ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 17, Issue, 06, pp.33392-33395, June, 2025
DOI: https://doi.org/10.24941/ijcr.48867.06.2025

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

VOCAL CORD POLYPS: INCIDENCE, HISTOLOGY AND PATHOGENESIS

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ARTICLE INFO

Article History:
Received 09th March, 2025
Received in revised form
21st April, 2025
Accepted 19th May, 2025
Published online 24th June, 2025

Key words:
Polyp, Vocal Cord, Voice abuse, Occurence.

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ABSTRACT

On the basis of clinical and histologic examination, history and - epidemiologic survey of 591 patients with vocal cord polyps, the authors evaluate the morphology of the pathologic substrate, indicate possible pathogenesis and analyse the most frequent factors in the formation of polyps such as vocal abuse and unfavourable microclimate at work. Sex does not play any role in the incidence, and the histologic structure is not related to the time factor.

Citation: Dr. Rajendra Singh. 2025. *"*Vocal cord polyps: Incidence, histology and pathogenesis*". International Journal of Current Research, 17, (06), 33392-33395.*

INTRODUCTION

The incidence of benign circumscribed hyperplastic lesions, as well as malignant tumours, of the larynx has been increasing and so has that of the vocal cord polyps. Although, since the introduction of microlaryngoscopy, polyps no longer present diagnostic or therapeutic problems there have remained many problems of this lesion still to be solved. Attitudes differ in regard to the term 'polyp' itself, and a definitive answer concerning the aetiology and morphology of this pathologic entity has not yet been given. This paper seeks to evaluate some open questions, and to analyse critically the data obtained in dealing with this problem over many years.

MATERIAL AND METHODS

A comparison of the number of patients suffering from this disease during the period 2014-2019 with those in the period 2020-2024, has yielded some surprising data. In the first period (2014-2020), 117 patients were treated for benign circumscribed lesions in the larynx, 72 of them for polyps in the second period (2019-2024) benign circumscribed lesions occurred in 863 patients, 591 of them with polyps. Detailed data are shown in Table I. The influence of sex, age, vocal abuse, smoking, and environmental factors on the occurrence of vocal cord polyps, has been analysed and the following data obtained: among patients with polyps, there were 284 males and 307 females. Age and occupation are shown in Tables II and III. The patients were mostly workers in the textile and wood industries. 325 were smokers, and these are ranked into 7 groups according to the number of cigarettes smoked per day (table IV). Excessive misuse of the voice, unfavourable working conditions and a combination of these factors are shown in Table V.

Table - I. Age of Patients

Age	No. of Patients
< 20 years	33
20-30 years	96
30-40 years	137
40-50 years	225
50-60 years	70
60 years and more	30
Total	**591**

Table - II. Occupation

Occupation	No. of Patients
Industry and engineering	218
Commerce and transport	81
Clerks	92
Educationalists	59
Pensioners	44
Students	44
Farmers	4
Others	49
Total	**591**

Table III. Number of cigarettes smoked per day

No. of Cigarettes	No. of Patients
0	266
1-9	41
10-15	103
16-20	111
21-25	11
26-30	44
31 and more	15
Total	**591**

Table IV. Vocal abuse and unfavourable working conditions

	Patients	Percent
Vocal abuse	177	30
Unfavourable working conditions	122	20
Vocal abuse and unfavourable working conditions	129	21
No vocal abuse and good working conditions	163	29
Total	**591**	**100**

CLINICAL AND HISTOLOGICAL DATA

The vocal cord polyp is a well defined, hyperplastic, benign pathologic structure of the mucous membrane, differing in size, pedunculated or sessile, usually lying on the anterior two-thirds of the vocal cord, and pale to dark red in colour. The vocal cord is mobile, unless the size of the polyp interferes with its vibration, and it is usually of normal colour.

