method of treatment is suitable for every burn under every set of conditions. He draws attention to the need for a better understanding of the principles of burn therapy as opposed to rigid adherence to one particular method.

Small areas of deep burning may be allowed to heal under a coagulum. Tanning is not suitable for extensive burning of class D, nor for circumferential burns, not because the coagulum constricts the blood supply but because circumferential burns of the fingers or hand are always class D on the dorsum where the skin is thin, and bone, tendon, and joint lie unprotected by adipose tissue. Grafting is imperative, and poor results will follow any other procedure. The hand must be prepared for grafting as early as possible by means of antiseptics, and perhaps the best means of achieving this is to use the Bunyan envelope and irrigation with hypochlorite solutions.

Split skin grafts are indicated in burns of moderate depth, or in deep burns of moderate extent. The grafts can be held in place by strapping on slabs of sterilized sponge rubber with elastoplast, and some movement is permitted which does not interfere with the 'taking' of the graft. Large burns exposing the tendons require whole skin plus some fat. This means a pedicled or tubed graft; or a band of skin can be lifted from the abdomen and the hand kept under it till it adheres, and the edges can be cut free and sutured to the edges of the defect. With this type of graft, the cosmetic results often fall short of ideal, but the functional results are superior to those obtained by the use of split skin grafts.

Deep burns of the dorsum of the hand, which have been allowed to heal by cicatrization, or over which too thin a graft has been applied, often show a less acceptable result when examined a few months after the patient has been discharged, increased stiffness, contracture, and blisters being not very uncommon sequelæ. Whatever method is used, surgical treatment should cease only when full, or at least the best possible, function has been restored permanently. This period does not necessarily coincide with the period of wound healing.

Summary

1. The treatment of septic infections of the fingers has been discussed.

2. The indications for conservative and radical surgery of hand wounds with special reference to war wounds have been discussed.

3. The technique of finger amputations has been described.

4. A simple method of extracting fish-hooks has been given.

5. Diphtheroid infections have been described with reference to management.

6. The pathology and treatment of burns of the hand and fingers have been discussed.

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SOME EXPERIENCES WITH PENICILLIN

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I. Bacteriological (Dr. J. T. Cornelius)

IN December 1944, penicillin was made available to the hospital by the surgeon-general with the Government of Madras for clinical trial, and since March 1945, it has been purchased in the open market.

The following report relates to the results and experience gained in the use of penicillin in the treatment of selected cases of infection which were sulphonamide-resistant, and caused by organisms that were penicillin-sensitive on bacteriological tests.

In the bacteriology laboratory, Fleming's agar-cup method was adopted for determining the penicillin sensitivity of the organism. The method consists in puncturing one or two circular holes in a blood-agar plate with a sterile cork borer, and after inoculation and spreading, a drop of weak penicillin (10μ and 1μ per c.c.) is pipetted into each hole. The inoculated plates are incubated. Penicillin diffuses through the media and produces zones of inhibition from the centre of the hole. The distance of the inhibition zone from the centre is taken as a measure of the sensitivity of the organism.

In a few cases, the penicillin content of exudates was also estimated by placing it in a cup in an agar plate which was heavily inoculated with *Staphylococcus aureus* and noting the distance of the zone of inhibition from the centre. This gave a measure of the concentration of penicillin in the exudate. By this method, the effect of penicillin was found to persist even after 48 hours of treatment.

Penicillin sensitivity tests were carried out on micro-organisms isolated from blood cultures or cultures from infected areas when they are considered to belong to the group of penicillin-sensitive organisms. Suitable cases were thus selected for penicillin treatment.

Penicillin was obtained as the sodium salt. It is a brown yellow powder put up in vacuum vials of one hundred thousand units. It is extremely soluble in water and saline. The sealed vials containing the dry powder are stored in the refrigerator until they are used, as the potency of penicillin is affected by high temperatures. The potency is measured by the amount of penicillin which completely inhibits the growth of a test strain of *Staphylococcus aureus* which is termed the Oxford unit.

Twenty c.c. of sterile saline is introduced with a sterile syringe through the rubber cap of the vial with aseptic precautions. This gives a solution of 20 c.c. containing 5,000 units per c.c. These vials containing the solution are also placed in the refrigerator during use, and they were used up within 24 to 48 hours of preparation. Three to five c.c. of this solution were injected intramuscularly at 3-hour intervals into the patients under penicillin treatment.

