#### NECROSIS OF BONES OF FOREARM

perforated the heart and a few millimetres of its tip appears on the posterior aspect of the left ventricle. The heart itself is contracted and not hypertrophied. The great vessels seem normal. It is not opened but perserved intact as a museum specimen. The left lung is somewhat collapsed. The right lung is somewhat voluminous. No consolidation is found anywhere. There is no blood in the right pleural cavity and no exudate on the surface.

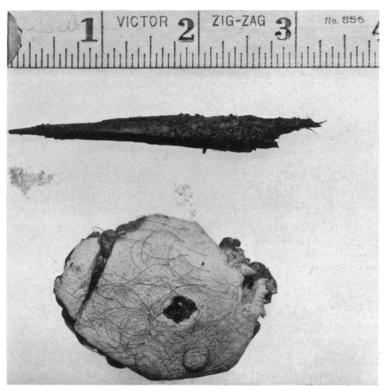


Fig. 2.—Showing length and size of splinter with portion of skin showing where splinter entered the chest wall—nipple, etc.

#### CHOLECYSTOSTOMY

Dr. Bruce L. Fleming, by invitation, read a paper entitled "An Investigation of the Functions and Symptoms of the Surgically Drained Gallbladder."

# LYMPH EXUDATE AND FIBROUS TISSUE

Dr. Edward T. Crossan pronounced the annual oration on the above-titled subject for which see page 1019.

# STATED MEETING HELD OCTOBER 6, 1930

# The President, Dr. George P. Muller in the Chair NECROSIS OF BONES OF FOREARM FOLLOWING TRAUMATIC REMOVAL OF PERIOSTEUM

Dr. George M. Dorrance reported the case of a man admitted to St. Agnes' Hospital, September 4, 1928. The forearm had been injured in a wringer. A large amount of muscle, tendon and fascia had been torn away

from the anterior and posterior surface. The periosteum seemed to be denuded from the area that subsequently sequestrated. The wound became infected and was treated by Dakin's oil. An X-ray plate taken September 11, 1929, showed the bones of the forearm and wrist normal. Three weeks later another series of plates showed an area of beginning necrosis. On December 14 the X-ray plates showed a free sequestrum in each bone (Fig. 1). By January 17, 1930, the X-ray showed the ends of the bone had approximated each other and union was taking place between the end of the radius and between the two lower ends of the radius and ulna. The speaker remarked that if the whole end of the bone had become necrotic, he could understand that the circulation to the bone marrow had become obstructed. However, it



Fig. 1.—Post-traumatic necrosis of radius and ulnar. Condition three months after injury.

was difficult to explain the localized necrosis unless they were dealing with injury to the overlying periosteum followed by secondary infection.

# BLASTOMYCETIC OSTEOMYELITIS OF FEMUR

Dr. Benjamin F. Buzby reported the case of a boy, aged eleven years, who was admitted in the Orthopædic Service of Cooper Hospital November 7, 1927, with the complaint of swelling of the left thigh, pain in the left hip on motion, on walking, and on exposure to cold.

The family history was negative. His own health had always been good. He dated his present disability to a fall he had had two and a half years before when he injured his left thigh. He recovered from this in a short while and was free from symptoms except aching in damp weather until two weeks before admission, when he noticed swelling of his left thigh and pain on use.

Examination showed him to be a fairly well-nourished boy in no apparent discomfort. His temperature was 99.4°, pulse 120, and respirations 24. There was a slight enlargement of the heart with a presystolic thrill and a low-pitched presystolic mitral stenotic murmur with accentuation of the pulmonic second sound. Except for the condition of his left thigh his examination otherwise was negative. His left thigh was considerably enlarged in its upper third where there was localized heat, redness, and induration over a small area on the antero-lateral aspect. The skin was freely movable over this mass, and the mass seemed unattached to the underlying bone. There was no fluctuation. The blood count was: erythrocytes, 4,790,000; hæmoglobin, 80 per cent.; leucocytes, 13,100 with 71 per cent. polymorphonuclears, 26 per cent. lymphocytes, 1 per cent. large mononuclears, and 2 per cent. transitionals. The urine was negative. The Wassermann was negative. November 8, 1927,

# BLASTOMYCETIC OSTEOMYELITIS OF FEMUR

an attempt was made to aspirate this mass but only a few drops of blood were obtained which gave a sterile culture. November 8 his white blood count was 10,200. November 14 an exploratory operation was done. When the periosteum was incised and elevated much necrotic material and some pus were evacuated. The patient's condition became alarming when the bone was exposed and the wound was packed with gauze and the operation stopped. Culture from under the periosteum showed staphylococcus albus. Tissue removed at the same time, when examined microscopically, was infiltrated with pus, lymphocytes and other exudative cells. For the next three days his temperature averaged about 100°, but his pulse, which was 176 at the cessation of the operation, returned to 126 within twenty-four hours. Two days later,

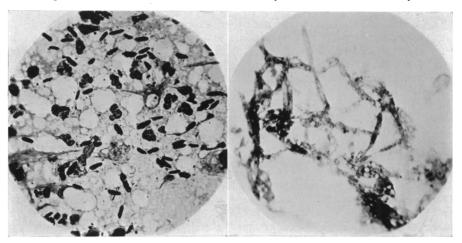


FIG. 2.—Smear showing pus cells and cigar-shaped spores, obtained at primary operation.

