Part 1

Assessment of Nasal Valve Obstruction: a new nasal ‘wall’ sub-unit concept

Part one of a series of two articles

Nasal obstruction is one of the common presenting symptoms to the otorhinolaryngology department. It is a subjective symptom, which can be due either to mucosal problems like rhinitis or structural problems involving the cartilaginous or bony nasal skeleton. The term ‘nasal valve complex’ was first coined by Mink in 1903. He described this site as the narrowest portion of the nasal cavity which offers the greatest resistance to nasal airflow. The nasal valve complex is bordered superiorly by the caudal end of the upper lateral cartilages and septum. Posteriorly it is bordered by the inferior turbinate. The inferior border is the nasal floor and the lateral border is the bony pyriform aperture and adjacent fibro fatty tissue of the ala. Traditionally this nasal valve complex is split into the ‘internal nasal valve’ and ‘external nasal valve’. The internal nasal valve (INV) is a specific area located superiorly within the nasal valve complex. It is the junctional area between the caudal end of the upper lateral cartilage laterally, and the adjacent dorsal nasal septum medially. This usually subends an angle of between 10 to 15 degrees. Subjects with an internal nasal valve angle of less than 10 degrees tend to present with obstructive symptoms. External nasal valve is the area from the nasal entrance to the internal valve, and it is the alar margin composed of lower lateral cartilages and the floor [1]. It is not as well defined as the internal nasal valve area.

Why is the current classification of internal and external valve system not user friendly?

In a patient with nasal obstruction, diagnosing the site of nasal obstruction is paramount. The authors feel that the current classification of internal nasal valve and external nasal valve, albeit, anatomically proven, has its own drawbacks as follows:

1. Traditional teaching regarding nasal valve obstruction has centred on the categorisation of defects into those affecting the internal nasal valve area (higher up in the nose) and those affecting the external nasal valve area (lower down in the nose). This categorisation requires drawing ‘an imaginary horizontal boundary line’ between the superior internal nasal valve area and inferior external nasal valve area. However ‘in practice’, it is not possible to draw this imaginary line in a deformed nose and hence not possible to arrive at a tailored surgical solution.

2. ‘In practice’, in a traumatic nose with multiple deformities (requiring complex procedures) the so called external nasal valve, internal nasal valve and also areas ‘in between’ are involved making it difficult to accurately define the site of the lesion, hence making it difficult to choose the right surgical option.

3. Not all deformities causing nasal obstruction can be fitted into the classification of internal and external nasal valve problems, for example based on the above definition of external valve, patients with extensive soft tissue scarring and deformity of the columella (see Figure 16), will not fit into either external valve or internal valve. Another example will be vestibular stenosis (see Figure 18) which cannot be classified into either internal or external nasal valve problems. Again ageing changes with a prostatic obstructive tip cannot be classified into a specific group either (see Figure 17).

4. The perceptions of rhinologists regarding anatomical boundaries of what is actually the internal and external nasal valve do vary, hence comparative data of any intervention becomes meaningless.

5. Apart from the internal and external valves, there is also literature on ‘septal valves’ and ‘turbinal valves’ [1] which adds to the spectrum of confusion.

Thus simply drawing an imaginary horizontal line in the middle of the nose and dividing the areas of obstruction into superior internal nasal valve and inferior external nasal valve is not always practically possible and does not help in identifying the site of the problem and so does not help in the management plan either. Hence it is not a surprise that after 100 years since Mink described this area, surgeons still have problems in making an appropriate anatomical diagnosis of nasal valve obstructions and arriving at specific interventions and Mink’s classification of nasal valve problems have gone unchallenged for over a century!
A new 'Glasgow nasal wall sub-unit concept'

Hence the authors suggest a totally new, user friendly, clinical classification based on anatomical sub-unit sites in the nose, which the rhinologists are already familiar with and hence can easily visualise a surgical option. Thus, in contrast to the rather confusing external and internal nasal valves, the authors propose a 'New Glasgow Concept' of re-defining the nasal valve areas into simple, easy to use 'anatomical areas and sub-units' as follows.

'Medial' nasal wall areas and 'lateral' nasal wall areas with various sub-unit problems within each area

The 'medial' nasal wall (MW) area causing nasal obstruction is divided into the following subunits from above downwards, namely: 1. High dorsal septum; 2. Anterior membranous septum and caudal membranous septum; 3. Conjoined medial crural plates; 4. Soft tissue columella.

The 'lateral' nasal wall (LVW) areas causing nasal obstruction are divided into the following subunits from above downwards namely: 1. Caudal nasal bones with upper lateral cartilage and 'K' area; 2. Lateral crus of the lower lateral cartilage; 3. Junctional areas between upper and lower lateral cartilage including the scroll region; 4. Soft tissue alar margin, including soft triangle.

The main advantage of classifying the valve areas into 'medial and lateral wall areas and sub-units', is that it helps the rhinologist to focus on the 'aetiological anatomy' of the defects, which in turn helps in tailoring the surgery to the particular site. We have been using this form of classification in assessing nasal valve problems over the past five years and this has not only given us the clarity of diagnosis, but also helped in the surgical planning tailored to individual needs.

