

ORIGINAL ARTICLE

Comparison between Bronchoscopic Morphological Finding and Histopathological Report in Endobronchial Lesion

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Abstract:

Background: Bronchoscopy and guided techniques have a definite role in diagnosis of endobronchially visible tumors. It allows the sampling of cytological specimens as well as biopsies for histological diagnosis.

Objective: This study aims to assess the comparison between bronchoscopic finding and histopathological report in endobronchial lesion.

Methods: This cross sectional study was conducted in the Department of Respiratory Medicine in collaboration with the Department of Pathology, National Institute of Diseases of the Chest & Hospital, Mohakhali, Dhaka, from January 2018 to December 2018. Patients in whom an endoscopically visible lung mass and who had a definite cytological or histological diagnosis of lung cancer were included in the study. The diagnosis of pulmonary malignancy could have been established by bronchoscopy. Out of total 90 patients with endobronchial lesions were included in the study. Uncooperative patients, patients with recent myocardial infarction and blood dyscrasias were excluded from the study. All flexible bronchoscopies were carried out or supervised by the same bronchoscopist using the Olympus BF-1T150 fiberoptic bronchoscope. Collected data were compiled and appropriate analyses were done by using computer based software, Statistical Package for Social Sciences (SPSS) version 23.0.

Results: In this study 90 patients with endobronchial lesions, majority (55.6%) patients belonged to age 41 to 60 years, male: female ratio was 3.3:1. In FOB morphological findings, 59(65.6%) had endobronchial mass followed by 54(60.0%) mucosal edema, 35(38.9%) mucosal infiltration, 22(24.4%) hemorrhagic secretion and 21(23.3%) had mucosal hypertrophy. In histopathology biopsy, majority (36.0%) patients were found squamous cell carcinoma followed by 17(18.9%) adenocarcinoma, 12(13.3%) small cell carcinoma, 3(3.3%) adenocystic carcinoma and 6(6.7%) carcinoid tumour. In squamous carcinoma, 31 patients had endoscopic findings of endobronchial mass followed by 22 had mucosal edema, 13 had mucosal infiltration, 10 had widening of the main carina and 9 had hemorrhagic secretion. In adenocarcinoma, 12 patients had endoscopic findings of mucosal edema, 9 had endobronchial mass, 5 had hemorrhagic secretion and purulent secretion respectively.

Conclusion: Our results show that an endobronchial mass is the most common bronchoscopic finding that is suggestive of malignancy. Proportionally, mucosal infiltration is the most common finding in small cell carcinoma. The diagnostic yield and tumour detection rate of flexible bronchoscopy in endoscopically visible lung malignancies is considerably high. For endoscopically visible lung malignancies, forceps biopsy alone has a high diagnostic yield.

Key words: Bronchoscopy, endobronchial lesion.

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Introduction:

Lung cancer is the malignancy with the highest mortality worldwide, being the only one whose incidence of death has progressively increased despite improved and more aggressive therapy in recent years. The mean five-year survival ranges from 13% to 21% and from 7% to 10% in developed and in developing countries, respectively.¹ The prognosis of lung cancer is unfavorable, early diagnosis plays an important role in increasing survival in lung cancer patients. The use of various methods can contribute to early diagnosis. Among the most commonly used methods are imaging tests (chest X-ray and CT), sputum cytology, and fiberoptic bronchoscopy.² Flexible bronchoscopy plays a central role in the diagnosis of lung malignancy, especially in endobronchial tumours. It allows the sampling of cytological specimens as well as biopsies for histological diagnosis.³ Prior to the introduction of the fiberoptic bronchoscope, the collection of cytologic specimens directly from the lesion was difficult in many cases. With the advent of the fiberoptic bronchoscope, a biopsy of the lesion by forceps or brushing under direct vision or by fluoroscopic control is possible in the majority of suspected bronchogenic carcinomas.⁴ Pulmonologist come across significant number of intrabronchial mass lesions on bronchoscopy.⁵ For endoscopically visible tumours, biopsies are the most common method of specimen collection with high diagnostic yield. Bronchoscopists can face difficulties in describing endobronchial lesions. Such lesions range from a devitalized area showing loss of natural luster to gross presentations of large exophytic masses obstructing the bronchial lumen. The description of images as seen under the cold light of the endoscope is subjective, reflecting the variability to which any scientific observation is subject. Fiberoptic bronchoscopy reports show a bias in description: the same lesion can be described with different words, and the cold light of the endoscope can cause artifacts (as it often does). In addition, at best, examiners recognize endoscopic signs of malignancy, but no histopathological diagnosis can be presumed from the results of the test.⁶

