

The Current Surgical Treatment of the Pulmonary Tuberculosis in Japan

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It is my great privilege and pleasure to be invited to attend the honorable 5th Annual Meeting of the Korean Thoracic and Cardiovascular Society, and to have a chance to present a report on the Present Status of Surgical Treatment of pulmonary Tuberculosis in Japan.

First of all I would like to express my cordial appreciation to the president and all members of this meeting.

Before starting a discussion of main subject, the present status of active tuberculosis cases in Japan Who are requiring some kinds of treatment, will be shown here.

As you probably know we have carried out nationwide tuberculosis prevalence survey four times with every five-year-interval since 1953. The fourth survey was carried out in 1968 and the fifth survey is decided to be carried out in Autumn of this year.

According to the results of fourth survey the presumptive number of active cases is 1.5 million, corresponding to 1.5% of all population. In this survey active cases were divided into 4 groups such as group of chemotherapy alone, tentative chemotherapy, surgical treatment and symptomatic treatment.

The number of cases requiring surgical

treatment is supposed to be 55,000, which occupies 3.7% of all active cases. Cases classified as the tentative chemotherapy of 0.25 million, corresponding to 16.5% were divided into 2 groups by the result of survey of same patients performed one year after fourth survey: one is a group with higher probability of requiring surgical treatment which is 70,000, corresponding to 4.8% Another group consists of cases with higher probability of getting cure by chemotherapy alone which is 0.18 million, 11.18%. Thus, cases supposed to require the surgical treatment is 8.5% of all active cases.

This number is very small, but they can not be expected to get cure completely by chemotherapy, moreover they maintain both a much potency to the relapse after cessation of chemotherapy and much danger of tuberculosis infection to another persons. Therefore, the role and place of surgical procedure in the treatment of pulmonary tuberculosis is considered still important in Japan.

Since 1963 we have collected and analysed every year cases who had been operated upon in 50 institutions belonging to Japan Tuberculosis Research Committee and had been followed up for the period from 6 months to one year postoperatively. As the number of operated cases reached to more than 17,000 up to 1971, I would like to review and evaluate the present

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status of surgical treatment for pulmonary tuberculosis using this material, and to add some comments and my own opinion to it.

As revealed in this slide, the number of operated cases shows a rapid decrease year by year. For instance, cases operated upon in 1971 becomes lesser than 1/3 as compared in 1963. This trend can be confirmed by next slide.

If the operation rate is defined as the ratio of operated cases to admitted cases in one year, it shows also a gradually lowering curve. In our sanatorium the operation rate presenting 80% in 1950 decreases down below 20% in 1971 but stabilizes slightly for recent several years.

It can be said that operated cases are gradually decreasing year by year depending upon development of chemotherapy and this trend will continue at least in the near future in Japan.

Needless to say it is considered to be essential to analyse the preoperative background factors and surgical procedures applied in order to evaluate their results of surgical treatment.

If the preoperative ventilatory function findings are analysed in operated cases, cases with %VC more than 71, that is, favorable functional cases are found in more than 70% and cases having %VC less than 50, namely, poor functional cases in less than 10%, on the average of 9 years period. These findings do not show a marked difference from year to year except for the last 2 years. This is based on excluding empyema cases in this period

However, the significant difference of %VC is found between in the positive sputum cases and in the the negative sputum cases. The poor functional cases can be found more frequently in the positive cases than in the negative cases and favorable functional cases reveals a quite opposite relation to poor one.

From these results unfavorable factors for the surgical treatment look like to have a tendency to be overlapped each other.

If the operated cases are divided from the standpoint of both radiological and bacteriological findings immediately before the operation, 4 groups can be made, that is, round 20% negative sputum without cavity, 44% negative sputum with cavity, 3% positive sputum without cavity and 34% positive sputum with cavity on the average. But these findings in 1971 show more or less a difference from the average, namely they are 22%, 54%, 2% and 22%, respectively. A yearly change of these findings is observed significantly especially from 1966 which is characterized by a gradual increase of negative cavitory cases and a gradual decrease of positive cavitory cases.

If we take into consideration of surgical indication strictly, the absolute indication in these cases is not so much in number because of positive cases being only 35% before the operation.

Needless to say the first purpose of treatment for pulmonary tuberculosis is to get a conversion to negative sputum, so round 65% cases have already achieved the first purpose. These should be classified as the relative indication of surgical treatment.

From this standpoint of view a majority of cases is considered to have undergone the operation as relative indication in Japan. This is due to a remarkable advance of chemotherapy.

Hence, I want to present my opinion as to the indication of surgical treatment for the negative sputum cases. As far as negative cavitory cases mentioned above is concerned, the period of negative sputum is only 1 or 2 months. So they differ markedly from so-called open negative cavitory cases because the

negative sputum in the latter should be confirmed to be continued more than 6 months by monthly sputum examination.

