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Present Views on the Application of Surgery in the Treatment of Pulmonary Tuberculosis*

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WITH THE ADVENT OF VERY COMPLICATED chest surgery, particularly that related to the heart, and the complicated investigations carried on into the physiology of the chest, the importance of pulmonary tuberculosis in ordinary day-to-day treatment of patients tends to be forgotten.

Like the treatment of most diseases in early times, the therapy of tuberculosis was varied. Thoracoplasty was first done by de Cereville¹ of Lausanne in 1885. Carl Spengler² did a more extensive resection and introduced the term "extra pleural thoracoplasty." Brauer³ suggested still more radical collapse. Phrenic nerve paralysis for collapse was introduced by Stuertz⁴ in 1911.

In the last few years of the last century, a few pulmonary resections were done, but by 1921, less than a dozen successful cases were reported and about as many unsuccessful ones. As late as 1937, Alexander⁵ stated resection could not be considered for late or small lesions because it was so dangerous.

The antibiotic era in the treatment of pulmonary tuberculosis was ushered in with the discovery of streptomycin in 1946, followed shortly by isonicotinic acid hydrazide and para-aminosalicylic acid. With these new medicinal weapons the physician was able to have some control of tuberculous disease, especially fresh disease, where the blood supply was still rich. This meant that the danger of massive spreads following pulmonary surgery was much diminished and perhaps that the danger of cutting tuberculous disease in a lung might not be too great. This initially gave a great stimulus to attempts at pulmonary resection to eliminate tuberculous foci and later en-

couraged less radical resections — such as segmental resections and wedge resections, thus preserving as much functioning lung tissue as possible, enabling patients with low pulmonary function to have surgical treatment.

Careful evaluation of pulmonary function gave the surgeon accurate preoperative information on how much resection his patient could tolerate.

The modern problem is largely how far to push medical treatment before resorting to surgery. Trapp and Allan⁷ in reviewing operative cases up to 1961 stated, "pulmonary resection for tuberculosis should become rare in less than five years." Their prophesy has been fairly accurate, but still a few cases are done and I have attempted to get the indications for these operations and their results, as far as possible.

In our department, the trend has been away from collapse procedures as definitive therapy, to resectional procedures, sometimes with added collapse procedures. Over the past few years, the trend has been to much less surgery of any kind, and dependence on antimicrobial therapy.

The change from preferred collapse to preferred resection began in the early 1950's. In 1953, our first 100 resections were reviewed after five years.⁸ The year 1955 was the peak for resections. Since that time, the number of cases has fallen fairly steadily.

A review of the operative work in the past five years shows the diminution in the number of cases done. The indications for operation have decreased in number to some extent, but the number of patients fulfilling these criteria has diminished more, largely due to the effectiveness of long-term antibiotic therapy, but partly due to surveys picking up cases in early stages when

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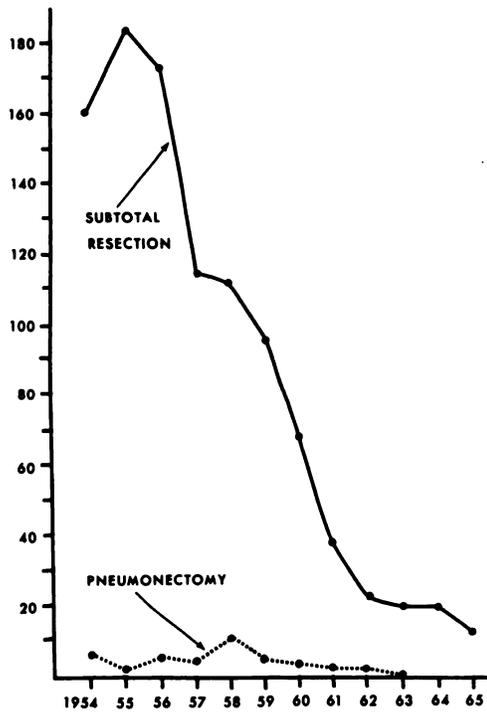


FIGURE 1

the chance of cure with drugs alone is greatest. One of the most difficult decisions to make in this era of effective antibiotic therapy is when, if ever, is surgical interference justified. We think there is still a small place for surgery in the treatment of pulmonary tuberculosis, but as you will see from the figures to be presented, we are finding fewer and fewer cases which fall into this category.