Materials and Methods:

This cross sectional study was conducted in the Department of Respiratory Medicine in

collaboration with the Department of Pathology, National Institute of Diseases of the Chest & Hospital, Mohakhali, Dhaka, from January 2018 to December 2018. Patients in whom an endoscopically visible lung mass and who had a definite cytological or histological diagnosis of lung cancer were included in the study. The diagnosis of pulmonary malignancy could have been established by bronchoscopy. Out of total 90 patients with endobronchial lesions were included in the study. Uncooperative patients, patients with recent myocardial infarction and blood dyscrasias were excluded from the study. All flexible bronchoscopies were carried out or supervised by the same bronchoscopist using the Olympus BF-1T150 fiberoptic bronchoscope. The patients were made to stay nil per orally for at least 6 hours before the procedure. Written informed consent was obtained from each patient. Topical anaesthesia was achieved with 10% lignocaine spray to the oropharynx and 2% lignocaine solution infused through the scope during the procedure. Once the endobronchial lesion was localized, biopsy was taken using the reusable round cup biopsy forceps FB-20C-1. Whenever possible, at least four biopsies were obtained from the centre of the most abnormal area and the specimens were immediately fixed in formalin and sent for histopathological examination. In each patient, biopsy was followed by bronchial washing. For bronchial washing, 10 to 20 ml aliquots of 0.9% normal saline at room temperature was instilled repeatedly and the aspirate was collected in a plastic trap bottle. The washing and biopsy specimens were sent to the laboratory for cytological and histopathological study respectively. All patients received supplemental oxygen and were monitored throughout the procedure. When the cytological or biopsy specimens showed atypical or suspicious cells, they were considered non diagnostic. Collected data were compiled and appropriate analyses were done by using computer based software, Statistical Package for Social Sciences (SPSS) version 23.0. Qualitative variables were expressed as percentage.

Results:

Out of total 90 patients with endobronchial lesions, majority (55.6%) patients belonged to age 41 to 60 years, 69(76.7%) patients were male, 76(84.4%)

were unmarried and 49(54.4%) were farmer (Table-I). All (100.0%) patients were found in fever followed by 90(100.0%) in cough, 71(78.9%) in haemoptysis, 70(77.8%) in weight loss and 66(73.3%) in chest pain. Twenty seven (30.0%) cases, the tumor was located in the upper lobe bronchi, 23.3% being located in the right upper lobe bronchi and 6.7% being located in the left upper lobe bronchi. In the right and left lower lobe bronchi, respectively, tumors were visualized in 6.7% and 15.6% of the cases (Table-II). In FOB morphological findings, 59(65.6%) had endobronchial mass followed by 54(60.0%) had mucosal edema, 35(38.9%) had mucosal infiltration, 22(24.4%) had hemorrhagic secretion and 21(23.3%) had mucosal hypertrophy (Table-III). In BAL cytology, 5(5.6%) patients were found positive for malignant cell (Table-IV). In brush cytology, 47(52.2%) patients were found positive malignancy (Table-V). In histopathology biopsy, majority (36.0%) patients were found squamous cell carcinoma followed by 17(18.9%)

Table-I
Demographic characteristics of the study patients (n=90)

	Number of patients	Percentage
Age (years)		
15-40	12	13.3
41-60	50	55.6
>60	28	31.1
Sex		
Male	69	76.7
Female	21	23.3
Marital status		
Married	76	84.4
Unmarried	10	11.1
Widow	4	4.4
Occupational status		
Farmer	49	54.4
Business	10	11.1
Housewife	13	14.4
Service	12	13.3
Driver	2	2.2
Others	4	4.4

adenocarcinoma, 12(13.3%) small cell carcinoma, 3(3.3%) adenocystic carcinoma and 6(6.7%) carcinoid tumour (Table-VI). In squamous carcinoma, 31 patients had endoscopic findings of endobronchial mass followed by 22 had mucosal edema, 13 had mucosal infiltration, 10 had widening of the main carina and 9 had hemorrhagic secretion. In adenocarcinoma, 12 patients had endoscopic findings of mucosal edema, 9 had endobronchial mass, 5 had hemorrhagic secretion and purulent secretion respectively (Table-VII).

