

SURGERY IN A JAPANESE PRISON CAMP ON SINGAPORE ISLAND *

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WHEN Singapore surrendered to the Japanese on 15th February 1942, orders were given that all patients in the General Hospital were to be removed within twenty-four hours to a hospital which was previously a Mental Hospital, and that no equipment or drugs were to be removed from the General Hospital. This meant considerable discomfort for the patients, caused many deaths, and called for a great physical effort by the European medical and nursing personnel who were already exhausted by overwork.

Europeans numbering about 3000 were rounded up, harangued in front of the municipal buildings and then marched from Singapore to a temporary camp consisting of a few houses at the seaside three miles away. Approximately 370 women and 63 children were crowded into houses nearby. Food and cooking facilities were sadly wanting, and the sanitation was shocking. After a week the whole camp was marched to Changi Civil Prison over five miles away, which was to be our abode for two and a half years. After that we were transferred to a wooden-hutted camp equally overcrowded but in many respects better, in that we led an open-air life with more freedom and facilities for outdoor work.

In the beginning the Japanese called a meeting of our medical staff, and gave permission for us to have a camp hospital with a staff of twenty-five persons of which only four were to be doctors, and such equipment as *they* considered was adequate for nursing and for minor surgical work. It fell to my lot to be responsible for the surgical work inside the camp. I would like to add how grateful I was for the co-operation and assistance I received from my surgical colleagues who gave their advice when difficulties arose and who carried out several of the major operations while I assisted and supervised the necessary preparations.

I was given permission to visit the Mental Hospital and obtain some of the essential requirements for surgical work—a table, instrument steriliser, dressing drums, a few instruments, surgical dressings, drugs and a small quantity of chloroform and ether.

Since the prison had been damaged by fire it took our engineers a few days to get the water and electric supplies in working order, and when this was achieved it was not long before we could use the

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prison steam disinfectors for sterilising dressings, etc. Electric inspection lamps and emersion heaters for sterilising water were made and fitted. I need hardly say that the chemists wasted no time in getting their paraphernalia together for distilling water and alcohol, and extracting suitable alkalis from wood ash, etc.

Our available surgical equipment and stocks were augmented by donations given by various people who had been able to conceal them in their bags on coming into camp. Each time the ambulance was allowed out we were able secretly, by the aid of our Asiatic friends in the outside hospitals, to add to the equipment bit by bit, until I soon had enough to perform any major emergency operation should the occasion arise.

The Japanese agreed to our using the Mental Hospital for major surgical cases, acute medical and infectious diseases, and allowed a surgeon, physician and ophthalmologist of our own to remain there. This arrangement was of inestimable value to the camp, both in regard to treatment and liaison with the outside world.

No communication was permitted with the women's section of the prison, and we were not allowed to employ our sisters or nurses. It was therefore necessary to select male orderlies whom we could train in surgical and ward work. The Salvation Army men were specially suited and became reliable workers. To begin with, I was allowed by the Japanese two theatre orderlies and one dresser for the ward. We had one surgical dressing-room or theatre and a small examination room, which, owing to the intense overcrowding in the prison, had to be used as a dormitory at night for some of the staff. Three dispensaries were installed in the prison and staffed mostly by those doctors who were in private practice before the war. An immense amount of medical and first-aid surgical work was done there, which relieved hospital out-patient work considerably.

As regards the ambulance, no objections were ever made by the Japanese to our using it night or day to convey emergency cases to the outside hospital, and we made the most of this privilege for a year or so. After that our own staff was brought into prison and conditions deteriorated there. By this time the prison hospital was able to take charge of most of the cases and do most of the major operations. In October 1943 all contact with the outside world was stopped.

In view of our very limited supply of drugs, anæsthetics, dressing materials, etc., and a period of internment which might last for one year, or even five, it was essential that all surgical work should be reduced to an absolute minimum. In addition to the necessity for dire economy, it was soon obvious that the health and resistance of the majority of internees made operative work an even more hazardous procedure.

