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Normalization of maxillary sinus mucosa after FESS. A prospective study of chronic sinusitis with nasal polyps

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SUMMARY

To observe the normalization of antral mucosa after FESS, 71 patients suffering from chronic sinusitis with nasal polyps were enrolled in this study. Pre-operative profiles including history, allergy skin test, and saccharin time test were done. Endoscopic findings of the antral mucosa were divided into 3 groups: polyposis, oedema, and thickening. The time sequence required for normalization of the mucosa was observed through the antromeatal opening. A patient's history of more than seven years, a saccharin time longer than 36 min, and polyposis of antral mucosa are ominous signs for recovery. The most frequent endoscopic finding of maxillary sinusitis is oedema and many of the sinus units (42%) gained complete recovery during the third month. Pre-operative profiles and endoscopic findings during surgery can serve as a reference of recovery time and treatment modality.

Key words: FESS, chronic sinusitis, nasal polyps

INTRODUCTION

Functional endoscopic sinus surgery (FESS) has been commonly applied in the treatment of chronic paranasal sinusitis in the past years. Although many papers have been written on diagnosis, technique, and results, the evaluation of results has largely relied on subjective assessment. This has led to criticism of the successes claimed. Clinically, the improvements in nasal discharge and nasal obstruction were more easily achieved than the improvement of postnasal dripping (Moriyama et al., 1991). In many cases, postnasal dripping observed by endoscopy was overflowed from the maxillary sinus. So, the persistent inflammation of maxillary sinus is one of the causes of failure after FESS. The reversibility and recovery period of maxillary sinus mucosa will play an important role in the treatment of chronic paranasal sinusitis by FESS. To obtain detailed information, a prospective study was undertaken on a series of patients undergoing FESS for chronic paranasal sinusitis with nasal polyps, by means of pre-operative assessment in addition to sequential endoscopic observation through the middle meatal antrostomy.

PATIENTS AND METHODS

The data were derived from 71 patients, ranging in age from 10 to 62 years, all of whom had chronic paranasal sinusitis combined with nasal polyps. Twenty-one of the patients had unilateral sinusitis only. Therefore, the study materials comprised 121 maxillary sinus units (SU). The patient's history ranges from 14 months to 20 years (mean: 87 months). Four patients had been treated by Luc's operation before. The cases of fungal sinusitis were excluded.

Pre-operative assessments

All patients had skin prick tests performed with 10 common allergens (Fang et al., 1988) and allergic symptom profiles to judge the allergic status. Mucociliary function was evaluated by the saccharin time test (Andersen et al., 1974; Stanley et al., 1984) on each side of the nasal cavity.

Operation and post-operative follow-up

The surgery was performed by the author himself under local anaesthesia using the technique as described by Stammberger (1986). Intranasal polypectomy was followed by infundibulotomy, opening of the bullae, clearance of anterior ethmoid cells, opening of basal lamina and middle meatal antrostomy in all cases. Through the antrostomy, the removal of localized abscesses and antral irrigation with normal saline were done. Further clearance of the frontonasal recess, posterior ethmoid cells and sphenoid sinus were performed as indicated by the pathological findings. The pathological change of antral mucosa

