THE SURGICAL COMPLICATIONS OF TYPHUS FEVER.

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Having witnessed the development of gangrene of the lower extremities during and following typhus fever in Arab natives of North Africa the writer was stimulated to make a study of the surgical complications of this disease. The first patient seen was a male Arab dwelling in the mountainous regions who developed gangrene of the feet as the result of typhus fever. Being far removed from surgical aid a non-medical Arab had successfully amputated the distal half of the left foot, in effect a Chopart amputation was performed, and he had also removed several toes of the right foot. This patient recovered from the disease and the wounds were healing. The second patient was in the convalescent stage of typhus fever and developed dry gangrene of both feet necessitating amputation. The third patient had suffered from typhus fever several months previously and ascending gangrene of the left foot and leg supervened. On examination of this Arab it was found that the foot had gone and the leg was represented by bare tibia and fibula; all the soft tissues had sloughed away as far as a point one inch below the knee joint which was held in partial flexion. The condition of these three native Arabs following typhus fever raised the question regarding the possibilities of other complications of interest to the surgeon and the nature of the gangrene which may occur during and following the disease. As the result of many conversations with surgeons and physicians practising in North Africa and a study of the relevant literature on the subject the following account has materialized. The surgical complications may be considered under the following group headings.

(1) Infective Complications.

As the result of the marked lowering of the resistance of the body infective lesions are both numerous and variable. The organism responsible for these complications appears to differ in certain epidemics. Thus Constantine and co-workers in a detailed study of 150 patients found the following organism incidence: Staphylococcus 60 per cent; streptococcus 12·5 per cent; pneumococcus 7 per cent; B. tetragen 3·5 per cent; anaerobic organisms 3·3 per cent.

Danielopolu in a study of typhus epidemics in Roumania found the streptococcus as the commonest infecting organism in these lesions.

Abscess Formation.—An abscess may develop anywhere in the body but the sites of election are the subcutaneous and deep cellular tissues which have a poor resistance. In some cases there are multiple abscesses which form in remote parts of the body. The following sites of abscess formation have been described.

(a) Cephalo-cervical region: This includes the sites palpebral, lingual, retro-auricular, submaxillary and cervical.

(b) The extremities: Arm, thigh, leg and foot.

(c) Chest: Empyema thoracis may occur.

(d) Abdomen: The abscess may be either intraperitoneal or extraperitoneal. Abscesses in the spleen and prostate have been described.

(e) Perineum: Peri-anal and ischio-rectal abscesses may occur. If the abscess forms in the subcutaneous tissues its evolution may be slow and may attain large dimensions. The treatment of this complication is incision and drainage of the abscess and a small quantity of powdered proflavine is massaged into the tissues forming the wall. The wound is covered with vaseline gauze of wide mesh and finely impregnated; dressings are performed...
at intervals of three days. Careful attention is given to the patient's general condition and every effort made to improve the general health and powers of resistance to infection.

Cellulitis.—This is a very serious complication—spreading cellulitis is often fatal. Constantine and co-workers described six patients who developed it with a mortality of 100 per cent. The streptococcus is the causal organism and sometimes the staphylococcus is associated with it. These patients appear not to possess any resistance to this type of infection. In the treatment of this complication measures designed to improve the general condition of the patient are instituted and chemotherapy should be employed to the maximum limit.

Inflammation of the Salivary Glands.—Inflammation may involve either the parotid or submaxillary salivary glands although the former is more commonly affected. Acute parotitis is a frequent and grave complication and suppuration often supervenes. In a series of cases studied by Constantine and co-workers there were sixteen patients with acute parotitis of which two succumbed. Nabies described thirty-two cases and nine deaths. Acute parotitis may be either unilateral or bilateral. About one-third of the cases belonged to the latter category. The streptococcus is the causal organism and the inflammation may lead to gangrene of the gland. A marked feature of the condition is the development of marked local oedema which may extend at an alarming rate. The recognition of acute parotitis during its early evolution is most important in order that treatment may be instituted to relieve intra-capsular tension which, if excessive, leads to massive disintegration of the gland. In some cases paralysis of the inferior division of the facial nerve occurs. Regarding the treatment and its complications it is necessary to avoid making large intra-capsular incisions in the gland. One or more small incisions should be made over the most prominent part of the parotid or where fluctuation is detected. It is advisable to dissect away a small flap of skin thus exposing the capsule of the gland which is then incised so as to admit a pair of Kocher's forceps which are then opened to allow pus to drain away. In some cases pus does not appear at once but it is important to diminish the intra-capsular pressure. Chemo-therapy by the oral route is instituted. Radiotherapy has been advocated for acute suppurative parotitis by Latchmore and co-workers who state that the prognosis has been completely modified by high voltage X-ray therapy. These workers recommend that doses of 100 r per day be given immediately the swelling appears. This method probably stimulates lymphocytic infiltration and the formation of antibodies. The epithelial elements of the gland are not destroyed and secretion normally appears fifteen days after resolution of the swelling.

