

## THE EFFECT OF CRYOSURGERY ON THE NASAL MUCOSA IN CHRONIC RHINITIS

(A histological and cytological study)

Eino Holopainen and Bertel Grahne, Helsinki, Finland

Electrocoagulation is still a method fairly frequently used in the treatment of chronic hyperplastic rhinitis (Valobro et al., 1963 and Saeki, 1965). Most authors do not recommend its use, however, because electrocoagulation may cause permanent damage to the mucous membrane, such as epithelial defects and deep sclerous scars. For this reason its use has mostly been restricted to complicated, advanced mucous membrane processes where other therapeutic methods have proved to be ineffective.

The use of cryosurgery in diseases of the mucous membrane has not yet been studied very much. The Frenchmen Laffolé (1967) and Letscher (1969) have performed clinical studies on the use of cryosurgery in nasal affections. So far, systematic, histocytological studies have not been undertaken, however. Indeed, quite recently Ozenberger (1970) histologically studied a few cases of chronic rhinitis, but he used a method of cryosurgery differing from that used in the present study.

### Material and methods

The material comprises 48 patients, 34 women and 14 men. Among these patients a total of 59 biopsies were taken before and/or after cryosurgery, that is 36 biopsies prior to surgery and 21 posteriorly. Efforts were made to take the biopsies from the same side of the inferior turbinate before as well as after the treatment. The postoperative biopsy was taken further back than the first biopsy but within the cryotreated area. The postoperative biopsies were taken 2-6 months after treatment. Sixty-four cytological samples were accumulated, 42 pre-operatively and 22 postoperatively.

The fixation and staining methods employed in the present study have been explained in detail in an earlier study (Holopainen, 1967).

### RESULTS

The histological changes visible in the mucous membrane before as well as after cryosurgery are presented in Table 1.

It is evident from this table that cylinder epithelium occurred in 81% of the biopsies taken before surgery. The cilia were preserved in 31% of the cases. The corresponding figures after cryosurgery were 85% and 55%, respectively, that is approximately the same figures. Prior to surgery hyperplasia was present in the mucous membrane in 44% and early stage of metaplasia in 25%

Table I. Pre-operative and postoperative histological findings in vasomotor rhinitis

Epithelium	Pre-operative		81	Postoperative		85
	Cases	%		Cases	%	
Ciliat. cyl. epit	14	31	81	11	55	85
Unciliat. cyl. epit.	18	50		6	30	
Hyperplastic epit.	16	44		10	50	
Metaplastic epit.	9	25		1	5	
Metachromasia	7	19		15	75	
Lamina propria	Pre-operative			Postoperative		
	Cases	%		Cases	%	
Increase in round c. infiltration	31	86		16	80	
Increase in tissue eosinophilia	12	33		11	55	
Occurrence of tissue mast cells	4	11		2	10	
Increase in glands	17	47		7	35	
Increase in collag.	21	58		17	85	

of the cases, whereas the corresponding figure postoperatively was 50% of hyperplasia and only one case of metaplasia. Toluidine metachromasia occurred in the epithelium more often after than before cryosurgery. I will return to the epithelial changes when discussing the results.

In the lamina propria, round cell infiltration occurred pre-operatively in 86% of the cases and postoperatively in 80%. Correspondingly, tissue eosinophilia was present in 33 respectively 55% of the cases. Tissue mast cells appeared very sparsely, as is evident from the table. The functioning, active glands of the stroma clearly decreased after cryosurgery, whereas the amount of collagen increased.

Table II presents the cytological findings.

An increased amount of secretion eosinophils was noted in 55% of the cases which had not undergone cryosurgery, whereas after cryo-treatment 67% of the cases showed the presence of eosinophils. Basophilic cells occurred very sparsely in both groups. On the other hand, all cases showed abundant

Table II. Pre-operative and postoperative cytological findings in vasomotor rhinitis

	Pre-operative				Postoperative			
	None or few Cases	%	Mod. or many Cases	%	None or few Cases	%	Mod. or many Cases	%
Secretion eosinoph.	19	45	23	55	8	33	16	67
Neutrophils	19	45	23	55	15	63	9	37
Mast cells	42	100	—	—	23	96	1	4
Cylinder cells	—	—	42	100	—	—	24	100
Goblet cells	6	14	36	86	3	13	21	87
Metaplastic	39	92	3	8	23	96	1	4
CCP cells	39	92	3	8	23	96	1	4

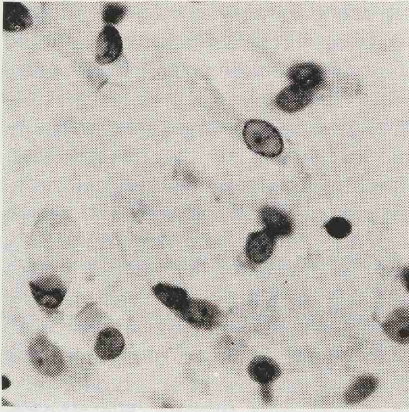


Figure 1. Goblet cells in secretion (after cryosurgery). Papanicolaou 550 x.

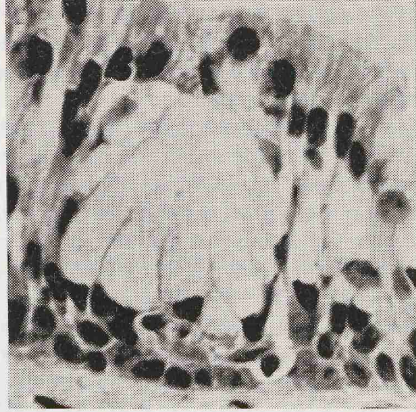


Figure 2. Goblet cells in epithelium (after cryosurgery). Van Gieson 520 x.

numbers of cylinder cells, either with or without cilia. In most cases goblet cells occurred more abundantly than normal. Metaplastic cells appeared very seldom both before and after cryosurgery (Figure 4).

