carpus. I then made two longitudinal incisions on the forearm, one in the mid-line of its flexor aspect, the second on the dorsal side, a fingerbreadth radial to the middle line. Owing to the small size of the child's limb each incision was only 3 inches long, while in the man's the measurement was 5 inches. In order to provide a web at the base of the new digit, both incisions approached the ulna at their proximal ends; both were deepened to the bone—the volar incision between the tendon of the flexor carpi radialis and the flexor tendons of the fingers, the dorsal between the radial extensors of the wrist and the common extensors of the fingers. Special care was taken to mobilize and retract the bellies of the abductor pollicis longus and the extensor pollicis brevis which crossed the line of incision. The periosteum of the radius was divided longitudinally, and, with a fine saw, a 3-inch rod, a quarter of an inch square in cross-section, was separated from the distal third of the radial shaft on its lateral side. I find it a mistake to use a motor-driven saw for this purpose; the force of its revolution tends to tear the bony rod out of its periosteal covering, an accident that happened in my first case, though fortunately without causing the rod to necrose. [Ligatures tied round the rod as the saw-cut is deepened reduce the risk of enucleation (Fig. 2). The base of the rod should be incompletely separated, by greenstick fracture, from the shaft.] The tendon of the flexor pollicis longus, the radial artery, and the tendon of the flexor carpi radialis were next transferred *en bloc* to the flexor face of the bony rod; the dorsal face carried five tendons, the brachioradialis insertion, and, fastened to the rod with catgut, four tendons—the two radial extensors of the wrist, the short extensor, and long abductor of the thumb (Fig. 3). [These tendons, after re-education, become pronators and supinators, and act powerfully because they are attached to projecting bone.]

The radial skin-flap (Fig. 4) was stitched round the new digit (Fig. 5), and the ends of the ulnar and radial shafts were shortened sufficiently to allow the ulnar skin-flap (Fig. 4) to be turned over them like a hood, the edge of which was sutured to the raw edge of skin at the root of the new digit, thus completing the web between the digit and the stump (Fig. 5). The new digit was then splinted at an angle to the volar face of the forearm. In this way the limb, as in my first case, was provided with an extremity shaped somewhat like the small glove used in prize fights (Figs. 6 and 7). To this it was my intention, in the boy's case, to add a second digit, made from the ulna, instead of completing the grip by means of an artificial finger; the skin of the child's limb, however, was insufficient for this purpose.

AFTER-TREATMENT

This was begun as soon as an x-ray showed that the new digit was ankylosed with the radius (Fig. 8). The forearm was then fitted with a temporary prosthesis made of plaster-of-Paris that bore a "finger," against which the new digit was carried by the movement of pronation; this afterwards served as a model for the definitive apparatus.

My first patient used a strong leather gauntlet, stiffened with lateral plates of metal and laced to his forearm, for more than a year; at first this was quite satisfactory, but in time it worked loose and began to turn round when the new digit pressed on its artificial opponent. To avoid rotation of the gauntlet I had it fixed to a leather arm-piece by means of two lateral plates hinged at the elbow. Both patients now wear this improved form of prosthesis.

The use that the second patient makes of his reconstructed forearm is shown in one of the enlarged extracts from a cinematographic film that illustrates this paper (Fig. 8).

For the skilled movements of both patients I am indebted in a special degree to Miss Gwillim, sister-in-charge of the re-education and massage department, Kasr-el-Aini Hospital, and my thanks are due to my colleague Dr. R. A. Gardner, director of the department of radiology, for his x-rays. The improved gauntlets were made for me by Mr. A. Moring of Cairo.

REFERENCE

- ¹ *British Journ. of Surg.*, 1928, xvi, 62.

PUERPERAL COMA: RAPID RECOVERY FOLLOWING INFLATION OF BREASTS

BY

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The following case is recorded, partly because of the rather unusual treatment adopted, and partly to draw attention to the possibility of the occurrence in puerperal women of a condition analogous to milk fever in cows.

