appear (which does not often happen with this plan of treatment); and do not, as a rule, attempt to reduce the weight of those entering on old age who have been obese for a considerable time.

In most cases allow occasional periods of rest from the rigid diet, and while giving the minimum health rations, take note if the weight increases in consequence.

A series of dietetic prescriptions for obesity, devised by the writer in accordance with the above suggestions, have the food values shown in the index table given below. These prescriptions readily lend themselves to modifications for individual needs. The numbers in the main column of protein values refer to protein derived from milk, cereals, fruits and vegetables; and the numbers after the plus signs in the same column refer to protein derived from animal tissues and eggs. It will be seen that the protein derived from the latter sources is greatly restricted in this plan of treatment.

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<th>Carbohydrate grams</th>
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**Clinical Department.**

THE STREPTOCOCCUS MUCOSUS CAPSULATUS AS A CAUSE OF MASTOID DISEASE.*

By Gorham Bacon, M.D., F.A.C.S., New York.

Professor of Otology, College of Physicians and Surgeons, Columbia University, New York.

According to my experience the streptococcus mucosuscapsulatus is the most insidious and destructive germ with which the otologist has to contend, and the question of an operation, when the mastoid cells are involved, is a most important one.

In 1905 Dr. George Sloan Dixon published in the *Archives of Otology*, Vol. xxxiv, Part 6, a paper entitled "Report of a Case of Panotitis Resulting in Meningitis, with Pathological Findings," in which he reported the case of a nurse who was under my care in the New York Eye and Ear Infirmary. She entered the hospital on February 7, 1904, and gave a history of an acute attack of otitis media which had begun six weeks previously. She had labyrinthine symptoms which, with the knowledge we have today, would have warranted an operation. There was no mastoid tenderness. On the fourth day after admission meningitis developed, and she died almost immediately.

In this paper Dixon says: "This case seemed to call for an examination of my bacteriological examinations during the past four years. They were found to comprise about 1050 cases of acute and chronic purulent otitis, with and without mastoiditis; 2.75% of the infections were Friedlander’s pneumococcus, or, more properly, the bacillus mucus capsulatus." Of 30 cases due to the bacillus mucous capsulatus, 15 had existed for 42 days or over, before operation. Of these, two had perisinous abscesses with Bezold perforation; one had perisinous abscesses and cortical perforation with subperiosteal abscesses; four had epidural abscess (one of which died of meningitis); one had panotitis and died of meningitis; and one had brain abscess and also died. Six cases had periosteal abscess.

Dixon further says: "Of those cases which had existed under 42 days, four promptly recovered after paracentesis, but mastoid operation was required on the remaining ten, and all did well except one patient who died of pneumonia."

Such a report only emphasizes the virulence of this germ, and since that time I have taken particular pains to watch these cases most carefully, especially with reference to an early operation.

During the years 1914-1915, I had the four following cases in private practice:

Case 1 was that of Caroline R., aged 5, who was seen by me in consultation on May 12th. She had had lobar pneumonia one month before when both ears had been affected, and there had also been an inflammation of the throat and enlarged glands in the neck. The right ear had cleared up, but the left had been discharging for about three weeks. The left membrane had ruptured spontaneously two weeks before I saw her. There was slight tenderness over the mastoid tip, the temperature had been rising, a little higher each day, from 98.5° in the morning to 101 or 102 in the afternoon, and a culture showed that the streptococcus mucous capsulatus was the cause of the infection. A simple mastoid operation was performed that same day at the Infirmary. As soon as the tip was opened pus poured out. There was a very large cavity and the whole mastoid cells were involved; softened bone and granulations were everywhere. The wound was dressed in the usual way and the child made uneventful recovery. Her temperature was 98° before the operation.