Penicillin cream was made with solutions containing 500 to 1,000 units per c.c. for local use.

II. Clinical (Dr. Carol E. Jameson)

In the Medical College Hospital at Vellore, we have had the head of the bacteriology department and one of the clinicians in charge of all our penicillin treatments, in collaboration with the doctors in the various departments. Forms are furnished by the surgeon-general's office requiring data regarding bacteriological findings and accurate information on time and manner of dosage of penicillin, with clinical results in relation to this. At first, penicillin sensitivity tests were required in all cases. Later, since it has been recognized that staphylococcus is almost universally responsive to penicillin, we have sometimes used it in these cases without waiting for sensitivity tests. Since the ban has been off in venereal cases, we have had a few gratifying results with gonococcus infections. When cases slip back, or fail to continue their initial good response, a second bacteriological examination usually shows a secondary invader or a loss of sensitivity of the original organism, usually the former. A few of our cases have been treated on the basis of sputum cultures or cultures taken from the cervix uteri, in which we have not been absolutely certain that the cause of the patient's prostration was due to this source. Usually the results have justified its use, although lack of sufficient penicillin in some cases accounts for failure to sustain initial improvement.

I shall try to analyse our cases briefly, giving our most definite and unquestionable results first. In some cases, when we felt we were about to lose the patient, we took the culture and began treatment after smears, pending a blood or other culture.

I. A baby, aged 4 days. Admission 5-4-45.

Diagnosis: Ophthalmia neonatorum.

Bacteriology: 9-4-45. Eye smear—gonococcus. 15-4-45. Eye smear—negative.

Treatment: 9-4-45 to 14-4-45. Saline irrigations, 2 per cent silver nitrate, M&B 693 ointment, M&B 693 by mouth. 14-4-45, 11 a.m. Penicillin 500 units per c.c., 2 drops 2-hourly and vaseline to lids. 15-4-45. Penicillin 3-hourly.

Clinical course: Before penicillin treatment, the eyes were getting progressively worse, lids and surrounding tissues so swollen it was impossible to see the cornea without retractors.

Result: After penicillin, within 24 hours the eyes looked normal.

II. A woman, aged 22. Admission 14-4-45.

Diagnosis: Puerperal sepsis and severe anæmia, nephritis.

Bacteriology: 23-4-45. Uterine culture—staphylococcus. Blood culture—negative.

Treatment: Sulphanilamide 6 tablets. Sulphaguanidine 34 tablets. Liver extract 6 injections, blood transfusion, and intravenous glucose and diuretics. 23-4-45. Penicillin 100,000 units in six 3-hourly doses for 24 hours only.

Clinical course: The patient was getting progressively worse; hæmoglobin 17 per cent; temperature 102.4°F.; suppression of urine; eyes swollen and shut. A severe diarrhœa had been controlled by sulphaguanidine.

Result: Immediate improvement within 24 hours followed 100,000 units of penicillin after which it was stopped, and improvement continued.

III. A woman, aged 20. Admission 21-2-45.

Diagnosis: Puerperal sepsis—breast abscess.

Bacteriology: Blood cultures aerobic and anaerobic—negative. Cervical smear—streptococcus. Breast abscess culture—*Staphylococcus aureus*. Urine culture—*B. coli* and *enterococcus*.

Treatment: Sulphanilamide tablets 12, M&B 693, 9, sulphaguanidine 18, blood transfusion 200 c.c. 28-3-45. Penicillin 3-hourly, 15,000 units for 3 days—total 350,000 units. After a 4-day interval 650,000 more units, 15,000 every 3 hours over a period of 6 days. Total 1,000,000 units.

Clinical course: After a normal delivery temperature 100°F. Hæmoglobin 20 per cent, red cell count 728,000, normoblasts present. Hæmoglobin continued to drop after delivery. A blood transfusion of 200 c.c. followed by a severe reaction with fever to 104°F. Six days later, hæmoglobin 13 per cent with fever, diarrhœa and vomiting. Sulphaguanidine used, but stopped because of vomiting. Œdema of face increased. Penicillin started.

Result: Rapid improvement with loss of toxic symptoms and reduction of œdema about the eyes. After 3 days of penicillin (*i.e.* 350,000 units), stopped. After 4 days, it was evident that she was slipping back, and 650,000 more units were given. This time, the improvement was permanent. The baby is flourishing.

