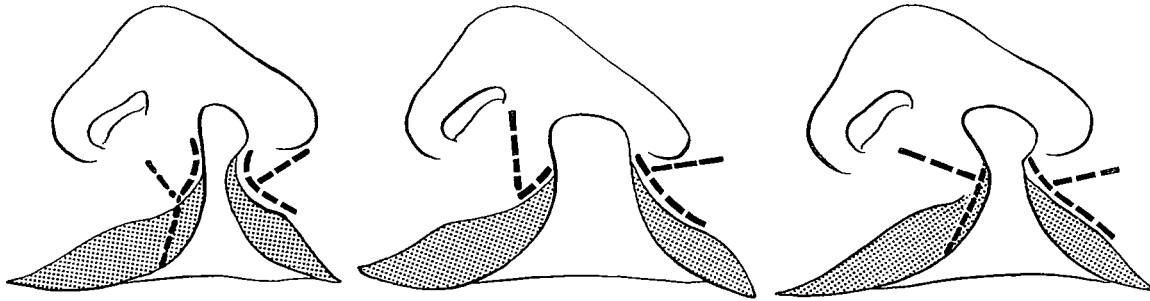
### *Wunderer*



*Siegfried Wunderer*

Siegfried Wunderer of the Vienna University Clinic, in 1963 at the Washington International Congress, grouped all Z-plasties under the Hagedorn principle, including Tennison's triangle, Skoog's double interdigitation and the rotation-advancement, which is the same type of trap into which others have fallen. Yet Wunderer, with his interest in etymology, subdivided clefts in an unusual way: narrow lip clefts (*A*), wide lip clefts (*B*) and those with rudimentary cupid's bows (*C*). He then proceeded to report six years' work on 170 cases using his modification of the Z-plasty adapted to his three varieties of clefts.





At least he noted and tried to do something for the occasional less-defined cupid's bow, but I wonder whether Wunderer is justified in wandering zigzag across natural lines with incisions and scars.

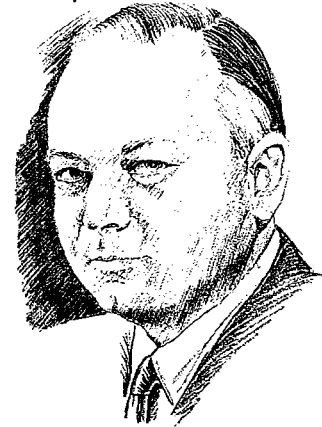
### Shaw

An interesting reversal of the LeMesurier plan was developed by Darrel Shaw over 20 years ago in Cleveland. In 1971 in Melbourne, Maes, Li, Richey and Shaw projected diagrams of Shaw's design and noted:

In LeMesurier's method, the cupid's bow was surgically reconstructed, not preserved.

This is the basis of their design, and, according to them, a quadrangular flap from the medial side of the cleft containing the cupid's bow is rotated into the lateral side of the cleft—a reverse LeMesurier. They noted less amount of tissue discard than in the LeMesurier procedure, utilization of preexisting cupid's bow, height of the peak of the cupid's bow on the cleft side not influenced by the incisions, natural pouting of the vermilion border, avoidance of droop of the cleft side of the lip and avoidance of contracture by stepladder scar.

Actually, Shaw's ingenious approach is a sophisticated rendition of the original quadrilateral flap that Gustav Simon cut from the medial side. In its reversal it does offer improvements over the LeMesurier design in that it preserves the bow. Yet the line of the scar is unnatural, showing little regard for philtrum columns or dimple, and after 20 years with so few case results published, evaluation must be confined to theory.



Darrel Shaw

