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ORIGINAL ARTICLE

Endoscopic Septoplasty in Primary Cases Using Electromechanical Instruments: Surgical Technique, Efficacy and Results☆

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Nasal septum deviation;
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Abstract

Introduction and objectives: The microdebrider is a surgical tool which has been used successfully in many endoscopic surgical procedures in otolaryngology. In this study, we analysed our experience using this powered instrument in the resection of obstructive nasal septum deviations.

Subjects and methods: This was a longitudinal, prospective, descriptive study conducted between January and June 2007 on 141 patients who consulted for chronic nasal obstruction caused by a septal deviation or deformity and underwent powered endoscopic septoplasty (PES).

Results: The mean age was 39.9 years (15–63 years); 60.28% were male (n = 85). The change in nasal symptom severity decreased after surgery from 6.12 (preoperative) to 2.01 (postoperative). Patients undergoing PES had a significant reduction of nasal symptoms in the pre- and postoperative period, which was statistically significant ($P < .05$). There were no statistically significant differences between the results at the 2nd week, 6th week and 5th year after surgery. All the participated patients were satisfied with the results of surgery and no patient answered ''No'' to the question added to compare patient satisfaction after surgery. Minor complications in the postoperative period were present in 4.96% of the cases.

Conclusions: Powered endoscopic septoplasty allows accurate, conservative repair of obstructive nasal septum deviations, with fewer complications and better functional results. In our experience, this technique offered significant perioperative advantages with high postoperative patient satisfaction in terms of reducing the severity of nasal symptoms.

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PALABRAS CLAVE
Desviación septum nasal;
Septoplastia endoscópica;
Instrumentación electromecánica

Septoplastia endoscópica en casos primarios mediante el uso de instrumentación electromecánica: técnica quirúrgica, efectividad y resultados

Resumen
Introducción y objetivos: El microdebridador es una herramienta quirúrgica que ha sido exitosamente utilizada en diversos procedimientos de cirugía endoscópica en otorrinolaringología. En el presente estudio se analiza nuestra experiencia en el uso de la instrumentación electromecánica en la reparación de las desviaciones obstructivas del septum nasal.
Materiales y métodos: Este es un estudio descriptivo, prospectivo y longitudinal realizado entre enero y junio del 2007, sobre 141 pacientes que consultaron por obstrucción nasal crónica producida por desviación o deformidad del tabique, y que se sometieron a septoplastia endoscópica con instrumentación electromecánica (SEIE).
Resultados: La edad media fue de 39,9 años (15-63 años) de los cuales, 60,28% fueron varones (n = 85). El cambio en la gravedad de los síntomas nasales después de la cirugía descendió de 6,12 (preoperatorio) a 2,01 (postoperatorio). Los pacientes sometidos a SEIE tuvieron una reducción significativa de los síntomas nasales en el pre y postoperatorio y fue estadísticamente significativa ($p < 0,05$). No hubo diferencias estadísticamente significativas en los resultados obtenidos entre la segunda y sexta semana, y al quinto año después de la intervención.
El 100% de los pacientes están satisfechos con los resultados de la cirugía, y ningún paciente respondió «No» a la pregunta añadida para conocer la satisfacción del paciente después de la operación. Complicaciones menores en el postoperatorio estuvieron presentes en un 4,96%.
Conclusiones: La SEIE permite una reparación correcta y conservadora de las desviaciones obstructivas del tabique nasal, con menos complicaciones y mejores resultados funcionales. En nuestra experiencia, esta técnica ofrece importantes ventajas intraoperatorias con una alta satisfacción postoperatoria del paciente en términos de reducción de la severidad de los síntomas nasales.

Introduction

Since the ancient start of nasal surgery until the end of the first decade of the 20th century, a considerable number of surgical procedures and techniques have been proposed to correct nasal breathing problems due to septal deviation.[1] During this long process, nasal septum surgical procedures have evolved from primitive and aggressive techniques with poor results and multiple complications, towards surgical procedures with better results and less morbidity of nasal function due to surgical trauma.

The accumulated anatomical knowledge applied to nasal function and the progress and refinement of surgical techniques have led to the advent of transnasal endoscopic surgery, which allows a detailed and thorough approach to the nasal cavities and anatomical structures and spaces it comprises. This has provided better clinical outcomes in terms of reduced aggression, better welfare and faster recovery through significant differences in the pathophysiological changes observed in comparison to conventional surgical procedures. These factors have had a marked impact on the evolution and postoperative morbidity of patients. Alterations of the nasal septum and their impact on rhinosinusal function have been widely studied.[1–4] For a long time, correction techniques for cartilage and bone deviations of the nasal septum have evolved from ample and bloody septal resection towards preservation and realignment procedures, or the combination of both. Indeed, the term septoplasty takes its meaning from the Greek word meaning ''to mould or reshape the septum''.[1] Most currently accepted procedures are mainly aimed at preserving the mucosa and reducing aggression on the cartilaginous and bone structures of the septal skeleton. In that vein, the use of electromechanical instrumentation (microdebriders and shavers) during endoscopic septoplasty have enabled more precise interventions, less tissue trauma, shorter surgical times and less bleeding, among other advantages.