Case 2 was that of S. L. F., aged 64, who came to me on April 15th, complaining of pain in the right ear, and giving a history of a feeling of fullness in the ear three days ago. Examination showed the membrane slightly red and swollen about the short process as well as the canal. There was also slight tenderness on pressure over the mastoid. He was given drops to use, but as the pain was not relieved,
I opened the drum membrane under gas that same evening. Some serous fluid and gas escaped. He was then directed to douche the ear frequently during the day. The pain seemed to yield to treatment, and he was apparently doing well until three days later when the ear stopped discharging and began to pain again. The patient felt very dizzy and almost fainted on attempting to rise on the morning of April 19th, and that afternoon the drum membrane was again incised under gas. On the 20th the wound was discharging freely and there was practically no dizziness. An x-ray picture showed cloudiness of the mastoid cells on the right side, and a culture showed the cause of the infection to be the streptococcus mucosus capsulatus.

The ear discharged very freely until April 22d, when the perforation closed. On the 24th the patient felt very much better after the best night he had had for a long time, and the drum membrane seemed to be clearing. On the 26th of April it became necessary to open the drum for the third time. On the 29th there had been but a slight discharge, and the patient seemed to be in about the same condition as he was ten days before. A second x-ray picture showed a slight increase of cloudiness on the affected side.

A consultation with Dr. Lewis and Dr. Townsend was held, and Dr. Lewis and I strongly advised operation, which was done at the New York Eye and Ear Infirmary on April 30th. The usual incision was made. The bone of the outer cortex was extremely hard and very thick. The large tip cell was filled with pus, and granulations, and the groove of the mastoid contained granulations and softened bone and some pus. The antrum was large. Everything was cleaned out and the wound packed with sterile gauze. The patient left the hospital in a little less than two weeks, and his recovery was steady though a little slow. The wound was dressed in the usual way, and gradually filled up. By June 11th there was one spot of bone still uncovered near the tip and there was a small sinus at the tip leading into the soft tissues. That morning the patient came into my office with marked swelling, extending down into the neck, which had come on suddenly the night before. This seemed to be caused by the pus of the sinus which I had left in the middle of the same sinus, and by the next day the swelling had practically subsided except around the tip. The patient went away for the summer and was under the care of a local physician. He had been very much run down, and was undoubtedly the cause of the slow healing of the wound. The change of air to the country greatly improved his general health, and on his return to the city the wound was entirely healed and had been so for about a month.

Case 3 was that of J. W. A., who has been a patient of mine for a number of years, suffering from a chronic middle-ear catarrh on both sides, and exostoses in each auditory canal. On December 20th I was called to see him by his family physician, as he had a severe cold and pain in the right ear. On examination I found some vesicles filled with blood in the canal, which prevented a good view of the drum membrane. He was directed to syringe the ear every two hours with a solution of boric acid. The next afternoon, as the temperature suddenly went to 101° after being normal in the morning, and as there was some tenderness over the lower third of the mastoid bone, especially at the tip, I incised the drum under gas. After the incision the temperature was normal, but the discharge became more profuse and purulent and the tenderness over the mastoid was quite marked, especially over the tip. A culture was made and showed that the streptococcus mucosus capsulatus was the cause of the infection. A blood count showed the polys as high as 78%, and the leucocytes ranging from 5000 to 6000.

An operation was performed at the New York Eye and Ear Infirmary on December 25th. The usual incision was made. Pus was found under pressure in a large cell in the lower third of the mastoid. The outer cortex was very hard, especially over the antrum. A very large antrum was filled with soft bone and many granulations. The dura was uncovered to a very small extent in the middle fossa. The wound was packed with iodoform gauze in the upper part, over the dura, and with plain gauze in the lower part.

The patient left the hospital on January 8th, and the wound was dressed in the usual way. He was considerably prostrated by the infection which seemed to pull him down very much, and as a result the wound was slow to heal. By the first of March it was practically healed and the patient went South. He returned the first of April, greatly improved in his general health and with the wound in excellent condition. The hearing of the right ear is practically the same as that of the left, though that of both is somewhat impaired, owing to his cataractious troubles.

It is interesting to note, in connection with this case, that a urinalysis, made just before the operation, showed the presence of some albumin and a few casts evidently due to the poison, as an analysis made a month previously showed no abnormal conditions.

Case 4 is that of Paul B., a medical student, who was seen by me in Roosevelt Hospital in 1914. He had an acute inflammation of the ear which was due to the presence of the streptococcus mucosus capsulatus. The ear had discharged spontaneously before I saw him, and there was slight tenderness over the mastoid bone. Five x-ray plates were taken of the mastoid bone. The first three plates were cloudy but the fourth showed a less cloudy appearance and the final one was so much cleared up that I decided not to operate, as the drumhead had assumed its normal appearance and all tenderness on pressure over the bone had disappeared.

