NOTICES

NEW LOCATIONS

CANADIAN MEDICAL ASSOCIATION PUBLICATIONS

Effective July 14, 1969 the publication offices of The Canadian Journal of Surgery and The Canadian Medical Association Journal will be located at:

129 Adelaide Street West,
Toronto, Ontario.
(Suites 501, 502 and 505)

The new telephone number is: (416) 366-9521.

All communications to the Editors, the Managing Editor, the Advertising Manager and the Librarian should be addressed to the new location by contributors, advertisers and all other persons having business with the publications. The single important journalistic excuse is that membership records and subscriptions will be handled at C.M.A. House, Ottawa.

CANADIAN MEDICAL ASSOCIATION SECRETARIAT

All other functions of the C.M.A. will be carried out from C.M.A. House, 1867 Alta Vista Drive, Ottawa 8, Ontario. (613) 731-9331.

CRYOSURGERY OF THE PITUITARY

A 16-mm., 30-minute colour film entitled “Cryosurgery of the Pituitary” was produced at U.C.L.A. under a grant from Pfizer Laboratories. This film follows the progress of a classical acromegalic patient from his arrival at the Los Angeles School of Medicine, through a six-hour transphenoidal cryohypophysectomy, to his evaluation six months after operation. The film was supervised by Dr. Robert W. Rand, Associate Professor of Neurosurgery at the University.

This film, or a colour brochure describing its contents, is available to medical teachers from the Pharmaceutical Division, Pfizer Company Ltd., 50 Place Cremazie, Montreal 11, Que.

SUGICAL HISTORY OF PULMONARY TUBERCULOSIS: THE RISE AND FALL OF VARIOUS TECHNICAL PROCEDURES


In 1904 the Toronto Hospital for Tuberculosis was opened on a 49-acre tract of farmland near the little country town of Weston, Ontario. In the next 26 years 7181 adult patients were treated at the Hospital; of these 3221 died from tuberculosis—a case mortality rate of 44.9%. The Hospital’s annual report in 1930 also stated with some satisfaction that, over this same period, 31.1% of the patients had been discharged as “improved”, but only 5 (0.07%) had been discharged in an “apparently arrested” condition! In this same year Drs. J. C. McClelland and R. K. Harris organized a surgical service in the Hospital. Dr. R. M. Janes joined this service in 1932. This paper describes the rise and fall of nine surgical procedures in this hospital over the 38-year period, 1930 to 1967. For present purposes, artificial pneumothorax and artificial pneumoperitoneum are classed as “surgical” procedures, in contrast to bed rest and graduated exercise, good food, electricity and ultraviolet light, gold injections and tuberculin injections, which were the only other definitive treatments available until antibiotics came into use in 1947.

It should be pointed out that, in the western world, tuberculosis mortality per 100,000 population started to decline more than 100 years ago, primarily because diet and living standards had improved, infectious cases were segregated, general knowledge of hygiene had increased, but perhaps also because the genetic resistance of the host was gradually increasing. The number of deaths from tuberculosis in Ontario has declined progressively since 1900 (Fig. 1). The case mortality rate of all forms of tuberculosis, however, remained high until antibiotic therapy became available.

Surgical Procedures

Artificial Pneumothorax

This temporary and reversible collapse of the lung was originally proposed by Forlanini in 1882 to reduce the high mortality associated with tuberculous cavities. In 1898 J. M. Rogers of Ingersoll, Ontario did the first artificial pneumothorax in Canada. This procedure was introduced into the Toronto Hospital for Tuberculosis during the First World War and, in the early years, was attempted in about 5% of admissions. As the staff gained confidence, it came into wider use and, at the height of its popularity in the 1930s, was attempted in 60% of all admissions, and a pneumothorax was established in 75% of those in whom it was attempted (Fig. 2). At the Toronto Hospital, bilateral pneumothorax was induced in one-fifth of all patients with bilateral disease. A peak was reached in 1939 when artificial pneumothorax was successfully induced in 152 new cases...
sputum in many patients who might otherwise have died, its use was not without danger. Pyogenic or tuberculous empyema were grave complications. Even if infection did not develop, a fibrin "peel" occasionally formed over the visceral pleura and often prevented re-expansion of the lung. As the case mortality rate declined, the procedure was gradually dropped from the therapy of pulmonary tuberculosis. No patient with "new" tuberculosis has been treated by pneumothorax in this hospital since 1952. However, a few patients with inoperable lung disease attend the outpatient clinic for periodic air refills; these are patients who are unsuitable for decortication or unwilling to undergo that procedure. In the years 1930 to 1932 a pneumothorax was successfully induced in 1067 patients.