Material and Methods

Study Subjects

The study was conducted according to the principles established in the Declaration of Helsinki, and was approved by the institutional review board of La Floresta Medical Institute in Caracas, Venezuela. The work was carried out at a national reference centre for rhinosinusal endoscopic surgery.

Previously, a total of 141 consecutive patients (aged over 15 years) who attended consultation between January and June 2007 due to nasal obstruction caused by septal deviation were selected for this longitudinal study. These patients were given a detailed explanation of the study and nasal surgery procedures involved, including response, complications and alternatives. All gave their written informed consent before undergoing the intervention. No patient refused to participate and comply with the controls. All patients consulted due to chronic nasal obstruction with over 3 months evolution, caused by an evident

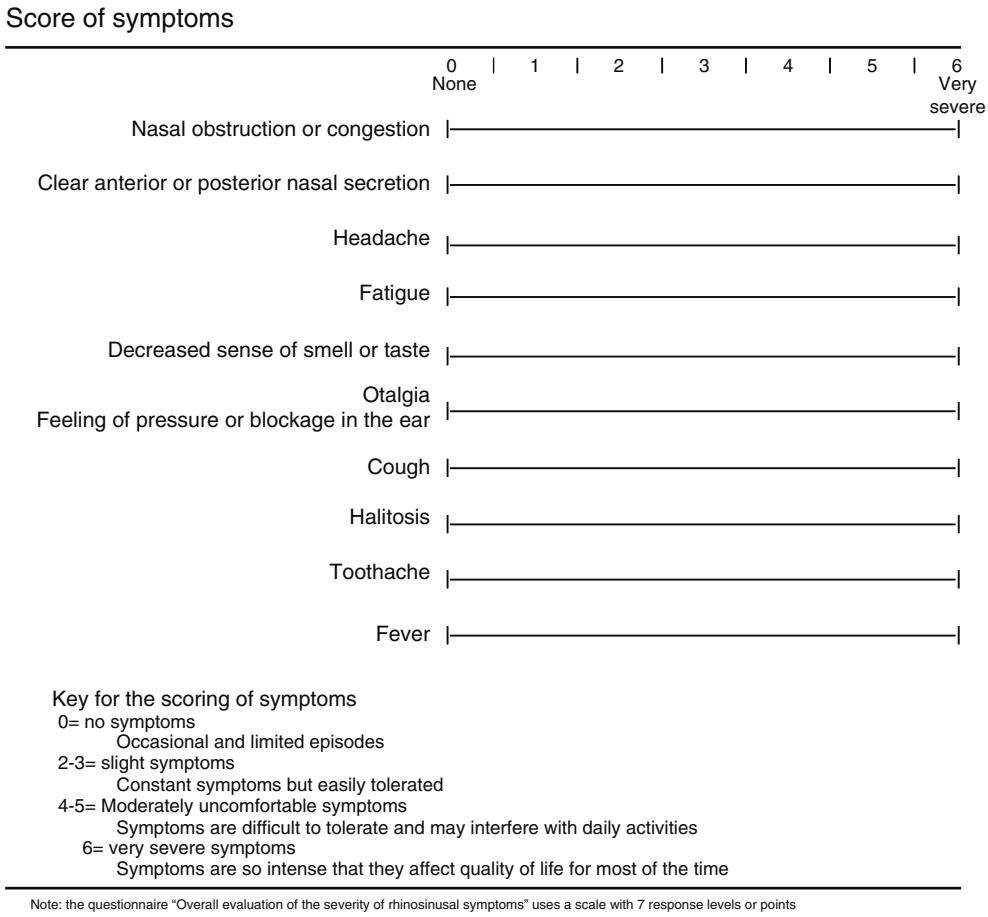

Figure 1 Questionnaire completed by patients before and after the operation (second and sixth weeks and on the fifth year after the intervention) regarding the 10 different rhinosinusal symptoms and the scale of 7 levels of increasing severity.

deviation of the septum, as shown by endoscopic sinus evaluation and a diagnostic computed tomography (CT) scan.

The exclusion criteria were: previous septoplasty and septorhinoplasty, concurrent rhinoplasty, sinonasal tumour, prior head and neck radiotherapy, septal perforation, Samter's triad, fungal sinusitis, pregnancy and illiteracy.

All patients included in this study suffered chronic nasal obstruction symptoms which persisted after 4 weeks of medical treatment, including topical nasal steroids, topical and oral thinners and decongestants, or an oral combination of antihistamines and decongestants.

