

Clinical and cytomorphological alterations of nasal mucosa in laryngectomized patients

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SUMMARY

A group of laryngectomized patients were rhinoscopically examined. The nasal mucosa was found to become thinner and change its colour over time. The nasal mucosa swabs from the same patients were cytologically examined at various time intervals following laryngectomy, revealing degenerative alterations of the multi-layered epithelium that occurred as a consequence of the nose exclusion from its function due to laryngectomy. Our experience has shown these degenerative changes to be completed within a two-year post operative period, as indicated by the fact that both the clinical and cytological findings obtained after that time point remained practically unchanged.

INTRODUCTION

The continuity of respiratory airways is interrupted by laryngectomy. In these patients, their respiratory system begins from tracheostoma. The physiology of breathing is severely impaired (Drettner, 1979; Cvetnić et al., 1986). What will be the nasal mucosa reaction to these entirely new conditions of functional inactivity? This question will hopefully be at least partially answered in this paper presenting a clinical and cytomorphological study of nasal mucosa. As neither of the methods employed is aggressive, the patients were generally willing to undergo the examinations proposed.

SUBJECTS AND METHODS

Thirty-two laryngectomized patients, 29 males and 3 females, aged 45-78 years, were included in the study during the 1985-1987 period. The time elapsed from the surgery varied but most patients were examined during the first or second year following laryngectomy (Figure 1).

In the clinical part of the study, anterior and posterior rhinoscopy was used, with particular reference to the colour and thickness of mucosa, and the possible pathological content in the nasal cavities.

For cytology, a swab of the mucosa stained according to Papanicolaou was used. This method has proved best in the exfoliative cytomorphological diagnostics (Figure 2).

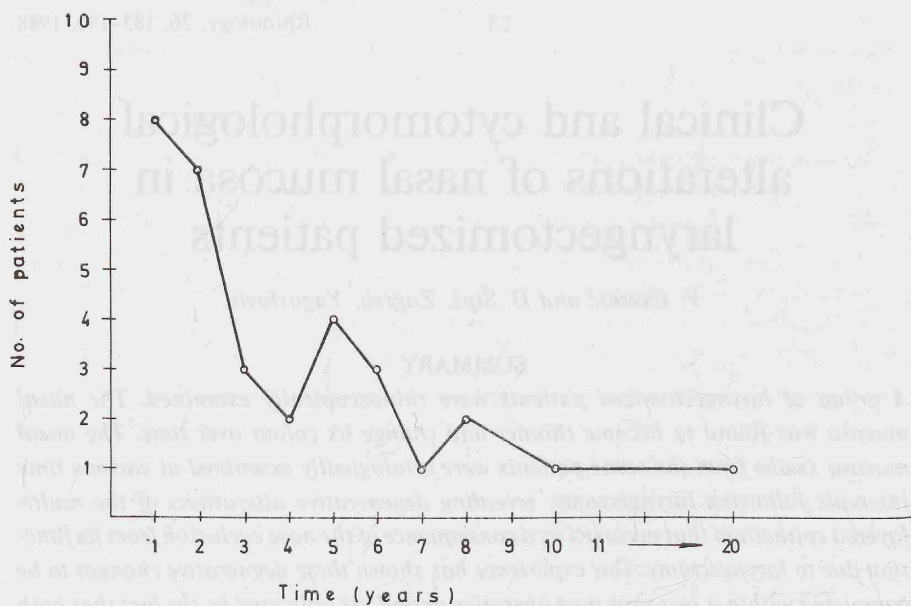


Figure 1. Number of patients in relation to time since laryngectomy

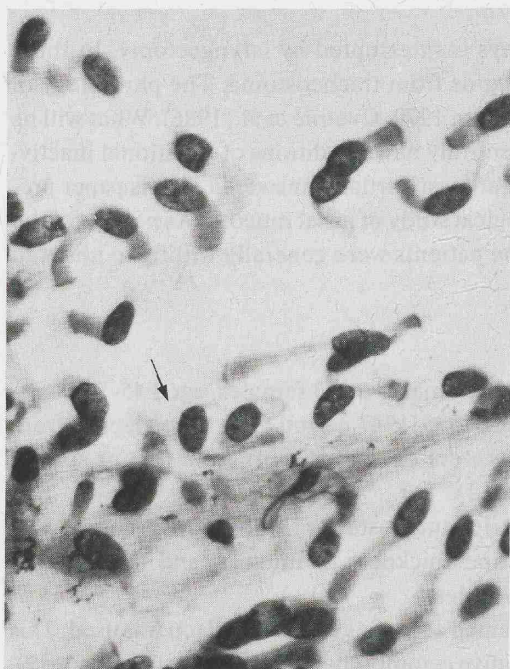


Figure 2. Cylindric ciliated cells and goblet cells. The arrow indicates one goblet cell. (Papanicolaou, x 400).