In May 1944 the camp was transferred to Sime Road, an open wooden-hutted camp. To begin with we had no means of sterilising

apart from boiling, until a steam-pressure drum system was devised. An old kitchen was converted into a small operating theatre which had to be "blacked out" for use after dark.

The period of internment in Singapore gave ample scope for the study of nutritional deficiencies, occupational disorders, and reactions of individuals to prison life. Full advantage of the situation was taken by the close co-operation of the numerous doctors (120) in the camp who were able to keep a daily estimate of food values and the health conditions of over 4000 men, women and children who were subject to the dietetic fancies of the Japanese.

Before considering some of the surgical conditions, it must be pointed out that the lack of proper and adequate drugs and equipment made treatment reminiscent of ancient days. My records deal with the male portion of the camp (approximately 3000). The average age was 45—mostly men who, before the war began, filled posts in the local defence forces, or were too old for service; men who for the most part had lived for many years in the tropics as miners, planters, business men or Government servants.

The long walk carrying baggage, in the heat of the day, followed by ten days of acute starvation and discomfort, could not have initiated a period of incarceration in a more unfavourable way. Temporary dressing stations were swamped with cases of septic blisters, fungus infections of the skin, herniæ, fissures-in-ano and hæmorrhoids.

There was an early rapid loss of weight; 15 per cent. in the young, 20 per cent. in the middle-aged, and 30 per cent. in older men (percentage of usual weight). Blood pressures dropped to unusual levels. "Black-outs" became frequent. There developed a general loss of muscle tone with laxity of ligaments. Loss of height averaged 1 to 2 inches. I would like to discuss some of the more major surgical conditions first.

INGUINAL HERNIA

Forty-two men had an inguinal hernia before being interned. Many had lost or left their trusses behind. One hundred and eighty-one developed an inguinal hernia while in camp. Of these, 27 had recurred from a previous operation. Eighty underwent operation during internment. Of these, 23 had recurred up to the end of 1944. This may seem a high rate of recurrence but it must be remembered that operation was performed only on those whose hernia was quite uncontrollable by any method, was painful, or showed signs of strangulation.

The Types of Hernia.—Many of the older herniæ were of the direct type bulging through the floor of the inguinal canal and prolapsing down into the scrotum, but the common type of hernia that developed while in camp was a bulge localised to the deep inguinal ring and somewhat external to it, which in *some* cases only progressed down the inguinal canal. I managed to get an imitation Brook's

truss made from wood, sorbo rubber and rubber straps made from the inner tubing of a motor tyre which gave support to this type of rupture. Patients were encouraged to continue their work and keep the abdominal muscles in tone as far as possible.

Type of Operation.—No one method of operative technique was used, as each case presented its own problem. One, however, aimed at stitching adequately the various fascial layers, reinforcing the fascia transversalis and strengthening the internal ring. Recurrences usually appeared at a new site. There was a type of patient who seemed to be doomed to have a recurrence whatever method was adopted. I used silkworm gut latterly and was satisfied with its results.

APPENDICITIS

Incidence of appendicitis was interesting in view of the carbohydrate diet.

1942—12 acute, 5 chronic.

1943—3 acute, 3 subacute and 3 chronic.

1944—5 acute, 5 subacute and 3 chronic.

1945 (6 months)—17 acute, 3 subacute and 2 chronic.

One might say that appendicitis was rare during the first three years. In January 1945 a small epidemic began when 17 cases, presenting very definite acute clinical features were operated on and found to have an inflammatory condition of the appendix. It was significant that all these cases came from one of the Jewish huts where eggs and tinned meats were fairly plentiful. There was also a catarrhal infective factor present. Seventeen per cent. of the men had had an appendicectomy done prior to internment.

