

SURGERY OF THE VALVE

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The nasal valve, which was first described by Mink in 1903, is the narrow passage between the lower margin of the upper lateral cartilage and the septum. It controls the inspiratory air currents, changing them from a column to a sheet of air, thereby giving shape, velocity, direction and resistance to the air currents.

The course of the air through the nose is normally quiet and smooth, and the flow is in an undisturbed high arc which is the normal laminary flow. The whole breathing cycle is under unconscious automatic self-regulating control and proceeds in an orderly manner. To understand this normal, effortless breathing, Mink (1903) did experimental investigations on nasal resistance and the influence on the nasal respiratory sufficiency. This was further investigated by Van Dishoeck (between 1935 and 1942). Uddstromer (1940) presented conclusions that on the average, the os internum accounted for 70% and the turbinates 30% of the resistance for adequate normal breathing. In reviewing the function of the os internum or valve area, Van Dishoeck arrived at the conclusion: "The fact that the ostium internum plays a major role in regulating the pressure and inspiration shows that breathing difficulties in many instances are not caused by septal deviations and hypertrophic turbinates, but by an abnormally built vestibule or ostium internum. In these cases, submucous resections and conchotomies are inefficient if not accompanied or preceded by regulation of the vestibulum and the os internum". Anatomically, the upper lateral cartilage is made up of three parts: 1. Attachment area extends underneath the caudal margin of the nasal bones; 2. Roof cartilage fused anteriorly or dorsally to the septum; 3. Terminal end, the caudal portion which flares away from the septum, but is attached by an aponeurosis.

This is thin and flexible and extends beneath the cephalic margin of the lobular cartilage. It forms an angle of 10 to 15° with the septum and becomes a slit-like valve that controls the intake of air which gives resistance, shape, direction and velocity of the inspired air. The lateral wall of the os internum is made up of the upper lateral cartilage and thus is the flexible part of the valve. The medial wall or septum is the fixed portion of the valve. The relationship of the upper lateral cartilage to the septum is very important as the upper lateral cartilage must be capable of movement with respiration and the shift of the position of the head in sleep.

The etiology of a valve deformity is any injury that causes flattening of the nose or a deviation of the nasal pyramid and the septum from the midline.

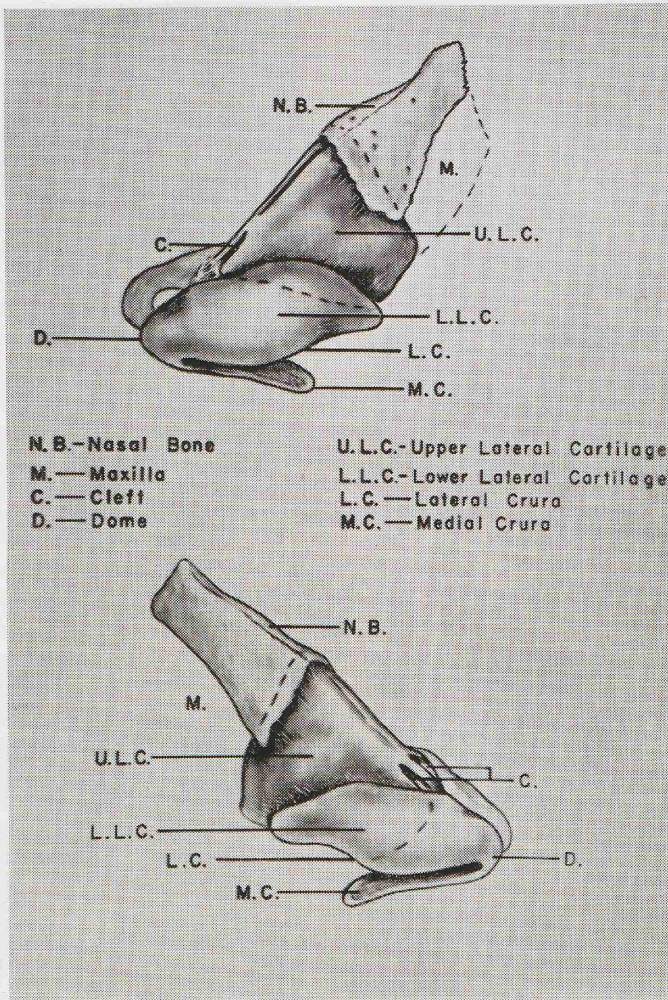


Figure 1. Anatomy of the upper lateral cartilage and its relationship to the lobule.