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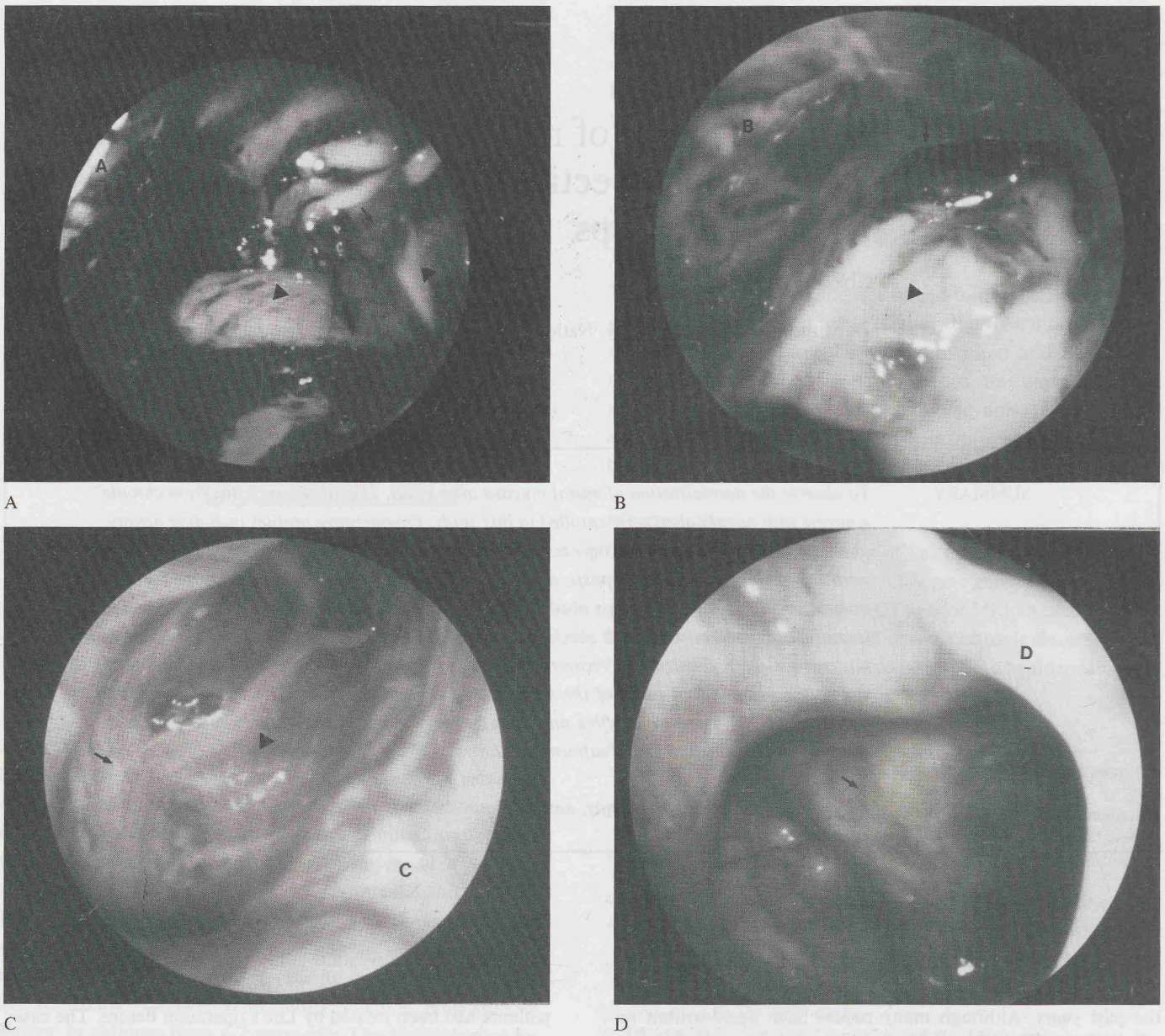

Figure 1. Sequential changes of the antral mucosa in one patient who had chronic sinusitis with nasal polyps after FESS (photography taken through a 30∞ (4 mm) Storz endoscope). A: polyposis change of antral mucosa (arrow) and much mucopus (closed triangle) during operation; B: maxillary antrum (arrow) at the 8th week filled with much mucopus (closed triangle), which is the main cause of post-nasal dripping; C: oedematous mucosa of antrum (arrow) with scant mucopus (closed triangle) at the 12th week; D: the antrum is clear and the mucosa looks healthy (arrow); complete recovery was seen at the 16th week.

under the endoscope was divided grossly into 3 groups: thickening, oedema, and polyposis. All patients were discharged within one week and then regularly treated at the outpatient clinic, initially twice a week, then once a week for suction and irrigation of antrum by endoscope through antrostomy, until the antral mucosa completely healed (Figure 1). If the antral mucosa had not made a complete recovery by the 17th week, then this was considered to be a persistent disease. Each side of the nasal cavity and maxillary sinus was observed as a sinus unit (SU). Data were analysed for statistical significance by means of a Chi-square test with Yate's correction.