Table-II
Complaints of the study patients (n=90)

Complaints	Number of patients	Percentage
Fever	90	100.0
Cough	90	100.0
Haemoptysis	71	78.9
Weight loss	70	77.8
Chest pain	66	73.3
Smoker	60	66.7
Breathlessness	52	57.8
COPD	36	40.0
Co-morbidity		
Tuberculosis	12	13.3
Diabetes mellitus	7	7.8
SOL in liver	4	4.4

Table-III
FOB morphology findings of the study patients (n=90)

FOB finding	Number of patients	Percentage
Endobronchial mass	59	65.6
Mucosal infiltration	35	38.9
Widening of the main carina	19	21.1
Luminal widening	11	12.2
Mucosal hyperemia	13	14.4
Mucosal edema	54	60.0
Mucosal hypertrophy	21	23.3
Serous secretion	2	2.2
Hemorrhagic secretion	22	24.4
Purulent secretion	16	17.8

FOB= Fiber-optic bronchoscope

Table-IV*BAL cytology of the study patients (n=90)*

BAL cytology	Number of patients	Percentage
Negative for malignant cell	85	94.4
Positive for malignant cell	5	5.6

BAL= Bronchoalveolar lavage

Table-V*Brush cytology of the study patients (n=90)*

Brush cytology	Number of patients	Percentage
Negative	43	47.8
Squamous cell carcinoma	25	27.8
Adenocarcinoma	22	24.4

Table-VI*Histopathology type of the study patients (n=90)*

Histopathology type (Biopsy)	Number of patients	Percentage
Squamous cell carcinoma	36	40.0
Adenocarcinoma	17	18.9
Small cell carcinoma	12	13.3
Adenocystic carcinoma	3	3.3
Carcinoid tumour	6	6.7
Normal	16	17.8

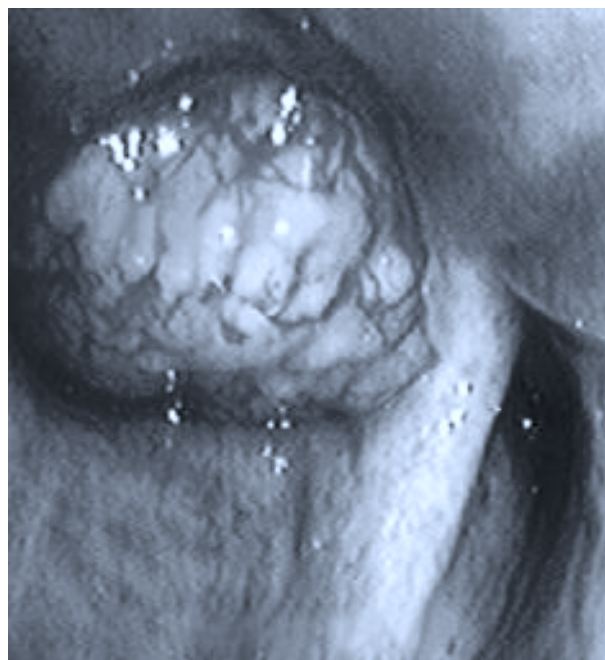


Fig.-1: *Fiberoptic bronchoscopy findings in hypervascular vegetative lesion in the right upper lobe bronchus (squamous carcinoma).*

