

Conservative management of spontaneous pneumothorax

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In recent years many authors have advocated prompt active treatment for spontaneous pneumothorax in the belief that patients treated in this way recover more quickly and suffer fewer relapses (Lenox-Smith, 1962; Smith and Rothwell, 1962; Hamel, Briggs, and Schulkins, 1963). The material on which this attitude is based is very often related to hospital admissions only and does not reflect the overall experience of managing patients with pneumothorax as seen in out-patient departments and chest clinics, where many patients are supervised conservatively on an out-patient basis. Fearing that there was a risk of the radical treatment policy becoming established on too slender evidence, we surveyed our cases of pneumothorax managed during a decade when there had been a constant policy aimed at keeping the patients at work whenever possible and certainly avoiding admission unless this was clearly necessary.

METHOD

The material consists of every case of spontaneous pneumothorax presenting at the Chest Clinic during the period 1954 to 1963 (119), whether subsequently admitted or not. In eight patients pneumothorax occurred at different times on both the left and right sides, giving the total of 119 pneumothoraces in 111 patients. The majority were referred by their general practitioners, either to the radiography service provided for them or to the consulting clinics. We think this represents an unselected group of pneumothoraces, as met in routine thoracic practice, and is thus more suitable for assessing the true position than figures based on selected hospital admissions only. All the available notes and radiographs were surveyed and the relevant data were recorded on cards for analysis.

The benignity of the condition usually does not warrant those procedures necessary to establish the cause beyond doubt. Furthermore, it is unlikely, even if these were undertaken on every

patient, that a true aetiological diagnosis could be made. Thus a presumed aetiology has been stated for each patient, and only three broad groupings have been employed:

Simple (82 patients) In this group were put those patients who, apart from the pneumothorax, had normal radiographs and no evidence of other pulmonary disease.

Emphysema (33 patients) Patients were put into this category when it was clear radiologically that there were hypertranslucent areas present in the lung that had collapsed. There were either bullae with no apparent cause, bullous areas adjacent to scars, usually presumed to be tuberculous, or areas of more generalized hypertranslucency. These patients often had clear evidence of chronic bronchitis.

Miscellaneous (4 patients) In this group are included one patient with active tuberculosis, one with bronchogenic carcinoma presenting with ipsilateral pneumothorax, one with bronchiectasis and Marfan's syndrome, and a diabetic who developed pneumothorax with an empyema.

It cannot be claimed that this classification is precise, but much care was exercised in allocating the patients to these clinical groupings before the analysis was undertaken. It is also stressed that the criteria are radiological: clearly the absence of translucent areas in radiographs does not exclude the probability of ruptured superficial air vesicles as the cause of 'simple' collapse (Kjaergaard, 1932).

The patients were also allotted to four groups according to clinical management. In group A were 88 patients who were managed successfully on an entirely conservative basis and without admission to hospital, a practice originally suggested by experience with artificial pneumothorax. The majority were allowed to remain at work: a few were advised to rest for a few days, parti-

cularly if their work was strenuous or symptoms caused anxiety. Group B consisted of 10 patients who were admitted to hospital beds, usually because of worrying dyspnoea or marked pulmonary collapse, but who received only simple aspiration of air. The eight patients in group C were also admitted but had an intercostal tube inserted with underwater seal or suction. The 13 patients who received pleurodesis by iodized talc poudrage, or occasionally other surgery, were placed in group D.

In addition to the foregoing factors the degree of collapse at the time of diagnosis was assessed, within broad limits, by measuring the distance from a point on the thoracic cage opposite the greatest degree of pulmonary collapse to the centre of the thorax and comparing this with the distance, on the same line, from the surface of the lung to the centre of the thorax. This gave a ratio representing the degree of collapse. It was thought that the degree of collapse might have some bearing on the time that a pneumothorax took to expand, and this was investigated in each case in treatment group A only. The assessment was obviously invalid in other treatment groups where surgical interference forestalled natural expansion.

Good histories were available in each case from which it was possible to obtain an indication of definite or very probable previous collapses. These were also recorded for analysis.

