A Follow-up Study of the Monarch Adjustable Implant for Correction of Nasal Valve Dysfunction

Dysfunction of the nasal valve is becoming an increasingly common cause of nasal airway obstruction as the general population ages. Semicrural nasal changes are becoming the most common reason for valve dysfunction.1 Because the nasal valve represents the smallest segment of the respiratory tract in cross-sectional area, even small changes in size or wall support can have a profound affect on nasal airflow.2 Consistent correction of the nasal valve has proved challenging for surgeons, where choice and proper execution of the appropriate surgical technique are critical for success. Still, consistent results can be evasive even for the experienced surgeon.

The Monarch implant (Hanson Medical, Kingston, Washington) is designed to function like the cartilaginous butterfly graft or effectively as an adjustable implanted Breathe-Right dilator (CNS Inc, Minneapolis, Minnesota). It corrects valve obstruction at both the internal and external levels for both dynamic and static dysfunction.3 The Monarch implant is a bimaterial device with an expanded polytetrafluoroethylene vs reinforced silicone outer casing surrounding a malleable titanium core. The malleability of the device allows the surgeon to fine-tune the airway to obtain an optimal valve area with aesthetic balance. Adjustments can be made during surgery or after surgery in the physician’s office.

Methods. A total of 16 patients underwent implantation by techniques previously described.3 Two patients had concurrent septoplasty, whereas 5 had turbinate resections. Nine patients were followed for a 6-month period. Valve collapse was diagnosed by way of physical examination, acoustic rhinomanometry (Rhinometrics; Interacoustics AS, Assens, Denmark), inspiratory nasal base view photographs, and a subjective questionnaire. The patients’ mean age was 66 years. Data were obtained before surgery and at 1-month intervals after surgery.

Results. At 1 month after surgery, questionnaire data revealed a great improvement in daytime and nighttime nasal airway ratings. The snoring rating dropped substantially, with a slight drop in apnea, a slight increase in olfactory function, and a decreased propensity for daytime mouth breathing. Inspiratory base view photographs showed a pronounced increase in the dynamic area of the external valve, whereas rhinomanometry revealed a substantially improved static internal nasal valve area (Table).

At 6 months after surgery, questionnaire ratings demonstrated slight improvements over the 1-month scores except for a slight return in mouth breathing. Rhinomanometry data revealed further improvement in the internal nasal valve area, whereas base view photographs revealed a decrease in external nasal valve stability (Table, Figure).

Comment. Questionnaire results revealed stability at 6 months compared with the 1-month data. Daytime nasal airway, nighttime nasal airway, and olfactory function further improved slightly, whereas snoring improvement remained stable. Apnea decreased quite substantially during this period. This is probably attributable to a decrease in nasal edema at 6 months with further airway improvement. Mouth breathing returned somewhat at 6 months. These patients were habitual mouth breathers and apparently returned to mouth breathing even with an improved nasal airway.

At 6 months, static internal nasal valve areas increased, whereas external nasal valve dynamic areas decreased. A decrease in postoperative edema is again most likely the reason for both of these changes. Decreasing edema would further enlarge the internal valve area. Conversely, alar edema would have a stenting affect on the external nasal valve, impeding dynamic stability at this

<table>
<thead>
<tr>
<th>Questionnaire Variable</th>
<th>Nasal Airway</th>
<th>Rhinomanometry, Internal NV Static Area, cm² (Increase, %)</th>
<th>Photographic Data, External NV Dynamic Area Increase, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
<td>Night</td>
<td>Snoring</td>
</tr>
<tr>
<td>Before surgery</td>
<td>4.5</td>
<td>2.8</td>
<td>7.1</td>
</tr>
<tr>
<td>1 mo</td>
<td>8.3</td>
<td>7.4</td>
<td>3.2</td>
</tr>
<tr>
<td>6 mo</td>
<td>9.1</td>
<td>8.0</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Table. Patient Questionnaire, Static Acoustic Rhinomanometry, and Dynamic Photographic Data

Abbreviations: MB, mouth breathing; NR, not reported; NV, nasal valve; OF, olfactory function.

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level. This added stability would be lost over time, as was seen in these patients.

Cosmetic changes were felt to be quite acceptable to the patients in exchange for the airway improvements they received. Theoretical concerns addressed in the pilot study, including tenting or loss of effectiveness, have not been seen in my patients. A single infection was easily treated.

The Monarch implant provides a simple, consistent, and apparently long-term option for correcting nasal valvular dysfunction. Additional long-term study and trials of alternative implantation techniques are currently under way.

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