Lead Article

Study of Histopathological Changes in Atrophic Rhinitis

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Abstract

A punch biopsy from the inferior turbinate was taken in 71 consecutive cases of atrophic rhinitis and studied for histopathological changes. Squamous metaplasia was seen in 85 percent of cases. Tunica propria showed granulation tissue (41 percent) and chronic inflammatory cellular infiltrate (32 percent). Mucosal glands were decreased in 42 percent of cases and absent in 28 percent. Areas of dilated vessels were observed in 35 percent and decreased vascularity in 59 percent of cases. These observations are similar to those reported by others. Total squamous metaplasia with keratinisation and hypertrophy was seen by us in one case. This has not been reported earlier.

Key Words

Atrophic rhinitis,
Squamous metaplasia

Atrophic rhinitis is a distressing malady of nose characterized by progressive atrophy of the mucosa and underlying bones of the turbinates resulting in abnormal patency of the nasal passages.¹ The disease is said to be localized to nose but others believe it to be a part of more generalised disorders like Plummer-Vinson's syndrome and systemic scleroderma. There is atrophy of tissue of ectodermic and mesodermic origin.^{2,3} There being not many studies available in literature on the histopathology of atrophic rhinitis,⁴⁻⁷ the present work was undertaken.

Material and Methods

71 cases of primary atrophic rhinitis who presented to ENT out patient department from January 1988 to January 1989 were the subjects for the study. Punch biopsy was taken from the soft tissue of the inferior turbinate about one centimeter behind the anterior and in all cases. Sections were prepared by routine paraffin processing and Hematoxylin-Eosin staining was done. These were examined under the light microscope for histological changes in the epithelium and submucosa including blood vessels and glandular tissue.

Observations

The incidence of atrophic rhinitis was found to be 0.89 percent. The mean age was 15.5 years, the range being 8-80 years. Twenty five cases were males and forty six females. The occupational distribution of patients was students (40%), labourers (33.3%), housewives (17.33%) and others (9.33%). Partial or total squamous metaplasia was seen in 70.4 percent of cases. Other features were denuded epithelium and squamous metaplasia with keratinization (Table I). There was marked absence of goblet cells. In tunica propria, granulation tissue was noted in 41 percent of cases, chronic inflammatory cell infiltrate mainly lymphocytes in 32 percent of cases and fibrosis in 23.5 percent of cases. Basement membrane was thickened in 50.70% cases, ill defined in 28.10% and normal in 21.10% cases (Table II). Reduced vascularity was seen in 59.1 percent of cases and dilated vessels in 35.2 percent of cases. Periarteritis was noted in 1.4 percent of cases while endarteritis was seen in 4.2 percent (Table II). Mucosal glands were reduced both in number and size in 42.2 percent of cases, and were absent in 28.1 percent of cases (Table III).

Discussion

The histopathological changes described in atrophic rhinitis include : marked atrophy of all layers including the mucus membrane throughout the nose and

Table No 1
Histological Changes in Epithelium in Atrophic Rhinitis

S. No.	Features	No. of Cases	Percentage
1.	Partial squamous metaplasia	26	36.6
2.	Total squamous metaplasia	24	33.8
3.	Denuded epithelium	11	15.49
4.	Total squamous metaplasia with keratinization	9	12.67
5.	Total squamous metaplasia with keratinization with slight hypertrophy	1	1.40
Total		71	100

Table No. II
Changes in Tunica Propria and Blood Vessels in Atrophic Rhinitis

S. No.	Features	No. of cases	Percentage
(a) Tunica Propria			
1.	Granulation tissue	29	40.84
2.	Chronic inflammatory cellular Infiltrate	23	32.39
3.	Fibrosis	17	23.54
4.	Granulation tissue with fibrosis	1	1.40
5.	Chronic inflammatory cellular infiltration with fibrosis	1	1.40
6.	Basement membrane		
	Thickened	36	50.70
	III defined	20	28.10
	Normal	15	21.10
(b) Blood Vessels			
1	Reduced vascularity	42	55.1
2	Dilated blood vessels	25	35.20
3	Endarteritis	3	4.20
4	Periarteritis	1	1.40

also of the bone of conchae, surface epithelium is thinner than normal with replacement of ciliated columnar cells by simple columnar or cuboidal cells. It may occur at places and is regarded as an essential feature of the disease.

Keratinization does not occur, or is of a very limited extent. There is marked reduction in the proportion of goblet cells and they might disappear completely. The basal lamina may be thickened and hyaline, or it may be normal. The compound alveolar glands decrease in number and size or may be atrophic. There may be

periarteritis and endarteritis of the terminal arterioles and vasodilatation of the capillaries.^{1,8,9}

Table IV gives the incidence of histopathological changes in the epithelium and tunica propria, seen by other authors.^{10,11,12} Denuded epithelium was seen in 15.5 percent of cases by us, whereas others reported an incidence of 40.4 percent¹¹ and 68.3 percent.¹² Total squamous metaplasia with keratinisation with slight hypertrophy was seen by us in one case. This has not been reported earlier. Goblet cells were almost absent and same has been observed by others. In the

