SOME CLINICAL ASPECTS OF BRONCHIAL OBSTRUCTION

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The purpose of this paper is to examine the symptoms produced by bronchial obstruction and to assess the accuracy of certain physical signs. Simple though the problem appears, it has received little attention in current medical textbooks, and this may well reflect a declining interest in history-taking and physical examination.

Opinion on the value of clinical assessment in this condition has varied at different times. Laennec (1819) regarded "*le râle sonore*" as good evidence of bronchial narrowing. More recently the value of this and other signs has been doubted. Lord (1932) noted that "there are no symptoms which can, with certainty, be ascribed to bronchial obstruction," and of the signs "a remarkable feature is the extent to which at times a bronchus may be occluded without corresponding evidence on physical examination." A recent report to the British Tuberculosis Association (1953) on tuberculous tracheo-bronchitis stated that "clinical assessment is not a reliable guide to the presence of bronchial disease."

On the other hand, McConkey and Greenberg (1935) investigated 21 patients with pulmonary tuberculosis in whom the presence of bronchial stenosis was confirmed by bronchoscopy. All their patients complained of wheezing not relieved by coughing, and were found to have loud sonorous rhonchi maximal over a circumscribed area, usually to one side of the sternum. Forced expiration accentuated these localized rhonchi. Samson (1937), writing on tuberculous tracheobronchitis, noted that change of position may intensify or diminish the loudness of a localized wheeze. McConkey and Gordon (1944) confirmed this finding in 61 tuberculous patients, and the presence of a stenosis was confirmed by bronchoscopy in 58 of them. They do not mention if this variation with change of position was present in all cases. Stone (1945), in a study of 50 cases of tuberculous bronchitis confirmed by bronchoscopy, noted that localized wheezing was present in 62%. Jarman (1949) found in 14 patients under similar circumstances that wheezing or "sounds of bronchial origin" were present in all. Jackson (1921) described the "asthmatoïd wheeze" as one of the most valuable signs of a foreign body in a bronchus.

Reports on tumours of the bronchi, however, suggest that local bronchial symptoms or signs are rare. Foster-Carter (1941) recorded "asthma" in only 1 of his 22 cases of bronchial adenoma, and in a review of a further 47 cases stated that wheezing was mentioned in only six. Reports on carcinoma of the bronchus are variable. Adler (1912), Brooks *et al.* (1951), Bryson and Spencer (1951), Edwards (1946), and Harnett (1952) do not mention wheezing or the finding of localized rhonchi. Brock (1948) mentions "the stridor due to partial bronchial occlusion." Fried (1948) and Thompson (1952) both mention wheezing but do not report its incidence.

Some confusion has arisen in the past because independent proof of bronchial obstruction close to the time of clinical examination has been lacking. Bronchoscopy is the best measure available, but is by no means infallible. The range of vision is at most extended only to the proximal segmental bronchi, and in the middle lobe and left upper lobe areas may not even include these. Nevertheless it provides better evidence on the calibre of the larger bronchi than that obtained by less direct methods—for example, bronchography.

The Present Study

A preliminary examination by one of us (R. N. J.) of 100 patients with bronchial obstruction confirmed by bronchoscopy showed that 28 were aware of a localized wheeze in the chest. In 39 of this series a localized rhonchus was found on examination. The results of this pilot survey warranted a more careful examination of the problem. To minimize any personal bias three observers independently questioned and examined a random group of patients undergoing bronchoscopy. The past records of these patients and their x-ray findings were unknown to each observer at the time he recorded his own findings. Each patient was asked whether he had noted the presence of the six following symptoms:

(1) *A Paroxysmal Cough*.—This was defined as one in which the cough came in severe bouts and was uncontrollable.

(2) *A Cough which had Altered*.—This was accepted only if the patient had noted a definite change in the sound produced by the cough or the sensation accompanying it. Change in severity alone was not regarded as a positive finding. No patient with laryngeal palsy was included in the series.

(3) *Dyspnoea*.—Each patient was asked whether he was conscious of difficult breathing, and, if this was present on exertion, its degree, and whether more pronounced than the patient expected for a person of his age and training.