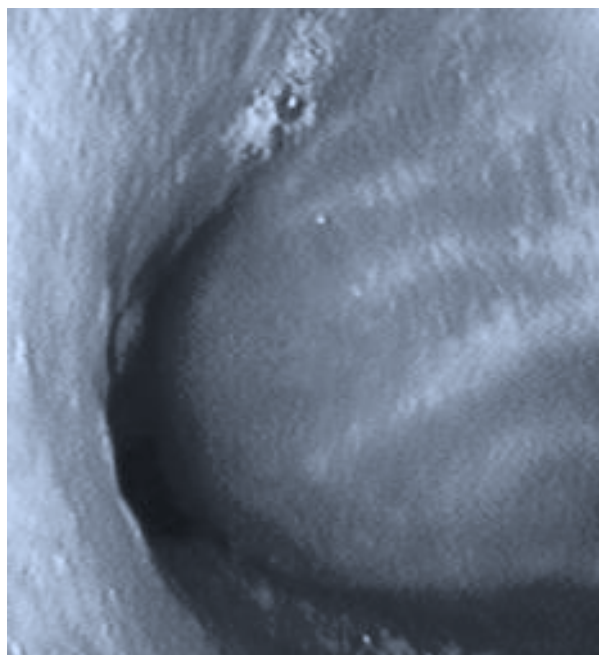


Fig.-2: *Fiberoptic bronchoscopy findings in external compression (adenocarcinoma).*

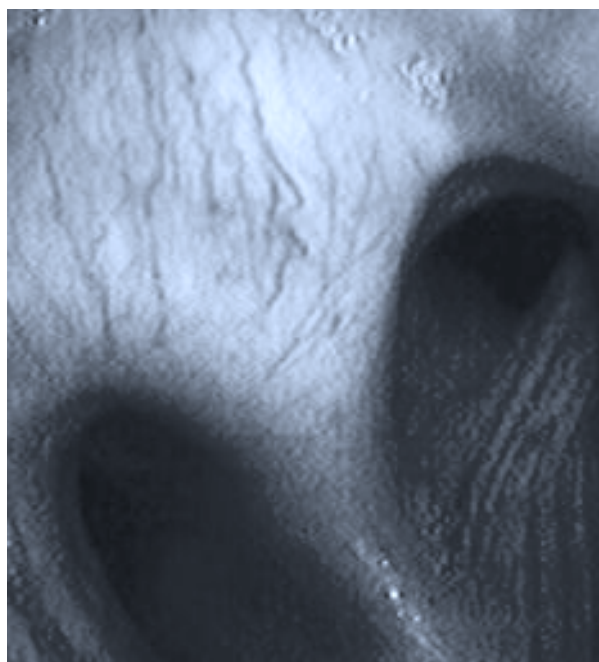


Fig.-3: *Fiberoptic bronchoscopy findings in widening of the main carina*

FOB findings evaluation for malignancy, true positive 73 cases, false positive 12 cases, false negative 1 case and true negative 4 cases in identification by histopathological findings (Table-VIII). The validity of histopathological findings evaluation for malignancy was correlated by

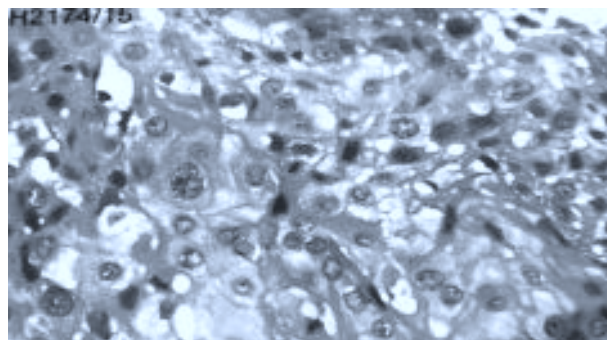


Fig.-4: Histopathological of biopsy specimen showing features of squamous cell carcinoma.

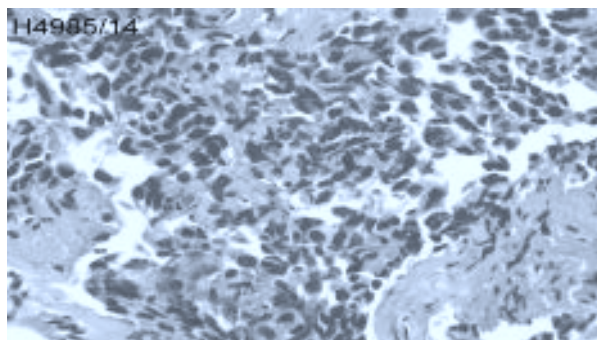


Fig.-5: Histopathological of biopsy specimen showing features of adenocarcinoma.

