ports some favorable results and states that pain is always diminished. The clinical observations with this form of treatment in dysmenorrhea are only of recent date, so that it is impossible at present to estimate the benefit to be expected from it.

SUCTION HYPEREMIA TO INCREASE FLOW OF MILK

With reference to the field of obstetrics, suction cups are applied to the breast with the idea of increasing the production of milk in nursing mothers, or to start anew the flow of milk in a breast which had stopped secreting (lactagoge Stauungshyperämie). Jaschke¹⁸ asserts that it is especially successful in women in whom there was no secretion of milk at all during previous puerperal states. He cites the history of a para who had no milk during her two previous puerperiums. After her third labor her breasts were cupped and as a result she had plenty of milk for her baby. In another patient labor was prematurely induced on account of a flat rachitic pelvis, during the thirty-fifth week of pregnancy. The mother at the time had no colostrum in the breasts; after three days of cupping there was sufficient milk for the child. Another case was one of an old primipara with no colostrum at full term. Her breasts were cupped on the second day postpartum; on the third day the infant was able to obtain forty grams of milk at a single nursing. Jaschke's experience leads him to conclude that "the secretion of milk is so increased by cupping that a causal relationship between artificial hyperemia and increased secretion can not be denied" and that "breast cupping is applicable in cases in which there is no flow of milk, as well as in those in which the breasts do not secrete early enough or in insufficient quantity." He also recommends cupping as a cure for retracted nipples, which in private practice often are the cause of the mother not nursing her baby.

Polano⁵,¹⁷ reports similar good results, one of his cases being especially interesting: In a patient in whom the milk became insufficient seven times during six months, two treatments per day for two days re-established the normal flow each time.

Such evidence demands consideration, and cupping can not be too strongly recommended for these conditions, especially as no harm can be done. The hyperemic treatment in these conditions bids fair to increase the number of nursing women and to do away with artificial feeding to some extent. The explanation of the increased secretion brought about by cupping is to be found in the fact that by moderate suction more arterial blood is brought to each secreting cell, while more forcible suction brings about a venous hyperemia. After the latter has been produced and the suction is stopped a marked arterial hyperemia again sets in. In this way more blood is brought to the gland in a given time than under normal conditions and the breast is better nourished than before. The treatment of puerperal mastitis by suction hyperemia is described in detail in Meyer and Schmieden's book. In my experience the treatment should be begun as soon as the first signs of a mastitis set in. When the treatment is started promptly, pain and inflammatory signs are allayed at once. When pus has once formed the time has come for incision: "ubi pus ibi evacua." The incisions required in conjunction with hyperemic treatment, however, need only be very small. This method has the great advantage of preserving a functioning breast without any disfigurement,

while the old method of making large radial incisions left disfiguring scars and often destroyed so much parenchyma that the breast was useless for nursing purposes during her future puerperal states.

I stated above that treatment should be begun when the first symptoms of a mastitis set in. This statement is contrary to the findings of Zangemeister,¹⁹ who believes that treatment should not be started too early, as it favors suppuration. I am not convinced that this is so; larger statistics only will determine which method gives the better result.

Another indication for the suction treatment in obstetrics is found in the induction of abortion, when the cups are applied to the cervix. This is hardly to be recommended, as the other methods of inducing abortion are more certain and quicker.

In connection with artificial hyperemia, it is all-important to treat the patient's general condition. It is the aim of the hyperemic treatment to increase the flow of blood through the diseased tissue in order that the latter may better resist the deleterious invasion of bacteria. This will be the more easily accomplished if the blood is in good condition, and, therefore, hygienic, dietetic and tonic treatment should not be lost sight of. From what has been said it can not be denied that the hot-air treatment, alone or combined with *Belastungslagerung* is of great value in the treatment of chronic inflammatory conditions in the female pelvis and that the cupping of breasts is a valuable aid in treating puerperal mastitis and breasts which secrete poorly or not at all. It is, therefore, not going too far when I venture to say that the general practitioner should familiarize himself with these forms of treatment, and that hospitals should do justice to the progress of medical science in establishing so-called "conservative wards" in which the above discussed treatment can be given a thorough trial. If this be impossible, special rooms should be established in gynecologic dispensaries for this purpose. Thus many women would be cured who now are but slightly improved or mutilated by operative treatment.