Disturbances of the normal anatomy through trauma and posttraumatic scarring changes the relationship of the upper lateral cartilages to the septum. This pathological relationship was first described by Cottle (1953) as ballooning and returning. This flaring out of the upper lateral cartilage away from its normal relationship to the septum causes a loss of inspiratory control, alternation of resistance and changes in the normal nasal reflex mechanism. Trauma causes flattening of the nasal pyramid resulting in a rolling back of the terminal end of the upper lateral cartilage with stiffening of the valve area and alternation of the control of the inspiratory air currents.

Thus, knowledge of the anatomy of the nose, the mechanism of nasal injury and the pathology of the resulting deformity is essential for corrective surgery

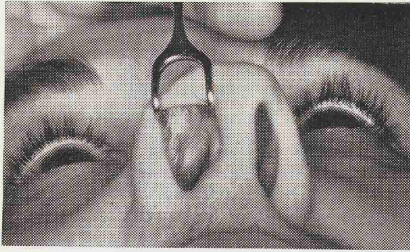


Figure 2 A. Valve deformity, right.
Note: Very stiff thick caudal end of upper lateral cartilage "returning".

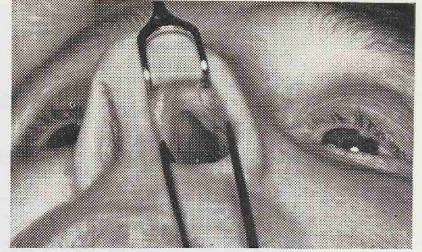


Figure 2 B: Valve deformity, left.
Note: Ballooning or flaring out of upper lateral, approximately 30°.

of the nasal valve. The valve is only part of the nose. Therefore, surgery of the valve is but one step in the overall correction. However, in this section, we will dwell only on this one step which is so important to nasal function. The lobule is an accessory part of the valve and surgery of the valve must be based on the recognition of this close anatomical and physiological relationship.

Foman (1938) wrote "Today's techniques have been developed to such a degree that the rhinologist can, with the greatest assurance, clear the airway by re-alignment, unbuckling or removing a part or all of the deflected septum. The feeling of confidence is lacking, however, when it comes to restoration of function". This is still the opinion of many nasal surgeons, but one must consider the concept and type of surgery that has been used.

The author, being familiar with the methods of handling the tissues of this valve region, feels that the method in use may be the reason why there is a lack of confidence when it comes to restoration of function. The customary technique calls for removal of the caudal end of the upper lateral cartilage with its mucosal covering as one of the steps in shortening the nose. This step sacrifices a functioning structure that Van Dishoeck considers as one of the inspiratory air pressure regulators.

Surgical correction consists of undoing or reversing the process of the formation of the deformity. Extensive undermining with freeing the deformed structures, excision of scar tissue and shortening of the isolated caudal end of the upper lateral cartilages is necessary. The preservation of the muscles and the mucosa with excision of excess cartilage with reconstruction of the os internum results in preservation of the valve-like action.

Surgery for restoration of the valve area is tedious, time-consuming, but it is a very rewarding procedure. It is done early in the operation when the anesthesia is good, the field is dry and the patient is not restless nor the surgeon tired. The most logical time is to follow immediately after the intercartilaginous incisions. Corrective surgery of the septum has been done through the hemi-transfixion, base of the nose widely undermined and the tissues freed from the spine. The intercartilaginous incisions are made, then the skin over the dorsum undermined widely. Thus, the approach to the valve area is through the intercartilaginous incision. The alar margin of the nostril is retracted with a curved alar retractor for good exposure. The caudal border of the upper lateral cartilage is grasped with the thumb forceps and the sharp

