SURGICAL PROCEDURES IN GENERAL PRACTICE

This is one of a series of articles contributed by invitation

ERYSIPELAS AND CELLULITIS

BY

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Erysipelas is an inflammation due to a streptococcal infection in the lymphatics of the skin. It is most characteristically seen on the face, and more often than not there is no obvious origin of the infection. In other cases, both on the face and elsewhere in the body, erysipelas starts either from a punctured wound or minute crack, or from an open infected wound. Its characteristic red appearance, with a well-defined slightly raised edge and minute vesicles, is unmistakable. The usual acute form is associated with marked constitutional symptoms and a high temperature. There is also a less acute type in which the pyrexia is of low degree and the patient not gravely ill: this form is sometimes recurrent at several weeks' interval.

Like that of other acute infective conditions which the surgeon meets with, the treatment of erysipelas is both local and general; but erysipelas is unlike most of the others in that the general treatment is of very great value and more important than the local. In the past many drugs, mostly of the type of antiseptics given intravenously, have been tried, but without benefit. Streptococcal sera and vaccines, sensitized and otherwise, have been used, though never with any convincing success.

Since the introduction of sulphanilamide as a remedy in streptococcal infections, however, we have a drug of the utmost value in the general treatment of erysipelas. In fact, erysipelas is one of the conditions in which sulphanilamide has had its greatest success. Its full name is para-aminobenzenesulphonamide, but it is put up by various firms, usually in 7½-grain tablets, under such names as sulphonamide-P, streptocide, prontasil album, and sulfanilamide. It is a white crystalline solid, and is given in tablet form by mouth. In order to maintain its concentration in the blood stream it is better, in the acute stage, to spread it over the day. It may be given four-hourly, one tablet at a time, with two night and morning, making a total of eight tablets, equal to 60 grains, for the whole day. The above dose, which is the average for a man of 10 st., should be adjusted to the size of the patient, and may be exceeded for a few days. When giving sulphanilamide certain precautions should be taken to prevent the complication of sulphaemoglobinaemia, which is caused by absorption of hydrogen sulphide produced in the colon. This condition is easily recognized, as the patient becomes cyanosed. To prevent its onset no purgatives must be given and the patient should be placed on a high-calorie low-residue diet and take liquid paraffin night and morning. Amidopyrine (contained in allonal) is forbidden, and phenacetin should be avoided if possible. Sulphanilamide may be prescribed at any stage of erysipelas, but of course the sooner it is given the sooner will it cut short the attack. In most cases it has a profound, sometimes dramatic, effect: the temperature drops to normal in forty-eight hours or less, the rash fades, and the patient feels better. During this period he must of course be kept in bed. In some cases in which, following the administration of sulphanilamide, the temperature has quickly dropped and the local condition improved, a relapse has occurred when the drug has been immediately stopped. It is advisable to continue

giving the drug, though in slightly smaller doses, for four days after the temperature has been normal. Agranulocytosis, which is a rare complication of prolonged sulphanilamide treatment, is most unlikely to come on after such a short course of treatment, but particular care should be taken with feeble or anaemic patients. Pain is not usually severe, but if it is morphine or its derivatives should be given, as rest and sleep are essential. Increased quantities of fluids should be taken, but, as already mentioned, purgatives must be forbidden.

So many lotions and ointments have been tried as local applications for erysipelas and given up that clearly none of them is of real value. Ichthyol has been very widely used, but its benefit is doubtful, though its smell, colour, and associated mess are impressive. When the inflamed area feels hot and painful relief may be given by applying gauze soaked in lotio plumbi. To prevent the spread of erysipelas it has been recommended that the healthy skin just beyond the red advancing edge should be painted with a strong iodine solution or even scarified in order to excite a protective leucocytosis and so render the tissues the better able to destroy the advancing streptococci. The infrequency with which these methods are used is the best testimony to their value.

Incisions should not be made in areas of erysipelas either with the idea of preventing its spread or under the mistaken idea that there is pus to let out. The only indication for incisions in erysipelas is extreme oedema such as may occur in the loose cellular tissues of the eyelids or scrotum. Small punctures may be made with a knife to allow the escape of fluid, but as the oedema subsides rapidly as soon as the inflammation begins to diminish this treatment is very rarely called for.

