

Significance of Diffuse Granularity and Nodularity of the Esophageal Mucosa at Double-Contrast Radiography

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Abstract. Out of 5000 consecutive double-contrast examinations of the esophagus, 50 cases presented a diffuse finely granular or nodular appearance of the mucosa. Endoscopy was subsequently performed in 38 cases and biopsy in the majority of these.

In 23 of the 38 verified cases the diagnosis was reflux esophagitis. In the other 15 cases the diagnoses were: candidal esophagitis (4), leukoplakia (2), glycogenic acanthosis (1), and diffuse leiomyomatosis (1). A normal mucosa was demonstrated in 7 cases. Our study indicates that a radiologically granular or nodular appearance of the esophageal mucosa often indicates reflux esophagitis and less commonly identifies diffuse lesions of variable origin.

Key words: Esophagus, radiography – Esophagitis, diagnosis.

Double-contrast radiography of the esophagus has greatly increased the chances of detecting fine surface abnormalities [1-3]. Numerous pathologic conditions of the esophagus may give rise to a nodular or granular appearance of the mucosa, including reflux esophagitis [2-4], candidal [5] or herpetic esophagitis [6-8], eosinophilic esophagitis [9], leukoplakia, acanthosis nigricans [10], glycogenic acanthosis [11], superficial carcinoma [12], and cystic esophagitis [13]. Itai et al. [10] reported that leukoplakia, present in 90% of their 133 cases, was by far the most frequent condition presenting with diffuse nodularity. Only 5 of their patients had reflux esophagitis. Our study assessed the underly-

ing cause of radiographically detectable diffuse granularity and nodularity of the esophageal mucosa.

Materials and Methods

In the past 4 years we have performed approximately 5000 double-contrast examinations of the upper digestive tract, including studies of the esophagus. Fifty cases presented radiographic appearances of diffuse granularity or nodularity. Granularity of the mucosa (Fig. 1) is defined as the presence of numerous ill-defined radiolucencies 1-2-mm in size, appearing in a well-distended esophagus. Nodularity (Fig. 2) signifies the more



Fig. 1. Granular appearance of the mucosal surface due to reflux esophagitis

Fig. 2. Nodular appearance of the mucosa of the upper third of the esophagus in patient with candidal esophagitis

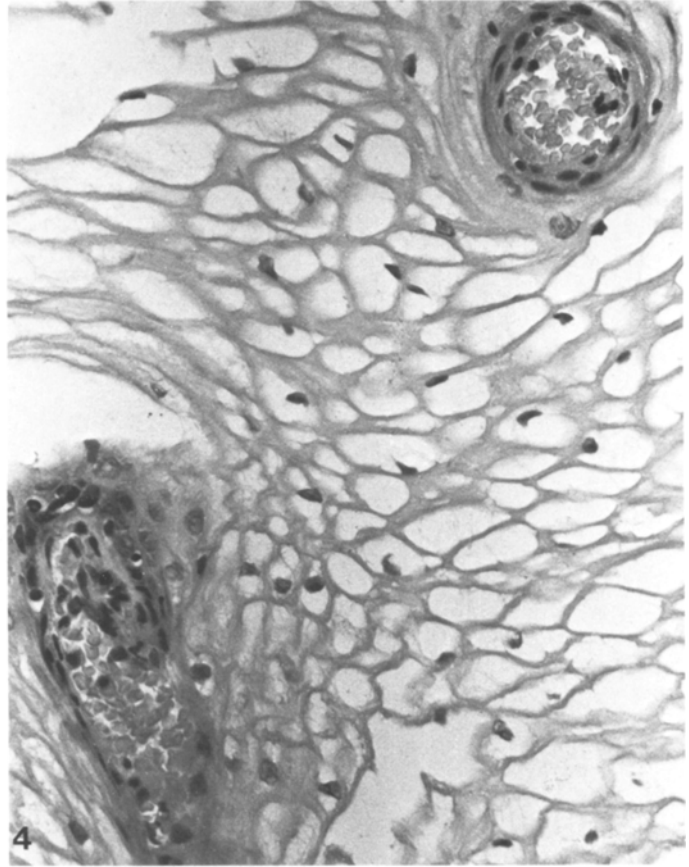
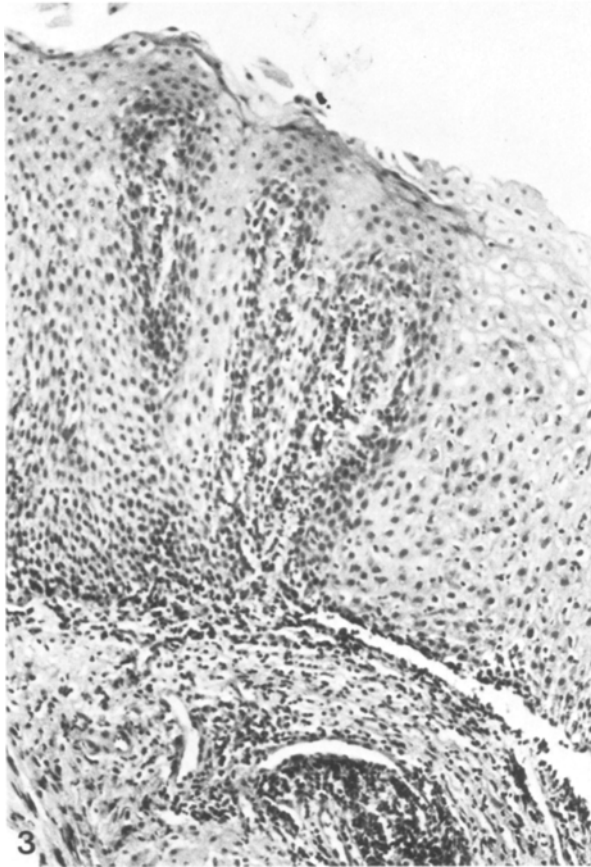