Table-VII

Association between bronchoscopic morphology findings with histopathological findings

FOB findings (morphology)	Histopathological findings				
	Squamous cell carcinoma	Adenocarcinoma	Small cell carcinoma	Adenocystic carcinoma	Carcinoid tumour
Endobronchial mass (n=59)	31	9	7	1	4
Mucosal infiltration (n=35)	13	2	8	1	5
Widening of the main carina (n=19)	10	4	3	0	2
Luminal widening (n=11)	4	3	0	0	3
Mucosal hyperemia (n=13)	2	4	2	0	4
Mucosal edema (n=54)	22	12	9	2	6
Mucosal hypertrophy (n=21)	8	5	3	1	2
Serous secretion (n=2)	1	1	0	0	0
Hemorrhagic secretion (n=22)	9	5	3	2	3
Purulent secretion (n=16)	8	5	1	0	2

Table-VIII

Comparison between histopathological findings and FOB findings evaluation for malignancy

FOB findings (morphology)	Histopathological findings	
	Positive(n=74)	Negative (n=16)
Positive (n=85)	73 (True positive)	12 (False positive)
Negative (n=5)	1 (False negative)	4 (True negative)

calculating sensitivity 98.6%, specificity 25.0%, accuracy 85.6%, positive predictive value 85.9% and negative predictive value 80.0%.

Discussion:

Flexible bronchoscopic examination remains an indispensable minimally invasive tool for diagnosis of lung cancer. However, there remains a

controversy regarding the ideal combination of different bronchoscopic techniques to give the best results.

In this study it was observed that majority (55.6%) patients belonged to age 41 to 60 years, 69(76.7%) patients were male, 76(84.4%) were married and 49(54.4%) were farmer. Ibungo et al.⁷ reported that most of the patients (32.9%) belonged to the age group of 71 to 80 years. Majority of the cases of lung malignancies were found in males (70%) when compared to females (30%). Rabahi et al.⁸ consisted that 59% patients were male and the mean age was 65 years (range, 14-89 years). Another relevant finding is the age bracket in which the incidence of lung cancer is highest, i.e., the 50-70 year age bracket. In patients younger than 40 years of age, the incidence is lower than 5%.^{9,10}

In our study it was observed that all (100.0%) patients were found in fever followed by 90(100.0%) in cough, 71(78.9%) in haemoptysis, 70(77.8%) in weight loss and 66(73.3%) in chest pain. Sareen et al.¹¹ showed that cough was the most common presenting complaint (62%) followed by dyspnea (55.3%), chest pain (45%) and weight loss (31.67%).

In this study 27(30.0%) cases, the tumor was located in the upper lobe bronchi, 23.3% being located in the right upper lobe bronchi and 6.7% being located in the left upper lobe bronchi. In the right and left lower lobe bronchi, respectively, tumors were visualized in 6.7% and 15.6% of the cases. The most commonly affected sites are the upper lobes and the central sites of the right lung, in 28% of the cases analyzed.¹²

Regarding FOB morphological findings in this study it was observed that 59(65.6%) had endobronchial mass followed by 54(60.0%) had mucosal edema, 35(38.9%) had mucosal infiltration, 22(24.4%) had hemorrhagic secretion and 21(23.3%) had mucosal hypertrophy. Ibungo et al.⁷ reported that when all the 95 endobronchial lesions are taken into account, including benign lesions, overall diagnostic yield of bronchoscopy was 90.5%. 7 cases gave inconclusive results (4 cases were lost to follow up while the other 3 did not give consent for repeat bronchoscopy).

In BAL cytology, 5(5.6%) patients were found positive for malignant cell. Rabahi et al.⁸ showed that of the 212 patients, 3 did not undergo biopsy

and 6 did not undergo BAL. Therefore, 203 patients underwent both procedures. Several studies in the literature have shown that the combination of the two tests results in a higher positivity rate, which ranges from 48% to 95%, depending on whether or not the lesion is endoscopically visible; therefore, we routinely perform lavage and biopsy.^{2, 13}

In Brush cytology, 47(52.2%) patients were found positive malignancy. Ibungo et al.⁷ documented that of the 73 patients with lung malignancy, a positive diagnosis was established by forceps biopsy in 71 of them giving a diagnostic yield of 97.3%. A positive cytology by bronchial washing was established in 2 cases giving a diagnostic yield of only 2.7%. Both bronchoscopic biopsy and washing were unable to provide diagnosis in 2 cases, in which a definite diagnosis of lung carcinoma was made by other investigations. However the diagnostic yield was reported to be much lower (76.92%) in the study done by Fuladi et al.¹⁴ who recommends adopting all the diagnostic procedures including brushing and washing, in addition to biopsy, in order to increase the overall diagnostic yield.