(4) *Wheezing*.—The patient was asked to locate the wheeze if possible, state its duration, and whether the change of position had any effect. A localized wheeze was recorded when the patient could clearly state from which side the sound arose. Wheezing which was ill-defined and referred to the centre of the chest or to the throat was classed as generalized.

(5) *Sputum Amount, and Whether there was any History of Sputum Retention*.—To explain the latter the patient was asked whether he had noted (a) a sudden diminution in the volume of the sputum, and (b) any feeling of retained secretion in one part of the chest.

(6) *Chest Pain, its Character and Duration*.—A dragging continuous ache had been noted by one of us (T. M. W.) during a temporary bronchial occlusion, and we wished to determine the frequency of this symptom.

In the clinical examination of the chest each observer recorded the presence or absence of: (a) stridor on forced expiration; (b) local reduction of the breath sounds; (c) a localized rhonchus, the effect of change of posture to either side and the effect of forced expiration. As a preliminary patients were asked to cough forcibly several times to ensure clearing of any secretions producing temporary bronchial obstruction. Patients with generalized rhonchi were not included in this category unless, in addition, a persistent localized rhonchus was clearly evident. Doubtful findings were recorded as negative.

The bronchoscopic examinations were carried out by members of the surgical staff at the Brompton Hospital or their deputies.

Evidence of bronchial obstruction was recorded if the surgeon noted definite reduction in the lumen of a main, lobar, or segmental bronchus. Slight alterations in calibre or abnormalities of the mucosa only were ignored. In analysing the results a symptom or sign was noted as present only when recorded by at least two observers. There was, of course, considerable variation in the findings of the observers on individual patients, but this is to be expected in any investigation which depends largely on subjective interpretation.

The findings in the first 50 patients with bronchial obstruction as shown by bronchoscopy (group A) are com-

pared in Table I with the first 50 in whom the bronchoscopic findings were negative (group B). Clearly, the latter group may include some with distal bronchial obstruction, and therefore does not constitute an entirely "normal" group. The diagnoses in the two groups are listed in Table II.

TABLE I.—*Analysis of Symptoms and Signs*

	Group A	Group B
Paroxysmal cough	13	8
Cough which has altered .. .	7	0
Dyspnoea	37	20
Localized wheeze	22	8
Generalized	15	16
Sputum retention	5	2
Chest pain	28	26
Stridor	9	6
Local reduction of breath sounds ..	20	5
Localized rhonchus	26	12

TABLE II.—*Diagnoses in the two Groups*

	Group A	Group B
Bronchial carcinoma	40	6
Pulmonary tuberculosis	7	14
Pneumonia	1	8
Other conditions	2	22

Discussion

A cough was the one symptom common to all cases of bronchial obstruction. Often there seemed to be no practicable means of distinguishing the cough of bronchial occlusion from that due to minor irritation or other benign causes. A paroxysmal cough was found more frequently among those with proved bronchial obstruction, but the difference was small and might well have been due to chance. On the other hand, all seven patients who had noted an alteration in the character of their cough were found to have bronchial obstruction, and it would appear that this symptom, though rare, is of importance. Patients commonly considered their cough to be the result of smoking, and hence failed to notice changes in its character. Certainly most patients found it difficult to define and date any alteration in this symptom.

Dyspnoea.—Since most of the patients were elderly, the occurrence of this symptom in both groups was not unexpected. In Table III the presence of dyspnoea is related

TABLE III.—*Relation of Dyspnoea to Bronchial Obstruction in 50 Cases (Group A)*

	Segmental Obstruction	Main Stem or Lobar Obstruction
No dyspnoea	6	7
Dyspnoea on walking or climbing stairs	5	32

to the site of bronchial obstruction. As would be expected, there was a higher proportion of dyspnoeic patients among those with obstruction of main or lobar bronchi compared with those who had obstruction of segmental bronchi. The number of cases was too small for a more detailed comparison of degrees of dyspnoea with the site of the bronchial block. The symptom was not closely associated with localized wheezing, as only 14 patients had noted both symptoms.