The indication for powered endoscopic septoplasty (PES) involved those patients who presented deviation of the nasal septum and symptomatic obstruction for at least 3 months, and in whom medical treatment had failed.

The Survey

All patients completed a questionnaire in person before and after the intervention (on the second and sixth postoperative weeks) and on the telephone on the fifth postoperative year. We applied a total score scale to the symptoms using the questionnaire ''Overall evaluation of the severity of rhinosinusal symptoms'' (Fig. 1). This was taken from a consensus document establishing objective and subjective criteria to investigate rhinosinusitis and was endorsed by 5 national scientific societies (American Academy of Allergy, Asthma, and Immunology, The American Academy of Otolaryngic Allergy, The American Academy of Otolaryngology-Head and Neck Surgery, The American College of Allergy, Asthma, and Immunology and The American Rhinologic Society).[5]

The evaluation included a severity scale of 10 different types of rhinosinusal symptoms: 0–1=none: occasional and limited episodes; 2–3=slight: constant symptoms, but easily tolerated; 4–5=moderately uncomfortable: difficult to tolerate symptoms which may interfere with activities of daily living; 6=very severe: the symptoms were so intense, that they affected quality of life for most of the time. The 10 nasal symptoms were: nasal congestion or obstruction, postnasal or anterior rhinorrhea, headache, fatigue, alterations of the senses of smell and taste, pain-pressure-fullness in the ears, cough, halitosis, toothache and fever. The questionnaire included a question to determine the level of satisfaction of patients after surgery which was related to the mean score. This added question was: ''Are you satisfied with the outcome of surgery?'' and the possible answers were ''Yes'' or ''No''. The investigators were unaware of the severity scores of symptoms for each patient, both before and after PES.

The recommended primary outcome variable was the time until resolution of symptoms or significant improvement based on the total symptom score (TSS).

Figure 2 Intraoperative scenario. The screen shows the rod of the microdebrider mill in the operative field, within the left submucoperichondral tunnel, in a position to cut, mould and resect obstructive deviations and irregularities of the nasal septum.

Statistical Analysis

The main criterion for the assessment of effectiveness was the change in total severity score of nasal symptoms (sum of the scores of the 10 individual symptoms) between the preoperative and postoperative periods (second to sixth week). We used the Statistical Package for the Social Sciences (SPSS® v.10.0) to monitor and compare the baseline result of nasal symptoms severity scores, with the results after the procedure. The changes in scores in the overall result were analysed using the Student *t* test for dependent data. The analysis of changes in symptom severity scores between the preoperative and postoperative periods was performed using Microsoft Excel®. Statistical significance throughout the study was set at a level of 5%. We considered *P* values less than 0.05 ($P < .05$) as statistically significant.

Surgical Technique

The submucoperichondral plane of the nasal septum was endoscopically dissected through a classical hemitransfixion incision using a Cottle septum elevator or a Gorney suction dissector. After elevating the mucoperichondrium and mucoperiosteum adjacent to the septal defect being resected, we used the microdebrider endoscopically to cut and remove bone and cartilage tissue from the septal defect (spurs, old fractures with malunion and deflections) causing mechanical endonasal obstruction or contact areas between the septum and the nasal lateral contact wall. Compared to traditional instrumentation, the microdebrider enabled a better surgical resection due to the simultaneous elimination and aspiration of blood and debris (Fig. 2).

The deviated cartilage and bone portions were straightened and shaped with the microdebrider mill. In patients with a persistent deviation of the superior septum, at the level of the union of the quadrangular cartilage with the perpendicular plate of the ethmoid, thinning of the area through carving avoided wide resection and removal of the septal skeleton. Moreover, in most cases it also avoided the need to significantly correct the tension generated by cartilage memory at that level. In this area, the nasal septum is comprised by transitional tissue (cartilage and bone). Thus, in general, old microfractures and deflections of this area cause obstructive endonasal alterations affecting the drainage spaces of the paranasal sinuses.

Occasionally, PES can be performed in posterior deviations, which may contain isolated septal deviations with the remainder of the septum remaining straight. Also, in the case of isolated septal spurs, for exposure and resection of the ipsilateral septal defect through a minimal endoscopic incision. In these cases, tear of the mucosa adjacent to the defect may occur, since it is usually weaker and more fragile at this level, so if mucosal damage includes the contralateral mucosa, this may result in a septal perforation.

Once the procedure was complete, the septal mucosa was deposited on the septal skeleton through the use of silastic septal splints (Doyle II intranasal airway splints) placed in each nasal passage. Septal splints offer some advantages such as minimising septal haematoma and the formation of synechiae, stabilising the septum and maintaining an airway to improve comfort during the initial recovery. None of our patients required the use of nasal packing. Septal splints were removed during the first postoperative visit on the fourth postoperative day.