RESULTS

There were 72 SU with a history longer than seven years, and 49 SU less than seven years. The 16 SU of the former group had persistent disease, but all of the latter group healed before the 16th week (Figure 2). The four cases who underwent previously a Luc's operation (6 SU) did not completely recover, although the symptoms did improve. There were 88 SU belonging to the allergic group. Twelve of these SU persisted with the disease after the 16th week. There was no significant difference ($p > 0.01$) concerning persistent disease, between the allergic and non-allergic group (Figure 3). However, the group in which saccharin time was less than 36 min (Sakakura et al., 1984) had the early recovery of antral mucosa and less of a persistent

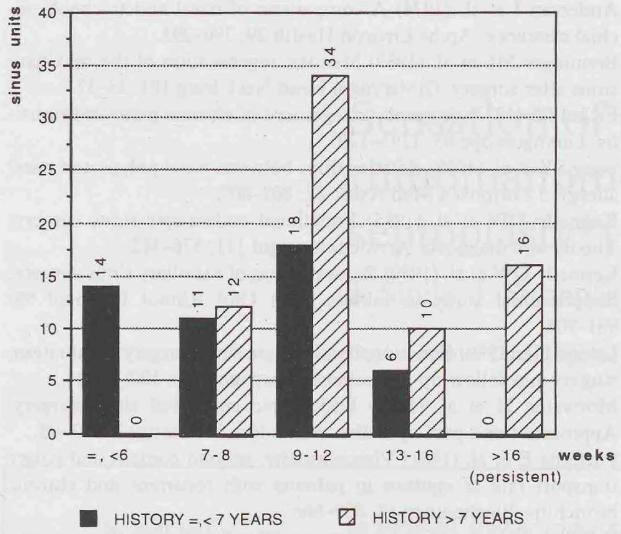

Figure 2. Time sequence of mucosa recovery and the history of sinusitis.

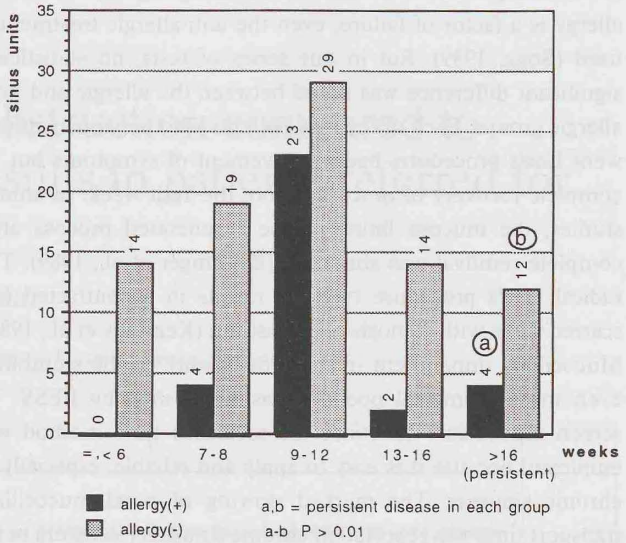

Figure 3. Time sequence of mucosa recovery and allergy.

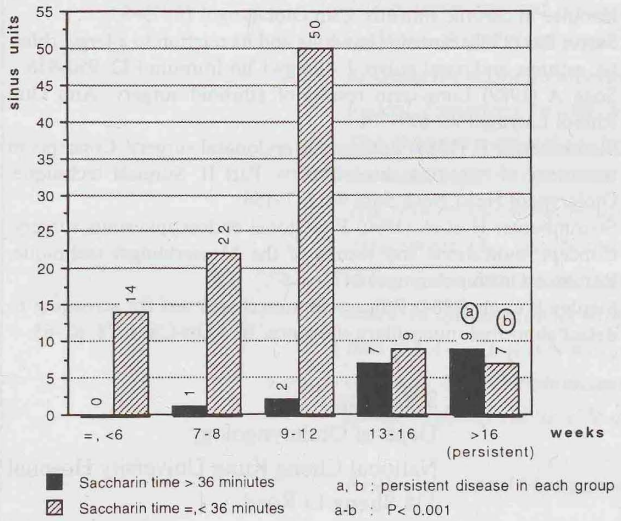

Figure 4. Time sequence of mucosa recovery and saccharin time.

