care must be taken not to allow the cutting loop to slip as it leaves the external os, and to remember at this point to turn off the current with the foot-switch; also to hold the stem of the curette parallel with the cervical canal in order not to cut too deeply. The loop is so constructed that strips of lining membrane and underlying glands are removed in one piece if the instrument is correctly held. If for any reason it is necessary to make a deeper cut, the instrument can be tilted and tissue up to one-quarter of an inch in depth cut out. Strips are then cut from the sides, and lastly the floor. As each cut is made bleeding automatically stops from this area, until finally the endocervix is completely dry, which enables the operator to gain a perfect view and to deal with any small part which may have escaped resection. If an erosion is present it is excised by a larger cutting loop mounted on a bakelite handle, and the uterine cavity and cervical canal packed with gauze plugging soaked in 10 per cent. picric acid in absolute alcohol, which is removed eight hours later. The operation is completed by dilating up the urethra with a special pair of urethral forceps to 40 degrees Charrière in order to deal with the associated urethritis.

Saline douches are begun fourteen days later, and continued until the cervix is healed, which takes about two months. Intermittent dilatations of the urethra at fortnightly intervals are continued until a calibre of 40 degrees Charrière is attained without bleeding and without any appreciable resistance.

Figs. 4, 5, and 6 show a chronic cervicitis with an extensive erosion before treatment, directly after treatment, and three months after treatment. The results of this method of operative treatment for chronic cervicitis, especially if it has given rise to renal or vesical symptoms, I have found to be excellent, both clinically and pathologically.

Clinically the vaginal discharge, frequency, dysuria, renal pain, and backache disappear in the absence of any other gynaecological or urological cause, and in a series of eighty cases which have been followed up by Dr. Bryce Cooper and myself, both at the Royal Waterloo Hospital and in private, there was no distortion or contraction of the cervical canal. This was only to be expected, as excision of tissue by the diathermy cutting current is followed by a supple scar, which does not contract; and so resembles the results obtained in other parts of the body. Sufficient time has not elapsed for me to give an opinion on the effect that this treatment may have on conception and future pregnancy, but in one case in the series conception took place for the first time after twelve years of married life, and resulted in a normal pregnancy.

Pathologically a series of hysterectomies was performed by Mr. Lyle Cameron, in some cases immediately following the diathermy curette and in some six months later. By serial sections of the cervix Dr. Knott showed in the former that all the infected tissues had been removed, and in the latter that there were no signs of cervicitis.

In 1933 the British Science Guild began the Research and Development Lectures with the object of directing public attention to the importance of scientific research and of the utilization of its results in the service of mankind. Early in 1934 a proposal was made that the lectures should be given in the theatre of the Royal Institution, where special equipment and facilities exist for experiments and demonstrations, and arrangements were made by which the Guild had the use of the theatre on two occasions in May. Four further lectures have now been arranged, including one, on December 12th, at 9 p.m., by Dr. G. W. C. Kaye, on "Sound and Noise."

GAS GANGRENE RESTRICTED TO THE SUBCUTANEOUS TISSUES

REPORT ON A CASE

BY

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The following case is thought to be of sufficient interest to report on account of: (1) the limitation of the infection to the subcutaneous tissues of one limb; (2) the good general condition of the child, maintained until pyogenic organisms made their appearance; and (3) the uneventful recovery, whether due to the mild pathogenicity of the organisms or as a response to serum.

Case Record

A small boy, aged 7, ran a nail into the right leg, just below the knee, on February 10th, 1934. This was shortly afterwards withdrawn by his father. He was sent into hospital on February 14th as a case of cellulitis of the leg. On admission his temperature was 99.2°, and pulse 100. He did not look ill or toxic, nor did he seem in any great pain, but on questioning he said: "I'm all right in myself, but my leg hurts me."

On examination the entire right lower limb was very swollen, tense, of a whitish colour, and there was a very small perforating wound over the external tibial condyle above the site of origin of the anterior tibial group of muscles. There was no pitting or crepitus; the oedema was solid. The circumference of the thigh was 15½ inches, as compared with 12 inches on the left side. An anaesthetic was given, and on cleaning the wound preparatory to excision of the skin edges a few bubbles of gas and a small quantity of pus issued from it. The surrounding tissues were gently pressed, and a few more bubbles and thin, brownish serum appeared. A smear was taken, the edges of the wound excised, and the latter left open.

An immediate examination of the pus was made, and, on finding organisms typical of the *B. welchii* group, anti-gas-gangrene serum was given, 5,000 units intravenously and 5,000 intramuscularly. Hot fomentations were applied to the wound, and the leg placed on a back splint. The child's general condition remained good, and the condition of the limb unchanged, the oedema not extending above Poupart's ligament. An x-ray photograph showed gas bubbles subcutaneously only in the region of the knee. A further 10,000 units of serum was given on February 15th into the subcutaneous tissues of the right thigh, and 5,000 intravenously with 5,000 intramuscularly on February 17th.