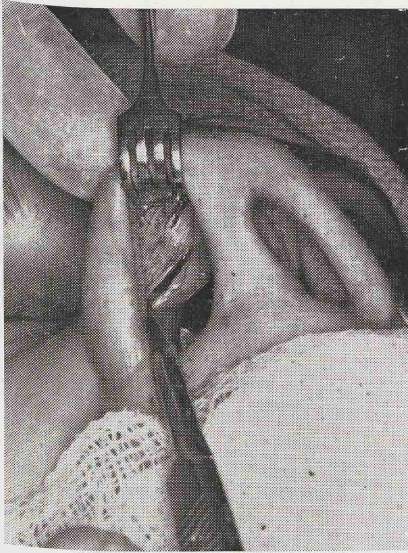


Figure 3 A: Intercartilaginous incision made 2 mm cephalic to the caudal end of the upper lateral cartilage.

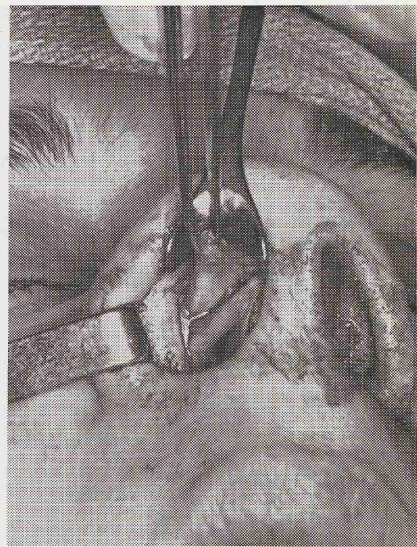
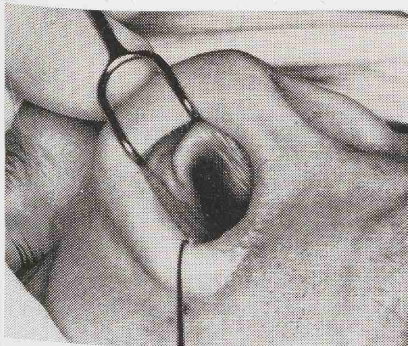
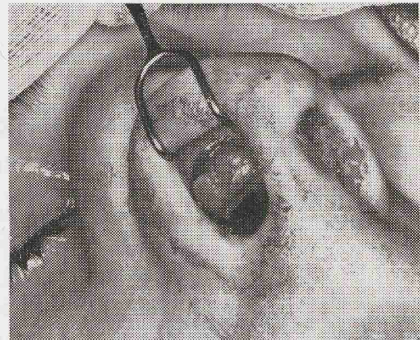


Figure 3 B: Isolation of deformed caudal end of the upper lateral cartilage. Note: Preservation of lip of mucosa.



4 A
4 C



4 B

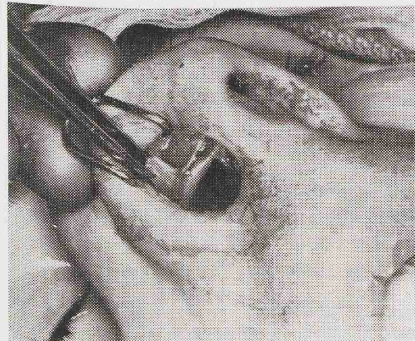


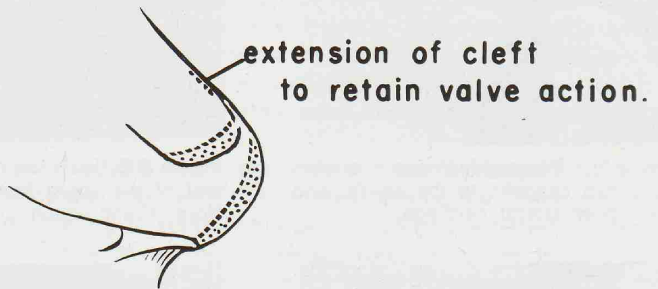
Figure 4 A. Photograph of actual returning combined with ballooning.

Figure 4 B. Surgical exposure of caudal end of upper lateral cartilage showing complete returning.