A primipara, aged 21, with nothing of note in her previous history, was first seen early in September, 1930. Her pelvic measurements were normal, the foetus was presenting by the vertex, and nothing unusual was found in the urine. Labour commenced about 5 a.m. on September 24th, and delivery was accomplished on the following day at 12.30 a.m., the head, which was in an occipito-posterior position, having been rotated manually and extracted with forceps. The child, a full-time healthy male, was alive, and there was no perineal tear or laceration of the vaginal walls. During the next forty-eight hours progress was satisfactory, but on the night of September 26th the patient was disturbed by nausea and vomiting. This continued next day, but her temperature remained normal until 6 p.m., when it rose to 101° F., the pulse rate being 128. She then looked very ill and complained of epigastric pain. Nothing abnormal was detected on physical examination, and she had a fairly good night after a dose of chloral and bromide. On the morning of September 28th the temperature was 100.5° and the pulse 110; she looked unwell and had a flushed face and slight icteric tinge of the conjunctivae. Her mental condition was normal. On examination some tenderness was felt over the liver; the uterus was not specially tender, and appeared to be involuting normally; the lochia were also normal. She was given glucose salines and later glucose by the mouth, and vomited twice only during the day. She was seen again at 8 p.m., when her temperature was 98°, and the pulse 100. She had been asleep and seemed dazed; she did not answer when spoken to, but this was attributed to her sleepy condition. At 4 a.m. on September 29th she was found to be in a very stupefied condition, her speech being unintelligible. The temperature was 102.8°, and the pulse 140. Her condition was so alarming that 0.5 c.cm. of pituitrin, and a rectal saline, were given. When seen half an hour later her pulse had improved considerably, but she was almost completely comatose. At 11 a.m. her temperature was 100°, and her pulse 120; she was jaundiced and practically in a state of coma, resenting only the most painful stimuli and being quite incontinent of both urine and faeces. There was a slight froth at her lips, and she dribbled saliva, though she usually swallowed fluid placed in her mouth. The tongue was moist, the eyes were open and occasionally rolled about, but apparently she did not see. The pupils were widely dilated, but reacted to strong light. Knee-jerks and ankle-jerks were present and equal; there was no clonus, and the plantar reflex was flexor. Nothing abnormal was detected in the chest. A vaginal examination was made, but nothing abnormal was found. An intracervical swab yielded a scanty growth of diphtheroids and *Bacillus coli*, but no streptococci or other pyogenic organisms. A catheter specimen of urine was found to contain numerous pus cells, and gave a pure growth of *B. coli*. It also contained bile and a trace of albumin, for which the pus cells would account. There were no leucin or tyrosine crystals. A leucocyte count showed: white blood cells 27,900, polymorphs 84 per cent., lymphocytes 10 per cent., monocytes 6 per cent., no eosinophils or basophils being seen.

The condition remained much the same throughout the day, during which 30 c.cm. of antistreptococcal serum was given. During the night she was rather restless, and cried out occasionally "like a meningitic." Next morning (September 30th) she was much more restless than on the previous day, and tossed about the bed. She still took no notice of questions or of her surroundings, and was still incontinent and dribbled saliva, but took fluids fairly well. Her temperature at 11 a.m. was 100°, pulse rate being 128. At 7 p.m. she was seen by Professor Oldfield, her condition

then being unchanged from the morning. He thought that the condition might be analogous to "milk fever" of cows, and suggested mammary inflation. This was carried out with a sterile Higginson syringe attached to an exploring needle, which was thrust well into the breast substance. The nipples were tied off with tape, since, before this was done, air was observed bubbling through milk which had been expressed on to the surface. Both breasts were inflated as far as possible, though great tension was impossible on account of spreading surgical emphysema. Two hours later she made a motion of assent when asked if she would like a cup of tea—the first sign that she had understood a question for forty-eight hours. On the morning of October 1st she was conscious and rational, though childish. She spoke rather thickly and with difficulty, but this may have been due to the surgical emphysema which had spread up her neck, to the lower jaw on either side, and down over her abdomen. Her temperature was 99.5°, and the pulse 100; the jaundice was much less. The following day she was perfectly clear mentally, no longer childish, and looked and felt quite well, though her temperature was 100°, and there was still pus in the urine. Thereafter progress was very satisfactory, for, though during the next week her temperature occasionally went up to 100° and pus remained in the urine, she ate, and felt perfectly fit. Recovery was complete by October 20th.

COMMENTARY

The case was clearly a toxæmia of an unusual kind arising during the puerperium. The clinical picture was unlike puerperal sepsis, eclampsia, acute yellow atrophy, or delayed chloroform poisoning, but resembled "milk fever" which occurs in cows. The remarkable recovery after mammary inflation makes milk fever as likely a diagnosis as any. The pyrexia can be accounted for by the *B. coli* infection, which was probably incidental to, and not the cause of, the extraordinary cerebral condition. It is unlikely that the case is unique; some of the cases described in hospital reports as "coma without fits" are probably really cases of "milk fever."