The histology of the polyps display various changes in the epithelial and sub-epithelial tissue (Figs. 1-7), and various degrees of epithelial hyperplastia and atrophy were obsrved. The degree of hyperplasia was evaluated by the Kambic-Lenart classification (1971, 1975, 1978) – Table III. In the sub-epithelial tissue of almost every specimen, diffuse or circumscribed edema, fibrosis, dilated vessels, and hyaline and basophil degeneration were noted (Table VI).

Fig. 1. Photomicrograph of vascular vocal cord polyp covered by squalors atrophic epithelium. There is some hyalinization (right arrow) and angiectasis (left arrow) in the stroma. H and E 4×10 = 40.

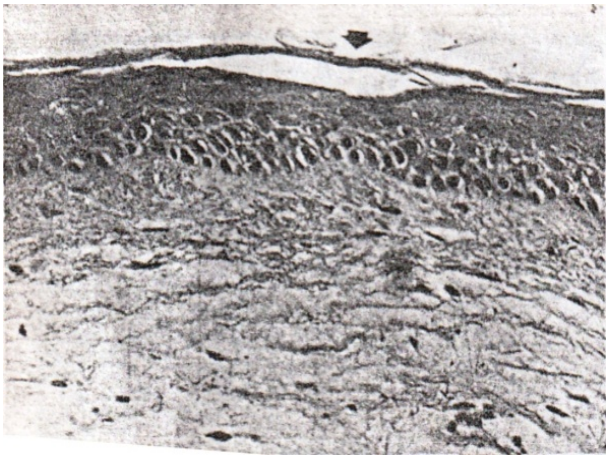

Fig. 2. Laminar desquamation (arrow) on the surface of atrophic epithelium with sub-epithelial oedema. H and E 25×10=250.

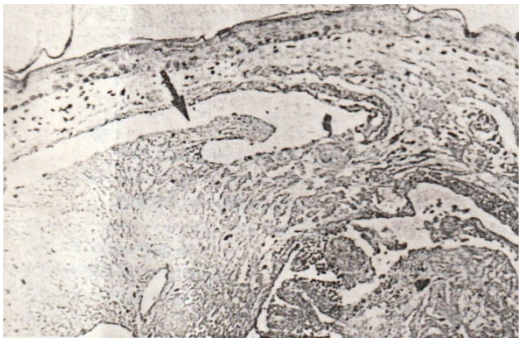

Fig. 3. Detail of Fig. 1, showing keratinizing atrophic epithelium, hyalinization (arrow) and slight oedema along dilated vessels H and E 10×10=100

Fig.4. Sub-epithelial hyalinized stroma with dilated vessels (arrow). H and E 10×10=100

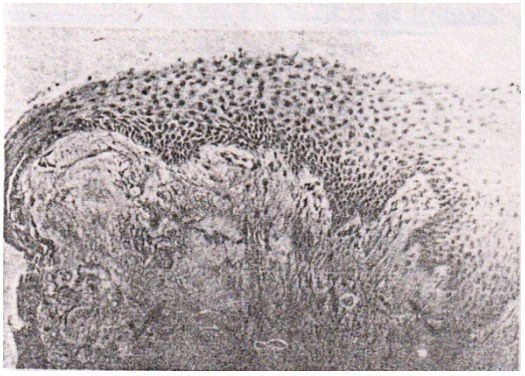

Fig. 5. Simple hyperplasis of epithelium with acanthosis, sub-epithelial basophilic edema (left arrow) and fibrosis (right arrow). H and E 10×10=100.

PATHOGENESIS: The evolution of a polyp might be due to increased hyperaemia of the vocal cord with vasodilatation. The latter results in stasis with increased permeability of the vessel walls, thus causing oedema, which appears predominantly at the border of the anterior or middle third of the vocal cord, where the mechanical force of vibration is most intense. Odema of the sub-epithelial tissue is the fundamental change, found to a greater or lesser extent, in all polyps. It is presumed that further evolution of the protein-rich edematous exudate proceeds in either or both of two directions: to

organization (fibrosis) and/or degeneration (basophil and hyaline degeneration).