The following cases are a few of those treated in my clinic at the New York Eye and Ear Infirmary during 1913, 1914 and 1915:

**Case 1.** Barney G., a Russian, aged 53 years, came to the Infirmary on May 31, 1913, and gave the following history: Pain in the right ear began six weeks ago, following a cold. He suffered pain every night for over four weeks, and two weeks before noticed a slight purulent discharge which has continued up to the present time. The drum membrane was incised in the clinic, and on the next day a postauricular swelling appeared and gradually increased in size. Examination showed slight discharge from the right ear, but no sagging, the drum membrane red and bulging, and an perforation in the lower part. There was tenderness on pressure over the mastoid area, especially over the
antrum. A culture was made and found to be the streptococcus mucosus capsulatus. An x-ray plate showed the left mastoid clear, with large pneumatic cells. The right seemed to be completely disorganized; two localities suggested perisinus and epidural abscesses,—the former below and the latter near the knee of the sinus. Three days after admission to the hospital a simple mastoid operation was performed and soft pneumatic cells were found with large perisinus and epidural abscesses. The tip was also removed. The temperature on admission was 99.2°; after the operation it rose to 101.0° but gradually came down to normal. The patient was discharged from the hospital on June 14th, and the subsequent dressings were done in the out-patient department.

Case 2. Thomas D., Irish, aged 55 years, was admitted to the Infirmary on October 21, 1913. His illness began on August 15th, with a severe attack of pain in the left ear which continued until the drum ruptured, twenty-four hours later. Following that there was intermittent discharge and occasional attacks of pain, none of which was severe, and he was advised to come into the hospital because of the discharge and tenderness over the mastoid. A bacteriological examination showed the growth of streptococcus capsulatus. The x-ray showed the right mastoid with moderate-sized cells of the pneumatic type; the cells were clear. The left mastoid seemed to be similar, but very cloudy. The sinus was far forward and looked as though it might be under the canal. A simple mastoid operation was done October 21st, revealing a large perisinus and epidural abscess, and a mass of dark necrotic granulations filling the antrum. The dura under the middle fossa was exposed and the sigmoid sinus for a considerable space. The temperature was 96.2° on admission, and immediately after the operation went to 101°, fluctuating between that point and 98° for four days until it became normal. The patient was discharged from the hospital on November 6th, and after that was dressed in the out-patient department.

Case 3. Fred G., an American, aged 21, was admitted to the hospital July 25, 1913. He gave a history of pain and deafness in the right ear on July 7th, due to sea-bathing. The drum membrane ruptured and he came to the clinic the next day with a profuse discharge from the ear. He was admitted to the hospital for observation and the drum membrane was freely incised. There was slight sagging of the posterior wall and moderate pain. Examination of a smear showed strong suspicion of a streptococcus mucosus capsulatus, but Dr. Dixon could not be sure of it. The x-ray showed a moderate-sized pneumatic mastoid left, with extensive development of zygomatic cells, all of which were clear. The right side was cloudy throughout. The sinus seemed superficial and there were perisinus and epidural abscesses. The usual operation was performed on the right ear on July 31st. The bone was of the large pneumatic cell type filled with soft granulations. Large extensions of dura was exposed, and the sinus was exposed and healthy. The tip and zygomatic cells were carefully cleaned out. The patient was discharged on August 8th, and treated afterward in the clinic.