The accumulate aggravation rate after cessation of chemotherapy in the open negative cavitory cases reached to 36% in the period of 7 years. The annual aggravation is calculated to be 5%, even though chemotherapy has been continued at least 1.5years. Moreover, the aggravation rate has a close relation to thickness of cavitory wall: its rate is significantly lower in the thin-walled cavity, less than 2mm in thickness than in the thick-walled cavity, more than 3mm in thickness. The cavity in the sclerotic lung tissue shows the highest percentage of aggravation among open negative cavitory cases.

This slide makes it very clear to have high % of aggravation in case of chemotherapy as compared with one in case of surgical treatment.

The surgical treatment has always some hazards such as bronchial fistula, empyema, postoperative complications and death, however, such hazards are very small in %, that is, death rate is 1.1% and complication rate is 3.0%. Moreover, the death can be eliminated by a correct determination of indication and the complications also can be controlled more easily as compare with ones in the positive cases.

The indication of surgical treatment for the open negative cavitory cases was examined theoretically a comparative study of thickness of cavitory wall on tomogram and resected specimen. From upper figure of this slide, the fact that thickness of cavitory wall on the tomogram has a close relation to that on resected specimen can be affirmed.

However, as shown in lower figure of this slide, there is no relation between thickness of cavitory wall on tomogram and thickness of

fibrotic layer of cavitory wall on tomogram and thickness of fibrotic layer of cavitory wall on resected specimen. The thickness of fibrotic wall is mostly less than, 1mm and not over 1.5mm even in the thickest cases.

No tubercle bacilli in the specimen obtained from the inside of fibrotic layer of cavity can be found on culture. This fact means fibrotic walled cavity has already been free from tuberculous changes. As the cavitory wall in the lung is magnified 2 times on tomogram, cavity with wall less than 2mm in thickness on tomogram can be considered to have been cured already.

From this discussion the open negative cavity with wall more than 3mm is considered better to perform the operation as relative indication. The reason is based on some advantages such as reduction of duration of chemotherapy and prevention of relapse. Of course there are some disadvantages mentioned above in the surgical treatment which can be expected to eliminate them by the correct determination of indication and skillful technique of operation and postoperative management.

In case of tuberculoma the prognosis of chemotherapy is better than the open negative cavity but the aggravation including enlargement, spread and discharge of tubercle baccilli in sputum is found in 10%. Therefore, I would like to recommend to carry out the operation in case of tuberculoma more than 2~3cm in diameter.

Analysing the mode of surgical procedures applied in all cases, pneumonectomy is round 10%, lobectomy 45%, other resections 20%, thus all of pulmonary resections 75%, thoracoplasty 17% and the other operations including cavernostomy and cavernoplasty 8%.

This result is based on the order of choice of surgical procedures in Japan, In our prin-

ciple pulmonary resection is the first choice of surgical interventions. next thoracoplasty, followed by the other operations.

These figures differ markedly in accordance with sputum findings, As compared with the positive cases, in the negative cases pulmonary resection especially lobectomy and other resections occupy a higher percentage, on the contrary thoracoplasty occupys a lower percentage. Such a trend can be seen between aged cases and yonger cases, and between unfavorable functional cases and favorable functional cases.

A yearly change of surgical procedures is not so marked but dared to say a slight increase of pulmonary resection and a slight decrease of the other operations are found,

Next, the results of surgical treatment will be shown. In this study the results are evaluated by 4 factors such as successful rate, negative sputum rate, mortality rate and complication rate, The successful case is defined as case with negative sputum Who had already returned to work at the period of follow up. The mortality rate is calculated for the cases whose death is considered to be related to the operation and/or tuberculous aggravation postoperatively. The postoperative complications include only bronchial fistula, empyema without fistula and tuberculous aggravation. If the complications have been already cured at the period of follow-up, these cases are calculated to successful cases.

As seen in this figure, the successful rate, showing black column, is 85.9%, the negative sputum rate, showing horizontally lined column, is 94.2%, the mortality rate, showing white column is 2.0%, complication rate, showing obliquely lined column is 5.4% and positive sputum rate is 3.8%, in all cases.

However, these figures differ markedly

according to the preoperative background factors. For example, the results show a significant difference between in the positive cases and in the negative cases. As expected, the sucessful rate and negative sputum rate are higher in the negative cases than in the positive cases, in sharp contrast to them the mortaity rate, complication rate and positive sputum rate are significantly lower in the former than in the latter. Exact value of each factor in 3 groups can be understood by this slide.

When the good cases and poor cases was defined as poor cases having the criteria given in the lower part of this slide, in the poor cases the result reveals 44% success, 59% negative sputum, 16.5% mortality and 16.9% complications. This data looks like so miserable but it can be valued highly to get 60% negative sputum even in cases with large amount of tubercle baccilli showing resistance to primary line drugs and both restrictive and obstructive impairment who could not quite be controlled by chemotherapy.