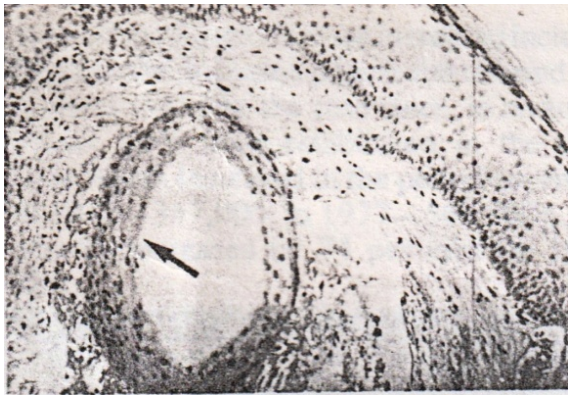

Fig. 6. Simple hyperplasia of epithlium with keratinization, squamous epithelial metaplasis of glandualr duct (arrow), and stromal oedema. H and E 10×10=100

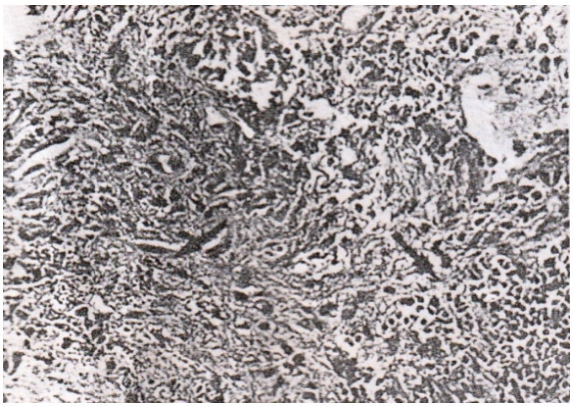

Fig. 7. Haemosiderosis (left arrow) and hemorrhage (right arrow) in sub-epithelial stroma. H and E 25×10 = 250

Table V. Histologic Lesions Of Epithelium

Lesion of epithelium	No. of Patients
Simple hyperplasia	297
Abnormal hyperplasia	97
Atypical hyperplasia	8
Atrophy	166
Combination of atrophy and hyperplasia	23
Total	**591**

Table VI. Histologic lesions of sub-epithelium tissue

Lesion IN SUP-EPITHELIAL TISSUE	No. of LESIONS
Oedema	510
Foci of hyalinosis	325
Angiectatic vessels	278
Fibrosis of stroma	174
Basophil degeneration	92
Inflammatory infiltration	69
focal siderosis	46
Metaplasia of ducts	11

Microscopy showed almost invariably a combination of both stages as well as a combination of basophil and hyaline degeneration and of fibrosis in the same specimen, in varying proportions. In some polyps, there may occur small focal sub-epithelial haemorrhages, composed of erythrocytes or haemosidering pigment. Vasodilatations is present as a rule and is due to the above-mentioned causes, with a more or less enhanced proliferation of vessels, presenting in extreme cases as 'angiectatic' polyps.

DISCUSSION

The incidence of these vocal cord polyps has increased in recent years, perhaps as a result of dynamic changes in our way of life and of unfavourable ecologic conditions, such as smoking, increased industrialization and air pollution. On the other hand, more people seek medical aid, and pathologic changes in the larynx may be detected at an earlier stage. It has been thought that the increased incidence of vocal cord polyps was related to the increased population referred to the department. However, this seems not to be the case since, in recent years, three new ENT departments have been established in the same region. The population in this region increased in the period covered by our study by 59 per cent (in 1948-357,000; in 1977-569,000), and the number of workers in industry increased by 74 per cent (in 1960-184,000; in 1976-320,000). Women were more frequently affected than men (52 per cent against 48 per cent). This ratio differs from the data in the literature. Many authors have noted that the incidence was greater in men (Behrendt, 1964-74 per cent; Kleinsasser, 1974-18 per cent) and, according to Salmon (1979), men are affected twice as frequently as women. It is probable that the high level of employment of women in our country (50 per cent of all employees are women) also affects the incidence of vocal cord polyps. Adverse working conditions may affect the gracile larynx of women. The incidence of polyps among benign circumscribed lesions of the vocal cords in our patients (68.5 per cent) does not correlate with data obtained by other authors (New, 1938-46 per cent; Fitz-Hugh, 1958- 50 per cent; Kleinsasser, 1974-39 per cent). Approximately the same percentage (58 per cent) as in our own statistics, was reported by Behrendt (1964). The diversity shown in different data can be explained by differences in the interpretation of benign circumscribed lesions, since the distinction between polyps and nodules depends largely on personal evaluation.

