

Some Factors Concerning the Distribution of Bronchial Glands

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ABSTRACT

It is well known that the secretion from bronchial glands play an important role to make the airway clean up against sticky bronchial secret. The aim of the present study was to evaluate the relationship between the functional modality of bronchial glands and occurrence of postoperative pulmonary complication due to difficulty of expectoration.

However, the noteworthy development of bronchial glands was proved histologically with a distribution index (DI) in each circumstances of either the elderly more than 40 of age or existing inflammation of bronchial trees.

Based on histochemical examination by means of PAS stain, the almost same attitudes in regard to magnitude of secretion were not necessarily documented even among bronchial glands with marked development.

It was of note that the intimate correlation between secretory behavior of bronchial glands and development of bronchial glands was not certified in the series of this study and that secretory function of bronchial glands did not compatible with pronounced distribution and marked development of them.

As a result of this study, the preventive role of bronchial glands from occurrence of postoperative pulmonary complication has not been substantiated by morphological and biochemical study.

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INTRODUCTION

Postoperative pulmonary complication is one of the serious and major complication associated with various kinds of operation. Moreover, it is stressed that its incidence is not necessarily low despite of advancing pre- and postoperative cares.¹⁾²⁾

In general, postoperative pulmonary complication does not infrequently encountered in the elderly and the main causes are the impairment of expectoration due in part to depression of cough reflex induced by postoperative pain and due in part to preoperative obstructive ventilatory failure.

The meticulous postoperative care is necessary for prevention against postoperative pulmonary complication, such as postural drainage, nebreization, therapeutic bronchoscopy etc.

These recommended cares against accidental postoperative pulmonary complication are mainly to make the air way clean up for retention of the sputum.

It is documented that a large number of bronchial glands play an important role for cleaning up of bronchial tree, in which serous and mucous secretion from bronchial glands enable it to provide an easy transport and to decrease a viscosity of the sputum in order to expel it away from airway as easily as possible.

This study is to certify the preventive effect of postoperative pulmonary complication with special reference to its distribution and function of bronchial gland.

MATERIAL AND METHOD

Surgical specimen of bronchial stump was subjected to histological examination following pulmonary resection. The distribution of bronchial glands in bronchial wall was presented with a ratio in area occupying bronchial gland to bronchial lumen within the microscopical specimen. The specimen of bronchial stump was taken a picture with a magnification of more than 50 times through light microscopy.

On these microscopical pictures, the areas occupying either bronchial gland or bronchial lumen were respectively separated by accurate maneuver of cutting. The each pieces of picture separated either bronchial gland or bronchial lumen were weighed in the microbalance. The ratio of bronchial gland to bronchial lumen in weight of each pieces were presented as a distribution index (DI) of bronchial gland.

Furthermore, PAS stain was applied to assess secretory function of bronchial gland, which showed histochemical stain of mucoprotein, glycoprotein and polysaccharid in secretion of bronchial glands.

RESULT

The distribution index (DI) of bronchial glands was investigated in relation to age. As shown in Fig. 1, the values of DI increased gradually with advancing age.

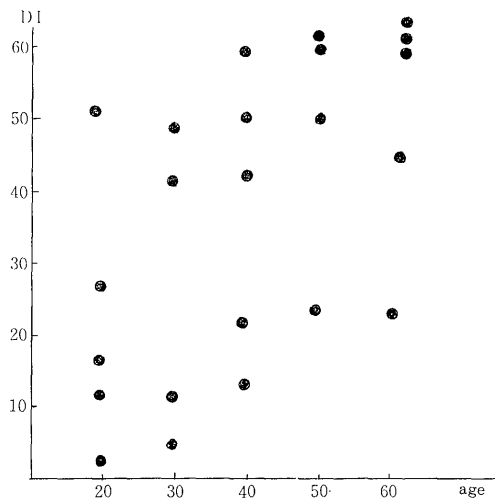


Fig. 1 Relationship between age and distribution index (DI) of bronchial gland, showing increased DI according to advancing age.

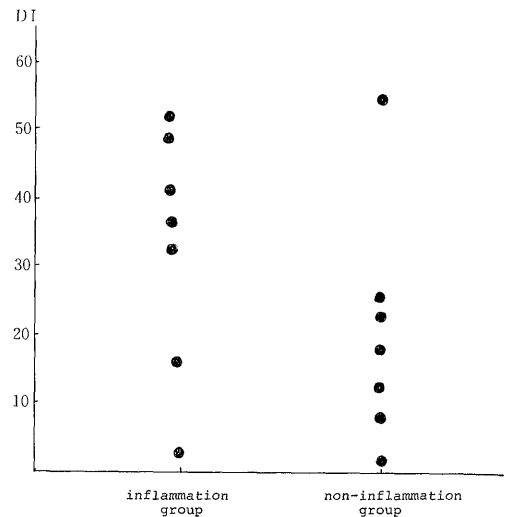


Fig. 2 Relationship between DI and the degree of histological inflammation in bronchial wall, showing increased DI by existence of inflammation in bronchial wall.