Discussion: The appearance of the breast abscess was that of a metastatic abscess. The breasts were empty, absolutely flat, and there was no generalized or localized mastitis. I believe the cervical smear and urine cultures can be disregarded. *Staphylococcus aureus* was probably the causative organism and the breast abscess was not the source of the toxæmia but only a local fixation abscess indicating the real nature of the infection.

IV. A patient, aged 35.

Diagnosis: Cellulitis of face. Septicæmia. Diabetes.

Bacteriology: 20-2-45. Smear from lip pustule—*Staphylococcus aureus*. 21-2-45. Blood culture—*Staphylococcus aureus*. 27-2-45. Blood culture—negative. Pus from pustule on lip; streptococci in short chains.

Treatment: Full doses of 'Cibazol' and 'soluseptasine' were given for 48 hours, also insulin to control the diabetes. The patient became progressively worse. It was almost impossible to see the cornea by separating the eyelids, because of œdema, which extended over the top of the scalp. The temperature ranged between 102°F. and 103°F. Penicillin was started when the patient was becoming progressively worse. A total of 1,100,000 units was given in doses of 15,000 every 3 hours.

Clinical course: The temperature dropped to 99.6°F. within 3 days and the swelling gradually subsided, leaving a dozen localizing pustules over lips, cheeks, and scalp. These subsided without surgical interference and the temperature was normal in 2 weeks.

Result: Complete cure.

V. A patient, aged 58.

Diagnosis: Diabetic carbuncle.

Bacteriology: 15-3-45. Culture from pus—penicillin-sensitive Streptococcus and *Staphylococcus aureus*. Blood culture—negative.

Treatment: Sulphathiazole and insulin. Penicillin 15,000 units every 3 hours—200,000 units.

Clinical course: Marked improvement after penicillin.

Result: Immediate improvement. 28-4-45. A huge scar had almost closed completely.

VI. A patient, aged 55.

Diagnosis: Cellulitis of face from abscess at inner canthus left eye.

Bacteriology: Culture from abscess—*Streptococcus hæmolyticus* and *Staphylococcus aureus*. Blood culture—sterile.

Treatment: One hundred and twenty-two sulphathiazole tablets were given—2 tablets at 4-hour intervals.

Temperature was still 103.8°F. with daily chills. Penicillin 300,000 units given.

Clinical course: A generalized eruption resulted from sulphathiazole sensitivity, and both ears were involved in a swelling which looked like erysipelas. Temperature 103°F., and delirium continued. Urine showed sugar. After 300,000 units of penicillin given, 15,000 units every 3 hours for 3 days, his temperature was normal and toxæmia gone.

Result: Rapid recovery.

VII. A woman, aged 34.

Diagnosis: Ruptured ectopic gestation—toxæmia—pneumonia.

Bacteriology: Sputum culture—penicillin-sensitive streptococci.

Treatment: Laparotomy with the removal of ruptured tube, and autogenous transfusion. Sulphathiazole 2 tablets every 4 hours for 3 days. M&B 693 every 4 hours for 3 days. Oxygen inhalations. Penicillin 60,000 units at 10,000 units every 3 hours for 6 doses.

Clinical course: The patient was admitted with bowels acutely distended with gas, and the abdomen full of blood, with an influenza-like cold and cough with temperature of 100°F. Emergency ectopic operation was done and auto-transfusion. Distension made it difficult to return the bowels to the abdomen. Cough grew worse after operation with severe dyspnœa and thick yellow sputum. The abdominal distension had subsided, so the dyspnœa was not due to that, but it increased throughout the first week post-operative, with signs of pneumonia in the left lung. She was too ill to be taken to the *x*-ray room until later when the film showed a resolving pneumonia. Oxygen was given intermittently, 29-12-44. The dyspnœa was severe enough to suggest a pulmonary embolism.

After 60,000 units of penicillin, 10,000 units every 3 hours for 6 doses, the condition improved rapidly. Temperature was normal in 4 days, and she was discharged within 9 days.

It is of interest to note that this was the eighteenth pregnancy. All the previous ones ended in toxæmia and miscarriage. The one preceding this was particularly severe, with a blood pressure of 220/140.

Result: The patient was discharged on the 21st day in good condition. The dose of penicillin was unbelievably small, but I believe tipped the balance between life and death. Similar reports have appeared elsewhere.

VIII. A medical man.

Diagnosis: Abscess of finger.

Bacteriology: 16-3-45. Smear—*Staphylococcus aureus* and streptococci, culture from pus, *Staphylococcus aureus*.