PEPTIC ULCER

The true cases of chronic peptic ulcer fared badly as a result of the unsuitable camp diet, shortage of milk and alkalis, but those who previously had suffered from the nervous type of dyspepsia were improved and even cured. Speaking generally, peptic ulcer cases progressed slowly to the stage of pyloric obstruction when a short-circuiting operation was done. They were bad risk cases, but with the marked improvement that followed operation and in spite of the poor diet later, the risk was fully justified. One case died of persistent regurgitant vomiting in spite of many surgical attempts to rectify the condition.

Six cases of hæmatemesis occurred. Every effort was made to treat these cases by medical means. One died and five were operated on. On retrospection I feel that surgery might have been applied sooner with less risk to the patient in view of the inadequate medical treatment that was available. These cases were desperate surgical risks in circumstances where resuscitative measures were limited.

At operation large hard masses of fibrous tissue were found at the pylorus with a hair-like omentum stuck on to this gelatinous looking mass. The stomach and bowel everywhere were water-logged and unhealthy. The question of simple jejunostomy was considered, but the extra risk of doing a short-circuiting operation and so avoiding the depressing psychological factor of a feeding tube was thought to be justified. Partial gastrectomy, the operation of choice under suitable conditions, was not considered justifiable.

Perforations occurred from time to time. There were four cases in 1945 with peculiarly short histories: (1) Three weeks dyspepsia. (2) Two weeks dyspepsia. (3) No previous history of dyspepsia. (4) A few short attacks of dyspepsia.

These cases occurred within a few days of each other. It seemed as though a definite psychological factor was at play, since on each occasion that the camp received good news and fresh hopes were raised, one or more perforations took place.

From the women's camp there was a remarkable absence of emergency surgery. No gastric surgery was required and only one case of subacute appendicitis occurred in two and a half years.

I shall now discuss some of the more minor surgical conditions which, however, formed quite a major part of our work.

PAINFUL SHOULDERS

I think we are all familiar with the condition of painful shoulder, called subacromial bursitis and periarthrititis by the Americans, though I prefer the terms adhesive capsulitis with or without degenerative "tendinitis." This was a very common condition and affected mostly men between 40 and 50 years who, in their younger days, had led an active life, but for the past year or two had had a sedentary occupation and were now called on to do manual labour necessitating carrying heavy buckets or tubs. Nearly every case had a history of sepsis or rheumatism prior to the onset of the condition. In many cases the ligaments of the shoulder joints were so lax that a condition verging on sublaxation existed. My records include 21 cases ranging from acute capsulitis to the typical case of Codman's cheesy tumour which was relieved by operation. Several of the cases showed a cloudy chalky fluid on aspiration of the subacromial bursa.

Three distinct clinical types were noted :—

- (1) A shoulder strain followed immediately by acute pain over the front of the shoulder, extending down the arm, forearm and back of hand. Pain not unbearable but preventing lying on the shoulder at night.
- (2) A shoulder strain followed by a mild ache which passed off until the same night or the following night, when it became intensely acute and unbearable, necessitating sitting up or walking the floor all night.

- (3) A painful shoulder not related to any particular strain or injury, of gradual onset and getting worse after a few weeks and associated with neuritis extending down the arm, forearm and back of hand—more like a case of arthritis.

Clinically these cases had in common a tender spot over the front of the shoulder.

Treatment.—In the milder cases the arm was rested on a pillow at first and this was followed by radiant heat and exercises after the acute phase had subsided. In the more severe cases the subacromial bursa was aspirated and novocaine solution injected into it with great relief. Almost full range of movement was regained, although often some creaking was felt. None of the cases recurred.

In those resistant to treatment and where the shoulder pain had localised to the insertion of the deltoid a gentle manipulation was done under anæsthesia when that was available.

DUPUYTREN'S CONTRACTURE

An attempt was made to investigate the background upon which this condition developed. It became quite prevalent in those who were doing manual work. Apart from trauma no constant factor was found. Some showed evidence of associated toxic and metabolic factors such as gout, rheumatism, fibrositis, etc. I could not find any evidence of a hereditary factor. The origin of this condition still remains in doubt. It was not seen in females.