Figure 4 C. Same as B. showing partial excision to demonstrate the degree of returning. Returning involves only the terminal end of the upper lateral cartilage where it is attached to the septum by fibrous tissue.

point of a curved iris scissors is used to tease and scrape the underlying mucosa from the under surface of the terminal end of the upper lateral cartilage. The subcutaneous and muscle tissue that lies over the upper lateral cartilage is freed and teased upwards in order to expose the smooth, shiny dorsal surface of the upper lateral cartilage. The mucosa is carefully preserved as well as the canopy of the muscle tissue. When both sides of the terminal end of the upper lateral cartilage have been denuded, the deformity is studied to determine the amount of cartilage to be excised.

The amount to be removed is judged by its relationship to the caudal end of the septum. Schultz (1918), found that the terminal end of the upper lateral cartilage is shorter than the caudal end of the septal cartilage in the white race.



Amount of removal of caudal end of septum and upper lateral to retain relationship.

Figure 5. Combined septum pyramid surgery. Restoring proper relationship of caudal end of the septum to caudal end of upper lateral cartilages.

In order to preserve this relationship, usually the amount of cartilage removed from the upper lateral cartilage is equal to that previously removed at the time of the shortening of the septum. To restore the flexibility of the newly created caudal end of the septum, an incision is carried along the fused upper lateral cartilage which heals by fibrous union and duplicates this normal cleft.

No mucosa is excised as the mucosa is dissected free from the cartilage (Figure 3B). It has a tendency to contract, but there is an adequate lip of mucosa remaining after the submucous removal of a strip of cartilage from the cephalic margin of the lower lateral cartilage. Also, a strip of mucosa is preserved at the time of removal of the caudal end of the upper lateral cartilage. This strip of mucosa along each margin of the intercartilaginous incision will contract and heal without tissue tensions. This mucosa, when sutured with the 3-0 plain catgut advancing suture, as indicated in illustration, will shift the caudal end of the upper lateral cartilaginous margin upwards and will correct and prevent any tendency to saddling or flattening of the middle

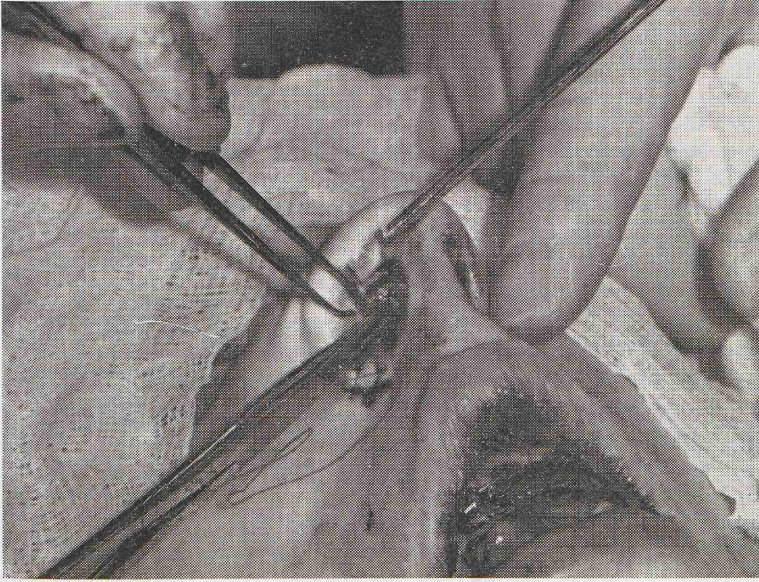


Figure 6. Insertion of the advancing suture as described in the text.