When the results are analysed by the mode of operative procedures in all cases, the best result is obtained by pulmonary resection excluding pneumonectomy, next thorcoplasty, followed by pneumonectomy and the other operations. The reason to obtain the best result in pulmonary resection excluding pneumonectomy is not always based on the superiority of procedure itself but the preoperative favorable background factors for the operation.

If the evaluation of results is carried out in the positive cases by the same way, the result shows to be poorer in each surgical procedure, especially pulmonary resection excluding pneumonectomy than those in all cases. The complications in pulmonary resection becomes more frequently.

As understood by this slide, the difference

of result observed between each mode of operative procedures becomes smaller, moreover the result is going up on the whole in the negative cases.

According to these results it can be concluded that the results of surgical treatment is almost satisfactory but effort to get the correct indication and to improve the technique is required to thoracic surgeons because some operation failure cases still remain.

Finally I have to touch the postoperative complications and death. The incidence of all complications in pulmonary resection was more than 10% in the 4 year's period about 15 years ago, but it decreases down to 5% in the recent 9 years period.

As revealed in this slide, the incidence of all postoperative complications is variable from year to year but shows a slightly decreasing tendency on the whole.

The postoperative complications are divided into bronchial or alveolar fistula of 55%, empyema of 20% and spread of 25%.

This distribution does not show an essential alteration between in the positive cases and in the negative cases.

The bronchial fistula is the most predominant in the positive cases, showing more than 60%. In the negative cases the bronchial fistula also is the most predominant complication, showing about 50% but the increase of spread is somewhat markedly noticed as compared with the positive cases.

The type of postoperative complications differ markedly in accordance with the mode of surgical procedures. For instance, the empyema is the most predominant in the pneumonectomy, the bronchial fistula is the most significant in the pulmonary resection excluding pneumonectomy as well as in the other operations, and the spread is the most

frequent in the thoracoplasty.

As understood by the former slide, the failure in the pulmonary resection is mainly caused by bronchial fistula and the failure in thoracoplasty is caused by spread.

For such a reason it is very important to focus our attention for preventing development of bronchial fistula and spread.

As shown in this slide, according to our clinicolaboratorial studies, the incidence of bronchial fistula is very high 12.7% in cases having positive sputum before the operation, 6.8% in cases having one months' duration of negative sputum, whereas it decreases down to 1.5% in cases having 2 months' duration of negative sputum. There is a statistically significant difference in each 2 groups. However, no further change of its incidence can be detected in cases with 3 months' or more duration of negative sputum before the operation.

This fact can be supported by the relation of duration of negative sputum before the operation to the contamination of tubercle bacilli in the pleural space and histologically tuberculous changes in the wall at the end of lobar bronchus of resected specimen.

From these findings we should concentrate our effort to get the negative sputum for the period of at least 2 months before the operation, if impossible to decrease the amount of discharging bacilli in sputum by use of effective drugs or preparatory operations such as cavernostomy and cavitary drainage.

The average of mortality rate is 2% in 9 years period, but it is decreasing from the peak of 3.0% in 1966 to 0.3% in 1971. Such a trend can be detected more markedly in the positive cases.

As shown in the lower part of this slide, if the operative death is defined as death within 48 hours, the early death within 2 months and

the late death after 2 months postoperatively. The died cases are divided into operative death of 32%, early death of 41% and late death of 27%. This figure is of difference according to bacteriological findings in sputum. The late death is the most predominant, showing 44% in the positive cases and the operative death is the most significant in the negative cases, showing 46%.

As expected, the period of death is influenced by the mode of operations. For example, the early death is the most predominant in pulmonary resection and the late death is the most frequent in thoracoplasty and the other operations. This fact can be understood easily by the indication and technique of each procedure.

As the cause of death, the respiratory insufficiency is the most predominant, next bleeding shock, followed by tuberculous aggravation. and the former 2 causes occupy more 50% of all died cases.

Of course, the proportion of cause of death differs significantly in accordance with the period of death. The bleeding shock is the first cause in the operative death and the respiratory insufficiency is the first cause in

the early and late death. The tuberculous aggravation becomes the second cause in the early and late death.

From these results it is recognized to be quite important to keep a good balance between amount of bleeding and transfusion of blood during and after the operation and skillful postoperative respiratory management as well as correct determination of indication in order to reduce the mortality rate.

I would like to present here 3 cases whose operations are of difference, respectively.

In conclusion, surgical interventions in Japan are supported by pulmonary resection of 70%, thoracoplasty of 20% and the other operations of 10%. Each surgical procedure has the proper indication which is overlapped each other.

The result of surgical treatment for pulmonary tuberculosis is considered to be almost satisfactory at present and we can have an hope to get the better results in the future by means of the improvement of operation technique and respiratory management during and after the operation, and the accurate determination of indication for the surgical treatment.

THANK YOU.