Many methods of treatment, both local and general, have been used for erysipelas, which remains an infection with a low mortality rate, and if left untreated will run its own course and disappear, leaving no ill effects. The treatment outlined above, however, is planned to shorten the course of the disease and add to the comfort of the patient.

Cellulitis

By cellulitis is meant an infective inflammation of the subcutaneous tissues, usually superficial to the deep fascia, though sometimes beneath it. Whereas erysipelas is always a streptococcal infection, cellulitis may be either streptococcal or staphylococcal, and is occasionally due to other organisms. There are several routes by which organisms may gain access to the tissues, but it is most commonly by infection carried in through a punctured wound. The infection may extend rapidly in the cellular tissues and, especially in streptococcal cases, there is likely to be a lymphangitis and lymphadenitis as the result of quick spread by the lymphatics. The treatment of lymphangitis is so much that of the initial cellulitis that they will be considered together.

The treatment of cellulitis is the classical treatment of an inflammatory condition, and may be summarized in absolute rest, heat, and adequate incisions when pus has formed. The first item—rest—is often overlooked, but it is of the greatest importance. When a finger or hand is infected it is essential to splint the part and rest the whole arm, either in a sling or, if the patient is in bed, on a pillow; and it may be added that in the case of a

septic finger, if it is associated with any constitutional symptoms, rest in bed is most important. In treating a leg the patient is kept in bed and the limb is elevated on pillows: if the foot or ankle is concerned a splint holding the ankle at a right angle is called for. It is sometimes quite surprising how cellulitis will cease to spread and the temperature drop as soon as all movement of the affected part is prevented.

There are a number of different ways in which heat may be applied: moist heat in a bath, dry radiant heat, and various forms of fomentations. For a severe cellulitis of the finger or hand the following is an outline of the treatment and the method of applying heat. The patient should be kept strictly in bed from the beginning. Every two hours the hand is immersed in an arm bath of hypertonic saline (5 per cent.) for half an hour, the water being kept at as high a temperature as the patient can tolerate; it is then lifted from the bath, not rubbed but very gently dried by swabbing with wool, placed on a pillow, and given an application of radiant heat. Radiant heat is easily provided by placing the hand under a leg cradle to the top of which an ordinary electric-light bulb is tied. The cradle is then covered with a mackintosh and blanket. Care must be taken not to have the electric bulb too close either to the hand or to the mackintosh, as either may very easily be burned, and the strength of the lamp should not be more than 25 or 40 watts. As the hand is lifted out of the bath and rested on the pillow the fingers and wrist should be kept quite still, and if the patient is inclined to move the hand about when it is on the pillow it should be gently secured to a splint but with the inflamed part left exposed to the heat.

When the leg is concerned it is not always convenient to soak the part in a bath, and the following treatment may be carried out. The whole area involved in the cellulitis is covered with magnesium sulphate paste, which is warmed to body temperature and spread on gauze so as to make it easy to apply. Over the gauze is placed hot antiphlogistine spread on lint, and the whole leg is then wrapped in cotton-wool. The dressing may be changed every twelve or twenty-four hours, when any spread of the cellulitis is noted. Both in the case of the arm and that of the leg it is essential that treatment should not be allowed to interfere with sleep, and the hot baths should be given to the arm only when the patient is awake. The patient should take large quantities of fluid and as much food as he can eat. With a cellulitis there is often great pain, especially when the finger is affected, and this, unless relieved, will do great harm by preventing sleep and thus lowering the patient's resistance. If the pain is bad morphine or dilaudid should be given.

WHEN TO INCISE

There is often a temptation to make early incisions, especially when the area of inflammation is spreading and the temperature is raised; but there is nothing to be gained by incising a cellulitis in the initial stages. It is far better to pursue conservative treatment, for it will be found that many cases of cellulitis will recover without the necessity of making an incision, and thus the convalescence is shortened. But this is not the sole reason for avoiding operation. It is believed, and has been proved, that far from doing good early incisions are likely to do harm. In the first day or two of the inflammation the surrounding tissues are building up barriers of defence, which, if called upon to withstand the added trauma of an incision, are likely to break down and allow

the infection to spread further. The only real indication for incising a cellulitis is suppuration, and as soon as pus has formed it should be let out. At this stage the infection has usually become limited, and only good comes from making an incision, provided the latter is confined to the area of the abscess and does not encroach on the surrounding tissues. After the incisions have been made hot arm baths should be continued, but with normal saline at first and then with a gradually increasing strength of salt solution. Care should be taken not to let the part get too sodden, and ten or fifteen minutes' immersion every three hours may be long enough. In the interval between the baths the hand should be covered with gauze and lightly bandaged or wrapped in a sterile towel and given radiant heat for about an hour. After this it should be allowed to lie at rest on a pillow or in an elevated position.