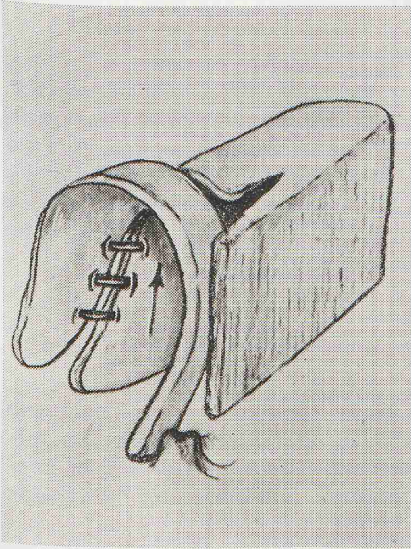


Figure 7 A. Intercartilaginous incision. Advancing sutures in place. Note: The upward pull on the caudal end of the upper lateral cartilage.

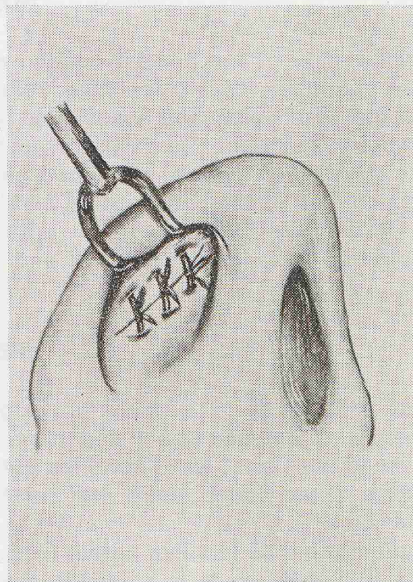


Figure 7 B. Intercartilaginous incision sutures in place.

third of the nose post-operatively. 3—0 plain catgut on a curved needle is used. Usually 3 or 4 sutures are needed. The first suture is inserted inferiorly into the lip of the mucosa of the upper lateral cartilage. It is then inserted into the lip of mucosa on the cephalic margin of the lobular cartilage. This orthopedic suture will advance the upper lateral cartilage as shown in Figure VII. However, these advancing sutures are not put into place until all work is done in all parts of the nose. No sutures are used until all steps of the operation are completed. All parts of the nose now are freely movable and will fall into proper position without tension before any sutures are inserted. After the other steps of the combined septum pyramid procedure is completed, incisions then are sutured using the advancing suture technique of the alar incision, the septo-columellar incision and the intercartilaginous incision as just described. The nose is then packed with $\frac{1}{2}$ " salvage-edge plain nu-gauge moistened with codliver oil or normal saline solution. This packing is inserted carefully in a telescoping manner which acts as an internal splint. An external splint of adhesive tape is applied and supplemented by dental stent compound mould in order to gently compress the tissues between the two splints and to prevent extravasation of blood into the tissues. In summary of the procedure, the success of the restoration of the valve function is based on adequate exposure, mobility of tissues, and preservation of the canopy of muscle tissues over the dorsum of the upper lateral cartilage. This, associated with retention of all of the mucosal reflections of the cul-de-sac, restores the movement of these structures that is necessary for adequate inspiratory control.

SUMMARY

Knowledge of the anatomy of the nose, the mechanism of nasal injury and the pathology of the resulting deformity is essential for surgical correction of the nasal valve. The relationship of the upper lateral cartilage to the septum is very important. Surgical correction is part of an overall septum pyramid reconstruction and is performed early in the operation. The mobility of the caudal end of the upper lateral cartilage is restored and the intercartilaginous incisions are closed with an advancing type of interrupted catgut suture, followed by adequate internal and external splinting.

RÉSUMÉ

La chirurgie de la valve du nez exige une bonne connaissance de l'anatomie nasale. Il est également important de connaître le mécanisme des traumatismes du nez et les difformités qui s'en suivent. Il faut insister sur les rapports anatomiques entre les cartilages latéraux supérieurs et la cloison nasale.

La chirurgie de la valve nasale n'est qu'une étape dans la chirurgie combinée de la cloison et de la pyramide nasale. Elle est pratiquée dans les premiers temps opératoires. Cette chirurgie veut restorer la mobilité de l'extrémité caudale des cartilages latéraux supérieurs. On ferme les incisions inter-

cartilagineuses par des sutures au catgut de sorte que la valve est plus projetée vers le haut que la croix latérale des cartilages alaires. Il est essentiel de compléter la chirurgie par un pansement nasal interne et externe adéquat.

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