In histopathology biopsy, majority (36.0%) patients were found squamous cell carcinoma followed by 17(18.9%) adenocarcinoma, 12(13.3%) small cell carcinoma, 3(3.3%) adenocystic carcinoma and 6(6.7%) carcinoid tumour. Ibungo et al.⁷ consisted that out of the total 73 confirmed cases of lung malignancies, squamous cell carcinoma was found to be the most common histological type accounting for 76.7% (n=56) followed by small cell carcinoma and adenocarcinoma which were found in 10.9% (n=8) each. 1.4% (n=1) turned out to be adenosquamous type. Similar to the findings of Zavala¹⁵ who reported a diagnostic yield of 97% for forceps biopsy of endoscopically visible lung malignancies. This results are contrary to the findings of the more recently published studies which suggest that adenocarcinoma is the most prevalent lung cancer in India.^{16,17} Rabahi et al.⁸ reported that of the 212 patients, 199 were evaluated for tumor histological type, and the results were as follows: squamous carcinoma, in 39%; adenocarcinoma, in 21%; small cell carcinoma, in 12%; and large cell carcinoma, in 1%. The least common

histological type was large cell carcinoma, a finding that is consistent with the literature.^{2,10, 18}

In squamous carcinoma, 31 patients had endoscopic findings of endobronchial mass followed by 22 had mucosal edema, 13 had mucosal infiltration, 10 had widening of the main carina and 9 had hemorrhagic secretion. In adenocarcinoma, 12 patients had endoscopic findings of mucosal edema, 9 had endobronchial mass, 5 had hemorrhagic secretion and purulent secretion respectively. Rabahi et al.⁸ reported that of the patients with squamous carcinoma, 58 (74%) had endoscopic findings of an endobronchial mass, 28 (36%) had mucosal infiltration, 8 (10%) had lumen narrowing, and 5 (6%) had external compression. Of the 41 patients diagnosed with adenocarcinoma, 20 (49%) had an endobronchial mass, 13 (32%) had mucosal infiltration, 9 (22%) had lumen narrowing, and 10 (24%) had external compression. Of the 25 patients diagnosed with small cell carcinoma, 16 (64%) had an endobronchial mass, 15 (60%) had mucosal infiltration, none (0%) had lumen narrowing, and 6 (24%) had external compression. Adenocarcinoma was most commonly located in peripheral areas and showed indirect findings, such as bronchial obstruction and external compression, which are endoscopically invisible, or no findings at all.¹² The reason for this could be due to the central location of these tumours which are easier to assess by bronchoscopy when compared to adenocarcinomas which have a predominantly peripheral location which makes them nonvisible endoscopically. However, similar findings of squamous cell carcinoma as the predominant type were reported in certain other studies^{19,20} of the total 73 confirmed lung malignancies, both bronchoscopic procedures i.e, biopsy and bronchial washing, failed to give a definite diagnosis in 2 cases.

In this study, FOB findings evaluation for malignancy, true positive 73 cases, false positive 12 cases, false negative 1 case and true negative 4 cases in identification by histopathological findings. The validity of histopathological findings evaluation for malignancy was correlated by calculating sensitivity 98.6%, specificity 25.0%, accuracy 85.6%, positive predictive value 85.9% and negative predictive value 80.0%. Chowdhury¹⁸ reported that 175 cases subjected to bronchoscopy, lung cancer was confirmed in 146 (83.4%) cases by histopathology of bronchial biopsy. Similar study

Ibungo et al.⁷ reported that 73 patients with lung malignancy, a positive diagnosis was established by forceps biopsy in 71 of them giving a diagnostic yield of 97.3%.

Conclusion:

Our results show that an endobronchial mass is the most common bronchoscopic finding that is suggestive of malignancy. Proportionally, mucosal infiltration is the most common finding in small cell carcinoma. The diagnostic yield and tumour detection rate of flexible bronchoscopy in endoscopically visible lung malignancies is considerably high. For endoscopically visible lung malignancies, forceps biopsy alone has a high diagnostic yield.

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