Table No. III
Histology of Mucosal Glands in Atrophic Rhinitis

S. No.	Type of Change	No. of Cases	Percentage
1.	Absence of glands	20	28.16
2.	Reduction in size a number of glands	30	42.25
3.	Normal glands	20	28.16
4.	Squamous metaplasia with reduction in size and number of glands	1	1.40
Total		71	100

Table No IV
Comparative Study of Histopathological Changes in the Epithelium and Tunica Propria

S.No.	Changes	Anand & Agarwal (1972)	Sinha et al (1975) percent	Sinha et al (1978) percent	Present percent	Study
a) Epithelium						
1.	Partial Squamous metaplasia	37.5	73.3	20.0	36.6	
2.	Total squamous metaplasia	52.5	20.0	8.3	33.8	
3.	Total squamous metaplasia with keratinization	10.0	8.8	3.3	12.61	
4.	Denuded epithelium	-	40.4	68.3	15.4	
b) Tunica Propria						
1.	Chronic inflammatory cellular infiltrate	-	77.7	73.3	32.2	
2.	Granulation tissue	-	51.1	30.0	40.8	
3.	Fibrosis	-	66.6	38.3	23.9	
4.	Chronic inflammatory cellular infiltrate with fibrosis	100	-	-	1.4	
5.	Basement membrane					
	Thickened	62.5	--	-	50.70	
	III-defined	20.0	-	-	28.1	
	Normal	17.5	-	-	21.1	

tunica propria chronic inflammatory cellular infiltrate was observed in 32.2 percent of cases in the present study. The reported incidence of the name was more than 70 percent by others.^{11,12} Chronic inflammatory cellular infiltration with fibrosis was seen by us in only 1.4 percent of cases. Anand and Agarwal reported this in 100 percent of cases.¹⁰ While others reported it to be absent.^{11,12} (Table IV) Basement membrane was thickened in 50.70% of cases ill defined in 28.1% and normal in 21.1% cases where

as others have reported the same in 62.5%, 20% and 17.5% of cases respectively (Table IV).¹⁰

The incidence of endarteritis and periarteritis has been reported to range between 37.8 and 65 percent.^{10,12} We noted this in 1.40 percent and 4.2 percent cases respectively. In another study no such feature was reported.⁴ Dilated blood vessels have been seen by some workers^{11,12} and we observed these in 35.21 percent of cases. Reduced vascularity was seen in this study in 59.15 percent of cases whereas others have reported this in 48.4 percent of cases.¹²

Mucous glands become scanty, cellular outline tends to be indistinct and lumen becomes small. There may be fibrosis or atrophy of the glands.^{2-5, 7-9} They may even be normal in 5-17.5 percent of cases¹⁰⁻¹². In the present study mucous glands were normal in 28.16 percent, reduced in size and number in 42.25 percent and absent in 28.16 percent of cases. No fibrosis was seen by us. Metaplastic changes in mucous glands

were present in 1.4 percent of cases contrary to earlier reported incidence of 40.4 percent¹¹.

We conclude that the most important pathological changes in atrophic rhinitis are squamous metaplasia, chronic inflammatory cellular infiltrate, granulation tissue, reduced vascularity and a decrease in number or even absence of the mucosal glands.

References

1. Weir N (1987) : *Acute and chronic inflammations of the nose*. In Mackay JS, Bull, TR ed. *Scott-Brown's otolaryngology*. London . Butterworths & Co. 121.
2. Girgis IH (1966) : *Surgical treatment of ozaena by dermatofat graft*. *J Laryngol Otol* 80 : 615-627.
3. Bernat J. Ozaena (1968) : *A manifestation of iron deficiency*. 1st ed Oxford : Pregman Press, 1-8
4. Taylor M, Young A : (1961) : *Histopathological and histochemical studies in atrophic rhinitis*. *J Laryngol Otol* 75 : 574-589.
5. Datti PV (1974) : *Closure of nostril in atrophic rhinitis*. *Indian J Otolaryngol* 26 : 178-182.
6. Sharan R (1978) : *Transplantation of the maxillary sinus mucosa in atrophic rhinitis*. *Indian J Otolaryngol* 30 . 14-16,
7. Chatterjee P (1980) : *Autogenous medullary (Cancellous) bone graft in ozaena*. *J Laryngol Otol* 94 : 737-745.
8. Friedman, I : (1986) : *Systemic Pathology Nose, Throat and Ear*, London : Churchill living Stone. 16-17,
9. Rewell, RE : (1963) : *Pathology of the Upper Respiratory Tract*. London : Livingstone 16-17.
10. Anand CS, Agrawal SR . (1972) : *A histopathological study in atrophic rhinitis*. *JIMA* 59 : 278-181.
11. Sinha SN, Samuel KC, Juneja IHS, Mittal DP : (1975) : *A study of exfoliative cytology of atrophic rhinitis*. *J Laryngol. Otol* 89 1027-1041.
12. Sinha SN, Srivastava RN, Prasad D, Rajvanshi VS (1978) : *Intra nasal injections of placental extract in atrophic rhinitis* *Indian J Otolaryngol* 30 : 20-22.