**Operations on the Phrenic Nerve**

Because cavitary disease in the lower lobes was often poorly controlled by pneumothorax, operations on the phrenic nerve were introduced to paralyze the diaphragm temporarily or permanently. These procedures were used either in conjunction with a pneumothorax or as the primary, definitive treatment. Under local anesthesia, the phrenic nerve was approached above the clavicle and, if temporary paralysis was required, the nerve was crushed once. The diaphragm usually recovered in four to six months although, in spite of the greatest care, the paralysis was sometimes permanent. If the surgeon intended to produce permanent paralysis he divided the nerve and, in some cases, avulsed the distal segment to disrupt the accessory phrenic nerve if it was present (Fig. 4).

Phrenic nerve operations were first performed at the Toronto Hospital for Tuberculosis in 1932. During the 38-year period covered in this paper 732 patients underwent this operation, reaching a peak in 1940 when it was done in 153 patients (Fig. 3). Its rise in popularity and subsequent decline paralleled closely those of artificial pneumothorax. In this hospital, no definitive phrenic nerve operation has been done since 1951. However, temporary phrenic paralysis is occasionally used today to obliterate the pleural space after lobectomy or a segmental resection.

**Scalenotomy**

This procedure was done in four patients in 1932 and in one patient in 1939. The scalene muscles were divided close to their insertions at the first and second ribs to relax the apex of the lung. By this means the surgeon hoped to promote the closure of apical cavities. The procedure was not successful and was soon abandoned.

**Extrapleural Pneumothorax and Plombage**

This procedure was used in those patients who had an apical cavity that did not collapse after a pneumothorax, usually because of extensive adhesions which could not be divided by pneumonolysis. The surgeon resected a small portion of an upper, posterior rib and developed a plane outside the parietal pleura, between it and the endothoracic fascia. Thus, without opening the pleura, the whole apex of the lung was freed and pushed down. The resulting space under the upper ribs was maintained by regular refills of air, by Gomend oil (a substance believed to have a bacteriostatic effect on tubercle bacilli), by paraffin oil or paraffin wax (Fig. 5).

This operation, first performed in this hospital in 1933, was never widely used. In all, 98 patients were so treated. It reached a peak in 1940 when 15 patients underwent this operation (Fig. 3). The procedure had serious drawbacks. The collapse, once established, was irreversible. Any infection that developed in the space, whether tuberculous or pyogenic, was difficult to treat: one such patient died when hemorrhage into the space proved impossible to control. In one patient, in whom the space had been filled with paraffin (paraffin plombage), a paraffinoma developed around the esophagus producing obstruction that was only relieved by a colon bypass. After a few years, this procedure was abandoned and has not been used since 1945.

**Pneumoperitoneum**

Therapeutic pneumoperitoneum was originally proposed as a method for treating tuberculous peritonitis. With the decline of artificial pneumothorax, this pro-
Procedure was used for a few years to treat patients with bilateral pulmonary disease or with basal cavities which, because of their position, could not be collapsed by thoracoplasty. The procedure, which was relatively safe and completely reversible, was first used in this hospital in 1947 (Fig. 6). Pneumoperitoneum reached its peak in 1951 when it was done on 112 new patients and 9167 refills were given (Fig. 3). In all, 431 patients received this treatment. It was, however, of limited value and once chemotherapy was introduced it ceased to play any part in the treatment of pulmonary tuberculosis. No new case has been treated in this way since 1955. Today, in the postoperative management of pulmonary resections and decortications, pneumoperitoneum is occasionally used to elevate the diaphragm and obliterate a residual air space.

Monaldi Drainage

In 1938 Monaldi introduced his technique of inserting a catheter through the chest wall into large cavities. Suction was then applied to reduce the size of the cavity so that it would heal or collapse after thoracoplasty. At the Toronto Hospital for Tuberculosis two of these operations were done in 1940, six in 1941 and two in 1946, a total of 10 cases. This operation proved, however, to have little value and it has not been performed since 1946 (Fig. 7).

Thoracoplasty

Before the First World War, surgeons suggested that sections of ribs be removed to collapse a portion of the lung permanently. The concept of selected and graded thoracoplasties was developed in North America by Alexander. The first thoracoplasty at this hospital was performed by R. M. Janes in 1933 and subsequently 1011 patients were so treated. The procedure reached its peak in 1949 when 98 patients underwent 179 "stages" of this procedure (Fig. 8). In the past 25 years, a period during which 1265 operative stages were done in 699 patients, 11 have died during or immediately after operation—a rate of 1.6%; the procedure is relatively safe even in the elderly. The "standard" thoracoplasty was done in one to four stages depending on the number of ribs removed and whether or not the anterior ends of the ribs were also removed. The surgeon excised the corresponding transverse processes except for the first thoracic transverse process which was preserved to protect the first thoracic nerve root (Fig. 2). Occasionally part of the scapula was removed if the inferior angle impinged on the remaining ribs. The Schede thoracoplasty removed all the structures of the chest wall in the operative area except for the skin and subcutaneous tissue.