SNAPPING THUMB AND TRIGGER FINGER

This condition was associated with minor traumata to the hands and had a more definite toxic or infective focus as the underlying factor. Tenderness was first felt opposite the metacarpo-phalangeal joint of the affected digit which was then followed by an increasing difficulty in extending the flexed terminal digital joint.

Snapping thumb is commonly found as a congenital lesion, but it was not unusual in those using the grass sickle. I understand it was equally common with the women of this country who were handling shells in the munition factories. There is always a tender nodule felt opposite the metacarpo-phalangeal joint. Is it a xanthomatous change in the tendon sheath and tendon? The ring finger was involved in nearly every case—very similar in many respects to Dupuytren's contracture only affecting a different tissue. Conservative treatment was employed in every case though operative treatment is preferable. With conservative treatment the average length of time was three months.

Ganglion of the Wrist and Tenosynovitis.—This occurred amongst those employed as carpenters. One case of tenosynovitis was associated with oxaluria.

Olecranon-Bursitis.—This condition became prevalent during the two and a half years spent in prison cells with their cement floors and constant traumata to the elbow. Many methods of treatment were used. It was found that in those who received no treatment at all the bursa gradually disappeared after a few months. In two cases complaining of pain the bursa was excised and found to contain "melon seed bodies."

Semi-membranosus Bursitis.—Associated with chronic aching pain in the knee and down the calf following a strain of the posterior ligament of the knee-joint, and was met with mostly in those who were pushing carts and straining the back of their knees. In one case it had to be dissected out.

Tennis Elbow.—Strains of the common extensor origin were relatively frequent while lifting logs of wood or bags of rice, etc. There were two distinct groups of cases:—

- (1) Those more acute in onset and tending to clear up within a short period.
- (2) Those more chronic in onset and course, and very resistant to treatment.

In the first group the elbow could not be fully extended and responded to manipulation with or without a local anæsthetic. The second group had usually a history of some superadded focus of infection. The elbow could be almost completely extended. It was very resistant to treatment and is the type which in civil life usually requires fasciotomy and erosion of the common extensor origin.

Epididymitis, warts, rodent ulcers and skin carcinomata were all prevalent.

FIBROSITIS

Although fibrositis and sciatica were common complaints they were not nearly so prevalent as one would have expected, in view of the unpleasant conditions under which people existed. Of those cases that were seen, many had recurring attacks lasting weeks or months. While local anæsthesia was available many cases of acute strain and fibrositis were treated with good results, while the more persistent types of fibrositis involving the neck, rhomboid-scapular area and back responded to fasciotomy. Manipulations had to be reserved for cases especially resistant to other forms of treatment. Two cases giving the typical clinical features of prolapsed disc responded dramatically to a gentle manipulation followed by graduated exercises.

Gout.—Seventeen cases are on record. The majority had no recurrences after one year and all were cured by the end of 1944.

Fractures of Ribs.—It was not possible to come to any conclusions regarding the state of the bones following this long period of malnutrition owing to the absence of X-ray facilities. Fractured ribs, however, were of frequent occurrence and usually resulted from trivial injuries. Healing occurred after three to four weeks.

The shortage of drugs made the conservative treatment of ano-rectal conditions extremely difficult. For chronic *constipation* sulphur in palm-sugar was useful while it lasted. Red palm oil had a laxative effect on some and the opposite effect on others. A herbal infusion of "galengang" made by the chemists was found to stimulate peristalsis, but its effectiveness was not complete without the assistance of the abdominal muscles.

Fissures-in-Ano.—These occurred daily in acute and chronic forms—the former responding to injections of an anæsthetic in oil, while the latter usually required excision.

In the first few months of interment when the diet was deficient in all nutritional values and critically short of vitamin B, peripheral *nerve palsies* occurred. The peroneal nerve became very susceptible to trauma and pressure. Ten cases are recorded where paresis occurred and on an average lasted four or five months.