Treatment: Sulphathiazole by mouth. Incision and drainage, but it did not drain freely. Penicillin 255,000 units, 15,000 every 3 hours, and 15,000 applied locally at intervals in a cream. Total 270,000 units.

Clinical course: Toxæmia continued in spite of sulphathiazole by mouth and incision. The whole finger remained swollen and there was no tendency to localize. After penicillin treatment for 3 days, the finger looked much better and the toxæmia subsided.

Result: Good. The abscess was covered with a delicate scar 15 days after treatment.

IX. A patient, aged 25.

Diagnosis: Cellulitis of arm.

Bacteriology: 15-3-45. Smear from pus—*Staphylococcus aureus;* blood culture—negative.

Treatment: Sulphathiazole by mouth. Incisions. Penicillin 15,000 units every 3 hours. Total 500,000 units.

Clinical course: Marked toxæmia and high temperature until 3 days after penicillin. *X*-ray of the right humerus showed only thickening of the periosteum.

Result: Cure. 30-4-45. No pus, but skin not yet closed over granulation tissue.

X. A woman, aged 21.

Diagnosis: Chronic gonorrhœal cervicitis and salpingitis.

Bacteriology: Cervical smears and cultures showed gonococci.

Treatment: 4 T.A.B. vaccine intravenously starting with 1 c.c. and increasing to 4 c.c. with febrile reactions to 103. Sulphathiazole 66 tablets. Gonococcus vaccine 20 millions, 40 millions and 50 millions. No improvement.

Clinical course: The profuse irritating yellow discharge continued. No trichomonas was found. Penicillin 200,000 units given at 15,000 every 3 hours and 1 c.c. locally into the cervix with the patient in the Trendelenburg position, followed by a vaseline tampon in the vagina given twice. A laminaria tent was also put into the cervix to help drainage. Medical diathermy was given—120°F. for 10 minutes, to cervix. This increased the profuse watery discharge temporarily.

Result: Marked improvement.

XI. A patient, aged 22.

Diagnosis: Crushed of the leg below the knees.

Bacteriology: No culture before operation. Culture from wound after operation—*B. pyocyaneus* and *B. coli.* No gram-positive organisms after treatment.

Treatment: Removal of leg by severing tissue (patient was in shock). Amputation of ragged ends 2 days later. 78 tablets of sulphathiazole and 2 transfusions 200 c.c. and 150 c.c. given; 312,000 units of penicillin given prophylactically, 34,000 locally to the wound and 278,000 parenterally.

Clinical course: This is the only patient treated prophylactically with penicillin. After the last injection, the penicillin content of blood was tested and showed about 2 units per c.c. This is the only case in which we tested the penicillin content of blood.

Result: Good. The surgeon believed that the case would have been very much prolonged had the penicillin not been used. The temperature came to normal within 2 weeks.

XII. A child, aged 1½ years.

Diagnosis: Unresolved pneumonia.

Bacteriology: Sputum culture. Penicillin-sensitive pneumococci.

Treatment: M&B 693 by mouth, ½ tablet doses. A greater amount was given than for the average case of pneumonia. *X*-ray still showed a large shadow at the left base. Penicillin 100,000 units, 5,000 units every 3 hours for 20 doses.

Clinical course: Toxæmia and fever continued in spite of treatment until penicillin was given. The temperature dropped to 99°F., but recovery was delayed by dysentery. *X*-ray treatment to the chest was also given for the unresolved pneumonia.

Result: The child was taken home against advice, very much improved. We believe this case showed a definite response to penicillin, but it was not so clear-cut as some of the others.

The three following cases showed a definite response to penicillin treatment, but we believe that in all three further surgery is indicated to remove the focus.

XIII. A patient, aged 17.

Diagnosis: Multiple osteomyelitis.

Bacteriology: Blood culture—negative. Smear from sinus, *Staphylococcus aureus.*

Treatment: Penicillin 15,000 units every 3 hours for 14 doses. 12,500 units every 3 hours, 3rd and 4th days, and 10,000 units every 3 hours, the 5th day to a total of 500,000 units, following repeated surgical procedures and sulpha drugs by mouth.

Clinical course: Toxæmia improved at once after penicillin; temperature dropped from 103°F. to 99°F. It rose again after an interval of a few days.

XIV. A woman, aged 25.

Diagnosis: Cystitis—pneumonia, thrombophlebitis.