Case 4. Rose K., a Russian, aged 21, was admitted to the hospital on September 2, 1913, with a history of pain in the left ear five weeks before, following a cold. The drum had been incised one week before, and since then there had been a slight purulent discharge. Pain had been severe for the past few days with pain behind the auricle. Examination showed the left ear filled with thick pus. The drum membrane was bulging and perforated with sagging of the posterior superior wall, and there was slight tenderness on pressure over the mastoid antrum and tip. A bacteriological examination showed the cause of the infection to be the streptococcus mucosus capsulatus. The x-ray showed the right to be a moderate-sized clear pneumatic mastoid, with a number of zygomatic cells. The left was of the same type, but very cloudy throughout. Operation was advised, but refused, and the patient left the hospital on September 7th. She came to the Infirmary again on September 13th, and on the 16th a simple mastoid operation was done on the left ear. The outer cortex was rather thick, and the bone was of the moderately-sized pneumatic type. There was no free pus. There were necrotic granulations and the bone was broken down. The zygomatic cells were cleared out and the tip was removed, and a small area of dura in the antrum and middle fossa was exposed. The patient was discharged on October 2, 1913, and treated afterwards in the clinic.

Case 5. Adolph R., a Roumanian, aged 59, came to the Infirmary on June 3, 1913. His trouble began three months before, following exposure to cold. He had pain in the left ear for the first eight days, and then had no further trouble, except an occasional rumbling noise, until two days before he came to the clinic, when the pain recommenced with a discharge. Examination showed a slight foul discharge from the canal, the membrane red and bulging, with slight sagging of the posterior and upper canal wall. There was no mastoid tenderness. The patient had diabetes. The bacteriological examination showed that the infection was due to the streptococcus mucosus capsulatus. A blood count showed the white cells, 7100, and the polys 61%. The x-ray showed the right mastoid to contain large pneumatic cells. The left was of the same type but cloudy throughout, disorganized below and behind, and probably an epidural abscess near the knee. There were high zygomatic cells. A simple mastoid operation was done. There was very extensive destruction of the cells, pus in the antrum and tip, and both an epidural and a perisinus abscess found. The patient made a good recovery.

Case 6. Jacob S., an American, aged 19, came to my clinic on November 10, 1912, with acute pain in the right ear of one week's standing. The membrane was red and bulging and was incised. The pain was relieved at once. There was little, if any, discharge. On December 30th, the patient noticed pain over the mastoid and the discharge increased in quantity. He came to the clinic again on January 5, 1913. Examination of the right ear showed a slight, thick discharge in the canal, which was constricted throughout and sagging in the posterior and upper portion. There was a small perforation in the drumhead, and slight tenderness over the mastoid antrum on firm pressure. The cause of the infection was the streptococcus mucosus capsulatus. An x-ray showed both mastoids to be of the large-celled pneumatic type, the right being hazy throughout, especially above and behind the antrum. The temperature was 98°. A simple mastoid operation

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was performed and free pus was found in the antrum and tip. There was a persisting abscess. The patient was discharged from the hospital on January 14th, and treated in the dispensary.

Case 7. Christian S., a Greek, aged 30, came to the Infirmary on June 23, 1914, with a history of continuous and moderate discharge of one month's duration. He had had no severe pain. There was diffuse tenderness of the auricle and surrounding tissue. There was no sagging of the upper and posterior wall of the canal. The drum membrane was almost occluded. The bacteriological examination showed the streptococcus mucosus capsulatus. The x-ray examination showed a large clear-celled pneumatic mastoid on the right, and on the left the same type, but cloudy throughout. On operation an epidural abscess was found and a large area of dura was exposed. The sinus, covered with granulations, was also exposed. There was a very extensive and destructive process. The temperature was 99° on admission, and after the operation went to 100.3°. The patient was discharged on July 13th, and treated subsequently in the clinic.

Case 8. Mary A., an Austrian, aged 36. Her illness began with severe pain in the left ear following a chill, four weeks before her admission to the hospital on September 8, 1914. The pain gradually increased in severity until the drum was opened. Her temperature on admission was 99.2°. The cause of the infection was the streptococcus mucosus capsulatus. Operation showed the diploetic type of bone. The entire process was extensively involved, and there was a perisinus abscess. There was no involvement of the posterior sinus cells. The tip was removed and a large area of dura was exposed. The patient left the hospital on September 17, 1914.