Fig. 3. Reflux esophagitis: The basal cell layer is thickened and the papillae take up almost the entire thickness of the epithelium. The lamina propria is infiltrated by lymphoplasmacellular inflammation (H & E $\times 10$)

Fig. 4. Reflux esophagitis: marked vascular dilatation and congestion (H & E $\times 200$)

Table 1. Endoscopic diagnosis of 38 cases showing granular or nodular esophageal mucosa

Diagnosis	No.	Radiologic findings		
		Granularity	Nodularity	Both
Reflux esophagitis	23	15	11	3
Candidiasis	4	—	4	—
Leukoplakia	2	1	1	—
Glycogenic acanthosis	1	—	1	—
Leiomyoma	1	1	—	—
Normal	7	5	3	1
Total	38	22	20	4

sharply defined, less numerous, and less regular 2–3-mm bumps seen on an esophagogram [4]. All polypoid or frankly elevated lesions, single or few in number, were excluded from this study.

Endoscopy was done in all cases after the double-contrast study, and mucosal biopsy specimens were obtained in the majority. The tissue fragments were fixed in buffered 10% formalin and, after appropriate orientation, were embedded in paraffin;

the serial sections were stained with hematoxylin and eosin, periodic acid–Schiff, and periodic acid–Schiff after diastase.

Results

Fifty of the 5000 consecutive double-contrast examinations showed diffuse nodular or granular alterations of the esophageal mucosa but only 38 of them underwent endoscopy. Our study is confined to these cases.

Table 1 lists the endoscopic and, where applicable, histologic diagnosis in these cases. The most frequent diagnosis was reflux esophagitis: 23/38 or 60%. In 15 of these cases endoscopy showed mild esophagitis; diffuse granularity was the salient radiologic feature. Our histologic criteria (Fig. 3) for esophagitis were: thickening of the basal cell layer, lengthening of the papillae, presence of an inflammatory granulocytic or lymphoplasmacellular infiltrate in the chorium, and ectasias of vessels with marked congestion (Fig. 4). This