Results

We studied 141 consecutive patients undergoing PES between January and June 2007, who were asked for their acceptance to participate in the study. None of the patients refused to participate and comply with the controls. The mean age was 39.9 years (range: 15–63 years) and 60.28% were males (m = 85). About 78.1% of patients (m = 110) attended our otolaryngology centre through their own initiative or by referral from other patients who were treated at our centre, whereas 21.9% (m = 31) were referred by another physician.

The change in the score of severity of nasal symptoms after surgery was significant, as it decreased from 6.12 (preoperative) to 2.01 (postoperative). Patients undergoing PES presented a significant reduction in the severity scores between their preoperative and postoperative nasal symptoms. These results were statistically significant ($P < .05$). There were no statistically significant differences in the results obtained during the second and sixth weeks, and the fifth year after the intervention. The results of variation of severity scores of nasal symptoms after surgery are shown in Fig. 1.

All of the patients (100%) reported being satisfied with the results of surgery, and none of them answered ''No'' to the question added in order to record patient satisfaction after surgery. Those patients with the greatest level of symptomatic nasal obstruction reported major improvements after surgery. We registered 4.96% of minor postoperative complications, which were mild subnasolabial ecchymosis in 2.8% of patients (m = 4), septal perforation under 0.5 cm in 1.4% of patients (m = 2) and epistaxis in 0.7% (m = 1). No major complications were reported (Table 1).

Table 1 Distribution of Postoperative Complications.

	Number of patients	Percentage
No complications	134	95.03
Subnasolabial ecchymosis	4	2.8
Septal perforation (under 0.5 cm)	2	1.4
Epistaxis	1	0.7
Major complications	0	0
Total patients	141	100

Discussion

Advances in endoscopic sinus surgery have been driven by the aim of finding viable and minimally invasive surgical strategies which achieve accurate, effective and safe results. The application of endoscopic techniques for the correction of septal deformities was initially described by various authors[1–4,6–13] as a surgical alternative with optimal visualisation, reducing the amount of unnecessary dissections and the probability of complications, achieving an ostensible improvement of functional outcomes and a better integration in endoscopic procedures of the paranasal sinuses compared to the traditional technique of septoplasty with a frontal light.

Endoscopic septoplasty, especially when performed in conjunction with electromechanical instrumentation, significantly improves efficacy in functional outcomes compared with traditional septoplasty with a frontal light, as it allows carving, moulding and resection of irregularities and obstructive deviations of the nasal septum.

Some authors[14–18] have shown the usefulness of milling using electromechanical instrumentation or microdebriders for the treatment of septal deformities, deviations and spurs, allowing greater precision, carving bone irregularities and maintaining the nasal septum straight. PES also enables a selective, quick, secure and more accurate removal of septal defects, reducing surgical time and mucosal damage. Moreover, microdebriders have proven to be more controllable and precise surgical instruments, thus helping to prevent accidental damage and excessive removal of septal skeletal elements.

Microdebrider mills make precise and calibrated movements, thus avoiding the excessive back and forth motion required by manual files and rasps. Mills also have a protective jacket or sheath, which covers the entire rod except for the active part of the drill, thus preventing inadvertent friction damage and trauma to the nasal mucosa, and providing a channel for continuous suction of blood and debris, as well as controlled internal irrigation to prevent overheating of both the bone and the mill. It is important to note that a reckless and improper use of electromechanical instrumentation may cause undesirable damage to the tissue and surrounding anatomical structures. This type of instrumentation also allows modification of septal cartilage thickness. High-speed, oval mills also allow a reduction of the thickness of the cartilage and the tension caused by some deviations of the anterior portion of the septum, generated by the tension or tightness effect of the elastic memory of the septal cartilage.

In this study, we noted that patients undergoing PES presented a significant improvement in the severity of their rhinosinusal symptoms after surgery, and a significant reduction of the immediate postoperative discomfort and associated morbidity. PES also enables faster recovery and satisfaction after the intervention and reduces the use of drugs in the postoperative period. Patients with the greatest level of symptomatic nasal obstruction present considerable improvements after surgery, and obtain the greatest benefit from this procedure.

Conclusions

PES enables an accurate and conservative correction of obstructive septal deviations, especially those located in the superior and posterior region, as in the case of deviations and deformities which cause contact with the lateral nasal wall and compromise ventilation and drainage of the paranasal sinuses. PES also reduces excessive and unnecessary resection of septal cartilage and bone, with fewer complications and better functional results. In our experience, this technique offers significant intraoperative and postoperative advantages, especially among patients with a considerable degree of symptomatic nasal obstruction.

Conflict of Interests

The authors have no conflict of interests to declare.

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