Case 9. Max B., an Austrian, aged 32, was admitted to the Infirmary on May 18, 1915. He gave a history of pain in the left ear 10 days before. Two days after the pain began he came to the clinic and the drum was incised. Discharge continued until the day before his admission to the hospital when it ceased, and the pain began again. There was great tenderness on pressure over the tip, some constriction of the canal, and the drum membrane was swollen, reddened, congested and bulging. The bacteriological examination showed the presence of the streptococcus mucosus capsulatus. The x-ray plates showed a large mastoid, right, with extensive gyriform cells. Cells were also present about the antrum. The left was a very large pneumatic mastoid, comparatively cloudy. The report from the laboratory characterized this as "probably an operative case." His temperature on admission was 101°. The operation revealed the cells filled with pus, and great destruction of the bone. The large tip cells were filled with pus under pressure. The sinus was covered with granulations forming a perisinus abscess. The patient left the hospital on May 28.

Case 10. David D., a Scotchman, aged 68, came to the hospital on June 18, 1915. He first had pain in his left ear five weeks before. The drum was incised one week later and again three weeks after that. Two weeks later the last incision he developed severe pain in the ear and tenderness posterior to the antrum and tip. The discharge became more profuse. There was tip tenderness over the mastoid and a thick purulent discharge. A linear perforation was seen in the drum membrane. The laboratory reported the presence of the streptococcus mucosus capsulatus. The x-ray showed both mastoids of the pneumatic type with thick cortices. The right was fairly clear and the left quite cloudy. A simple mastoid operation was done on the left ear, and the mastoid cells were found filled with granulations and pus. The tip was completely removed. No sinus or dura was exposed. The temperature on admission was normal. The patient was discharged on June 30, and treated in the clinic.

Case 11. Herbert F., an American, came to the clinic on March 4th, 1915, with a history of slight pain three weeks before. The ear had felt stopped up and deaf, and finally had ruptured spontaneously. Slight pressure over the tip caused pain. There was no sagging of the canal wall. The discharge was moderate. There was marked bulging of the drum membrane. A culture showed that the streptococcus mucosus capsulatus was the cause of the infection. The x-ray showed the right mastoid to be a moderate-sized clear pneumatic. The left was of the same type, but cloudy throughout. The usual mastoid operation was done. There was extensive involvement of the mastoid cells, which were filled with softened bone, granulations and thick pus. The temperature was 100 on admission.

From an analysis of these cases it will be seen that some patients complained of slight pain, and others of very severe pain, but that there was extensive destruction of the mastoid cells in all cases that came to operation, particularly in the hospital cases. There was both a perisinus and an epidural abscess in seven of the eleven hospital cases, and in two others the dura was exposed. In two of the private cases, also, the dura was exposed.

The x-ray is a most valuable aid in deciding upon the advisability of an operation. If a mastoid, which was previously shown to be cloudy, begins to clear up, and the symptoms show a steady improvement, I feel that we can afford to wait if the patient is carefully watched, and if a sufficient number of x-ray plates are taken. Such was the method pursued in the case of the patient who escaped operation. If, on the other hand, a patient is under treatment and the discharge persists while all tenderness on pressure over the bone has disappeared, it is more than likely that a destructive process is going on in the mastoid cells, and we are likely to find an exposed dura and sinus, particularly if the condition continues for from three to six weeks. A blood count is generally of little value.

In concluding, I desire to draw attention to the following points:

1. The patient may have very severe pain, or the pain may be slight, and the temperature is seldom much above normal.

2. Tenderness on pressure over the mastoid process may be well marked, or there may be none, especially where the outer cortex is thick.

3. The discharge in some cases is very profuse, while in others it is slight, and there may
or may not be sagging of the posterior and upper canal wall.

4. The x-ray is a most valuable aid, as the cells on the affected side will be cloudy, and in some instances it is possible to detect an epidermal or perisinous abscess.

5. We should err on the safe side and operate when in doubt, for we often find a great destruction of bone, even in cases that present few symptoms. It is only in a few cases, which yield readily to treatment, that an operation can be avoided.

A CASE OF DOUBLE EMPYEMA SUCCESSFULLY OPERATED UPON, WITH REMARKS UPON LOCALIZATION.

By F. B. Lund, M.D., and H. Morrison, M.D., Boston.

This case of double empyema, is reported because of the rarity of double empyema,—at least of case reports thereof,—and because of the interest attached to the localization of the abscesses, which was quite different upon the two sides.