As a further incentive to the use of conservative methods, let me remind you of the famous Czerny's words: "All operations are accompanied by some danger and are justified only when all other methods of treatment have been exhausted."

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PURULENT PLEURITIS: PATHOLOGY AND TREATMENT

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The pleural sac is kept in its normal condition of simple moisture by a definite lymph circulation; the stomata both on the visceral and parietal layers, in health, keep this fluid down to certain limits. The thorax being a closed sac and the pressure within being negative, it follows that the aspirating qualities are usually most efficient. Samuel West¹ speaks of this as "the lymphatic pump," and shows that with any collection of fluid within the pleura there must be some mechanical obstruction to the operation of this pump. It is probable there is always more or less absorption of fluid through

18. Stauungshyperämie als ein die Milchsecretion förderndes Mittel, Medizinische Klinik, Feb. 23, 1908.

19. Die Behandlung der puerperalen Mastitis mit Saugapparaten, Deutsche med. Wochenschrift, 1908, No. 6.

1. Lancet, London, March 25, 1905.

these minute mouths, and that the attempt of Nature in an inflammatory reaction to block them completely, is ineffectual.

PATHOLOGY

In the last few years the bacteriologic examination of exudates in the thorax, systematically carried out, has shown to a certain degree the prognosis, and also the methods of treatment. A considerable number of authorities—Frankel (among the earliest), Weichselbaum, Renvers, Netter, Pruden, and lately Withington²—have investigated the relation of various specific bacteria to empyema. It seems evident that serous exudates which become purulent really contain pus organisms from the first, irrespective of paracentesis. At the present time, from a bacteriologic standpoint, the conclusion of most observers appears to be that in purulent pleuritis the pneumococcus is extremely frequent, occurring as a pure infection; that it is the common cause of metapneumonic effusions, and is usually the secondary infection in tuberculosis, and that the prognosis of pneumococcus empyema is relatively favorable. Streptococcus occurs more often than pneumococcus, and the effects of the former are more serious than those of the latter. Tubercle bacilli have been shown to be a less frequent cause of pus formation in the pleural cavity than of sero-fibrinous exudates. The finding of other organisms does not exclude the possibility of tubercle bacilli, nor does the discovery of tubercle bacilli in empyema exclude the possibility of other organisms, especially the pneumococcus, which may have died out.

Infection due to staphylococcus is rather infrequent. Mixed infection, that is, pneumococcus with streptococcus, pneumococcus with tubercle bacilli, or staphylococcus with tubercle bacilli, is about 10 to 20 per cent.

Babcock³ believes, and rightly, that from the standpoint of pathology the three varieties, dry pleurisy, sero-fibrinous pleurisy and empyema, are simply several stages of the same kind and form of inflammatory reaction. From a bacteriologic standpoint, the differences are more marked and evident. The differentiation of the primary from the secondary pleurisy is always more or less difficult; that is, the discovery whether in a given disease the same infecting agency is causing both. It is most probable that whatever the pleurisy, the immediate agent is bacterial.

TREATMENT

From the time of Hippocrates the chest has been opened by the knife, actual cautery, or simple thoracotomy, for accumulations of fluid within the pleural sac. The operation fell into disrepute, however, for a long period, and was advocated only in extreme cases. It was not until the middle of the nineteenth century that the procedure was looked on with favor. Bowditch, in America, deserves most credit for impressing on his professional confrères its value. Aspiration in both purulent and serous pleuritis was at first a common practice, but of late paracentesis has been restricted to serous exudates, while thoracotomy is performed in empyema.

It is not my intention to describe either of these measures for the relief of this condition. They are both not only well known, but the last at least is a purely surgical procedure. Thoracotomy has attained the position of being almost classical, and generally is performed indis-

criminately whenever pus is diagnosed as occupying the pleural sac.

