Cavernostomy and Tamponade of Pulmonary Cavities with Para Aminosalicylic Acid*

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The pulmonary cavity is the focus considering the campaign against tuberculosis. The cavity decides the patients fate and dominates the epidemic state of tuberculosis. The persistence of the destructive lesions perpetuates the source of infection.

Of people in whom sputum tubercle bacilli are found, more than 50 per cent die within 10 years of the discovery, in spite of collapse therapy and sanatorium care. This has been so up to the present, and the future will show how much antibiotics and chemo-therapeutics will be able to reduce this alarming mortality.

Streptomycin is generally effective in hyperaemic foci such as specific meningitis, laryngitis, bronchitis and some forms of intestinal tuberculosis. On the other hand, foci whose blood supply is reduced by lical trombosis, such as a caseous lung infiltration or a cavity wall, are as a rule not affected by streptomycin or para-aminosalicylic acid. Ulcerations of the larynx or of the intestines may heal, whereas the lung cavity, which has provoked it, will remain and may cause further disseminations in the lung or elsewhere. A second, even a third course of treatment must then be undertaken which is likely to end with the development either of toxic symptoms in the patient or streptomycin resistance in the tubercle bacillus. Therefore the tuberculous cavity remains the deciding factor in the survival of the patient and the perpetuation of the epidemic state in spite of antibiotics and chemo-therapeutics.

Taking into consideration the reduced permeability of the cavity wall and its poor blood supply, we introduce an adapted procedure. The three essential phases of the method are:

1) The gradual establishment of the cavernostomy by means of laminaria sticks, that is a “stoma” between the skin and the cavity.

2) The regular packing of the cavity with gauze, soaked in streptomycin or P.A.S.

3) The closure of the draining bronchus by means of diathermy, applied through an operating thoracoscope.

The draining bronchi of the cavity are generally open. If they appear to be closed, it is our experience that in active and suppurative cases this closure is fictitious and not a true one in the

anatomic-pathological sense. It is no question of a real fibrotic obliteration, but the bronchi can be blocked by specific granulation tissue. On this error is based Monaldi's method and it explains its failure.

We tried a "Cavernostomy" the first time at the beginning of 1947 on two cases which had to be considered as lost. The intervention had been carried out with improvised instruments. Both patients are perfectly healthy today. The construction of the definite equipment for the tamponade of lung cavities took a whole year, so that further patients could only be treated since March 1948.

According to the usual resources of tuberculosis therapy out of 38 cases, 30 had to be considered as hopeless. For the 8 others thoracoplasty would have been indicated, but the intervention was refused. The secretion of all the cavities, treated with our method, became and remained free from tubercle bacilli and that on an average of 17 days after the first streptomycin or P.A.S. tamponade. Later, the expectoration became negative if no other destructive foci were present: 28 patients became free from tubercle bacilli in the sputum. The other 10 had been the most desolate cases, yet cavity secretion became negative, but expectoration remained positive. Even these patients have improved in an astonishing way, temperature became normal, symptoms of toxic cardiac disturbances disappeared so much that thoracoplasty or a second cavernostomy on the same or on the contralateral side became possible.

Of course the method was at the beginning purely theoretical and experimental and we had therefore morally no right to try it on patients who had a chance of recovery with the already established therapy. Therefore the modest number of cases. We had to fear complications from the gradual dilatation of the cavernostomy channel as a rapid aggravation of the destructive lesion itself, or disseminations, or mortal haemoptosis, all this provoked through the unavoidable traumatisme of the cavity.

Fortunately no fatal complications occurred and all the patients are alive today, some of them leading a normal life, and the others have a good prognosis. It is impossible to judge how many of them would be dead by now without our direct treatment of the cavity. To conclude, our method cannot be considered any longer as theoretical and experimental or even dangerous. As clinical findings show, it is a most promising enrichment for treatment of cavitory tuberculosis.

The complications we have to expect are:

1) Hemorrhages are seldom, very seldom alarming and easily
stopped by packing of the bleeding cavity with gauze soaked in
Thrombin "Roche."

2) Fresh infiltrations around the cavity with a high but short
rise of temperature. In one case lobar pneumonia developed but
entirely resorbed in 12 days.

3) In four cases there was severe irritation of the cavity, the
trachea and the larynx, provoked by gauze-packing with a soiled
preparation of para-aminosalicylic acid. These four patients re-
covered, the cavities closed and the sputum became negative. But
in Dublin a cavernostomy case, on the way to recovery, died
in a delay of 48 hours after a tamponade with a bad preparation
of P.A.S.

A dangerous run in the international market of P.A.S. has
started, serious for patients and bad for the reputation of our
method. According to our researches the P.A.S. of Dr. Wander,
Berne, the so-called "Aminacyl" in a solution of 5 per cent has no
noxious influence on lung tissue and yet is highly efficacious. I
therefore recommend this preparation of para-aminosalicylic
acid. If Aminacyl is not available we better make the gauze-
packing with 0.1 gr. streptomycin in 20 cc. of physiological solution.
Besides this local application we give 0.5 gr. streptomycin intra-
muscularly or Aminacyl tablets.