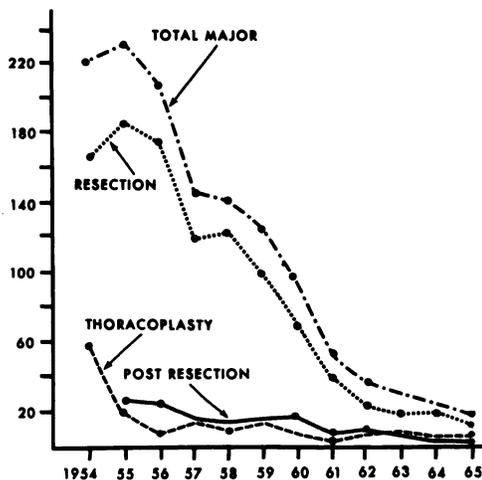


FIGURE 2

We have reviewed the cases with particular reference to indications and complications (Fig. 1). With the changing indications, the number of operations has declined as indicated by this figure showing resections from 1955, our peak year, to 1965. Figure 2 shows the dramatic falling off in pneumonectomies.

We have added to our indications "social indications." These are patients who do not take treatment well in an institution or who refuse to give medical treatment an adequate trial or who are unlikely to continue treatment following discharge, or are frankly psychotic. We have felt such patients are less a menace to themselves and the community at large if their disease is removed fairly early when the antimicrobial drugs are most effective against the organisms.

In reviewing the records of the last five years, 1961-1965 inclusive, as of March 1, 1966, the following indications were found. In many cases there was more than one indication, but the main one is given in Table 1. There were 103 resections, four of which turned out to be nontuberculous leaving 99 cases; one of these had carcinoma of the lung with his tuberculosis.

TABLE 1

Uncooperative or mentally ill (Social indication)	27
Cavity with positive sputum	26
Cavity with negative sputum	15
Destroyed lobe or lung	10
Tuberculoma	10
Bronchiectasis with T.B. infection	4
Recurrent breakdown	4
Bronchostenosis	3
Atelectasis with positive sputum	2
Bronchopleural fistula, spontaneous	2
Total	103

The indications for operation in the old series of 1953 were:

TABLE 2

1. Lower lobe cavitation
2. Hilar cavity
3. Giant cavity
4. Tuberculous bronchiectasis
5. Tuberculoma
6. Bronchostenosis
7. Destroyed lung
8. Failed thoracoplasty
9. Failed pneumothorax
10. Failed extrapleural pneumothorax
11. Hemoptysis
12. Miscellaneous

Obviously, there has been a radical change in our indications, though a few of the old ones remain.

In the same period of time, 1961-1965, there were only eight thoracoplasties done as a definitive treatment. Where possible, resection was preferred. The following are the indications for this operation in this series:

TABLE 3—INDICATIONS FOR THORACOPLASTY

Empyema	1
Empyema with spontaneous bronchopleural fistula	2
Cavity in old man with ineffective antibiotics	1
Cavity with extensive bilateral disease	3
Bronchopleural fistula in old oleothorax	1

There was one death 14 months after surgery, due to suicide. Of the remainder, three are well, two fairly well and two sick. This series of thoracoplasties is so small that conclusions cannot be drawn, and also the patients, with one exception, were poor risk cases.

In the first 100 cases reported in 1953, patients received inadequate preoperative antimicrobials and the postoperative course was comparatively short.

The preoperative and postoperative medication times and the total time in the present series average 8.8 months preoperatively and ranges from one month in suspected cancer to 50 months, with 14 over 12 months and seven under three months.

Where postoperative medication has been completed, the average time was 17.6 months making an average total treatment 26.4 months.

The drugs preferred at present are streptomycin, INH and PAS. If one of these is not tolerated or is ineffective, we may carry on with only two drugs. If other drugs are required, we use cycloserine, ethionamide, viomycin and pyrazinamide as a rule, in that order of preference.

Positive sputum smear or culture was present in all cases at some time except those shown microscopically to be nontuberculous. Table 4 shows positive sputum within two months before and at intervals following surgery.