FIG. 3.—Smear showing typical growth of organ-shaped spores, obtained at primary operation.

under anæsthesia, the packing previously placed was removed, and a typical saucerizing operation was done, after removal of all the necrotic tissue. No sequestrum was found. The wound was packed with gauze and a dry dressing applied. There was an excessive amount of post-operative oozing which continued for several days. His temperature by now was normal, pulse 110. The bleeding was controlled by packing by this time and his blood count, under liver diet, hæmatinics and high caloric diet, improved constantly. Much difficulty was encountered in getting a donor so no transfusion could be given early, but December 13 a transfusion of 300 cubic centimetres of whole blood was given. He was discharged from the hospital January 8, 1928, with his wound healing well by granulation, feeling quite fit and with a normal blood count.

The boy did well until about August 1, 1928, when he noticed a small, tender swelling in the popliteal space. This gradually became larger, until on readmission to the hospital on August 19 there was a tender swelling filling the left popliteal space which was constantly aching on use, but with no limitation of function of the knee. There was slight increase in circumference on the affected side. The temperature was normal, pulse 100, and respiration 20. The urine was negative and the blood count showed a slight secondary anæmia. Former X-ray had shown thickening of the femoral shaft only, but now there were two cavities, each 1 centimetre in diameter, presenting about 6 centimetres above the intercondylar notch. The abscess was evacuated and the affected bone area saucerized. The pus resembled staphylococcic pus in

appearance. No sequestra were encountered. The wound was treated by the Orr technic for osteomyelitis with a plaster bandage applied from the toes to the upper thigh. The smear from this pus showed many pus cells and many cigar-shaped, large, spore-like bodies, but no pyogenic bacteria. The culture report, when finally submitted by Dr. F. L. Weidmann, from the University Laboratories of Dermatological Research, who had been working on it in conjunction with Dr. D. L. Farley, read in part, "This is a strange yeast to me. It appears to belong to the Monilias and is probably a valid pathogen according to the clinical pathological circumstances in the case, but we have run into a very common experience in fungus work, namely, fungi can only successfully invade tissue where receptivity is just right on the part of the host." This report was made after repeated animal inoculation and growth on various types of culture media. It is interesting to note that at the first changing of the plaster case an attempt was made to obtain the same growth from the uncontaminated wound but this culture was sterile and direct smear showed only pus cells.

Convalescence from this operation was uncomplicated and he was discharged from the hospital on September 20 with a plaster case from his toes to his upper thigh and walking with crutches. His upper thigh wound was healed at this time and the lower wound progressing satisfactorily. On December 4 a caliper walking brace was applied and weight bearing with

crutches permitted.

On December 27 he was readmitted to the hospital with an area of redness presenting on the inner aspect of the lower thigh which was hot and tender but showed no fluctuation. At operation no pus was encountered and no culture taken but upon cutting through the periosteum and stripping it back it was found that a superficial layer of cortex was adherent to the periosteum and came away with it leaving a comparatively smooth non-bleeding surface. These fragments were carefully removed and the wound packed with vaseline gauze and, after exploring the popliteal wound and removing from it a small fragment of necrotic bone, a plaster splint was applied. There was quite a sharp post-operative reaction with pulse up to 160 and temperature to 103° but the pulse was 100 and temperature normal within a week. The splint and packing were removed on January 7, 1929, and his brace reapplied. He was discharged from the hospital in excellent condition, following which time this wound rapidly closed in and he has had no further symptoms in his thigh and has retained full function of his knee-joint.

He was readmitted to the hospital on July 24, 1929, with involvement of the lower end of the tibia. This area was opened and saucerized according to the Orr technic and a plaster case applied. A culture from this abscess showed staphylococcus albus.

He has had a persistent sinus in the popliteal space, the area from which this yeast organism was primarily obtained, but the amount of discharge has been only slight and serous in character in large part.

Doctor Buzby remarked that the literature on blastomycetic osteomyelitis is scanty with practically all the cases reported being fatal, the osteomyelitis being a part of the general systemic infection in which the lung, skin and bone are the commonly involved structures with the spleen, kidney, liver, lymphnodes and brain following in that order of frequency according to the report of Wade and Bel in twenty-two autopsied cases. They note that small abscesses are found in the liver and spleen while large ones invade the joint and cause secondary erosion and caries of bone.