'Medial nasal wall' valve area

'Medial' nasal wall sub-unit problems are more common in our practice causing airway problems than 'lateral' wall sub-unit issues. The problems could be in the following 'subunits' in the 'medial' nasal wall region from above downwards:

1. High dorsal septum
2. Caudal membranous septum and anterior membranous septum
3. Conjoined medial crural footplate
4. Soft tissue columella

'Lateral nasal wall' valve area

'Lateral' nasal wall problems are less common cause of airway obstruction in our practice (based on our experience of over 750 external rhinoplasties) than 'medial' nasal wall issues. The problems could be in the following 'subunits' in the 'lateral' nasal wall region from above downwards:

1. Caudal nasal bones with upper lateral cartilage and 'K' area
2. Lateral crus of the lower lateral cartilage
3. Junctional area between upper and lower lateral cartilage including the scroll region
4. Soft tissue alar margin, including soft triangle

Diagnostic and management algorithm of 'medial nasal wall' pathology

In this article (part 1) we will describe below the various sub-unit pathologies, in the 'medial nasal wall' areas, describe a diagnostic algorithm and arrive at a targeted surgical solution. In the next article we will examine lateral nasal wall areas. Assessment begins with history and examination aimed at individual areas and sub-units as mentioned above.

Conclusion

Successful outcomes in nasal valve surgery depends on an accurate assessment of the deformity and the selection of the appropriate surgical technique. We suggest an alternative way of assessing valve problems and propose a new classification of lateral and medial nasal wall problems with various sub-unit issues rather than superior internal valve and inferior external valve problems. This will help in making a precise diagnosis and arriving at a specific tailored surgical procedure.

References


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Authors’ note

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Table 1

Subunits and pathology – MW1 High dorsal septum deviations

Diagnosis
- Diagnosed only by nasal endoscopic examination.
- Can be easily missed on anterior rhinoscopy – one of the reasons for failed septoplasty.

Surgical procedure
- 1. Dorsal septoplasty
- 2. Bilateral spreader grafts

Subunits and pathology – MW2 Anterior membranous septum deviations & Caudal membranous septum deviations

Diagnosis
- Diagnosed by endoscopic examination or anterior rhinoscopy (Figure 4).
- In our experience, we found this to be the most common cause of nasal valve obstruction.
- Seen on simple tip tilt test by rotating the tip up.
- In the basal view seen as an additional un-interrupted vertical line next to the soft tissue columella on the side of the dislocation extending along the entire length of the columella from the tip to the sill region as seen in the right nostril in Figure 5. This 'Un-interrupted Vertical line' differentiates this from interrupted lines of medial crural footplate dislocations (Figure 10).
- The deformity is confirmed by palpation of the entire caudal septum by deflecting the conjoined medial crus away from the caudal septum.
- The nostril shape changes on the affected side to a vertical parallel slit, as shown on the right side in Figure 5.
- On the side of the caudal dislocation the nostril axis angle is more obtuse than the non-dislocated side.

Surgical procedure
- 1. Anterior Septoplasty, Septoplasty / Columelloplasty
- 2. Septal extension grafts

Subunits and pathology – MW3 Medial crura footplate obstructions, either unilateral or bilateral

Diagnosis
- Medial crus fracture or splaying of the footplate with deviations into the alar region reduces the inspiratory airflow and causes nasal obstruction.
- Confirmed by palpation.
- If the deformity is bilateral seen as widening of the width of the columella near the sill region (Figure 9).
- If unilateral seen as an additional 'interrupted vertical line' on the side of the deviation as shown on the left nostril in Figure 10.
- If unilateral the nostril shape on the affected side is doughnut shaped as shown on the left nostril in Figure 10.
- If bilateral there is a flask shaped deformity in the basal view (Figure 9).
- This can be a vertical shortening (base to tip) of the nostril if there are bilateral multiple fractures of the medial crus (Figures 11, 12). This is also seen in the basal view as a distortion and inversion of the tear drop appearance of the nostril with base of the nostril narrower than the apex.

Surgical procedure
- 1. Medial crus fixation sutures [2].
- 3. Columellar medial crural strut grafts [3].

Subunits and pathology – MW4 Soft tissue columella deformities

Diagnosis
- Infra tip lobule / soft triangle and columellar skin (Figure 16) can all be subjected to excess scarring secondary to trauma or revision surgery as shown in some examples below.
- Soft tissue hooding reduces airflow at the entrance and are seen in the basal view (Figure 16).
- Ageing changes or traumatic changes to the tip skeleton with heavy sub- orbital skin and ptotic tip and columella can result in restricted turbulent airflow (Figure 14).

Surgical procedure
- 1. Soft triangle scarring in our experience is very difficult to correct and should be excised and left to heal by secondary intention.
- 2. Y-Y plasty of the columella skin can be done and the columella can be lengthened at the expense of width.
- 3. Vestibular stenosis (Figure 18) requires incision of scar, skin graft, ronguering of the bony pyriform aperture with or without excision of the anterior end of the inferior turbinate.