

Nasal airway resistance and complications following functional septoplasty: A ten-year follow-up study*

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SUMMARY

Functional septoplasty was performed upon 63 patients to relieve nasal obstruction due to septa! deviation. The effect of the operation on pre-operative nasal airway resistance was assessed by anterior rhinomanometry at three months (63 patients) and 10 years (35 patients), post-operatively. The operation reduced nasal airway resistance in both the short-term (three months) and long-term (10 years) groups. At the late follow-up, inadequate results were found in six out of 37 patients examined. Two patients had septa! perforations.

Key words: rhinoplasty, septoplasty, rhinomanometry, infection, septa! perforation

INTRODUCTION

Modern functional septoplasty was developed and introduced by Cottle during the late 1950s. The method - which involves a hemi-transfixion incision, preparation of the premaxilla, and access to the septa! cartilage through tunnels - utilizes almost the same approach for different types of deviations. The subjective sensation of nasal obstruction is a poor guide to the objective status. Thus, progress in modern rhinomanometry implies an important contribution to elucidate the conditions in which nasal breathing is restricted. The nasal septum has areas of growth which remain active far up into adult life (Vetter et al., 1984). This phenomenon, scar formation, and the tendency to retraction which invariably takes place following surgery, inspired us to study the short- and long-term effects of septoplasty.

MATERIAL AND METHODS

Between 1982 and 1983, 63 patients underwent functional septoplasty at the Department of Otorhinolaryngology, University Hospital of Umea, Sweden. The group comprised 51 men and 12 women, with a mean age of 31 years (range: 17-56) and 27 years (range: 17-43), respectively. Nasal airway resistance (NAR) was assessed by anterior rhinomanometry pre-operatively, at 3 months, and approximately 10 years post-operatively (range: 9 years and 5 months to 10 years and 9 months). At the three-month follow-up all patients participated. At the 10-year post-operative control, nine patients had moved from the region, one had died, and one had been re-operated at a later occasion. These 11 cases were excluded from the study. Of the remaining 52 patients, 15 declined to participate in the follow-

up study. Thirty-seven patients (31 men and 6 women) attended for rhinomanometry and anterior rhinoscopy in 1992. Thirty-five patients underwent rhinomanometry. Two patients were found to have a septa! perforation and rhinomanometry was therefore not performed.

Functional septoplasty was performed by any of six junior ENT-surgeons according to current operative principles. Nasal resistance to airflow was determined by active anterior rhinomanometry using a Mercury Electronics NR6 Rhinomanometer. The mucosa was decongested with topical spray (oxymetazoline.HCl). The method was described by Broms et al. (1982) and expresses the nasal airway resistance (NAR) as the degree of the angle (V_2) on the flow-pressure curve where it intersects a circle of 200 radius units. For statistical evaluation, the angle V_2 is used; the relevant $NAR = \tan V_2$. The same method was applied in all measurements. The method used conforms to that recommended by the Committee Report on the Standardization of Rhinomanometry (Clement, 1984). In addition to the rhinomanometry, the 10-year follow-up also consisted of an anterior rhinoscopy and a detailed questionnaire concerning whether the patients were satisfied - or not - with the results of the operation and the nasal breathing. Statistical analysis of the objective rhinomanometric data was carried out using Student's t-test. The V_2 values in Figure 3 are expressed as means \pm SD. P-values < 0.05 were considered significant.

RESULTS

Rhinomanometry done three months after septoplasty showed that nasal airway resistance was restricted in all but one of 63

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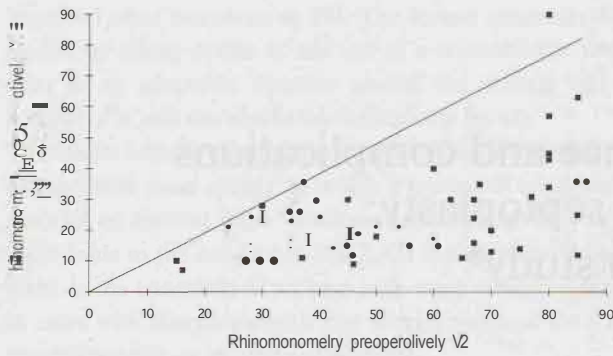


Figure 1 Pre-operatively narrower cavity. Results of septoplasty on V_2 in 63 subjects. To illustrate the result of surgery, comparison is made between the V_2 values pre- and post-operatively. The function $y=x$ is plotted as a diagonal. The values below the diagonal indicate improvement. The value above the diagonal represents a failure.

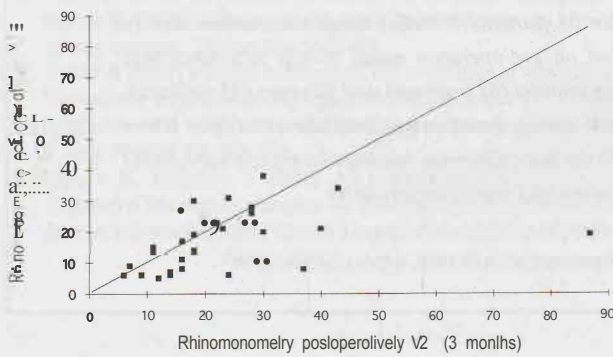


Figure 2 Pre-operatively narrower cavity. Long-term results of septoplasty on V_2 in 35 subjects. Comparison of the three-month post-operative results with the results in 1992 (10 years later). The function $y=x$ is plotted as a diagonal. Most values orientate close to the diagonal, indicating that post-operative values are nearly the same at 10 years as those at three months.