TABLE 4—SPUTUM

	Cases
Positive within 2 months before operation	53
" " 2 " after "	9
" " 3 " " "	5
" " 6 " " "	2
Negative at 2 months after operation	10
Not recorded at 6 months	—

The results of decisions made on these indications should be of interest. We have classified the patients as well—either working or fit for full-time work requiring moderate physical exertion; fairly well, fit for sedentary or part-time work, still in recovery period; ailing, either confined to sanatorium or out and unfit for any work, taking only 99 tuberculous cases (Table 5).

TABLE 5—RESULTS

Well	67
Well with positive sputum	1
Fairly well	9
Recovering	1
Ailing	9
Lost to follow-up	6
Dead	6

The following complications occurred:

TABLE 6

	Cases
Delayed expansion over one week	19
Postoperative intrapleural hemorrhage (over 1,000 ml in 24 hours)	5
Atelectasis	4
Empyema with bronchopleural fistula	2
Bronchopleural fistula without infection	1
Wound infection	1
Postoperative hemoptysis	1
Rate of complications	33%
Excluding slow expansion	14%

Postoperative deaths are recorded in Table 7.

The time from diagnosis to operation (Table 8) has been divided into two groups, first those in whom the time elapsed was three years or less. This made up 77 of the 99 cases, the average time being 9.3 months. Second are those in whom the time was over three years. In this group of 22 patients, the average time was 12.7 years. In the first group, 62 (80 per cent) are well, eight (10 per cent) are fairly well, there was one death and six were lost to follow-up. In the long term group of 22, 15 (68 per cent) are well and one (4.5 per cent) is fairly well, two (9 per cent) are still ailing and there were three deaths

TABLE 7—FOUR POSTOPERATIVE DEATHS (WITHIN 2 MONTHS OF OPERATION)

1) 1- 2 days	Right upper lobectomy	Pulmonary embolism
2) 1- 5 days	Pneumonectomy	Pulmonary insufficiency
3) 1-10 days	Pneumonectomy	Thrombosis pulmonary artery
4) 1- 2 months	Right upper lobectomy	Silicotic with bronchopleural fistula and pulmonary insufficiency

TABLE 8—TIME OF DIAGNOSIS TO TIME
OF OPERATION

	Up to 3 Years (77 Cases) Average 9.3 Months	Over 3 Years (22 Cases) Average 12.7 Years
Well	62	15
Fairly well	8	1
Ailing	—	2
Lost to follow-up	6	—
Death	1	3
Convalescent	—	1

(13 per cent). This would suggest though the operative mortality is higher, the chance of a good result for the survivors is quite good.

Our first 100 cases were carefully followed and reviewed. Five years was about the time that it took to do 100 cases, the same interval as the present 99. In that group there were 33 pneumonectomies, with two deaths.

The figures in Table 9 do not include the six untraced cases in the present series. There would seem to be a considerably greater number fit for full-time work under present conditions. This may be due to one or other of two factors or likely both—first, the long time pre- and postoperative antibiotic therapy and secondly, our increasing confidence in the controlling power of our drugs so that we permit them to return to work much earlier than we used to.

TABLE 9—WORK CAPACITY

	This Series %	Old Series %
Fit for full-time work	77	26
Fit for part-time or light work	9	33
Total	86	59
Postoperative deaths	4	3

CONCLUSIONS

Pulmonary tuberculosis has been with us from time immemorial. For centuries it was treated medically. Late in the 19th and early 20th centuries, various types of surgery were advised until the disease became largely a surgical condition. In 1946, when

the first effective antituberculosis drug became available, the rise of medical treatment began again. At first, it was considered wise to add surgery to the medical regimen, to eliminate foci. Then it was found that long-term drug treatment was a safe method and the indications for surgery became more limited. However, some old chronic cases and some recently diagnosed cases appear still to require surgery though their number is diminishing.

The supply of chronic cases should diminish rapidly, but some indications for this treatment in new cases will probably persist. The two most likely to remain, in my opinion, are the social or mental indications which are not likely to diminish appreciably and the case with persistently open cavity and positive sputum.

However, we must admit that the pendulum has almost swung completely back to the medical side during the past ten years of increasing use of surgical methods.