Table I shows that a localized wheeze was by no means an unusual symptom and that it was more frequent than the ill-defined or generalized wheeze. It is our opinion that the localized wheeze impressed a substantial number of patients, but apparently not their doctors, none of whom mentioned this symptom when referring the patient. It is worthy of note that all 22 patients located the wheeze to the correct side of the chest. Nine of these correctly indicated the region involved. Among this select group a few would emphasize their answer by pointing with one finger to where they felt the obstruction to be. Table IV shows that most of those who had noticed a localized wheeze

TABLE IV.—*Effect of Posture on Wheeze and Localized Rhonchi*

	Group A	Group B
Proportion showing accentuation of localized wheeze by lateral posture .. .	14/22	4/8
Proportion showing accentuation of generalized wheezing by lateral posture ..	1/15	1/16
Proportion showing accentuation of a localized rhonchus by lateral posture ..	16/26	7/12

were also aware that change of posture affected the sound. The usual history was that lying on the same side aggravated the sound, so that relief was sought by resting on the opposite side. Change of position had no effect on those with generalized or ill-defined wheezing.

It is reasonable to suppose that mediastinal displacement is enough to accentuate the narrowing of a partly obstructed bronchus and hence to make a wheeze louder. Certainly it is easily shown that localized rhonchi are accentuated by change of position and by forced expiration. The latter manoeuvre has been shown on bronchoscopy and bronchography to cause considerable bronchial narrowing. Localized wheezing was also aggravated by exposure to cold and infections, and by forced exertion. Menstrual aggravation of wheezing in tuberculous bronchitis has been noted by Amberson (1940). Of three female patients with tuberculous bronchitis in our series none had noted any change in this symptom either before or during menstruation. A localized wheeze was present in eight patients from group B. Examination of the x-ray films of these eight showed that in six the lesion was on the same side as that to which the patient referred the wheeze. Three of the six had enlarged hilar shadows. Of the two unexplained cases one suffered from bilateral pulmonary tuberculosis and the other from a paratracheal cyst on the opposite side.

Why did only a minority complain of a localized wheeze? It is possible that this symptom is present only when bronchial narrowing is incomplete, and that, once complete obstruction occurs, the symptom ceases. Because the figures available from group A were small the total number found by R. N. J. in the pilot and later studies—that is, 150 cases of known bronchial obstruction—were examined. A localized wheeze was found in 9 out of 35 cases of complete block (26%), compared with 33 out of 115 cases of partial block (29%). These figures imply no relation between the symptom and the degree of obstruction, but it should be remembered that at bronchoscopy the degree of obstruction was assessed in the supine position only. It is probable that those reported to have complete obstruction had only a partial block when in one lateral position, and that this accounted for the continued presence of a wheeze. The site of the obstruction in relation to the incidence of a localized wheeze was then studied in the same 150 cases (Table V).

TABLE V

	No. of Cases	No. with Localized Wheeze
Obstruction of main bronchus ..	47	21 (45%)
.. .. lobar	82	24 (29%)
.. .. segmental	21	5 (24%)

Although a localized wheeze was more common among those with obstruction of a main bronchus the above differences are too small for any clear relationship to be established. Another factor in the production of this symptom might be the type of disease. A comparison could be made only between bronchial carcinoma and pulmonary tuberculosis in the 150 cases. Among 117 cases of bronchial carcinoma a localized wheeze was noted in 40 (24%), while among 15 cases with pulmonary tuberculosis a localized wheeze was found in 8 (53%). As the number of tuberculous patients was small too much importance cannot be attached to the considerable differences observed. It may be that this symptom is more commonly found when tuberculosis rather than carcinoma affects the bronchi, but of this we have no proof.

Sputum retention was rarely observed, and no useful information could be deduced from the small number investigated in this series.

The character of the chest pain too afforded no help in detecting cases of bronchial obstruction.

The first of the examination findings—stridor—was equivocal and bore no clear relation to the presence of bronchial obstruction. Some patients with generalized bronchitis, and even one in whom there was no known abnormality, could produce this sign. As interpreted by us, the sign was of no value in detecting bronchial obstruction. On the other hand, a local reduction of breath sounds was an important finding. Investigation of the further five group B cases showed that in four the lesion was on the same side as the sign (in one of these a bronchogram showed confirmatory narrowing of a segmental bronchus). The fifth group B case suffered from secondary deposits in both lungs, and our finding is unexplained. This sign, therefore, though present in less than half of the cases of bronchial obstruction, was a good pointer to this condition in the absence of fluid.