RESULTS

Observation of the colour of the nasal mucosa of laryngectomized patients revealed the colour to change from pink-red to livid as early as during the second month after surgery, subsequently changing into light-blue. Pathological secretion was found in the nose of these patients up to the end of the second month following surgery, whereafter it could not be detected there anymore. The nasal mucosa was also observed to become thinner over time, which manifested as an enlargement of nasal spaces. Three months after surgery, clinical picture of the nasal mucosa did not differ from that obtained in patients examined much later, indicating that the nasal mucosa assumes its nearly definite appearance during a three-month postoperative period.

Cytological findings: In swabs of the nasal mucosa where a nasogastric probe had been postoperatively inserted, especially in cases where it had to remain there for a prolonged period of time, large amounts of granulocytes, phagocytes, bacteria, squamous cells and surface squamae were detected during the first month following surgery. In one of the patients, fungal spores, abundant squamous anucleated cells and inflammation-altered cylindric cells were observed (Figures 3 and 4).

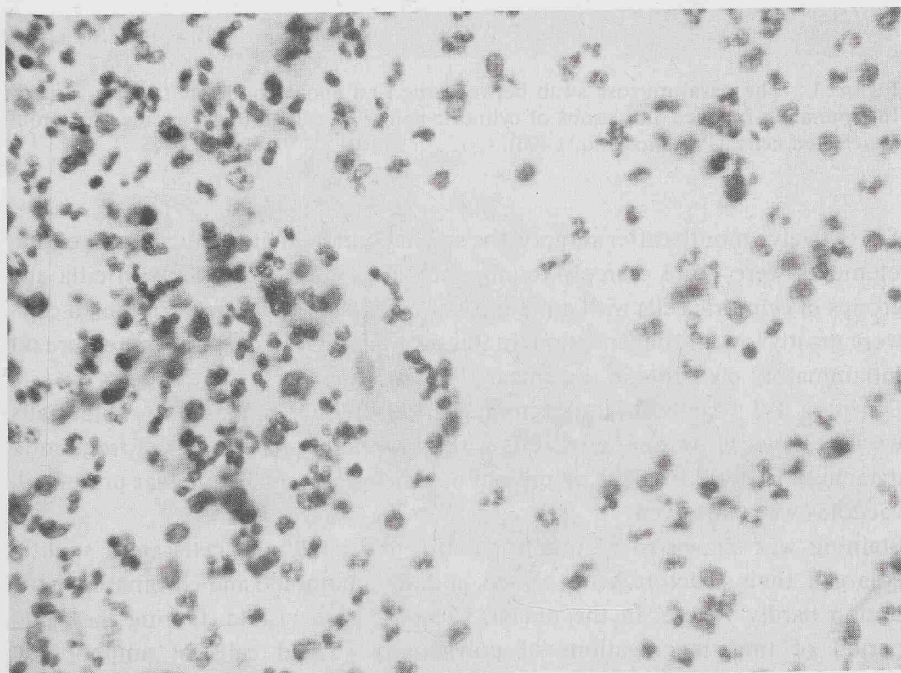


Figure 3. The nasal mucosa swab from a laryngectomized patient, a month after surgery. Plenty of bacteria, granulocytes, phagocytes and a few squamous cells. (Papanicolaou, x 200).



Figure 4. The nasal mucosa swab between the first and second month after surgery. Inflammation-induced alterations of cylindric epithelial cells. Fungal spores, squamous anucleated cells. (Papanicolaou, x 400).

Six to twelve months after surgery, the smear contained little mucus and cellular elements were quite scarcely found. Individual cylindric cells with cilia and groups of cylindric cells with quite meager cytoplasm were seen. Epithelial cells were mostly low and degenerated. In this post-laryngectomy phase there were no inflammatory elements in the smear (Figure 5).

During a 1-5 year post-laryngectomy period, neither mucus nor goblet cells were observed. Low epithelial cells with or without cilia were most frequently detected. In these cells, the cytoplasm was meager, and where it was preserved, vacuoles were observed.

Staining was shown to vary considerably. Nuclei of the cells were slightly enlarged, their structure being erased, and the membrane and chromatin distribution hardly visible. In the nuclei, vacuoles were visible. During the same period of time, aggregations of polygonally shaped cells of amphophilic cytoplasm, which was more homogenous and dense, were also observed. These alterations are typical of metaplasia. In some patients, such cells could occasionally be detected as early as a year after surgery (Figures 6 and 7).



Figure 5. The nasal mucosa swab six months after laryngectomy. Low and degeneratively altered cells of the nasal mucosa epithelium. A few cylindric cells with cilia. (Papanicolaou, x 400).