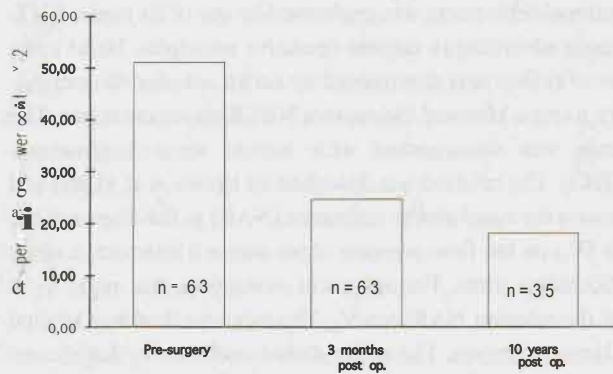


Figure 3 The effect of septoplasty on nasal airway resistance (NAR) in 35 subjects. Pre-operatively narrower cavity. By calculating the mean values of V_2 , a rough summary of Figures 1 and 2 has been made. Nasal airway resistance (NAR) = $\tan V_2$. Pre-operative V_2 (51.2±21.5) versus post-operative V_2 at three months (23±14.3; $p < 0.001$). Post-operative V_2 at three months versus post-operative V_2 at 10 years (18.2±9.0; $p > 0.05$).

patients (Figure 1). At the 10-year follow-up the nasal airway resistance values from the first follow-up were unchanged (Figure 2). By calculating the mean values of V_2 a rough summary of Figures 1 and 2 has been made (Figure 3). There was a significant reduction of V_2 of the pre-operatively narrower cavity, both at three months and 10 years after surgery ($p < 0.001$).

Table 1 Evaluation of interview and rhinoscopy 10 years after functional septoplasty.

number of patients re-operated	4/63 (6%)
satisfied	31/37
septal perforation	2/37
dissatisfied and requested re-operation	2/37

Four of the 63 patients (6%) were re-operated. Three of them were re-operated after the first follow-up and they were not excluded from the study. At the 10-year follow-up, 31 of the 37 re-examined patients were satisfied with the surgical results. Anterior rhinoscopy revealed two patients with septal perforations. One septal perforation was obvious at the first follow-up and the size was about 1 mm. At the 10-year follow up this perforation was only slightly expanded to 3-4 mm in diameter. The other perforation, in contrast, was 10-11 mm in diameter and identified with a minor saddle-deformity at 10 year. Two patients were dissatisfied and requested re-operation, while two patients were not completely satisfied but did not request any further treatment.

DISCUSSION

The results of this study show that the currently used surgical technique used for septal deviations is effective in reducing nasal airway resistance in most subjects operated. The reduction of nasal airway resistance remains the same in the period of 10 years; 31 of 37 (84%) of the operated patients were still satisfied 10 years after surgery. This high rate of success can be partly explained by the fact that our patients have been selected for surgery after pre-operative rhinomanometry. Thus, those with nasal obstruction due to mucosal swelling were excluded from surgical treatment.

To our knowledge, no long-term follow-up study with both rhinomanometric and rhinoscopic techniques for evaluating the surgical results has previously been published. In a recent study, Jessen et al. (1989) reported that 24 of 35 (69%) patients were satisfied nine years after septoplasty. They showed a significant reduction of V_2 of the pre-operatively narrower cavity at nine months and nine years post-operatively. However, post-operative rhinoscopic findings were not evaluated. In a follow-up study by Stoksted (1969), re-operation was a necessity in 14% of plastic septum operations performed according to the conservative Cottle technique

In the present study, at 10-year follow-up, rhinoscopy revealed two patients with septal perforations. Both had a history of early infection or septal abscess during post-operative care. The incidence of nasal septal perforation has been reported to be approximately 1%. Previous septal surgery is responsible for half of these (Younger and Blokmanis, 1985). Masing (1971) reports a single septal perforation from 641 conservative septoplasties performed during a five-year period. We have not been able to find any additional report of septal perforations as a complication after the modern type of conservative septoplasty. Our two cases of septal perforation following post-operative infection raises the question whether pre-operative antibiotic

treatment should be given as a routine procedure in septal surgery. In terms of common septoplasty, post-operative infections are extremely infrequent (Yoder and Weimart, 1992) and there is no support in the literature for per-operative antibiotic treatment when performing uncomplicated septoplasty (Pirsig et al., 1988). In troublesome cases of septoplasty, antibiotic treatment would perhaps be beneficial for the outcome of the results.

Altogether six patients had to be re-operated due to persistent nasal obstruction. This number of dissatisfied patients can be anticipated since surgeons who were under training had performed the operations. The results raise the question whether septoplasty should be restricted to skilled ENT-surgeons in order to obtain optimal results. However, a university hospital clinic has the responsibility for training young surgeons in this type of common operation, although it must be emphasized that surgical training must be performed under supervision by experienced surgeons.

In conclusion, this study has shown that septoplasty is effective in reducing nasal airway resistance in the long run. It has also shown that it is important to conduct follow-up studies in different types of surgery in order to identify incorrect methods and surgical techniques and, hence, to improve the quality of health care.

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