Up to February 28th the circumference of the thigh had diminished by one inch, the child was well and comfortable, and there continued to be a small sero-purulent discharge from the wound; but on March 1st his temperature and pulse began to rise, and he complained of increasing pain on the inner side of the thigh. An inflamed indurated area was present along the inner side of the lower third of the thigh, which was very tender. Slight pitting oedema of the scrotum developed at this stage, but soon disappeared. On March 2nd an incision was made into the subcutaneous tissues along the inner side of the thigh and a small quantity of pus obtained, which was sent for pathological examination, the report being haemolytic streptococci only. Following this incision quantities of serum drained from the wound. Further incisions were made into the subcutaneous tissues in the now indurated areas in the popliteal region and inner side of the upper part of the leg on March 5th and 9th, and the small quantity of pus which was first obtained was soon followed by the discharge of large quantities of serum. Hot fomentations were applied and, later, eusol dressings. During the period of pyogenic infection the child had a raised temperature and pulse, but these became normal on March 14th, and he was discharged on the 19th. The limb was now 1½ inch less in circum-

ference round the thigh than the other, the incisions were granulating in healthily, and the movements of the limb normal. On recent inquiry from his doctor it was learnt that the wounds soon healed, and the child has since remained perfectly well.

Remarks

On reviewing the literature on this subject I can find no statistics to show in what proportion of cases infection is confined to the subcutaneous tissues as above, but Choyce¹ mentions that it does occur. Thirty cases, however, have been reported of gas-gangrene infection following subcutaneous injections,^{2,3,4,5} either given hypodermically or as subcutaneous salines, but in the majority of these cases the infection became rapidly generalized and death ensued, or the patients recovered only after immediate multiple incisions and the administration of serum.

Perhaps Tissier's findings⁶ may explain the mildness of the infection. Tissier, in an article written in 1916, described experiments to show that gas-forming organisms in themselves had little power to cause gas gangrene, but when in association with other organisms they rapidly produced the typical disease. He showed that filtered cultures of *B. welchii* or *B. oedematiens* produced no effects; inoculation of animals with either of these organisms alone produced a hard oedema, which slowly disappeared, but when there was added to these cultures growths of aerobic bacteria the effects of malignant oedema were noted. He also stated that the presence of devitalized tissue was the necessary condition for the development of gas infection.

On looking at this boy's temperature chart it will be seen that the onset of severe symptoms coincided with the first appearance of pyogenic organisms in the pus. Up to this time on three occasions anaerobic organisms only were obtained from the wound, but on the twentieth day after infection the pus obtained on incision over the indurated area on the thigh gave a growth of haemolytic streptococci, and at this time the child's general condition was not so good. The hard, solid oedema of the leg, with absence of crepitus, suggested that the infection was mainly by organisms of the *B. oedematiens* type, although both groups of organisms were demonstrated in the pus.

It is also interesting to note in the cases quoted that the patients who received their infections by subcutaneous methods were in hospital suffering from some pre-existent disease or from loss of blood, and that other patients in better condition, who were given injections at the same time with the infected agent, did not develop gas gangrene.⁷ It seems strange in this case that, in the absence of devitalized tissue in a healthy child, gas gangrene should have developed at all, and it should be noted that at no time was there any evidence of infection extending beneath the deep fascia. How much of the child's good recovery was due to the early administration of serum or how much to the low pathogenicity of the organisms it is difficult to say.

In another case admitted to this hospital a few months ago, of severe compound fracture of the leg with much destruction of muscle, gas gangrene set in on the third day, although 12,000 units of anti-gas-gangrene serum had been given as a prophylactic dose on admission. It quickly subsided, however, following intravenous administration of large doses of

serum and free opening up of the wound. A reappearance of gas infection of the leg on the forty-fifth day after the injury followed encasement in plaster, but subsided again after serum injection and exposure of the wound to the air.

My thanks are due to Mr. Lewin for permission to publish this case, and to Dr. Knott of Guy's Hospital, who kindly confirmed the pathological findings.

IV = Intravenous. IM = Intramuscular. SC = Subcutaneous.

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INTERFERENCE IN THE SCHICK TEST BY DIPHTHERIA ANTITOXIN INJECTION IN THE HUMAN SUBJECT

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The aim of this investigation was to find out how soon an injection of antidiphtheritic serum may be given to a suspected case of diphtheria after the performance of a Schick test without invalidating the result of that test.

Ker¹ (1924), in his presidential address to the Fever Hospital Group of the Society of Medical Officers of Health, gave an account of some work on this point. He assumed that all definite cases of diphtheria are Schick-positive at the onset of the disease, and, by testing such cases at varying intervals before the intramuscular injection of antidiphtheritic serum, he tried to find out how soon the serum had to be administered after the performance of the test in order to inhibit the positive reaction. He tested forty-seven cases two hours before the injection of serum, and of these forty-five yielded positive reactions and two were doubtful. Of nineteen cases tested one hour before the injection of serum, eighteen gave positive reactions and one a negative. The single patient reacting negatively died of circulatory failure within ten days after the test was performed, and it is possible that the circulation was already too depressed to respond to the stimulus of the test. Finally, fifty-six cases were tested immediately before the injection of serum, and of these forty-five had positive reactions, two were doubtful, and nine