In a few patients with tuberculous empyema, the surgeons at the Toronto Hospital for Tuberculosis did a thoracoplasty and the Eloesser procedure—a skin flap was turned in to create a permanent epipleuralized track for drainage. Since this thoracoplasty consisted of an "apiculysis" and removal of the upper ribs. The operator developed a plane between the parietal pleura and the endothoracic fascia and stripped the apex downwards extra-pleurally. An apical cavity was thus compressed from above down as well as from side-to-side (Fig. 9). The Björk thoracoplasty was an osteoplasty in which varying lengths of the posterior ends of the ribs were removed. The remaining portions of the ribs were then twisted down at their costal cartilages and wired in place to form a new, rigid horizontal roof for the chest at the required level.

Once antibiotics had been introduced pulmonary resection became safe and the popularity of thoracoplasty rapidly declined. Resection was clearly a better procedure if dangerous residual disease could be removed rather than compressed under a thoracoplasty. The last thoracoplasties undertaken at the Toronto Hospital for Tuberculosis as definitive procedures were done in 1960. At present the only indications for a thoracoplasty are:

1. empyema in which decortication is not feasible;
2. bronchopleural fistula with a residual air space following resection, and
3. post-pneumonectomy infection within the hemithorax.

Cases fulfilling these indications are rare (Fig. 8). When it is necessary, we use the procedure introduced by F. G. Kerger—thoracoplasty with parietal pleurectomy. The requisite rib lengths are removed subperiosteally carefully preserving the intercostal muscles and their neurovascular bundles. The operator then removes the thickened, rigid, parietal pleura, and the living muscle bundles are allowed to fall on the underlying lung or mediastinum.
The resection was bilateral. As antibiotics became available the number of resections rose and the number of thoracoplasties declined (Fig. 8). Table I compares the operative mortality to the antituberculous therapy available at the time.

Since 1954 the number of resections has declined because antituberculous therapy is more effective. Additional drugs were discovered which could be used if the tubercle bacilli became resistant to the three primary drugs: streptomycin (SM), para-aminosalicylic acid (PAS) and isoniazid (INH). If they take several drugs in full dosage for two years, few patients will not achieve permanent control of their disease. Very few patients with pulmonary tuberculosis now being treated for the first time require resection. Similarly, children who develop segmental or lobar atelectasis after primary infection no longer need resection.

At present the indications for resection are: (1) relapse of disease following previous antibiotic therapy (tubercle bacilli resistant to the primary drugs), especially if there is persistent cavitation. In patients residing in a harsh environment (e.g. Eskimos) or in chronic alcoholics, when the physician cannot ensure that the patient will adhere faithfully to the required antibiotic program, there may be additional indications; (2) severe, post-tuberculous, lower-lobe bronchiectasis; and (3) a destroyed lung in a young person, especially when the lesion is associated with a tuberculous empyema and bronchopleural fistula (Figs. 11 and 12).

### Table I—Resection for Pulmonary Tuberculosis. Mortality Related to Type of Antibiotic Therapy

<table>
<thead>
<tr>
<th>Treatment period</th>
<th>Number of resections</th>
<th>Number of post-operative deaths</th>
<th>Mortality rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antituberculous therapy not available 1941 - 1946</td>
<td>45</td>
<td>7</td>
<td>15.6</td>
</tr>
<tr>
<td>&quot;Inadequate&quot; antibiotic therapy 1947 - 1952</td>
<td>177</td>
<td>4</td>
<td>2.3</td>
</tr>
<tr>
<td>&quot;Adequate&quot; antibiotic therapy 1953 - 1967</td>
<td>552</td>
<td>8</td>
<td>1.5</td>
</tr>
</tbody>
</table>

The procedure reached a peak in the year 1954 when 83 resections were done on 80 patients; in three patients, the pleural space was obliterated by a right parietal and visceral decortication.

### Decortication

The first decortication in this hospital was performed by F. G. Kergin in 1947. The patient, a teenage girl who was developing a fibrothorax following a tuberculous pleural effusion, achieved an excellent result. Of all the surgical procedures discussed in this paper, decortication is the only one in which the indications have not changed appreciably over the years. Furthermore, the frequency with which this procedure has been done has not varied significantly over the years although there was a peak in 1960 when 14 decortications were performed (Fig. 8). The current indications for decortication are: (1) fibrothorax following certain cases of tuberculous pleural effusion; (2) tuberculous empyema; and (3) inexpandable lung following artificial pneumothorax (Figs. 13 and 14). At this hospital decortication was performed in 108 patients; only one died during or soon after operation.

### Fig. 10—L.B. Chest radiograph November 17, 1961. A post-pneumonectomy empyema was cured by a right, ten-rib thoracoplasty and partial pleurectomy. The patient is now in good health.