Unquestionably, with our present clinical knowledge and in view of the results secured by many operators, a free opening and drainage of the chest cavity might appear to be the most rational method of treatment. In this pus-containing cavity, however, we do not find the usual conditions. It is surrounded by walls capable of expanding and contracting as the fluid is removed. The method of cure is, therefore, closure of the pleural sac, secured by evacuation of its contents and expansion of the lung or falling in of the chest wall. If the empyema is of long standing, adhesions are surely formed binding down the lung, so that, the pressure being removed, expansion is nearly, if not quite impossible, and the thorax must of necessity retract in its attempt to close the cavity.

Expansion of the atelectatic lung is very much to be desired. Lately Ransohoff⁴ has described a method of releasing this organ, and in 1893 De Lorme, a French surgeon, showed by an operative procedure that "the functional value of lung tissue long buried in thickened pleura and fibrous adhesions could be restored.

I desire now to speak of two methods more fully, which approach rather closely the field of the medical man; the first briefly, the second in detail.

Last year Dr. Joseph Bryant⁵ advised the treatment of empyema by continuous suction. As a matter of fact this seems to be a modification of Bulau's siphon drainage. The pus is evacuated by means of a large canula, a small rubber tube being passed into the chest cavity through this. To the rubber tubing is attached a collapsible rubber bag. The vigor of the suction can be regulated by the size and expanding power of the bag. The rubber tubing is attached to the chest wall by adhesive straps and worn continuously. Of course the apparatus is emptied and cleaned as the occasion arises. Not only is the exudate evacuated in this manner, but the influence of the negative pressure, supplemented by the normal respiratory movement, is of great benefit in expanding the former atelectatic lung. Bryant treated many cases in this manner, but failed to state the number or to give the mortality. The average duration of illness of those who recovered appears to have been about four to eleven weeks. The practical utility of the plan is one that he is not "disposed to emphasize in a great degree as a substitute for rib resection."

Dr. John Murphy of Chicago has lately employed a method of treatment in empyema, which is most interesting and instructive, and may prove of great value. It consists first in the aspiration of the pus, followed by the injection of one to five ounces of a 2 per cent. solution of formalin in glycerin through the same canula without removing the instrument. The treatment is repeated in ten days to two weeks if necessary.

Although up to the present time Dr. Murphy has not published a description of this procedure, or in fact formally presented the results of his work, it is known that he is most enthusiastic over what has been accomplished, even going so far as to intimate that it will, in the majority of cases, supersede rib resection.

Theoretically, the method appears to be based on the fact that the injected solution will not only wholly or partially sterilize the pus cavity, but will also stimulate

2. Withington, C. F.: *Tr. Assn. Am. Phys.*, vol. xvii.
3. *Diseases of the Lung*.

4. *Ann. Surg.*, xliii.
5. *Surgery Gynec. and Obst.*, iii.

the more or less formed inflammatory products (adhesions, flocculi, thickened pleura, etc.) and lead to their gradual absorption. In this treatment there does also seem to be a certain amount of breaking down and softening of these exudates, perhaps in part due to the hygroscopic action of the glycerin. In any event, the irritative properties of the solution would bring an enormous number of leucocytes to the area, and also a dilution of the contents of the cavity by serum.

All these factors might seem to be of considerable help in the disappearance of the contents of the sac, for by the action of the lymphatic pump (undoubtedly there are many stomata which are not shut off in pleuritis), in conjunction with osmosis, absorption in the majority of cases does clinically occur.

REPORT OF CASES

Through the kindness of Drs. Gaub, Elterich and Edwards, I am able to report seven cases treated by this method, the patients ranging in age from 3 months to 30 years. Of these seven patients, three died, a mortality of 42.8 per cent., but two were practically hopeless when treated. Of the four who recovered, all except a woman 30 years old were children. The infections appeared to be metapneumonic. The average number of injections were two, the interval between ten days to two weeks.

The infecting agent in two cases was staphylococcus, in one streptococcus, in another mixed infection, pneumococcus and streptococcus. The length of time from the first injection to discharge was four to six weeks. In every case after injecting the formalin there was a reaction, slight rise in temperature, increased cough, or moderate amount of thoracic pain. All these symptoms quickly subsided.