In the literature (Ackerman and Rosai, 1974; Anderson and Scotti, 1976; Leroux-Robert and de Brux, 1976; Friedmann and Osborn, 1976; Salmon, 1979) there are still disagreements about the term 'polyp'. The distinction between a polyp and a nodule is probably a matter of opinion, since both of them exhibit identical histologic characteristics. An exact and uniform histologic picture of the vocal cord polyp has not as yet been arrived at. We agree with Rubin (1962), that histologic interpretation depends on the pathologist's attitude and experience of benign lesions in the larynx and Maioux and Girard (1939-cited by Arnold, 1962) describe edema, vasodilatation and fibrosis in the histologic picture of a polyp. Ash and Schwartz (1943) focus attention on fibrosis, edema and mucoid, fibrinoid, angiomatous and hyaline degeneration. Csillag (1955-cited by Köhn, 1959) distinguishes edema, hyaline and amyloid degeneration, and fibrosis. Epstein et al. (1975) classify polyps into oedematous, vascular, fibrous and hyalinized. Anderson and Scotti (1976) regard these as stages in the development of laryngeal polyps. There are no pathognomonic changes in the epithelium in polyps; all appearances may occur, from severe atrophy to various stages of hyperplasia, with or without keratosis. Our own hypothesis has been that external causes, particularly dust or cigarette smoke, contribute substantially towards these changes in the epithelium, and that hyper- plasia may appear where these two factors are present. Nevertheless, our findings do not provide absolute proof of this hypothesis, even for smokers, since hyperplastic and atrophic changes were not directly related to

the number of cigarettes smoked per day (Table VIII). Malignant change has never been observed.

Table VII. Relation between histologic lessions of epithelium of vocal cord and the number of cigarettes smoked per day

No. of cigarettes smoked per day	Hyperplasia	Atrophy
Non-smokers	185	81
1-9	8	33
10-15	69	34
16-20	28	83
21-25	4	7
26-30	15	29
31 and more	0	15
Total	**309**	**282**

Almost all authors agree that trauma plays the main role in the etiopathogenesis of polyps; some of them (Arnold, 1962; Anderson and Scotti, 1976) believe that inflammation should also be considered. In our own histologic specimens of polyps, almost no or scanty inflammatory cellular infiltrate has been found. Hence, from the etiopathogenetic point of view, it might be ignored.

CONCLUSIONS

Vocal cord polyps are well defined, benign lesions of the laryngeal mucosa, with typical histologic characteristics. Various stages of hyper- plasia and atrophy can be observed in the epithelium. Oedema, basophil and hyaline degeneration, angiectatic vessels, and fibrosis are found in the subepithelial tissue. Vocal abuse, together with other adverse effects, cause vasodilatation; this is followed by stasis, increased capillary permeability and interstitial edema. The evolution of a protein-rich exudate may lead to fibrosis and/or degeneration (basophil and/or hyaline). The distinction between a polyp and a nodule is only a matter of opinion, since histologically both produce identical changes. Among the possible etiologic factors analysed, the following were considered to be important: an excessive amount of vocal use and faulty vocal technique, and an unfavourable climate at work; there was no difference between smokers and non-smokers. Women are predominant among our patients : however, no reliable explanation of this difference has been ascertained.

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