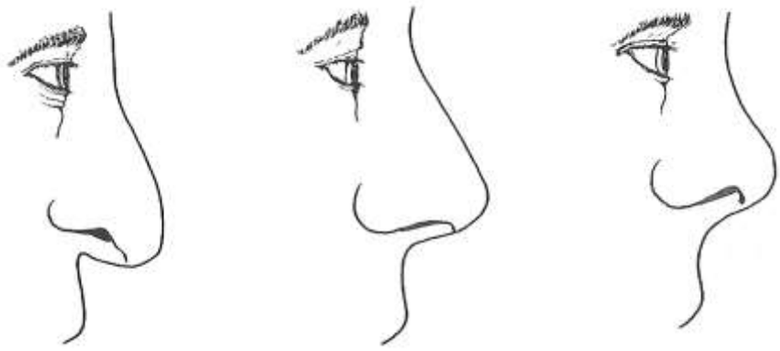
THE DIAGNOSTIC IMPORTANCE OF THE NASOLABIAL ANGLE AND THE LIMINAL VALVE



The *ala*, or wing of the nose, forms the lateral flared portion of the nose. The *nostrils* are positioned just under the ala on either side. The alar wings narrow behind the flared lateral projections to provide a decreased diameter of the nostril opening. The most constricted portion of the nostril due to this anatomical arrangement is found about 1 cm behind the nostril opening. This constriction is referred to as the *liminal valve*, the anterior nasal valve, or the valve of Mink. Some patients who claim that they are not able to breathe freely through the nose experience a dramatic opening of the airway when the liminal valve is surgically widened. This is also seen in aerodynamic assessments when nasal catheters of differing sizes are used to evaluate nasal airflow and airway resistance. Clinically, individuals who have a very *acute* nasolabial angle experience more difficulty in nasal respiratory competence because of the angle created at the liminal valve by the shape of the external nose; that is, the angle of the liminal valve generally follows the outline of the nostrils.

The diameter of the liminal valve can be quite variable and can influence airflow into and out of the nasal cavity. Since the angle of the liminal valve follows the configuration of the nose, it can in some instances create resistance to airflow as air passes the liminal valve in and out of the nose during respiration.

The outer configuration of the nose, and the underlying cartilaginous ring that constitutes the anterior nasal valve is related to the configuration of the *nasolabial angle*. This angle, from a lateral view, is formed by a confluence of lines from the nose to the lips. The two lines that form the nasolabial angle are: a line extending from the tip of the nose to the base of the nose, and a line extending from the base of the nose to the upper lip. The nasolabial angle is most esthetic when 110 degrees. When the nasolabial angle is over 130 degrees, the nasolabial angle is described as being *obtuse*, while an angle 90 degrees or less is described as an *acute* nasolabial angle.

An excessive or *obtuse nasolabial angle* is often seen with excessive vertical (downward) maxillary growth. Generally, the more the maxilla grows downward and exhibits a very "gummy" smile, the more the nostrils become more prominent. Generally, the more obtuse the nasolabial angle, the more prominent become the nostrils.

The illustration of three individuals with different nasolabial angles shows the parallel relationship between the nostril position and the nasolabial angle. The drawing on the **right** shows an ideal nasolabial angle of 110 degrees, with an appropriate amount of nostril opening that follows the outer contour of the nose. When this individual breathes, airflow in and out of the nose is not impeded by the liminal valve since the flow does not need to bend as it passes the liminal valve into the nasal cavity.

An excessive or *obtuse nasolabial angle* is often seen with excessive vertical (downward) maxillary growth. It is as if the face grew vertically and the soft tissues were distorted in the vertical plane, as an adaptation to this growth. Individuals with long faces also tend to show an excessive amount of tooth structure at rest and may have difficulty in achieving a natural lip seal at rest (lip incompetence). Surgical treatment of vertical maxillary excess, as with a LeFort I maxillary impaction, can create a more esthetic relationship between resting lips and teeth, as well as restoring the nasolabial angle to the normal range as the nose is tilted down from an obtuse angle to a normal position.

In the **middle view**, the angulation of the nasolabial angle is 95 degrees. The flow of air past the liminal valve has to turn to enter or exit the nose. The constriction created by the acute nasolabial angle would be expected to create some interference to airflow. If the diameter of the liminal valve is also constricted, a significant airway interference may result.

An *acute* nasolabial angle is seen in some patients with midfacial retrusion, such as patients with a repaired cleft lip and palate who experienced some horizontal and vertical collapse of the maxilla. A nasal mode of respiration may be impaired in such patients as the angle of the liminal valve of the nose acts to impede the flow of air through the nares. In the **illustration on the left,** of an individual with a repaired cleft lip, the nasolabial angle is very acute and this results in air having to make more than a 90 degree turn to pass the liminal valve. This change in angulation creates an airway interference due to the resistance to airflow created by the acute nasolabial angle. Also, in patients with repaired cleft lips, whether unilateral or bilateral, one of the nostrils is most often constricted, and with a typically deviated septum, nasal breathing becomes difficult due to combined sources of airflow resistance.

By now most physicians, especially ENT specialists, are aware of the liminal valve, whereas previously, many missed the significance of the size and angulation since to view the contents of the nasal cavity, they will use a speculum to spread the nasal valve for ease of viewing the turbinates and nasal septum. When using a speculum, the nasal valve is ignored and bypassed.

As part of an evaluation for OMDs, I recommend that the *nasolabial angle* and the size of the *liminal valve* should be observed and recorded. Surgery to enlarge a constricted liminal valve is an relatively easy operation. Since about 85% of an adult population has some deviation of the nasal septum, it has been tempting for surgeons to straighten the septum when the problem of airway interference may lie elsewhere.

An interesting fact is that children rarely have a deviated septum. Also, the breathing cycle in adults changes from one nasal chamber to the other every 60-90 minutes. This cyclical change in nasal breathing is not found in children who exhibit equal breathing through each nasal chamber.

I hope that the comments and suggestions offered here will aid your initial examination and lead to appropriate referrals to ENT specialists.

Dr. Bob
Robert M Mason, DMD, PhD
Speech Pathologist, ASHA Fellow
Craniofacial Orthodontist
Previous Chief of Orthodontics
Emeritus Professor of Surgery
Duke University Medical Center