In general, the values of DI were shown with wide range in each groups from 20 to 60 years of age. However, its values became to be high in the elderly, especially more than 40 years of age.

From the view of age, it was shown that the distribution of bronchial glands has become to be intensely over 40 years of age, compared with that of young group. Furthermore, the DI of bronchial glands, as shown in Fig. 2, increased apparently according to the existence of inflammation in bronchial wall. The degree of existing inflammation of bronchial wall was estimated by finding of submucosal cell infiltration microscopically as shown in Fig. 3.

As indicated in Fig. 2, the notably high level of DI in regard to existence of inflammation was not necessarily documented. However, it has been shown a tendency that the increment of DI was identified in cases with inflammation of bronchial wall rather than that without inflammation.

As presumed from above finding, the development of bronchial glands was facilitated by age and existence of inflammation in bronchial trees as an influencing factors.

To assess the function of bronchial glands histochemically, PAS stain was employed. It is well known that PAS stain enable it to detect mucoprotein, glycoprotein and polysaccharide in bronchial secretion of bronchial gland, which document either the behaviors of hyperfunction of bronchial glands or hypofunction.

In cases of corresponding scanty distribution of bronchial glands with low value of DI, an insufficient stain of bronchial glands was obtained with PAS stain, suggesting a small dosis of secretion of mucoprotein, glycoprotein and polysaccharide in bronchial

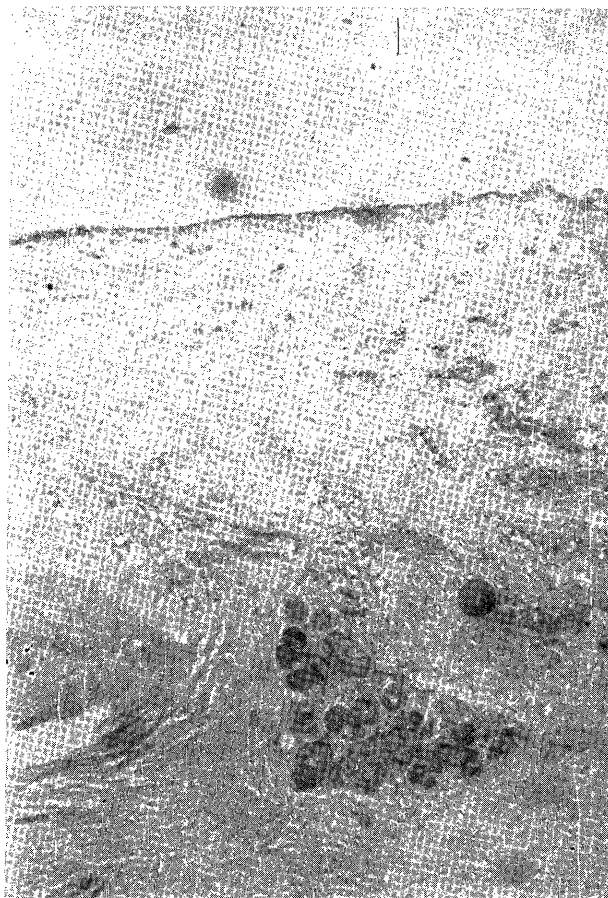


Fig. 3 The microscopic finding, showing marked development of bronchial gland with inflammation in bronchial wall.

gland.

While the bronchial glands developed markedly with high values of DI, two instances were observed, which showed either dense definitive or thin underfinitive color of bronchial gland by PAS stain as indicated in Fig. 4.

Among intense distribution of bronchial gland, the results of PAS stain study did not reveal almost the same hypersecretion of mucoproteins, glycoprotein and polysaccharide. It showed that some were hyperfunction, the other were rather hypofunction despite of hyperplasia of bronchial glands in the morphology based on this study. It was summarized that the hyperplasia of bronchial glands did not result in their hyperfunction and did not lead to relief of postoperative pulmonary complication completely by secretory function itself.