Localized rhonchi were found in 26 of the group A cases. As in the case of a wheeze, this sign was accentuated in more than half by lying on one side. Accentuation and, indeed, discovery of localized rhonchi by forced expiration were also notable findings. In 20 of the 26 cases forced expiration made this sign more obvious. One observer (T. M. W.) noted, further, that in nine cases forced expiration was necessary for the discovery of the sign, whereas in the remaining 11 forced expiration accentuated a sign already present. These localized rhonchi were in most instances maximal over the anterior chest at the level of the hilum. They were ascribed to the correct side in all but one case. Attempts to define involvement of one particular lobe were unsuccessful. Both partial and complete bronchial obstruction were apparently not related to the incidence of this sign. Thus localized rhonchi were found in 14 of the 35 cases of complete block (40%) and in 51 of the 115 cases of partial block (44%). Likewise this sign was not related to the cause of the stenosis, since the distribution between cases of tuberculosis and carcinoma showed little difference. Localized rhonchi were also found in 12 of the group B cases and probably arose from distal bronchial obstruction. The only evidence in support of this was the site of the principal lesion as shown by x-ray examination; in 10 the clinical and x-ray findings agreed; the last two cases suffered from bilateral pulmonary tuberculosis.

It is interesting to compare the symptom localized wheeze with the finding of localized rhonchi. Both were present together in only 12 patients. At first sight this low figure seems surprising. When it is remembered that both are intermittent and may vary from day to day, it is understandable that in only a small proportion will the symptom and sign be simultaneously present.

Conclusion

Two symptoms and two signs have proved of some value in assessing bronchial obstruction—a cough which has altered in character, a localized wheeze, a local reduction of breath sounds, and localized rhonchi. The effect of change of posture in accentuating localized wheezing and rhonchi has been confirmed. However, these symptoms and signs were inconstant, and even the most frequent localized rhonchi were noted in just over half the cases of proved bronchial obstruction. Nevertheless we would suggest that these symptoms and signs are important enough to be included in routine clinical assessment of the chest, and their presence, especially localized wheezing and localized rhonchi, should call for further investigation.

Summary

One hundred patients (50 with bronchial obstruction and 50 in whom bronchoscopy was negative) have been studied independently by three observers to assess the diagnostic value of certain symptoms and signs.

A cough which has altered in character, a localized wheeze, a local reduction of breath sounds, and localized rhonchi were more commonly found among patients with bronchial obstruction.

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Medical Memoranda

A Case of Acute Hydramnios

Acute hydramnios is a very rare condition, and, according to Browne (1946), every case should be reported.

CASE REPORT

The patient was an Ibo woman, aged about 37, who reported to the antenatal clinic at the Maternity Hospital, Aba, Nigeria, complaining of severe abdominal pain and distension. She said she was seven months pregnant. She had had eight previous pregnancies, the first ending in abortion at three months, but the remainder went to term and ended in apparently normal deliveries of normal babies—six female and one male. All her confinements were at home, and she had never attended hospital in her life before; but her condition on this occasion was so serious that she felt her life was in danger, and decided, after a certain amount of consideration, to go to the hospital.

Her pregnancy had apparently proceeded without incident until the evening before her attendance, when she felt that her abdomen was becoming acutely distended. The swelling continued throughout the night and also while on her way to hospital the following morning. She had severe pain all over the abdomen and was vomiting. She also complained of shortness of breath.

On examination she was seen to be of average build but rather thin. There was no pallor of the conjunctivae or any sign of shock. Her pulse rate was 84, regular, and of good volume. The temperature was normal. There was oedema of the lower limbs, which she stated had been present since the previous day. There was also oedema of the abdominal wall below the level of the umbilicus. The blood pressure was 120/80, and a catheter specimen of the urine contained a trace of albumin but was otherwise normal. Orthopnoea was present, but examination of the chest revealed no lesion of the heart or lungs to account for this. The abdomen was greatly distended and the skin over it shining and tense. Coils of small intestine could be seen outlined in the flanks when they were pressed against the thin abdominal wall by the tumour within. On palpation it was difficult to outline the uterus owing to the tenderness present, but the fundus was at the level of the xiphisternum and there was marked tenderness over the liver where it was being squeezed against the diaphragm. A fluid thrill could be readily detected, but no foetal parts