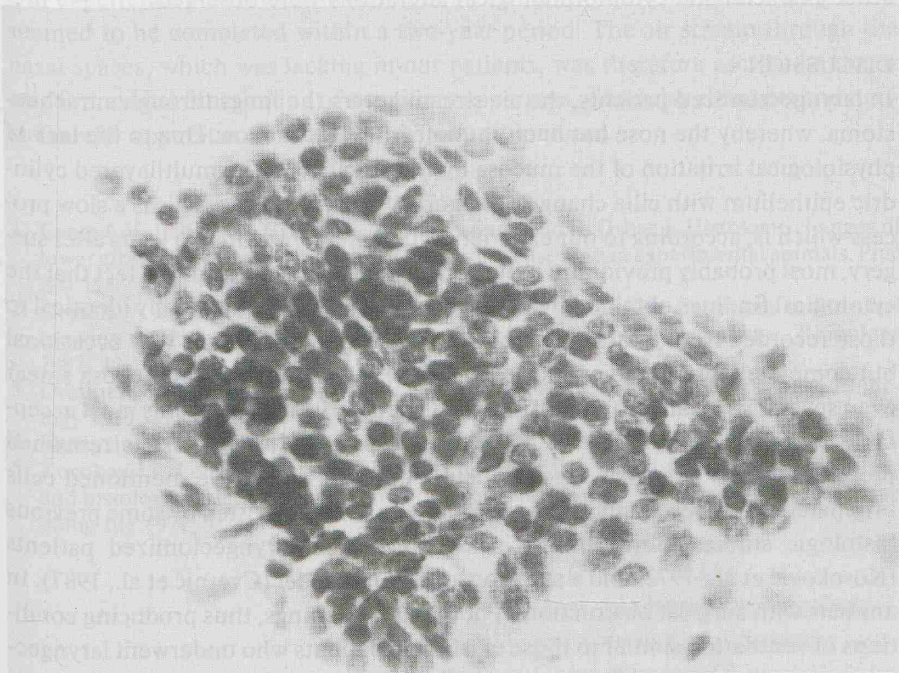


Figure 6. The nasal mucosa swab five years after laryngectomy. Low epithelial cells, some of them with preserved cilia. Vacuoles visible in the cytoplasm and nuclei. (Papanicolaou, x 200).



Figure 7. Polygonal metaplastic epithelial cells four years after laryngectomy. (Papanicolaou, x 400).

In the nasal mucosa smears of patients who survived five years after surgery, no other characteristic cytomorphological alterations were observed.

DISCUSSION

In laryngectomized patients, the air stream enters the lungs through a tracheostoma, whereby the nose has been shut off from its function. Due to the lack of physiological irritation of the mucosa by the air current, the multilayered cylindric epithelium with cilia changes and goblet cells disappear. This is a slow process which is, according to our experience, completed within two years after surgery, most probably providing a quite conceivable explanation of the fact that the cytological findings obtained two years after surgery were practically identical to those recorded from that time point on. The second question is why occasional but completely preserved cylindric cells were found in the nasal mucosa smear even several years after laryngectomy had been performed. It seems most acceptable to explain this by the fact that the respiratory mucosa islets remained preserved at the sites of better perfusion, and that the above mentioned cells originated from these islets. Such an explanation was suggested by some previous histologic studies of respiratory nasal mucosa of laryngectomized patients (Kosoković et al., 1972) and a study on an animal model (Cvetnić et al., 1987). In animals with surgical obstruction of both nasal openings, thus producing conditions of ventilation similar to those existing in patients who underwent laryngectomy, cytomorphological degenerative alterations of respiratory epithelium almost identical to those observed in laryngectomized patients were recorded, but within a shorter time interval.

During our study, sinusitis was observed not to affect patients who had undergone laryngectomy, which has already been reported on (Kosoković et al., 1972). This could be explained in a dual manner: Firstly, in laryngectomized patients there is no air stream through the nose and thus no potential cause of inflammation can enter the nasoparanasal spaces. Secondly, all the respiratory nasal mucosa elements, from the cylindric epithelium through the basal membrane, will be destructed, and thus the reaction of the mucosa to the possible agent entering nasal cavities in some other way will reach them in a very reduced form or is actually made impossible (Cvetnić et al., 1987). This concept of the destruction of all musocal layers in the conditions of the nose exclusion from its function may also serve to explain why the nasal mucosa becomes thinner over time, which has been elaborated above.

CONCLUSION

On the basis of our observations, thereby using rhinoscopy as a clinical method of examination and cytological testing of swabs of the nasal mucosa from laryngectomized patients, exclusion of the nose from its function can thus be deductively concluded to result in degenerative alterations of the nasal respiratory mucosa. Our experience points to destruction of all elements of the mucosa. This process seemed to be completed within a two-year period. The air stream through the nasal spaces, which was lacking in our patients, was therefore ascribed a major role for normal functioning of the ciliary apparatus, glandular elements and neurovascular apparatus of the nasal respiratory mucosa.

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