Finally an effort was made to trace those patients who had failed to attend for follow-up to facilitate an estimation of the relapse rate in those conservatively treated. This included postal questionnaires, visits by clinic staff to the last known addresses, contacting general practitioners, and writing to executive councils. Although a number of patients were finally contacted by these means the overall yield of the programme was less effective than was hoped for, largely because of much local population shift. The actual follow-up achieved was 94 (79%) for one year, 83 (70%) for two years, 63 (53%) for three years, 50 (42%) for four years, and 38 (32%) for five years.

ANALYSIS

Close analysis of the 33 patients in the emphysema group showed that nine were considered to have simple apical bullae; in 13, local bullous formation was associated with evidence of adjacent scarring; in 11 there were larger areas of relative translucency in the radiographs. A comparison of these subgroups revealed no clear difference

TABLE I
DISTRIBUTION BY AGE, SEX, AND AETIOLOGY

Diagnostic Groups	Males (99)			Females (20)			Total
	15-29	30-44	45+	15-29	30-44	45+	
Simple ..	64	8	1	6	3	0	82
Emphysema ..	1	7	15	1	3	6	33
Miscellaneous ..	2	0	1	0	0	1	4
Total ..	67	15	17	7	6	7	119

in age structure or treatment response, so that these 33 patients have subsequently been considered together.

The distribution of the pneumothoraces by the age and sex of the patients and by aetiology can be studied in Table I. It will be seen that there were 99 pneumothoraces in males and 20 in females, showing the usual preponderance of males in this condition. It is quite clear that the proportion of patients having an emphysematous aetiology is greater in the older age groups and that the proportion considered simple rapidly falls with increasing age, a finding common to other series. There was no obvious difference in the distribution of males and females in this respect, and the separated figures are too small for further analysis.

Distribution of the pneumothoraces by side shows 68 left (57%), compared with 51 right (43%). In the simple group there are 48 left (58%), compared with 34 right (42%). No patients sustained bilateral pneumothoraces simultaneously. A note was made as to whether the onset was acute or insidious, but this could not be related to any other factors, and, in fact, the majority, 110 (92%), were of acute onset.

The distribution according to treatment group, age, and sex is presented in Table II. Clearly the possibility of successful conservative management

TABLE II
DISTRIBUTION BY AGE, SEX, AND TREATMENT

Treatment Groups	Males (99)			Females (20)			Total
	15-29	30-44	45+	15-29	30-44	45+	
Out-patient conservative ..	57	9	8	5	5	4	88
In-patient aspiration ..	2	1	5	1	0	1	10
In-patient intubation ..	4	0	2	0	1	1	8
In-patient pleurodesis or other surgery ..	4	5	2	1	0	1	13
Total ..	67	15	17	7	6	7	119

TABLE III
DISTRIBUTION BY TREATMENT AND AETIOLOGY

	Simple	Emphysema	Miscellaneous	Total
Out-patient conservative	68	18	2	88
In-patient aspiration ..	2	6	2	10
In-patient intubation ..	4	4	0	8
In-patient pleurodesis or other surgery ..	8	5	0	13
Total	82	33	4	119

decreased with advancing age, presumably because of the higher incidence of both degenerative and inflammatory disease in the Emphysema group. Of a total of 74 pneumothoraces occurring in the age group 15-29 years, 62 (84%) were managed conservatively, whereas of the 24 in the age group 45 years and over the figure was 12 (50%). Table III relates treatment to aetiology and confirms the greater need for active treatment in the emphysematous (and more elderly) patients, *i.e.*, 15 of 33 (45%), as compared with 14 of 83 (17%) of those having simple pneumothorax.

The reasons for proceeding to active rather than conservative management are analysed in Table IV. There were 31 cases in this group, and it will