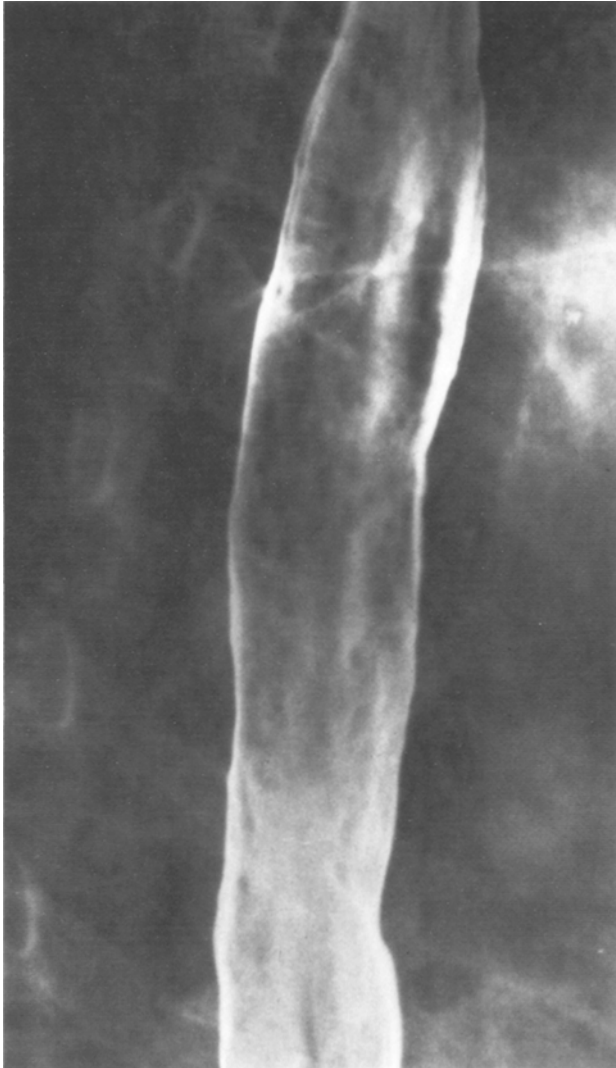


Fig. 5. Leukoplakia: small bumps due to the presence of greyish lesions 0.2 cm in diameter

last finding is central to the diagnosis of reflux esophagitis. It is found in 83% of cases [14] and might be regarded as the histologic equivalent of the small vascular ectasias often observed at endoscopy.

Another frequent histologic finding rated highly specific for reflux esophagitis is the infiltration of eosinophilic granulocytes both in the lamina propria and inside the epithelium [15]. In these circumstances eosinophilic esophagitis must obviously be excluded. The reflux esophagitis cases included 2 with marked eosinophilic infiltration which, in the absence of complete clinical data, have been regarded as variants of reflux esophagitis. These 2 cases were characterized radiologically by mucosal nodularities in the upper and middle third of the esophagus.

Endoscopy showed, in addition to a complex pattern of reflux esophagitis, whitish bumps on the mucosa in both cases.

All 4 cases of candidiasis were diagnosed based on the endoscopic evidence, clinical history, and course after medical treatment. The only radiologic feature found in these cases was nodularity, in agreement with the findings reported by other workers [5].

Leukoplakia was demonstrated in 2 cases (6%). The diagnosis was based on the histologic evidence of hyperplasia of the squamous epithelium accompanied by dyskeratosis, parakeratosis, and cellular atypias; it is a true precancerous lesion [16]. Leukoplakia was apparently diagnosed on the basis of quite different criteria by Itai et al. [10], who refer to it simply as an epithelial hyperplasia. This explains the high frequency (90%) of an otherwise rare entity in their series. The radiologic pattern in our cases (Fig. 5) was diffuse nodularity, described at endoscopy as multiple greyish nodules with a diameter of 0.2 cm.

Glycogenic acanthosis was demonstrated in 1 case (Fig. 6). Histologically, this means simple hyperplasia of the squamous epithelium containing an abundance of glycogen with no cellular atypias or inflammation [11, 17].

In another case of diffuse radiographic nodularity the histologic specimen taken during endoscopy showed the presence of a fragment of leiomyoma, which is the most common benign tumor of the esophagus [18] and may sometimes present as a multiple lesion [19].

Biopsy specimens were also taken from 3 of the 7 cases rated normal at endoscopy (Fig. 7). The specimens were considered adequate in only 1 case, because the submucosa had been included in the biopsy.

Discussion

Double-contrast examination of the esophagus has considerably increased the chances of detecting small lesions of the mucosal surface. Radiologic artefacts due to saliva or air bubbles which may lead to misdiagnosis, however, occur fairly often. To obviate such false-positive results it may be helpful to give a small quantity of barium as an "esophageal wash" immediately before the examination. When findings are doubtful, a repeat esophagogram using the same technique may be of value. Contraction of the muscularis mucosae [20] can also lead to a misdiagnosis of esophageal granularity or nodularity. This occurrence, however infrequent and inconstant, may be avoided