The internal opening of our big calibre rubber tubes touches
often the cavity wall, which hinder the discharge of pus; even
more, through a sucking action we imitate the phenomenon of a
cupping glass and irritate the cavity wall or risk hemorrhages.
For this reason we recently have not made any draining with suck-
ing action.

While coughing, the cavity pus is thrown out directly into a little
waterproof bag, fixed on the tube. In this way we avoid, for the
discharge of the cavity secretion, the detour over the bronchial
system, we have less poisoning. Bronchial and larynx ulcerations
have a better chance to heal thanks to this "short-circuit-expec-
toration" where the cavity tube is acting like a trachea.

Only with gauze-packing does all of the cavity wall get in-
to intimate contact with streptomycin or P.A.S. The repeated
instillation of the fluid on the gauze end assures the continuity
of the direct application, because the gauze acts like a wick. Prac-
tically we imitate in some way the treatment of tubercle bacilli
in a test glass and so the revolutionary therapeutic effect finds
its explanation, the sterilization of cavities on an average of
17 days.

By regular cavernoscopy we are able to follow the improvement
as clearly as the healing of tuberculosis in the eye with the oph-
thalmoscope. After the first few tamponades, the cavity wall
looses its caseous aspect, becomes smooth, has more and more blood supply and becomes highly hyperaemic. The permeability is increasing and so tubercles next to the cavity are now influenced by the sterilizing effect of P.A.S.

The closure of the draining bronchus: Specific granulation tissue of the draining bronchus may be gradually sterilized, then more and more substituted by fibrotic cells and the consequent retraction may finish in a real closure, that is a fibrotic obliteration of the bronchus. This has to be verified by cavernoscopy control, colored liquid and radiological contrast.

If the bronchus does not obliterate, we coagulate its opening with high frequency current (usually several sessions are necessary). A diathermy scurf never detaches but is substituted by fibrotic tissue and again by the consequent retraction we finally obtain the desired obliteration of the bronchus.

The finish of the treatment: Instead of the periodical dilatations of the cavernostomy and repeated tamponades, we let retract the stoma more and more. Once a last and thinnest drain is extracted, the remaining fistula closes at once. The scar left in the skin is not bigger than a pea.

CONCLUSIONS

Therapeutical out-look: Desolate cases may become curable. Lobectomy for cavitary tuberculosis without, before or after thoracoplasty, as a rule will be superfluous. Giant cavities or, destructive lesions, badly situated with a view to collapse therapy, shrink by preliminary cavernostomy, so that finally the thoracoplasty becomes possible and efficacious. In the usual indication field of thoracoplasty the plasty may be avoidable in a way that some of these cases recover by an accessory phrenic nerve crush plus pneumoperitoneum, and others by cavernostomy alone. Pregnant women with cavitary tuberculosis may recover and have a healthy baby.

And even more, considering the epidemic aspect, the public health as well as state economy, the method seems to be of value.

CONCLUSIONES

Los casos desesperados pueden convertirse en curables. La lobectomía para la tuberculosis cavitaria, sin, antes o después de toracoplastia, como regla será superflua. Las cavonas gigantes o las lesiones destructivas, mal situadas por lo que se refiere al colapso, se reducen por la cavernostomía previa de manera que la toracoplastia finalmente se torna posible y eficaz. En el campo habitual de las indicaciones de la toracoplastia, puede en cierto modo ser evitable ya que ciertos casos se recuperan por una frenopraxis accesoría más neumoperitoneo y otras por la simple cavernostomía.
Las embarazadas con tuberculosis cavitaria pueden recuperarse y dar a luz un producto sano.
Y más aún, considerando el aspecto epidémico, la salubridad pública así como la economía estatal, el método parece ser de valor.

Discussion

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It is a pleasure to discuss Dr. Maurer's approach to the control of tuberculous cavities. There is an old axiom that in treating cavities by drainage the successful procedure must provide the means of continuous and complete removal of secretions from the cavity. Packing the cavity with gauze has proved to be an effective means of providing drainage. The use of medications to aid in sterilizing the cavity need not be limited to any particular drug but any chemical which has the power of destroying the germs present may be used. The sulfa drugs were used effectively before the introduction of penicillin and streptomycin.

In the past I have had most satisfaction through the use of open cavernostomy with the placing of skin flaps on the inner walls to aid in obliterating and lining of the residual defect. Various chemotherapeutic agents have been used to aid in controlling any infection present. The following cases give an indication of the type of cavities which we have treated by open cavernostomy. They range from the giant bilateral apical to the mid-lung cavity in a remaining lung after one lung has been collapsed by thoracoplasty.

One important point that must not be overlooked is the necessity of obtaining closure of all bronchi that open into the cavity before allowing the drainage tract through the skin to close. If the skin opening is allowed to close before the bronchial openings are all closed there is frequently a recurrence of the cavity through re-infection by way of the open bronchus.

I am impressed by the results obtained to date by Dr. Maurer and shall apply the procedure which he has described in selected cases in my own practice. Again I would issue a word of caution. Do not be too hasty in discontinuing the packing of the cavity—be certain all bronchial openings have closed.

I must commend Dr. Maurer on his ingenuity and skill and I would wish for you and me a portion of the patience exhibited by Dr. Maurer in the treatment of his patients.