TABLE IV
REASONS FOR ADMISSION TO HOSPITAL OF 31 PATIENTS IN TREATMENT GROUPS B, C, AND D

	Simple	Emphysema	Miscellaneous	Total
Dyspnoea	4	6	0	10
Tension	3	2	0	5
Marked collapse ..	2	1	2	5
Previous ipsilateral pneumothoraces ..	2	3	0	5
Failure to expand at six weeks	2	1	0	3
Adhesions	1	1	0	2
Pain	0	1	0	1
Total	14	15	2	31

be seen that persistent dyspnoea, tension pneumothorax, or marked pulmonary collapse accounted for 20 (65%); five (16%) had suffered previous pneumothoraces on the same side; two (6%) had evident adhesions present (in one leading to haemothorax), and one (3%) had relief of pain only after aspiration of air. These reasons, accounting for 90% of the group, are self-evident and need no further comment. The remaining three patients, however, need explanation. They were originally managed conservatively but did not expand their lungs within six weeks; it was then considered advisable to act more energetically. One was a woman of 45 years with emphy-

sema; two were in the Simple group, a man of 24 years and a woman of 21 years. All three were treated uneventfully with talc poudrage and lost nothing by a previous trial of conservative management. Why this action was taken with these three patients when five others were allowed to continue to spontaneous expansion in the seventh week is not now clear: it is quite possible that if left alone they would have expanded in a similar fashion. Nevertheless, they must be considered failures of this regime, and, when added to the group successfully managed conservatively (88), they represent a failure rate of 3.3% (three of 91).

The time that the lung remained collapsed in each case was calculated from the history of onset and the date of the first radiograph showing complete re-expansion. The pneumothoraces in those patients successfully managed conservatively (treatment group A) are further analysed in the scatter diagram (Fig. 1). The two patients in the

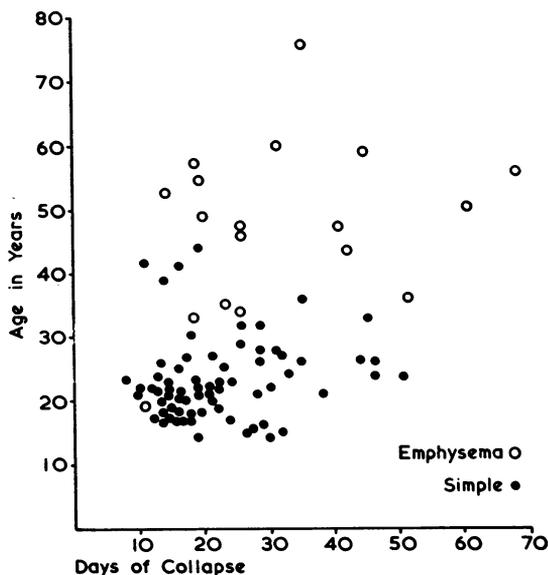


FIG. 1. Duration of collapse related to age and aetiology in those patients managed conservatively (group A).

Miscellaneous group (active tuberculosis and bronchiectasis) are excluded, leaving 86; 68 in the Simple group to compare with 18 in the Emphysema group. The relationship between the duration of collapse, the patient's age, and the aetiology is evident. As already shown, emphysema occurs largely in the older patients, while simple cases are usually young patients. Furthermore, it

is clear that the older emphysematous patients take longer to re-expand their lungs. The mean age of the Emphysema group was 47.3 years and the period of collapse 30.8 days, whereas the equivalent figures for the Simple group were 23.4 years and 22.5 days: the emphysematous patients took 38% longer to expand their lungs. No relation could be found between the degree of collapse and the duration in days.

No meaningful analysis of follow-up or relapse could be made in treatment groups B, C, and D, because the figures were too small, but it can be stated that no patients in groups C and D relapsed. Analysing relapses in group A (88 patients), however, gave a further indication of the success of conservative management. In this group varying follow-up periods were recorded due to (a) the accumulation of cases over a 10-year period, and (b) the failure to trace a proportion. In Table V are presented the number of patients remaining for analysis each year, the ipsilateral relapses in this group, and the calculated cumulative relapse rate. This is 11% at four years

TABLE V
FOLLOW-UP AND IPSILATERAL RELAPSES IN THOSE PATIENTS MANAGED CONSERVATIVELY (88 PATIENTS: GROUP A ONLY)

No. of Patients at Beginning of Each Year of Follow-up after Treatment	Relapses during Year	Cumulative Relapse Rate ¹ (%)
1st year 88	5	6
2nd year 69	0	6
3rd year 65	1	7
4th year 48	2	11
5th year 40	0	11
6th year 30	0	11
7th year 22	1	15

¹ Calculated by a technique similar to that used for life tables

and then appears to level off. The subsequent increase (from 11% to 15%) at seven years was due to one of only two relapses in the patients with emphysema: there were no relapses after four years in the Simple group.