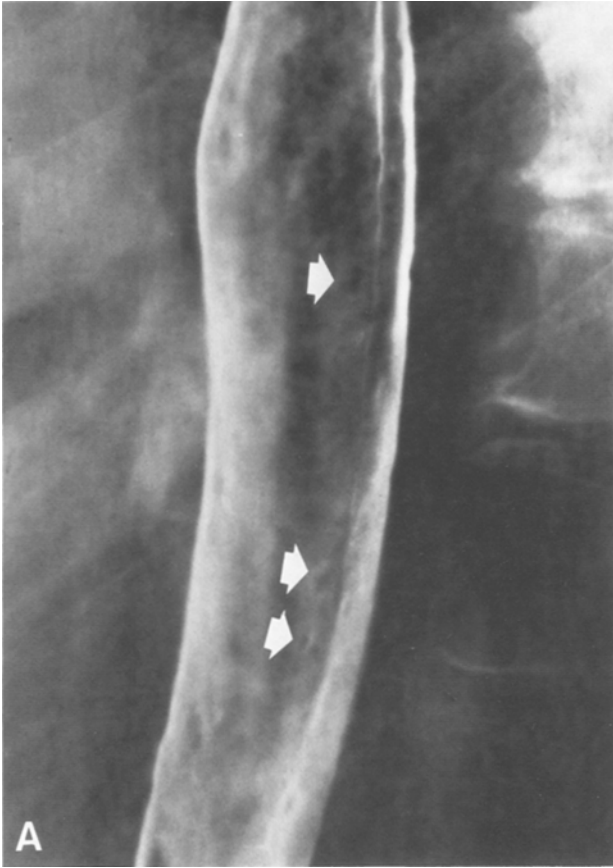
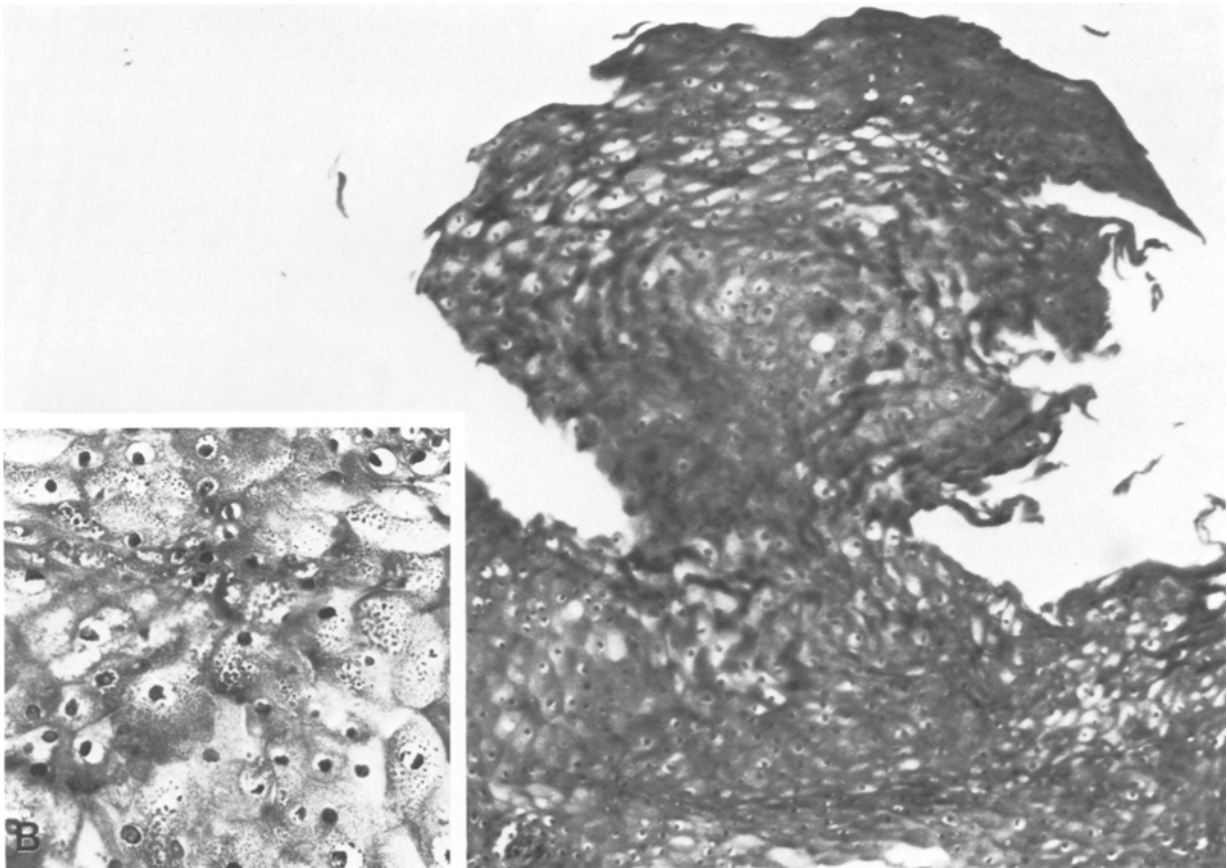