Inflammation of the Buccal Cavity and Mandible.—The following complications have been described in this region—gingivitis, gangrenous stomatitis and osteomyelitis of the mandible. In the treatment of these conditions the general treatment of the patient must be improved and oral chemotherapy may be of value. In osteomyelitis of the jaw surgical intervention may be indicated.

Inflammation of the Larynx.—Laryngitis with marked oedema is sometimes seen and suppurative chondritis leading to laryngeal stenosis may occur. In the treatment of these conditions tracheotomy may be required.

Inflammation of the Ear.—Acute suppurative otitis media, sometimes bilateral, may develop and otorrhoea is often the first symptom of the complication. Infection is prone to spread causing acute suppurative mastoiditis. In some patients the mastoiditis remains silent until there are signs of intracranial infection. Infection in the ear may lead to the development of brain abscess. In patients who recover there is frequently some residual chronic otitic suppuration. The treatment is designed to improve the patient's general condition; if suppuration is present drainage must be established. Oral chemotherapy is of value in these conditions.

Inflammation of Bones and Joints.—Reference has been made to the development of osteomyelitis of the mandible and the femur may also be affected. In these cases there is often co-existing suppurative arthritis of the knee-joint. The Staphylococcus aureus is usually responsible for these bone and joint complications. Treatment is designed to improve the
general condition of the patient and oral chemotherapy is valuable. Surgical treatment to provide drainage may be required.

**Inflammation of Veins.**—Phlebitis is a not uncommon complication and cases have been described where such veins as the orbital and saphenous are involved. In cases of acute suppurative mastoiditis there may develop lateral sinus infection leading to thrombosis. In the treatment of phlebitis the part is kept at rest. If infection or thrombosis of the lateral sinus is present the operation of lateral sinus occlusion is performed.

**Septicaemia.**—This serious complication carries a high mortality. In the treatment chemotherapy is most important, the choice of drug depending upon the nature of the organism cultured from the blood, and it must be given up to the maximum dose. Small blood transfusions may be of value and every effort is made to improve the patient's general health and powers of resistance to infection.

(2) **Vascular Complications.**

The vascular complications which occur during and after typhus fever are large in number and common. Apart from phlebitis, already referred to, the vascular lesions manifest themselves as gangrene of which there are various examples.

**Gangrene of the Extremities.**—The lower extremity is more frequently affected than the upper; according to Alquier thirteen times more often. A case of total gangrene of the upper extremity has been reported in the literature. Gangrene of an extremity may be either unilateral or bilateral and characteristically is of the dry variety. Dry gangrene usually occurs during the first weeks of the convalescent period and sometimes its evolution is spread over a considerable time. The gangrenous process always commences in the distal parts of the limbs and is liable to affect those areas which are exposed to cold or trauma. There has been considerable discussion regarding the causation of this type of gangrene and it is the opinion of many that it is due to progressive obliteration of the blood capillaries, arterioles and larger arteries. The syndrome has been described as the ascending gangrene of typhus fever. The treatment is amputation well above the line of demarcation.

**Gangrene of the Intestines.**—Croze has recorded the clinical findings in a French patient aged 30 convalescent from typhus fever. The abdomen became distended and abdominal pain was experienced. Subsequently peritonitis developed and the peritoneal cavity was opened and drained. The patient subsequently died and at autopsy there was an area of intestinal gangrene 3 cm. diameter with a perforation in the centre. In such cases of gangrene of the bowel the cause is occlusion of the blood-vessels supplying the affected segment. Treatment consists in resection of the gangrenous segment of bowel.

**Cutaneous Gangrene.**—Gangrene of the skin may occur and gangrene of the skin of the scrotum is commonly seen. It also occurs in the skin of the leg and arm and at pressure points in the skin overlying the sacrum and calcaneus.

**Other Varieties of Gangrene.**—The other forms of gangrene described as complicating typhus fever are gangrene of the vagina and the mucosa of the anal canal. In gangrene of chronic development Ferrari and Liaras recommend injections of serum from a convalescent patient. The initial dose is 20 c.c. followed at intervals of two days with doses of 30, 25, 20, 20 c.c.

(3) **Ocular Complications.**

Complications are numerous in connexion with the ocular apparatus and include thrombophlebitis of the orbital veins; post-inflammatory atrophy of the optic nerve, corneal ulceration, dacryocystitis and paralysis of 3rd and 6th cranial nerves.

**Conclusions.**

The surgical complications which may occur during and following typhus fever are discussed under three main headings—infective, vascular and ocular. The complications of this disease are variable in regard to site incidence and their gravity. In all cases of typhus
fever close collaboration between physicians and surgeons is essential in order that surgical complications may be diagnosed during their evolution and appropriate treatment instituted as early as possible. This may prove life-saving in a disease carrying a high mortality. Since the institution of prophylactic inoculation against typhus fever it will be of interest to note whether the incidence of surgical complications is lowered and its effect upon the mortality rate. There appears to be a racial resistance to this disease. Thus it is stated the Russians have a high resistance, the French moderate and the Roumanians a low resistance, suppurative complications always occurring.

REFERENCES.

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