CHRONIC ULCERS

Lastly, I would like to discuss the subject of chronic ulcers and septic lesions generally. Chronic ulcers formed one of the major problems during internment and presented many interesting points. During the early months smears were taken from ulcers for microscopic examination and only mixed non-specific organisms were found. It was a fairly true saying that any abrasion below the middle third of the leg would take weeks or even months to heal. Here the circulation was poor; it was an area most easily traumatised and susceptible to gravitational oedema. It was noted, however, that while operation wounds healed well by primary union, an ulcer in the same person might take weeks to heal. An ulcer usually began with a small abrasion or insect bite. Within twenty-four hours there would be redness round about, with oedema of the leg and foot and a painful lymphatic gland draining the area. At the actual site blister formation was common, and gradually the surrounding skin would change in colour from a deep red to purple and later to black necrosis. A systemic reaction might or might not be present.

It is significant to note that pellagra, which is known to result from a deficiency of the B₂ factor, occurred in epidemic form from May till October 1944, when ulcers and sepsis were also at their maximum incidence. The camp diet was never deficient in vitamin A, D or C. The shortage of vitamin B and B₂ complex was always dangerously low. One of the factors in the etiology of ulcers which must be taken into account more than before is that of hypoproteinæmia and perhaps shortage of fat in the diet. In fact, it cannot be said that ulcers result from the shortage of any one factor in the diet but rather the result of an unbalanced diet deficient in good quality proteins and probably the B factors.

Treatment.—Plain fomentations repeated as often as possible or

kept warm with a hot bottle or brick with the leg elevated reduced the oedema and inflammation in the acute stages. As soon as the ulcer was clean a vaseline or "tulle gras" dressing was applied and the foot and leg were supported by a rubber latex bandage. This was kept on for two or three weeks and renewed if necessary. This technique allowed the patient to be ambulatory, was comparatively comfortable, saved dressing material, prevented interference and protected it from contamination.

From approximately the middle of 1944 a change was seen in some of the ulcers. The small ulcer, with its dark purple areola developed rapidly into a large gangrenous black slough which was dry or shiny, tough and adherent, and had to be excised. In some cases this was followed by peripheral neuritis, paralysis and death.

On microscopic examination of the smear from some of the ulcers diphtheria bacilli were seen.

My view is that all the ulcers were primarily of nutritional origin and produced chronic sepsis. A state of hypoproteinæmia existed. Further ill-health occurred and interfered with the utilisation and metabolism of the vitamin B factors in the bowel. When resistance to infection was at its lowest ebb, in some cases diphtheroid organisms began to flourish and added an additional toxic factor. This would account for the great variation in the severity of the neurological symptoms. The response to vitamin B therapy was variable and even misleading. There was always a slight general improvement noticed, but it cannot be stated that any visible improvement occurred in the ulcers or in the neurological symptoms in the early period of treatment, even with large doses of vitamin B therapy. Patients usually became slowly worse under treatment for several weeks and they improved gradually later. It was not possible to give any anti-diphtheritic serum in treatment, but one could anticipate mixed results in view of the somewhat uncertain etiology. It is possible that the incidence of ulcer contamination and peripheral neuritis might have been much higher if excision of the slough followed by the closed dressing technique had not been adopted.

DISCUSSION

Mr Millar assumed that the large numbers of herniæ were due to marked loss of tone in the muscles due to malnutrition. He had come across a patient who claimed to have had bilateral inguinal hernia which had quite disappeared with the improvement in conditions resulting from his release from the camp. *Mr Millar* had been unable to find any sign of hernia on examination.

Mr W. V. Anderson asked if the painful shoulders were mainly bilateral and also if they were occupational in nature. During the war he had come across many cases of tenosynovitis in munition workers.

He was interested to know if the latex Mr Cameron had used had produced skin irritation through lack of ventilation, as was common here with elastoplast.