Bacteriology: Urine—gram-negative rods. 11-4-45. Sputum—pneumococcus and *Micrococcus catarrhalis.* Urine culture—streptococci and *Micrococcus tetragenus.* Urine culture—sterile, 17-4-45.

Treatment: Bladder irrigations with 1/4,000 acriflavine 5 days and sulpha drugs. Penicillin 900,000 units at 15,000 units every 3 hours intramuscularly.

Clinical course: Copious sputum throughout. X-ray showed probable bronchiectasis of both bases. After penicillin the thrombophlebitis improved at once. The pain and swelling in the left thigh was reduced and the toxæmia improved. The sputum continued and the temperature remained low.

Result: Indeterminate. I believe this should be definitely a case for lobectomy, if one sided. After lipiodol studies this might be done now on the worst side.

XV. A woman, aged 48.

Diagnosis: Hydro-ureter, ulceration of the bladder.

Bacteriology: Urine culture—*Streptococcus hæmolyticus*. Urine smears—no acid-fast bacilli.

Treatment: Penicillin previously given elsewhere parenterally 1,000,000 units. 5,000 units given into the bladder here with temporary improvement on two occasions.

Clinical course: Very painful attacks right loin and iliac region coming in spasms about every 2 days and requiring morphine for the past 1½ years following a right nephrectomy for septic kidney. She was told that there was no extensive lesion in this kidney. Cystoscopic examination now shows ulceration above the right ureteral opening. She localizes her pain here. There is a low-grade cystitis throughout the bladder, and both ureteral openings gape slightly.

The four following cases ended in death, although three of the four showed initial improvement and might well have recovered with massive doses. Three showed septicæmia and one a generalized peritonitis.

XVI. A woman, aged 32.

Diagnosis: Peritonitis following criminal abortion.

Bacteriology: Culture of pus from abdominal cavity. *Staphylococcus aureus* and *pyocyaneus*, 21-4-45. Culture from cervix—gram-negative bacilli, 26-4-45.

Treatment: 21-4-45. Drainage through laparotomy wound, of a profuse generalized cloudy watery exudate with thick pus (foul smelling) welling up from the pelvis, after breaking light adhesions. Suction was applied and about two quarts obtained. In spite of the probable presence of *B. coli*, 1 c.c. of penicillin of 5,000 units was put into the peritoneal cavity. Soluble sulphanilamide 1 ampoule 5 grammes given intravenously with saline and glucose during the operation. Wangensteen suction and intravenous glucose and saline given intermittently after the operation. 500 units was put into the drainage tube and the drainage tube clamped for 4 hours, in order to retain it in the peritoneal cavity. Sulphathiazole 1 g. was given every 4 hours by mouth. 25-4-45. 500 units were put into the peritoneal cavity through the drainage tube, 3 doses only, 15,000 units intramuscularly.

Clinical course: The patient had a history of 5 days' lower abdominal pain. The day following admission the patient got rapidly worse, was cold, clammy, and pulseless with a white blood cell count of 9,000 and temperature of 99°F. The abdomen was tender and by vaginal examination the posterior *cul de sac* was full and tender but no mass felt. The systolic blood pressure was 70. The patient was bleeding slightly from the vagina, was thirsty and restless, and the pulse almost imperceptible. The history of amenorrhœa followed by an attempted abortion said to be by medical means, the month previous, suggested criminal abortion. The history of a fair amount of bleeding at home was against the diagnosis of ectopic gestation, but the clinical signs were very suggestive, so we explored under local anæsthesia with a possible diagnosis of ectopic pregnancy. The odour of the pus obtained on opening the abdomen made us feel the penicillin was probably useless, but we used 1½ c.c. here (7,500 units) locally, although we felt that *B. coli* and *pyocyaneus* probably contradicted it.

The patient went off the table warm and with a very much improved pulse. The temperature rose to 103°F., the patient was hungry, bowels moved, and improvement seemed marked. The following days there was almost no discharge from the wound. Suddenly on the evening of 26-4-45 her pulse became very poor again, she became cold and clammy, developed internal strabismus and dyspnœa. The three doses of penicillin by injection were given only after she became moribund.

Post mortem: Showed the abdomen almost free of pus with no localized reservoir and the bowel surface more normal than at operation. The peritonitis appeared to originate in a broad ligament abscess now empty of pus. The uterus contained products of conception of about two months' duration. Examination of the head was not permitted.