#### Discussion and conclusion

In the biopsies of the present material the cylinder epithelium was remarkably well preserved, before as well as after surgery. The cilia were visible in more than 30% of the biopsies in both groups. This is a surprisingly high percentage, considering that when taking biopsies the epithelium is always damaged or destroyed in part of the cases. Metachromasia was present in the epithelium in small amounts. Metaplasia occurred remarkably seldom, usually at an early

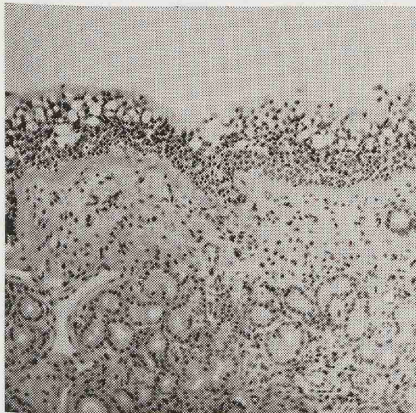


Figure 3. Cystic degeneration of epithelium (before cryosurgery). Van Gieson 100 x.

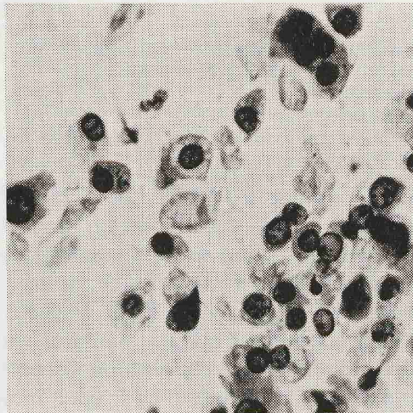


Figure 4. Metaplastic cells (early stage) (before cryosurgery). Papanicolaou 500 x.

stage. Epithelial cystic degeneration was present in only one case (Figure 3). However, when judging the frequency of epithelial changes it should be borne in mind that a biopsy represents only a small area of the nasal mucous membrane.

The most characteristic change in the lamina propria before surgery was increase in the number of glands, noticeable in almost all the cases. Post-operatively the number of functioning glands decreased. Round cell infiltration was also present in almost all the cases. On the other hand, tissue eosinophilia did not appear in the majority of the cases. Approximately 50% of the cases did not show any tissue eosinophils and clinically these findings correlate with the cases showing the clearest symptoms of vasomotoric rhinitis. Tissue mast cells appeared surprisingly seldom. Only one case showed an increase in the number of mast cells. In about 80% of the cases the amount of collagen had clearly increased in the stroma after cryosurgery, which is an evidence that the mucous membrane was fibrotic. Histological changes did not appear very often in the epithelium after cryosurgery, despite the fact that efforts were made to take the biopsy from the area exposed to cryosurgery. Again it should be mentioned that a biopsy represents only a small part of the entire mucous membrane. The number of blood vessels diminished to some extent, which was in accordance with the clinical finding that, when taking the postoperative biopsy there was much less bleeding at the mucous membrane defect than when taking the pre-operative biopsy.

The exfoliative cytological sample gives information on a larger area of the nasal cavity. However, the cytological sample only reports on the changes in the surface of the epithelium, and only indirectly does it give information on the deeper layers of the mucous membrane.

Secretion and tissue eosinophilia show a fairly good correlation with each other.

Table III. Tissue and secretion eosinophils and their correlation

	Pre-operative Cases	%	Postoperative Cases	%
Increase in tissue eosinoph.	12	33	11	55
Increase in secretion eosinoph.	23	55	9	37
Correlation	24	71	13	81
No correlation	10	29	3	19

It is evident from the table that the eosinophils had increased simultaneously in both the secretion and the tissue in 71% of the cases prior to cryosurgery, and in 81% postoperatively. It should be mentioned that blood eosinophilia shows a much poorer correlation with tissue eosinophilia than secretion eosinophilia does. In the cytological samples of the present material, the predominant cellular element was the ciliated or unciliated cylinder epithelial cell. Goblet cells also occurred fairly frequently (Figures 1 and 2). The occurrence of these two cell types indicates the vitality of the mucous membrane and it is also an indication that no advanced metaplasia has taken place in the mucous membrane. Occasionally, however, metaplastic cells were visible in the cellular samples. As seen in Table II no marked changes occurred in the cellular

population when comparing the samples taken before and after surgery. The results obtained in the present study indicate that the cryosurgical method used does not cause significant permanent changes in the mucosa nor in the secretion. However, only with a more comprehensive material and after a longer observation period will it be possible to draw more reliable conclusions.

### SUMMARY

Histo-cytological studies were done on 48 patients suffering from chronic rhinitis. Biopsies as well as exfoliative cytological samples were taken both prior and posterior to cryosurgery. In the present study no permanent changes in the structure of the mucous membrane could be noted.

### RÉSUMÉ

Des études histo-cytologiques ont été effectués sur 48 patients souffrant d'une rhinite chronique. Des biopsies de même que des preuves cytologiques exfoliatives ont été prises aussi bien avant qu'après la cryothérapie. Dans la présente étude aucun changement permanent dans la structure de la membrane muqueuse n'a pu être constaté.

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Otorhinolaryngological Hospital,  
University of Helsinki,  
Haartmaninkatu 4 E,  
Helsinki 29, Finland.