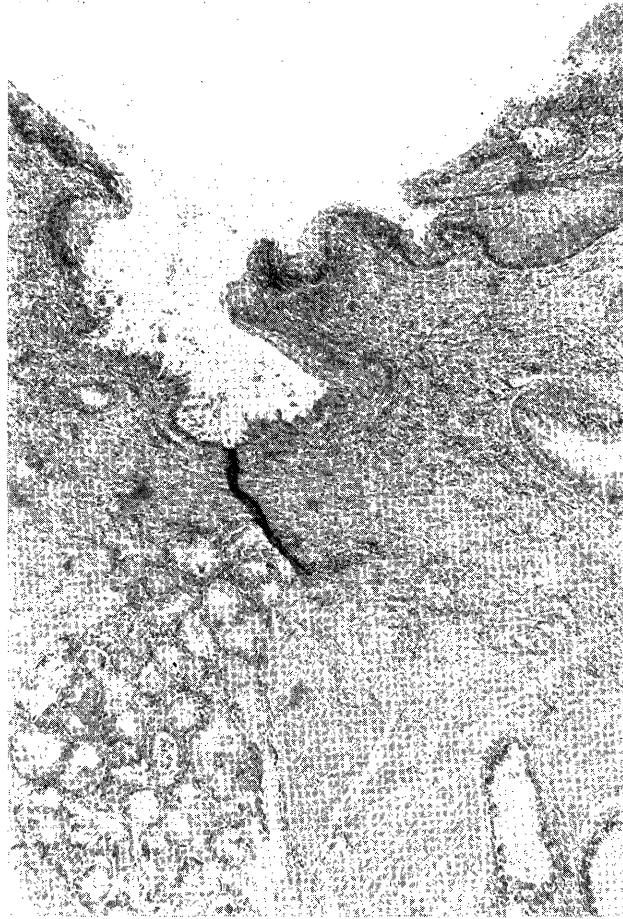


Fig. 4 The feature of bronchial gland by PAS stain study, showing a dense stain of bronchial gland.

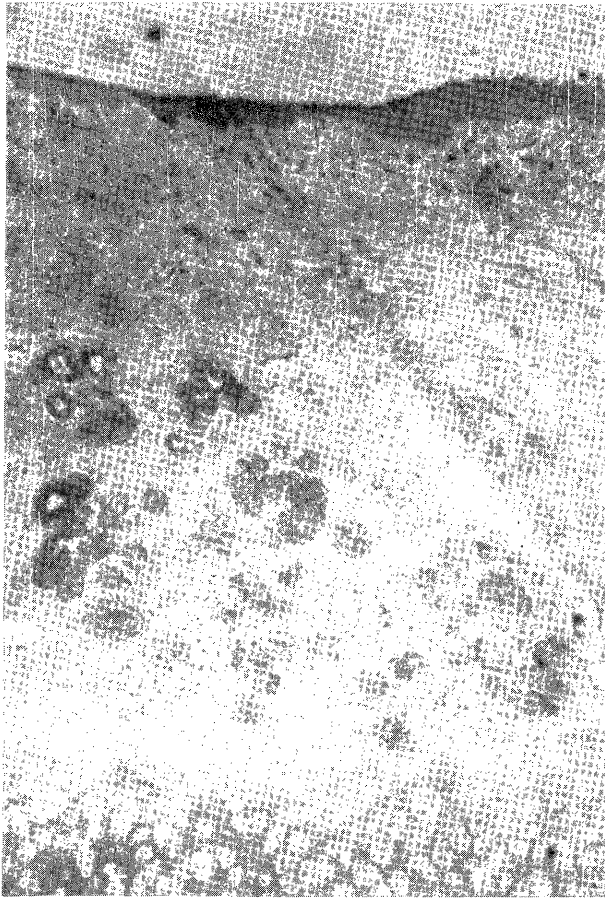


Fig. 5 The feature of bronchial gland by PAS stain study, showing a dense stain of bronchial gland despite low grade of its distribution.

DISCUSSION

Postoperative pulmonary complication arise more frequently in the elderly and in patients with preoperative inflammation of bronchial tree following surgery.¹⁾²⁾

From these clinical experiences in regard to occurrence of pulmonary complication, it is well documented that the factors related to age and existence of inflammation in respiratory tract are more likely to facilitate occurrence of postoperative pulmonary complication.

In this study, it has become apparent that both factors also provided to be hyperplasia and hypertrophy of bronchial glands.

However, this study achieved no preventive evidence of occurrence of postoperative pulmonary complication with aid of hypersecretion of bronchial glands.

In general, secretory function of bronchial gland was beneficial to clean up the airway, providing easily transport by serous or mucous secretion accompanying with cilia movement against intrabronchial foreign body.

Meanwhile postoperative pulmonary complications are initially induced by retention of sputum following to difficulty of expectoration.

Its cause mainly attributes to be due to either dryness of airway or obstructive ventilatory failure.

From these etiological consideration, it has been argued that the role of bronchial gland is large enough to prevent dryness in the airway functionally.³⁾

The development of bronchial gland has been substantiated by study of DI in bronchial glands in the elderly more than 40 of age as well as in patients with bronchial inflammation. In these situation, hypersecretory function of bronchial glands is considered best suited for management of difficulty of expectoration physiologically.⁴⁾ However, hyperfunction of bronchial glands was not shown with a similar fashion by study of PAS stain even in cases with intense distribution.

In general, it is well accepted that secretory function of bronchial glands as well as cilia movement are controlled by innervation of parasympathetic nerve.⁵⁾⁶⁾ It is of note, therefore, that development of bronchial gland is not necessarily compatible with its hyperfunction. In this report, the morphological and functional attitudes of bronchial gland were studied.

The development of bronchial glands seems to arise from the factors of advancing age and concomitant bronchial inflammation.

Whereas, it is no doubt that these factors promote the occurrence of postoperative pulmonary complication. In these circumstance, the development of bronchial glands seems to contribute to preclude from occurrence of postoperative complication. Meanwhile, it was defined that they did not exhibit almost the same secretory function.

From above results, it is emphasized that the development of bronchial glands is not compatible with hypersecretory function and is necessary to evaluate the function of bronchial glands as well as the development in number.

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