RESUMEN

La tuberculosis pulmonar ha estado entre nosotros desde tiempo inmemorial. Durante siglos ha sido tratada médicamente. Al final del siglo XIX y principios del XX varios tipos de tratamiento quirúrgico fueron propuestos hasta que la afección vino a ser considerada mayormente tributaria de la cirugía. En 1946, cuando apareció la primera de las drogas antituberculosas efectivas, el tratamiento médico comenzó a adquirir nueva importancia. Al principio se consideró conveniente el suplementar el tratamiento médico con métodos quirúrgicos, a fin de eliminar los focos. Mas adelante se comprobó que el tratamiento medicamentoso era seguro a largo plazo y las indicaciones quirúrgicas devinieron mas limitadas. Sin embargo algunos casos muy crónicos y otros de mas reciente diagnóstico parecen aun requerir la cirugía, si bien su número se encuentra en disminución.

La cuantía de casos crónicos debe de disminuir rápidamente pero algunas indicaciones quirúrgicas en casos recientes persistirán probablemente. Las dos mas aparentes, en nuestra opinión, son las de orden social o individual, que

no es de esperar que disminuyan y los casos con cavernas persistentes y esputo positivo.

Sin embargo, tenemos que admitir que el péndulo ha oscilado de nuevo casi completamente hacia el tratamiento médico en los últimos diez años, después de cerca de 75 años de empleo creciente de los métodos quirúrgicos.

RESUMÉ

La tuberculose pulmonaire appartient à l'humanité depuis des temps immémoriaux. Pendant des siècles elle a été traitée médicalement. A la fin du 19^{ème} siècle, et au début du 20^{ème}, on mit au point différents modes de chirurgie puis la maladie devient tout à fait chirurgicale. En 1946, quand apparurent les premières médications efficaces il y eût une nouvelle augmentation de la place du traitement médical. Il fut d'abord considéré comme un auxiliaire du traitement chirurgical pour faire disparaître complètement les foyers d'infection. Mais ensuite, on se rendit compte qu'un traitement médical prolongé réalisait une méthode de sécurité et les indications de la chirurgie devinrent alors encore plus limitées. Cependant quelques vieux cas chroniques et quelques cas nouveaux apparurent de nouveau comme pouvant demander l'application de la chirurgie. L'existence de cas chroniques va diminuer rapidement mais la chirurgie persistera probablement pour certains cas récents.

Dans l'opinion de l'auteur, les deux conditions qui lui semblent devoir laisser persister la chirurgie sont d'ordre social et d'ordre mental et il pense que ces deux conditions ne sont pas prêtes à diminuer. Par ailleurs, il faut ajouter comme indication les cas où persiste malgré le traitement médical une caverne avec expectoration positive. Cependant, l'auteur admet que les oscillations du pendule se sont complètement fixées du côté du traitement médical durant ces 10 dernières années après que nous ayons vu pendant 75 ans l'accroissement de l'utilisation des traitements chirurgicaux.

ZUSAMMENFASSUNG

Die Lungentuberkulose ist seit undenklichen Zeiten unser Begleiter. Jahrhundertlang wurde sie rein internistisch behandelt. Im späten 19. und frühen 20. Jahrhundert wurden verschiedene Formen operativer Maßnahmen empfohlen, so daß die Erkrankung schliesslich und endlich eine Indikation für operatives Vorgehen darstellte. Im

Jahr 1946, als die ersten wirksamen antituberkulösen Mittel zur Verfügung standen, begann der Aufstieg der konservativen Behandlung auf neue. Zu Anfang wurde es als zweckmässig erachtet, operative Methoden zum internistischen Behandlungsplan hinzuzunehmen, um die Herde zu eliminieren. Dann aber fand man, daß eine medikamentöse Behandlung über lange Zeit eine sichere Methode darstellte, und die Indikationen für das chirurgische Eingreifen wurden wieder in engere Grenzen gestellt. Es scheinen aber immer noch bestimmte ältere chronische Fälle, ebenso auch einige frisch diagnostizierte Fälle heute noch eine chirurgische Therapie zu erfordern, obwohl wie beschrieben wurde, ihre Zahl im Rückgang begriffen ist.

Der Bestand an chronischen Fällen dürfte sich rasch vermindern, aber es werden bestimmte Indikationen für eine solche Behandlung bei frischen Fällen auch wahrscheinlich bestehen bleiben. Die zwei Indikationen, die nach meiner Meinung die größte Wahrscheinlichkeit für sich haben, weiterhin zu bestehen, sind die soziale und die psychiatrische Indikation, die wahrscheinlich nicht merklich zurückgehen, sowie Fälle mit persistierender offener Kaverne und positivem Sputum.

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