#### BLASTOMYCETIC OSTEOMYELITIS OF FEMUR

Dickson's case was secondary to a pulmonary infection and the patient died in a few months from multiple generalized abscesses following a course of general pyæmia, the bone abscesses having been continuous with the soft tissue or lung collections of pus.

Wrede maintains that all bone abscesses are not metastatic but arise by continuity of infection and contiguity of structures and the bones most commonly affected are those near the respiratory and alimentary systems, as the blastomycetic infection enters the blood-stream through these portals and not through the skin. He further believes that when the process begins in the skin it extends to the periosteum and then on into the medulla, showing first peripheral caries. Respiratory system infection leads eventually, however, to metastatic infection.

Ryerson's cases were systemic and pulmonary in origin, were fatal and both resembled multiple tuberculous abscesses.

Connor's report is mainly a bacteriological one but his patient had a lesion of the humerus with many sinuses about the elbow, and a lesion of the os innominatum with abscesses on the buttocks. The patient was in apparent good health with no fever or leucocytosis. He also fails to place the causative organism in a definite classification due to its changing characteristics in culture media. The outcome of this one is not stated.

Chifalieus' case closely resembles the one here reported in that it was in a woman, aged twenty-five, who had been ailing for four years before admission with swelling, redness over the lower femur and limitation of motion in the knee. Her primary diagnosis had been tuberculosis or chronic osteomyelitis. At operation there was found a gelatinous albuminous exudate about white non-bleeding bone with a large single cavity in the lower end of the femur. The bone was treated by washing with ether and packing with gauze. The patient recovered fully but had a serous discharge from an overlying sinus lasting several months. This was thought to be secondary to a vesicant applied to the chest wall four years before symptoms began and eight years before adequate treatment was instituted.

In looking backward over the case herein presented several features make it appear quite different from ordinary chronic osteomyelitis, of which this boy has had two apparent attacks, the upper femur and the opposite tibia, from both of which staphylococcus albus in pure culture was isolated.

- 1. Low white blood cell count—7,400 when the Monilia was the causative agent as against 13,100 when the staphylococcus was isolated.
  - 2. Low temperature and rapid pulse.
- 3. Superficial dry necrosis of the cortical bone with lamination of the subperiosteal layers of bone.
- 4. The generalized thickening of the femoral shaft without history of serious preceding or accompanying symptoms until abscess formation became apparent.

From his continuous appearance of good health surely a source of infection in the lung or gastro-intestinal tract can be ruled out, which would leave either his chronic facial eczema or less likely the slow-healing gunshot wound of his palm as the portal of entry of the yeast infection. Even thus it is hard to explain the two different types of organisms found in the three separate bone abscesses. The infection must have been hæmatogenous in

origin with the primary focus long since entirely obliterated, for he never had an overlying skin lesion.

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# TREATMENT OF OSTEOMYELITIS

Dr. Irvin E. Deibert, by invitation, read a paper entitled "Observations on the Treatment of Osteomyelitis by the Orr Method" for which see page 1087.

Dr. Eldridge L. Eliason said that Doctor Orr has placed emphasis on two or three points; one is proper drainage, the other is rest, and that rest means rest by splinting and rest from the over-zealous dresser. Most surgeons seem to have come to the conclusion that acute osteomyelitis is no longer a subject for a long incision and canalization the full length of the bone and a curette, scraping out all the medullary cavity after having pushed back the periosteum to its full extent and thereby exposing raw bone for infection. Today the consensus of opinion is that acute osteomyelitis is best treated by as small and adequate an incision as can be accomplished for the purpose of drainage, which is a point the author brought out by the Orr treatment. This can be accomplished by a small incision and a drill or burr hole in the bone in the desperately sick patients. The crux of the matter is—does the Orr method deliver lower mortality and morbidity? The mortality of acute osteomyelitis is higher than it should be. Mormier in 779 cases and Lewis, of Baltimore, in 260 cases, have found the mortality between 15 and 17 per cent. In the whole series, acute and chronic, it was somewhere between 4.5 and 5 per cent. They also have shown in the vast majority of cases of acute osteomyelitis, that the patients reach the hospital after the disease is four to seven days old. Therefore, the disease has progressed and in very many instances has become, or at least is, at the time of admission, a blood-stream infection. Therefore, the early diagnosis based upon point tenderness and the advantages offered by the Orr treatment should help us to improve the mortality and morbidity in the acute cases. Doctor Deibert spoke of the daily dressings of the wounds treated by dakinization; he probably means frequent. Furthermore, most of us, although we may not follow the Orr technic absolutely, at least approximate it by the use of paraffin mesh and vaseline gauze. loose dressings in the wound, and the dressing of the cases after allowing them to go five to six days after operation. Doctor Eliason has had no experi-

#### TREATMENT OF OSTEOMYELITIS

ence in treating open compound fractures by the Orr method, but thinks if it applies in the other instances it might apply to them also.