Fig. 6. A Plaquelike lesions (*arrows*) in a patient with glyco-genic acanthosis. **B** Glyco-genic acanthosis: thick polypoid plaque in which the squamous cells contain an abundance of glycogen (PAS $\times 6.3$; inset $\times 400$)



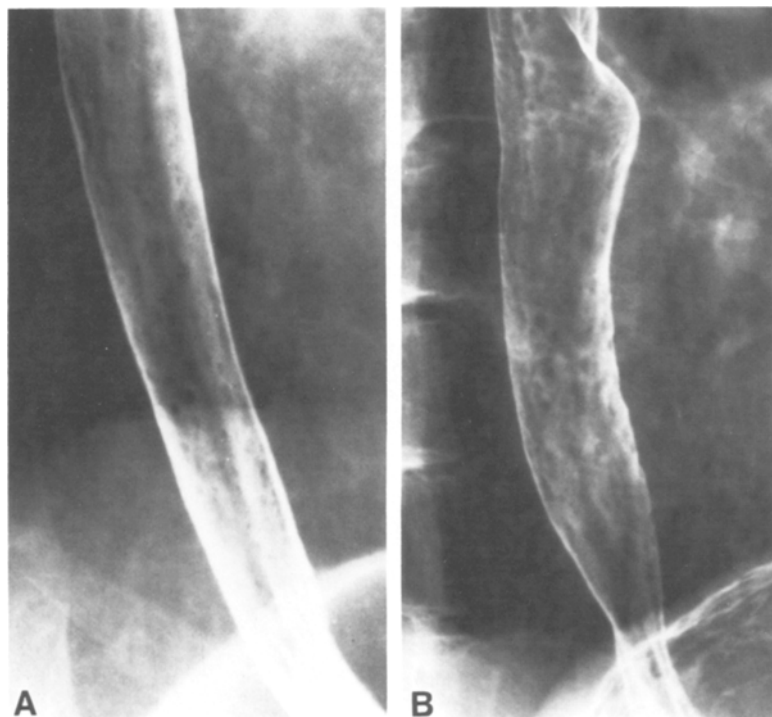


Fig. 7. A Small nodules of the mucosal surface due to mild reflux esophagitis. B False-positive result in a patient with diffuse nodularity and granularity of the mucosa. Endoscopy showed no pathologic change

by proper distention of the esophageal lumen utilizing double-contrast technique.

Diffuse granularity and nodularity occurred, in our experience, in about 1.0% of all double-contrast examinations of the esophagus. This is far below the 30% reported by Glick and Teplick [21] but very close to the 1.33% reported by Itai et al. [10].

In our series of 38 patients the most frequent cause of mucosal alteration (60%) was reflux esophagitis, which was mild or medium-grade in the majority of cases.

The radiologic diagnosis of moniliasis of the esophagus is fairly simple, given the multiple (often confluent) nodules located mainly in the proximal half of the esophagus [5] (Fig. 2).

Leukoplakia was present in only 6% of our series. Its incidence was lower than reported by other workers, partly because of the morphologic criteria adopted by them [10], which rank the lesion as dysplastic and precancerous. This definition is justified by the critical nature of the diagnosis and the need for close observation of this pre-malignant condition.

Glycogenic acanthosis (Fig. 6), found in only 1 case, is a benign lesion, the plaques of which can easily be seen at endoscopy. The pathogenesis and etiology of this lesion are not known, although it might be related to reflux esophagitis [22]. Diag-

nosis is important for differentiation from more serious lesions such as leukoplakia.

Of our 38 patients with radiologic evidence of diffuse granularity and nodularity of the esophageal mucosa, 75% showed significant changes at subsequent endoscopy. The lesions found were primarily caused by reflux esophagitis (60%). A wide spectrum of other entities was also observed and the associated findings are presented herein.

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