A girl of 16 was attacked on March 30, 1915, by epigastric pain, vomiting, headache, and slight cough. At Dr. Morrison's first visit her temperature was 102, pulse 120, and respiration 30. Examination showed signs of beginning consolidation at the base of the left lung. The following morning there were signs of frank consolidation of the left lower lobe.

From the very first, this patient looked very sick. On April 1st, her leucocyte count was only 5,000, showing her poor resistance. On April 2d,—the fourth day of the illness,—there was involvement of the right lower lobe; and by the end of the ninth day, the middle and lower lobes of the right lung and the lower lobe of the left were solid. The girl was obviously septic. Her leucocyte count had risen to 16,000. The temperature ranged from 100°-101° F., mornings, to 103°-104°, evenings. There was slight cyanosis, with considerable dyspnoea. The pulse was rapid; the systolic blood pressure was 115. Cardiac stimulation had been instituted early in the disease. There was considerable cough, and the sputum was muco-purulent and very tenacious.

The expected crisis failed to appear during the next six days. The patient was prostrated; she was running a septic temperature and was beginning to perspire freely. At both bases and the axillae there had developed flatness below the level of the angle of the scapula with distant bronchial breathing and bronchophony. Above this zone were fine crepitant rales. Both Dr. E. A. Locke, who was called in consultation, and Dr. Morrison felt convinced that there was fluid in the chest, probably pus, but they were uncertain whether it was in one side or the other, or both.

On April 14, the fifteenth day of her illness, she was sent to the Boston City Hospital, with the provisional diagnosis of double empyema. An x-ray examination at that time showed increased density in the left lower lobe, suggesting consolidation rather than fluid. Dr. Lund then did paracentesis in both sides of the chest, in two places in each side, with no result. For the next three days the patient's condition remained unimproved. On April 18, she began to cough up a great deal of foul pus, without relief, however.

On April 21st the left chest was again tapped. This time a few drops of thick pus were obtained through the needle inserted in the ninth interspace in the posterior axillary line. Resected was done of an inch of the ninth rib, with the evacuation of several ounces of thick foul pus, similar to that which the patient was expectorating, found as a thin layer between the lung and the chest wall. Drainage was established through a rubber tube inserted obliquely, with the skin sutured over the end to act as a valve.

On the following morning the patient's condition had not improved, and the right pleural cavity was explored a second time. A needle inserted through the tenth interspace near the spine, and directed upward, obtained a few drops of pus. The tenth rib was resected near the vertebra, and a few ounces of foul pus were found between the right lung and the spine. Drainage was established through a rubber tube.

The patient began to improve at once. There was profuse drainage through both tubes. The cough and expectoration subsided gradually. The sputum never showed any elastic tissue fibres. The temperature reached the normal level by the middle of May, 1915. The pulse rate remained elevated for another month. By the end of May, both wounds were granulating, and there was very little discharge through the small sinuses. On May 29th, an x-ray examination showed no evidences of fluid in the chest; there was some haziness throughout both lungs, but they were well expanded.

Throughout the summer, the patient improved steadily. She gained in strength and weight. Cough and expectoration ceased entirely. Both lungs became clear and expanded well; the chest became symmetrical.

COMMENT.

This is a case of double empyema following pneumonia. As judged from the series of cases of empyema collected by Dr. F. T. Lord, one case in fifty is bilateral.

On April 18, 1915, when this patient began to raise fetid pus in large quantity, there was a perforation of the lung tissue. The pus evacuated and the pus evacuated surgically were identical. Osler speaks of perforation into the lung as one of the natural modes of cure of empyema. He quotes from an article by Traube, published in 1872, entitled, "On a Natural Mode of Cure in Purulent Pleuritic Exudate." There appear two ways in which an empyema may discharge through the lung: first, by opening into a bronchus and the formation of a fistula; and secondly, by a local necrosis of the pulmonary pleura, exposure of the parenchyma, and a soakage of pus through the spongy lung tissue into the bronchi. In the first way, pneumothorax usually, though not often, develops, and aggravates the danger. In the second way, pus is usually discharged without the formation of pneumothorax, and must be regarded as one of the most favorable modes of termination in empyema. We believe that in the case here re-