Only five patients gave a history of previous ipsilateral pneumothoraces, and only one of these suffered a further ipsilateral pneumothorax subsequently. Thus there is not sufficient evidence to study multiple pneumothoraces in this series.

DISCUSSION AND CONCLUSIONS

The age, sex, and aetiology structure of this series of patients with spontaneous pneumothoraces reflects a similar pattern to that described in previous communications (Bernhard, Malcolm,

Berry, and Wylie, 1962; Lenox-Smith, 1962; Hyde, 1963), and no further comment is needed on these factors, which have been discussed fully in the past, except to stress once again the remarkable finding of the great predominance of simple pneumothorax in young males.

In this study the aetiology of the pneumothorax, age of the patient, and the need for active treatment were all related. Furthermore, the time that the lung remained collapsed in those patients treated conservatively was also related to age and aetiology. The increased need for active intervention when there was a more complicated aetiology, such as evident emphysematous bullae, fibrous scarring in the lung, or more generalized emphysema, or when the patients were in an older age group, makes it reasonable to consider active treatment in such patients at the time of the first occurrence. Even in this emphysematous group, however, over half the patients may be managed conservatively—55% in this series.

Our experiences with simple pneumothorax are even more encouraging. It is essentially a benign condition and only occasionally gives cause for anxiety. This contention is well supported by the evident success of non-interference with the natural history of the condition: 83% of our simple cases were successfully managed in this way.

As we understand it, the case for immediate surgical intervention is based on the consequent reduction both of the patient's stay in hospital and of the relapse rate. In our Simple group, however, admission was seldom necessary, so that a reduction in stay did not arise: it was usual for those managed conservatively to become symptomless quite rapidly, and in only two did planned conservative treatment fail. In the remainder the lung expanded spontaneously within four weeks in 78% of cases, even when the patients were allowed to remain at work. Furthermore, the case made out for early intubation is not impressive, since high relapse rates of 19% and 17% are reported (Klassen and Meckstroth, 1962; Smith and Rothwell, 1962), while other authors (Bernhard *et al.*, 1962) in a group of 50 patients found it necessary to make between two and six separate catheter insertions in 23 to obtain eventual expansion. Ransdell and McPherson (1963) report a failure rate of 26% for intubation, while, in a series reported by Hamel *et al.* (1963), an intercostal tube proved unsatisfactory in 51 of 153 cases (33%). Frankel, Krasna, and Baronofsky (1961) also draw attention to some of the disadvantages associated with intubation.

In this series we calculated a relapse rate of 11% over six years in the conservatively managed group. In our opinion, such a relapse rate justifies a policy which allows patients with this largely benign condition to remain at work. Support for this attitude is given by Beumer (1964) in a series of 104 patients and by Hyde (1963) in 171, who report favourably upon such conservative treatment. Patients should naturally be primed to report promptly should symptoms reappear either during the initial occurrence or subsequently. Only then need consideration be given to the institution of more active measures.

In conclusion it is clear that the general policy of non-intervention and out-patient management for spontaneous pneumothorax has been fully justified. It can be recommended with confidence for the simple form and will be over 80% successful. If there is relapse, if symptoms are distressing, if complications occur, if the patient is elderly and emphysematous or, like air-line pilots, at special risk, then admission and more active treatment may be considered. Such patients, however, will only form about a quarter of those seen in out-patient departments.

SUMMARY

A decade's experience of managing spontaneous pneumothoraces conservatively, usually without admission to hospital and often with the patient at work, is described. There were 111 patients with 119 pneumothoraces classified aetiologically as Simple, 88; Emphysema, 33; and Miscellan-

eous, 4. The cases were also allocated to one of four groups according to management and then analysed. Tables are presented relating age to aetiology, management, and duration of collapse.

The management of most patients without hospital admission presented no problems. Only a quarter of this unselected group of pneumothoraces needed any form of active treatment. In the Simple group 80% expanded without intervention, the mean expansion time being 22.5 days and the calculated relapse rate 11% over six years. It is concluded that a general policy of non-intervention in this group is fully supported.

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