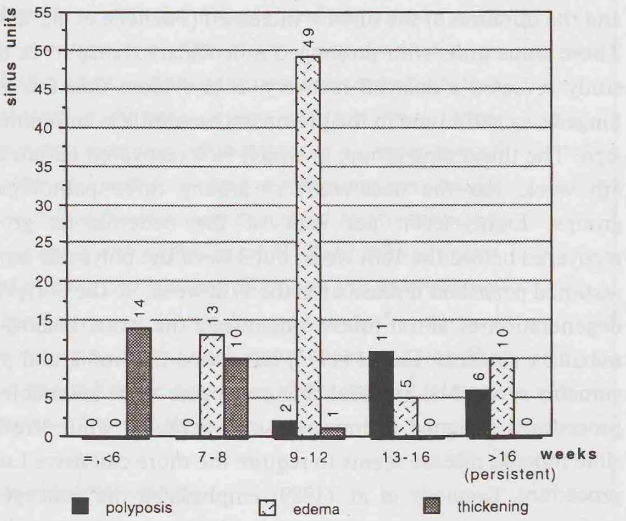

Figure 5. Time sequence of mucosa recovery and pathological change.

disease, compared with the group, whose saccharin time was longer than 36 min ($p < 0.001$; Figure 4). The most frequent gross pathological change in maxillary sinusitis is oedema, followed by thickening and polyposis. Fourteen SU (31%) of the mucosa-thickening group recovered completely before the 6th week and no persistent disease was noted. Forty-nine SU (64%) of the oedematous group recovered during the third month, and 10 SU (13%) made an incomplete recovery. Eleven SU (63%) of the polyposis group recovered during the fourth month, and 6 SU (31%) demonstrated partial recovery (Figure 5). In this study, 43% of the SU made a complete recovery during the third month. One hundred and five SU (87%) recovered before the 16th week and 16 SU (13%) had persistent disease.

DISCUSSION

The technique and pathophysiological principles on which FESS is based have been well described (Kennedy et al., 1985; Stammberger, 1986) and a large series has been published describing the clinical benefits (Levine, 1990; Stammberger et al., 1990). Controversy has included the role of FESS as a possible alternative to the Luc's operation in severe cases. In this prospective study, we observed the recovery sequence in chronic sinusitis with nasal polyps after FESS. The ethmoid lesions as usual showed early improvement after surgery and postnasal dripping, which overflowed from the inflammatory antrum, was most troublesome in many of the cases. So, the reversibility of maxillary sinus mucosa becomes the key point of a complete recovery. Clinically, it is very important to evaluate the relationship between the pre-operative assessments, any pathological changes and the normalization of maxillary mucosa. The greatest number of SU with persistent disease was found in patients with the longer history of polyps. Recurrence is more likely in patients with a long history of polyps (Salvin, 1988). So, the early treatment of FESS is advisable. Twelve SU

(14%) had persistent disease in the allergic group. As usual, allergy is a factor of failure, even the anti-allergic treatment is used (Sogg, 1989). But in our series of tests, no statistically significant difference was noted between the allergic and non-allergic groups. Each of the four patients who previously underwent Luc's procedure, had improvement of symptoms but no complete recovery of mucosa before the 16th week. In animal studies, the mucosa lining of the regenerated mucosa after complete removal was abnormal (Benninger et al., 1989). The radical Luc's procedure typically results in a contracted and scarred sinus with stenosis of the ostium (Kennedy et al., 1989). Mucociliary impairment in these cases may be the stumbling, even the antromeatal opening was established by FESS. To screen mucociliary function, the saccharin time method was employed because it is easy to apply and reliable, especially in chronic sinusitis. The marked slowing of nasal mucociliary transport time was reported in chronic sinusitis (Sakakura et al., 1983). The more severe the disease becomes, the slower the nasal particle transport will be (Sakakura et al., 1978). In chronic bronchitis, the ciliary transport rate decreased as the severity and the duration of the disease increased (Puchelle et al., 1981). These sinus units with prolonged mucociliary transport in this study revealed a delayed recovery. It is evident that the prolonged saccharin time in the pre-operative profile is an ominous sign. The thickening group, in which 96% recovered before the 8th week, has the best recovery among three pathological groups. Eighty-seven per cent of the oedematous group recovered before the 16th week, but 31% of the polyposis group assumed persistent disease until the 17th week. So the polyposis degeneration of antral mucosa manifests the worst healing of maxillary sinusitis. Eichel (1973) has stated that mild, and presumably reversible, mucosal changes appear to be amenable to procedures designed to improve sinus aeration, while irreversible mucosa disease seems to require the more extensive Luc's procedure. Kennedy et al. (1989) emphasized the concept of performing a conservative sinus procedure rather than a radical mucosa removal as a first procedure. Pre-operative assessments including history, allergy and saccharin time, and the endoscopic findings of antral mucosa change can be advised as the reference for recovery time and choice of procedure.

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