Comment: We believed the patient was recovering without penicillin when she became suddenly worse and died.

XVII. A woman, aged 22.

Diagnosis: Puerperal septicæmia. Pneumonia, meningitis.

Bacteriology: Blood culture—streptococcus, 22-2-45. Sputum culture—streptococcus. Spinal fluid culture—streptococcus. All were penicillin-sensitive.

Treatment: Sulphanilamide; then sulphapyridine; then sulphathiazole; then penicillin. Blood transfusion 300 c.c. Penicillin 12,500 units every 3 hours for 30 doses after an interval of 3 days, 15,000 units every 3 hours for 14 doses. Total—540,000, intrathecal 10,000 units.

Clinical course: In spite of extensive sulpha drug therapy, the patient became semi-comatose and developed a positive Kernig's sign. The meningeal symptoms improved within 24 hours after parenteral injections of penicillin, even before the single intrathecal dose. The general condition improved markedly until we stopped, after 340,000 units. She then became worse and did not improve after her second dosage of 210,000 units. She became extremely anæmic and dyspnœic. Her lung condition remained the same and pulmonary œdema developed shortly before her death with some cardiac dilatation. There was no return of the meningeal symptoms.

Result: Death.

Comment: Insufficient dosage of penicillin and lack of more blood transfusions were probably responsible.

XVIII. A man, aged 26.

Diagnosis: Staphylococcal septicæmia with peritonitis.

Bacteriology: 1-2-45. Blood culture—*Staphylococcus aureus*. 19-3-45. Blood culture—*Staphylococcus aureus*. 19-3-45. Pus culture—*Staphylococcus, Streptococcus, hæmolyticus, pyocyaneus*, and *B. coli*.

Treatment: Sulphathiazole was given for 24 hours with no result. Then penicillin 15,000 units every 3 hours for 22 doses, a total of 330,000 units.

Clinical course: On admission he was delirious with a temperature of 103°F., vomiting, and restless with distended abdomen. He became conscious and less toxic immediately after penicillin treatment. A large incision permitted a drainage of a large quantity of pus from the left loin and thigh. Pus continued to pour out, a fæcal fistula developed, abscesses developed elsewhere. The pus was foul smelling. 19-3-45. Six weeks later, patient was obviously going down hill. Penicillin was given again intravenously and intramuscularly in 20,000 unit doses for 24 hours with no result.

Result: Death. I believe an insufficient dosage in the beginning was responsible for his death.

XIX. A woman, aged 35.

Diagnosis: A huge lung abscess.

Bacteriology: Culture from sputum—*Staphylococcus aureus* and hæmolytic streptococci; penicillin-sensitive.

Treatment: Parenteral 5,000 units per dose for 4 doses and 10,000 units per dose for 6 doses. Total—80,000 units.

Clinical course: Fever and toxæmia were marked; sputum profuse and foul smelling. After 36 hours' treatment there were no signs of improvement. The patient became extremely dyspnœic and cyanotic and died almost at once.

Result : Death. After death, a sterile syringe drew out from the lung pus with penicillin-sensitive staphylococci. The symptoms suggest a rupture of the pulmonary abscess into the pleural cavity. Post mortem refused.

XX. A woman, aged 55.

Diagnosis : Diabetes and post-operative sinus.

Bacteriology : *Staphylococcus* and *pyocyaneus* in culture from sinus.

Treatment : After a month of treatment with various antiseptics and curetting of the wound, it finally closed after injections into the sinus of washings from an empty penicillin bottle !

Clinical course : The sinus in the abdominal wound followed the removal of a large extensively adherent multiple endometrial cyst together with a hysterectomy. The tumour had to be dissected, from the bowels on all sides. The sinus followed a wound infection. As the patient was very fat, this was quite deep.

Result : Healing. Our results bear out the well-known fact that penicillin is very potent in cases with sensitive organisms and adequate drainage.

No toxic effects or reactions such as thrombosis of veins, fever and local irritations were observed. Very few injections were given intravenously. There seem to have been no injuries to kidneys, liver, bone-marrow or nervous system. We used it intraspinally in meningitis cases on two occasions with also generalized blood infections. No cutaneous rashes occurred. Penicillin was used successfully in infections due to *Staphylococcus aureus*, streptococcus, pneumococcus, gonococcus and anærobic streptococcus. Cases came from both the medical, surgical and obstetrics sections, and to them our thanks are due.