### Fig. 11—C.B. Chest radiograph January 8, 1968. The right lung has been largely destroyed by tuberculosis. There is a calcified empyema and a bronchopleural fistula.

### Fig. 12—C.B. Chest radiograph May 17, 1968 showing a right pleurectomy.

### Fig. 13—J.W. Chest radiograph May 24, 1960. After 21 years of pneumothorax, the right lung is inexpandable.

### Fig. 14—J.W. Chest radiograph July 21, 1967. The pleural space has been obliterated by a right parietal and visceral decortication.
DISCUSSION

The effectiveness of any treatment for pulmonary tuberculosis must be determined by its influence on the case mortality rate, which declined little during the first three decades of this century. In the period covered in this report (1930 to 1967), nine surgical procedures were used at the Toronto Hospital for Tuberculosis of which seems to be useful at the time they were employed.

Today, however, antibiotic therapy is so effective that operative intervention is rarely needed. The first three drugs introduced—streptomycin, para-aminosalicylic acid and isoniazid are still the best drugs for initial treatment. In addition, six other "secondary" drugs are already in use: pyrazinamide, ethionamide, cycloserine, kanamycin, vioynic and isoxyl, and two more will probably be introduced shortly, namely ethambutol and capreomycin. Three other promising drugs, Rifampin (rifamycin-sodium-novastatin), Thiadizone (pyridazinomino-benzaldehyde thiocarbazona) and prothionamide are presently undergoing international clinical trial. If all of these agents prove effective, the physician will have 14 different drugs at his disposal when he treats tuberculosis. Because the present mortality rate from tuberculosis is very low and because no operative procedure is without risk, the indications for operation in pulmonary tuberculosis will probably be more strictly limited in the future. However, a few patients will still require a thoracoplasty, resection or decortication.

SUMMARY

This paper discusses briefly the rise and fall of nine different surgical procedures used in the treatment of pulmonary tuberculosis at the Toronto Hospital for Tuberculosis since 1930.

Most procedures played a useful part at a particular period in reducing the case mortality rate and the morbidity associated with pulmonary tuberculosis. However, in view of the many excellent drugs now available, the future indications for surgical treatment will probably be limited still further. Despite this, the occasional patient will still benefit from thoracoplasty, resection or decortication.

We wish to acknowledge the help received from Drs. C. A. Wicks, H. E. Pugsley, H. S. Coulthurd and D. R. Garrett. We also wish to pay a tribute to the late Dr. B. M. Jones and to Dr. F. G. Kerfin for their pioneering work in the surgical treatment of pulmonary tuberculosis.

REFERENCES


AFFERENT LOOP SYNDROME


Afferent loop syndrome, an uncommon complication of gastroenterostomy either alone or combined with a Billroth II gastroenterostomy, consists of a partial or complete closed-loop obstruction of the afferent jejunal loop with or without strangulation. Recently several articles dealing with the subject have appeared in the literature. In view of the high mortality and morbidity associated with this syndrome, clinicians should keep it in mind when caring for a patient who has previously undergone gastric surgery.

Chronic afferent loop obstruction presents with recurrent episodes usually over a prolonged period. The acute syndrome manifests itself either immediately after operation or its onset may be delayed for many years.

Five patients with afferent loop obstruction have been encountered at St. Joseph's Hospital, Toronto, during the past six years. They are the subject of this report.

CLINICAL HISTORY

Chronic Afferent Loop Syndrome

Three patients with chronic afferent loop syndrome (Cases 1-3) were elderly and presented with a history of intermittent epigastric pain, weight loss, and episodic nausea and vomiting after meals, which became worse later in the day.

All three patients had undergone a Billroth II partial gastroenterostomy with an antecolic anastomosis nine, six and one year previously. Originally two of the patients had had a gastroenterostomy complicated by a perforated stomal ulcer; subsequently the gastroenterostomy had been done because of the ulcer.

On radiographic examination we demonstrated an air-fluid level in a dilated loop of small intestine in one and evidence of a dilated jejunal loop in all three.

Case 1—P.M., a 67-year-old man, was first admitted on January 10, 1967, with mild, dull, steady epigastric pain and bilious vomiting after meals for six months. The symptoms became worse towards the end of the day and vomiting usually occurred in the evenings. He had no history of weight loss.

A gastroenterostomy for duodenal ulcer had been performed elsewhere in 1954 and later a jejunal enterenterostomy had been done. In 1958 a stomal ulcer perforated and he underwent partial gastroenterostomy with Billroth II, antecolic, gastroenterostomy reconstruction at another hospital.

On admission to St. Joseph's Hospital, the abdomen was soft and not tender. Prominent peristaltic waves were visible in all quadrants.

Fig. 1.—Case 1. Barium meal examination shows a markedly dilated afferent loop with delayed emptying on follow-up films.

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