Of the patients who died, one, a boy, aged 9, was suffering from a most pronounced kidney lesion, with general anasarca. While the patient was in the hospital, pus was discovered in the left pleural sac; it was a mixed infection of streptococci and pneumococci. Murphy's method was employed, and 3½ ounces of the solution injected. In eleven days another injection of four ounces was made. The patient died about three weeks after the treatment.

The second fatal case was that of a child 3 years old. The empyema developed during an attack of bronchopneumonia. On February 17 two ounces of formalin-glycerin solution was injected. On February 27 the chest was aspirated; no injection was given. On March 10 the chest was again aspirated, two ounces of creamy pus removed, and one ounce of formalin-glycerin injected. The patient died the same afternoon. In this child there was an undoubted cavity, located in the right lung, upper lobe, posteriorly. Bacteriologic examination showed streptococci.

The last fatal case was a most instructive one. An infant 2 years of age was admitted to the Pittsburgh Hospital for Children, with a history of measles three months before. Examination of lungs showed an empyema, for, on aspiration of the right side of the chest, three ounces of pus were removed. One ounce of Murphy's formalin-glycerin solution was injected. Immediately there was a marked reaction, extreme dyspnea, rapid and irregular pulse, and cyanosis. In spite of the most vigorous measures, the child died about an hour after the injection. There was no bacteriologic examination.

GENERAL CONSIDERATIONS

Relative to the above case, Capps and Lewis⁶ have shown (1907) that all operative procedures inside the thoracic cavity, on an inflamed pleura, may be followed by disturbances in the circulation. The patient may become dyspneic, cyanotic, the pulse thready, and death occur in a few moments or hours.

It is most interesting to note that in seventeen cases of experimental pleurisy in dogs the injection of three or four drops of formalin into the inflamed pleural cavity brought about a decided fall in blood pressure in 47 per cent., followed by death in a number. The reflex did not occur in some cases, and Capps and Lewis believe this may have been due to a certain protection of the pleura by a thick fibrinous mass.

The ideal method in the treatment of purulent pleuritis would be that one in which the mortality was the lowest, the recovery quickest, and with the least operative interference.

At the present time, whenever pus is diagnosed in the pleural sac, in the great majority of cases a rib resection is performed. Unquestionably this is absolutely necessary in many instances, but in others it is certainly uncalled for, since it prolongs the convalescence and produces more or less deformity, and occasionally a stubborn and protracted sinus. Empyema, before the days of radical operative interference, was cured frequently by simple paracentesis. It seems possible that in the near future more discrimination will be shown by surgeons in dealing with this condition. From the work done by bacteriologists, we know that the pneumococcus infections within the pleural cavity are comparatively benign; therefore it is possible that a simple thoracentesis, or at most a small incision drained for a few days, will be found to meet the requirements of this condition. Streptococcus or mixed infections containing this organism are known to be virulent, and a thoracotomy with drainage is unquestionably indicated in cases of such infections. In tuberculous empyema, uncomplicated by pyogenic cocci, repeated aspirations at long intervals will probably be found to give the best results.⁷

Murphy's method, when the indications and contra-indications are more fully understood and Dr. Murphy has reported his clinical results, will perhaps be of great value. It may be found of greatest benefit in empyemas of long standing, for, as Capps and Lewis have shown, formalin injected into a pleural cavity in which the inflamed membranes are not fully protected seems to be a procedure of some danger.

Our knowledge of all the conditions existing in the pleura and lung during an empyema is incomplete, but certainly a careful and systematic bacteriologic study of each case will go far toward indicating a line of treatment.

Craig Street and Fifth Avenue.

6. Capps and Lewis: *Tr. Assn. Am. Phys.*, xxii.

7. Brawn: *Deutsch. med. Wehnschr.*, xxxii, No. 14.

Cooperation in the War on Tuberculosis.—Tuberculosis is driving labor bureaus and health boards into cooperation. The cooperation cannot be accomplished unless we have uniformity in the nomenclature of diseases and occupations. We must also agree on standard units of investigation for housing and occupation.—Prof. John R. Commons, University of Wisconsin.