A CASE OF PERI-DUODENITIS WITH DUODENAL STENOSIS AND TRACTION DIVERTICULA

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AFTER the exhaustive papers on the subject by Kellog (1933), and Kraas and Beck (1934), and several reports of cases by various authors following the work of Case, it would appear useless to report any further cases. The present one is reported only in view of its very peculiar features and pathogenesis.

History.—In 1936 the patient, a male, aged 56, suffered from a cold tuberculous abscess starting from the 8th dorsal vertebra. He was then put in plaster for 2 months and in an orthopædic corset for another 4 months. In May 1943, a caseous abscess was opened in the right paravertebral region at the level of the first lumbar vertebra, and the patient was immobilized again for 4 months. From September 1943 to October 1944 the patient complained of intermittent stabbing pains in the epigastrium, occasionally diffusing to the back, without any relation to meals, especially occurring during the night for a period of 1 to 2 hours and accompanied by nausea and occasional bilious vomiting. Vomiting did not relieve the symptoms. During the last 2 months of 1944, the patient's symptoms increased in frequency and severity; during the first months of 1945, his troubles became continuous. The pains were then cramp-like, starting in the right hypochondrium and extending to the back, occasionally to the right shoulder and to the lower part of the lumbar spine, and were present most of the day and night. The patient used to refuse any solid food and seek relief in frequent lavages of the stomach and injections of morphia, by which pain was only temporarily suppressed, while it was only relieved by atropine. Habitual constipation, loss of strength and weight (30 lb.). The genupectoral position and Haye's devices did not relieve the pain. Later his vomiting became almost continuous, and the vomit was always tinged with bile. The patient was then sent for surgical treatment to a surgeon, whose report is unfortunately not available. The patient never showed any temperature.

Examination.—Very poor general condition. Offensive breathing, tongue coated. Skin and conjunctivæ pale. Deformed scar in the right paravertebral region between the 12th dorsal vertebra and 3rd lumbar vertebra.

Respiratory system : few rhonchi scattered all over the lungs.

Circulatory system : heart area within normal limits. Second aortic sound accentuated. Blood pressure 120/80.

Abdomen : right hypochondrium and lower part of the epigastrium slightly tender at pressure.

Examination of the nervous system : negative. Spine : the spinous processes are tender on pressure in the lower dorsal region, which is rigid.

Examination of the gastric function shows extremely variable content of the fasting stomach (from 1–2 cm. to 1–2 pints of fluid). Mucus, starch, bile ordinarily present, blood absent. Lactic acid is not present. Vomiting contains rarely blood and frequently undigested food. The acidity curve is of high, continuous type (maximum 110 free HCl, 130 total acidity in 2 hours fractional extraction); the examination of the deposit shows only sarcinæ and few red blood cells.

Blood urea : mg. 34 per 100 cm. of plasma (? chloropenic). Blood sugar : mg. 100 per 100 cm. of plasma.

Examination of stools, blood, urine, etc., revealed nothing of importance.

An *x*-ray of the spine showed evidence of an old caries of the 8th dorsal vertebra upper aspect, and of marked irregularity of the lower edge of the 1st lumbar vertebra. There were definite osteoarthritic changes in the lower dorsal and lumbar regions of the spine. A radiological study of the gastro-intestinal tract after a barium meal showed a hypertonic stomach of normal outline, size and shape, with marked mucosal pattern. There was some gastric residue in the 4th control, but no evidence of stenosis of the antero-pyloric area. Duodenal cap directed backwards. Diverticular pouches were visualized in the part of the duodenum, near the concave border, tender on pressure. The duodenal loop, at the level of its second flexure, was enlarged and tender, and showed deep mucosal pattern and peristaltic waves. Stasis had been detected in the diverticular pockets and in the enlarged loop. Radiological conclusions : moderate pylorospasm, diverticulosis with peri-diverticulitis of the second portion of the duodenum, and stenosis probably secondary to adhesive peritonitis.

The mild pylorospasm is amenable to atropine, morphia and an oral dose of 20 mg. of benzedrine.

As it is easy to exclude a reflex pylorospasm from lesions of the appendix, gall-bladder or kidneys, the continuity of the symptoms, the attacks of bilious vomiting, the absence of relation between pains and meals, the presence of bile in the fasting gastric juice well fit in with the picture of a chronic duodenal obstruction (Kraas and Beck, 1934).

It would take too long to exclude here all the congenital and acquired lesions of the head of