This condition occurs in cows two or three days after calving. The animal is noticed to be uneasy and unsteady

on its feet, falls and is unable to rise, and rapidly becomes unconscious, with dilated pupils, stertorous breathing, and dribbling saliva. The heart rate is increased, but the temperature is always subnormal unless some febrile complication is present. Without treatment 30 per cent. are said to recover spontaneously, the remainder die. About thirty years ago, inflation of the udder was found to have an almost miraculous effect in these cases; from a comatose and apparently fatal condition the cow completely recovers within eight hours. This treatment—until lately purely empirical—has reduced the mortality from milk fever to practically nil. A condition similar to that found in the cow occurs in the mare, the ewe, the sow, the goat, and the bitch, but it does not appear to have been described in woman.

It has been recently shown by Russell Greig¹ that milk fever is associated in every case with a marked hypocalcaemia, and that recovery following inflation is accompanied by a rise in the blood calcium to normal. Recovery can also be brought about by the injection, intravenously or subcutaneously, of calcium gluconate. According to him the acute blood calcium deficiency—the essential cause of milk fever—is the result of an inefficient parathyroid mechanism which is unable to cope with the drain on calcium resulting from the establishment of lactation. The specific effect of mammary inflation is apparently due to the mechanical distension preventing further interchange of calcium from the blood to the gland acini and possibly causing a reabsorption of calcium from the gland. Unfortunately in the case reported no blood calcium determination was done, and it is therefore impossible to identify precisely the condition present with milk fever.

I wish to express my thanks to Professor Carlton Oldfield, at whose suggestion the mammary inflation was done, for his very valuable help in this case.

REFERENCE

¹ Greig, J. Russell: *The Veterinary Record*, x, 301.

Memoranda

MEDICAL, SURGICAL, OBSTETRICAL

TETANUS: UNUSUAL CHANNEL OF INFECTION

In view of the unusual channel of infection the following case of tetanus may be of interest.

A man, aged 58, was admitted on December 28th, 1930, complaining of cramp-like pains throughout the body, and stiffness of the face, jaw, and legs. He could talk and swallow only with difficulty. Examination confirmed this stiffness, and while being observed the patient had several mild tetanic spasms. Careful search revealed no wound, but he had a chronic varicose ulcer of the right leg, which was fairly clean. The blood pressure was 185 mm., and the urine contained many granular casts. The blood non-protein nitrogen was 60 mg. per cent. The case was diagnosed clinically as tetanus, and large doses of antitetanic serum were given intravenously. The patient died suddenly on December 30th.

Post-mortem findings were largely negative, except for some chronic nephritis. Two pieces of the ulcer were removed and incubated in meat medium. On the fifth day many bacilli bearing terminal spores were seen. The culture was then submitted to Dr. T. B. Davie of the Thomson Yates Laboratories, University of Liverpool, who reported as follows. "Subcultures from your original meat medium culture showed very numerous streptococci, and among other organisms a few terminal spored organisms. Anaerobic cultures showed chiefly, and in large numbers, *B. welchii*, and a moderate number of terminal sporing organisms, most of which, however, appeared to be the non-pathogenic frequent of wounds—Hibler's bacillus—but a few appeared

to resemble *B. tetanus*. Animal inoculation: two guinea-pigs were inoculated with the mixed anaerobic culture. Both were given protection against *B. welchii* (anti-gangrene serum), and one against *B. tetanus* as well. The latter guinea-pig is still healthy, the other has developed pathognomonic extensor spastic paralysis. *B. tetanus* thus proved present."

It is interesting to note that the man's occupation was that of a fish frier, and it is quite likely that the source of infection was the soil from the potatoes used in that trade.

My thanks are due to Dr. Davie for the great trouble and care taken in investigating the culture, and to Dr. H. H. MacWilliam for permission to publish the case.

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MELAENA NEONATORUM

The report in the *British Medical Journal* of August 9th, 1930 (p. 213), of a case of melaena neonatorum prompts me to record the occurrence of a similar case accompanied by albuminuria of pregnancy in the mother.

For three weeks before her first confinement a primigravida, aged 29, had marked albuminuria: the systolic pressure was 150 mm., and there was no cardiac hypertrophy. On an average 75 oz. of urine were passed in the twenty-four hours; her temperature was normal, and she complained of no toxic symptoms. With rest in bed, restricted diet, and eliminative treatment the albuminuria was considerably reduced before the onset of labour. At 8 a.m. on February 2nd the patient was delivered of a female child weighing 7 lb. The labour was prolonged owing to the presentation being