Dr. Calvin M. Smyth, Jr., said that in the past year he had treated fourteen cases of open fracture by this method; twelve fractures of the leg, one of the femur, and one of the forearm. In no instance has he had cause to regret employing the method. The objectionable odor in osteomyelitis cases is not often encountered in the fracture cases, unless a good deal of infection had taken place. He feels that probably a little too much emphasis has been placed on vaselinized gauze and that possibly some other things would do just as well, iodoform, for instance, or gauze saturated with dichloramine-T.

He usually removes the case at the end of four weeks because after doing a few of these operations he found the gauze was extruded from the wound by granulation at that time and one usually found a clean, red, granulating wound that required no further packing. In these fourteen cases it had not been found necessary to open the enveloping bandage, and the results had been uniformly good. A very important point in treating fractures by this method is to recognize anaërobic infection and to deal with it should it occur.

Dr. B. F. Buzby stressed the necessity of complete removal of overhanging bone and all necrotic bone, and in acute osteomyelitis the question is getting patients to the hospital sooner. In the past year, on each of three successive Saturdays, three late osteomyelitis cases were admitted to the speaker's service, two of the femur and one of the radius. In one instance the patient had been sick for three weeks, another two and a half weeks, and one of the femur, sick one month, he thought was going to die on the table. This child disappeared at the beginning of the summer and reported back at the end of the summer with function practically normal in knee and hip. In the question of drill hole and the burr hole, Doctor Buzby took issue with Doctor Eliason because during the time covered by this series he has done them both ways and he has had more secondary sequestrectomies from the drill hole, while he has had none from primary removal of overlying cortex by a chisel. With drill holes, burr holes or trephine, the edges of the bone have died, possibly from the heat of the drill, and secondary operations have had to be done.

Dr. Deforrest Willard said that patients treated by the Orr method are more comfortable than others, and this is one of the great advantages of the method. He thought if the patients in the same ward were deprived of the sense of smell they would all be more comfortable. The odor, as the case gets older, is something beyond belief. If one made the first dressing in two weeks as Orr first advocated, one could do away with the objectionable features of this treatment and give the patient a very thorough method of treatment with a minimum of pain during convalescence.

Dr. Lee A. Rademaker said that studies regarding bacteriophage might have a practical application in connection with the method of treatment under discussion. Every organism has a certain amount of bacteriophage which can be brought into usability by certain procedures. It is interesting to

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speculate upon the question as to whether, in a localized infection in which constant drainage is allowed to take place, the phage acts to destroy the infecting organism. In two cases of osteomyelitis treated by Doctor Muller and the speaker, bacteriophage was deliberately introduced into the wound and it showed rapid improvement. Doctor Rademaker mentioned this merely as a possible explanation of the good results obtained by what on first glance would appear to be an unreasonable surgical procedure.

# CORDOTOMY FOR THE RELIEF OF PAIN

Dr. Francis C. Grant read a paper with the above title for which see page 998.

Dr. Charles H. Frazier remarked that there is no question but to Doctor Spiller belongs the credit for conceiving this method of controlling pain in the trunk and lower extremities, no matter what its source. Though founded on sound physiological and anatomical facts and though on many occasions clinical demonstrations of its effectiveness have been made, practitioners generally are uninformed as to the possibilities of cordotomy. Inoperable pelvic carcinoma is one of the common causes of intractable pain and the speaker ventured to say of the specialists in urology and gynæcology that few know what relief the operation would afford their patients.

The indication for the operation is clear enough—insufferable pain—but it is well to keep the patient under observation a few days in order to make sure that the pain is intense enough to justify a formidable operation.

From his own experience he is convinced that cordotomy is the most humane of all operations. Morphine is not the solution of the situation. Ever-increasing doses eventually fail to give relief, digestion is upset, sleep impossible and the patient generally demoralized. He remembers so well the comment of a patient after the operation, with an expectation of life of not over six months, "This is heaven."

As with all new operations, the technic will be modified from time to time. Originally Doctor Frazier designed special hooks to guide the operator in determining how deep to cut. These hooks are still useful in fixing the cord as the section is made, but since he has been making the section with the patient conscious, the depth of section can be determined by testing the patient. And he has found it an excellent plan to give the patient a rehearsal for several days prior to the operation of how he shall be expected to respond when tested for pain and temperature sense. Too much stress cannot be laid on this innovation. By cutting cautiously from without inwards in the conscious patient one can cut the tracts for tactile and conserve those for temperature sense. This is a delicate refinement that was not contemplated in the early days of the operation.

There is no doubt the operation has come to stay and should be given greater publicity. It is practised all too seldom. To be able to relieve pain of such intensity without damage to the other cord tracts is a real surgical accomplishment.