Mr Jeffrey discussed the question of chronic ulcers. In the Middle East and Burma it was found that the recent ulcers were due to staphylococci and the more chronic ones harboured streptococci.

With reference to epididymitis he had seen many cases in serving soldiers. The condition was not usually gonococcal, but non-specific and secondary to prostatitis.

Mr Jeffrey commented upon the prevalence of fractured ribs and assumed that this was because the bones were so decalcified that they fractured easily, and he asked about the rate of healing in fractures of long bones.

Mr R. L. Stewart and *Dr A. B. Smith* also took part in the discussion.

Mr Cameron, replying, stated that circumcision had been a very common operation in their camp. Patients got a small ulcer crack at the mucocutaneous junction, apparently due to malnutrition.

At first, shoulder conditions were difficult to treat owing to the lack of physiotherapy. In time, however, they had succeeded in organising this in a small hut under the charge of two or three medical officers. With the help of the electrical engineers they managed to improvise different forms of treatment. The hot plate, for instance, was upturned and used in applying heat.

Ear, nose and throat cases formed a large part of their early work. Otitis externa became prevalent along with ulcers and general sepsis. They had difficulty in treating them, trying various methods. Usually they went on the principle of trying to keep them clean and dry. They had a good deal of cellulitis following otitis externa and treated it with sulphaniamide which gave good results.

About chronic ulcers, *Mr Cameron* could not say whether staphylococci were more prevalent in the early cases and streptococci in the later ones. Smears taken showed mixed infections, Gram-negative bacilli being the most prominent organisms. When they got the diphtheritic lesion the smear showed large numbers of the typical organisms. This was interesting because they got toxic peripheral neuritis in some who had never had an ulcer before. He recalled one case who had chronic diarrhoea and who eventually developed toxic peripheral neuritis. Another man had a perforation of a duodenal ulcer and the wound had gone a little septic. Later he developed a severe peripheral neuritis of which he died. It was difficult to be quite certain whether such cases were due to the actual diphtheritic toxin or not.

With regard to amputations, they had carried out one on a coolie. A weight had fallen on his toe and he later developed gangrene, but the Japanese refused to give him any treatment. He eventually came into their hospital and a Sime's amputation was done. It had not been possible to follow up his case, but he was last seen on crutches—the wound having healed by first intention.

Epididymitis was very common and usually followed a slight trauma. There was never anything in the urine to suggest a *B. coli* infection. It usually lasted for about three weeks and required rest, which seemed to be all that was necessary. Sulphapyridine was tried but did not seem to help.

With regard to decalcification of bones, *Mr Cameron* was unable to make any definite statement owing to lack of X-rays for confirmation. Fractures such as Colles, Pott's, etc., were successfully treated in plaster while plaster was available. He recalled two cases of fracture of the neck of the femur,

one of which was treated conservatively in splints and in time had very solid union. The other, a man of 60, had a sub-capsular fracture. Nursing was difficult and treatment by splinting was a problem so they decided to operate. Open operation was carried out and a Smith-Petersen nail was inserted, the appropriate instruments for this being made by a camp engineer. The patient made a comfortable and uneventful recovery.

Mr Cameron's impression was that those with herniæ would improve with better conditions and he was interested to have this confirmed by Mr Millar.

Mr Cameron could not say whether shoulder lesions were more marked on the right or the left sides. He too had noted peripheral neuritis with burning feet, and he attributed this to lack of vitamin B₂. It was a most distressing condition, but used to clear up in ten days or so under treatment with Marmite. Drop foot was usually treated with elastic suspension applied in such a way as to enable the patient to get about.

With regard to latex, Mr Cameron had never found any skin irritation such as is usually associated with elastoplast. After three weeks the skin was quite clean except around the actual ulcerated area where there was usually some moisture, but after three days or so of exposure to the air this healed up quite satisfactorily. A latex bandage gave excellent skin traction for fractures and was a good supporting bandage for varicose veins.