It is sometimes argued that before pus has formed incisions should be made to lower the tension in the tissues, so as to relieve the pain and because the tension is thought to do harm to the tissues. It is far better to diminish the swelling by elevating the limb and giving drugs for the pain. A leg may be supported on pillows or slung from a cradle. The arm is easily held in an elevated position by a roller towel, the upper end of which is suspended from the ceiling or wall, while the arm rests in the lower end, preferably with the elbow flexed and the hand pointing upwards.

Contractures are likely to follow cellulitis overlying a joint—a result all the more to be expected when incisions have been made. This possibility must always be kept in mind, and should be prevented by suitable posture or splints. When cellulitis is severe and of streptococcal origin sulphanilamide may be used as described in the treatment of erysipelas, the same precautions of course being observed.

The above account of the treatment of cellulitis is applicable to that condition in general; there are, however, many important points of difference in the treatment of various parts of the body, but it is not possible to describe all of them here. Nevertheless, reference must be made to one most important point concerning the time for incisions in certain situations. In most parts of the body it is inadvisable to make early incisions in cellulitis, but in the neck it is different. A diffuse cellulitis in this region is quickly followed by oedema of the larynx and pharynx, which, combined with the great tension in the neck, causes suffocation. Incisions must be made early, but if these are only through the skin and subcutaneous tissues they are of no value: the deep fascia must be incised, for in all cases of serious pressure there is tense oedema beneath it. Similarly, when cellulitis affects the orbit or scalp incisions should be made before serious damage is done to the eye or before the blood supply to the outer table of the skull is imperilled.

Lymphangitis

The typical red streaks extending up a limb, indicative of lymphangitis, give some idea of the severity and seriousness of the infection, particularly as regards spread and degree of toxæmia. They are more commonly seen with streptococcal than with staphylococcal lesions, and as a rule begin to fade at the end of thirty-six or forty-eight hours. Lymphangitis of itself requires no treatment, but a careful watch must be kept on the lymphatic glands into which the vessels drain. With the fading of the red streaks these glands, which will have been tender and slightly enlarged, will usually become less tender. But occasionally, instead of resolving, the gland may

remain enlarged and suppuration take place; this may not cause much pain and may therefore be overlooked. Thus whenever pyrexia is continued, although the area of cellulitis is progressing satisfactorily, the lymph glands should be examined, as an abscess may form in them some days or even weeks after the cellulitis has been got well in hand. It is a mistake to incise lymphatic glands before they suppurate: no incision should be made until one is sure from the physical signs that pus is present. When a localized abscess is opened it heals well and quickly, whereas an incision made too early may cause infection to spread further. Hot fomentations for the enlarged glands associated with lymphangitis will do good by hastening resolution or accelerating suppuration as well as by relieving pain.

The course of cellulitis with its associated lymphangitis is greatly altered by appropriate and well-judged treatment. In the aged and those of poor resistance a certain mortality occurs from septicaemia and pyaemia. In all cases there is likely to be some degree of permanent stiffness when the cellulitis is extensive and especially where the fingers are concerned.

SCIENCE AND INDUSTRY

The annual report of the Department of Scientific and Industrial Research¹ opens with a tribute to the late Lord Rutherford and his inspiring leadership during the seven years he was chairman of the Department's Advisory Council. The reports which have appeared annually over his signature during that period all bear testimony to the strength of his conviction that the prosperity of this country can only be assured if its industries make the fullest use of the technique and the discoveries of science. His last act as chairman was the shaping of the present report, which is signed by Lord Riverdale (formerly Sir Arthur Balfour), the new chairman of the Council.

During the year consideration has been given to directions in which it may be possible to strengthen the contacts between industry and the National Physical Laboratory. The report records substantial progress in practically all directions of the Department's work, both in the researches carried out by the research establishments of the Department itself and in the laboratories of the research associations, formed on a co-operative basis in various industries under the Department's auspices.

Storage and Transport of Food

A short time ago a new system of refrigeration was developed at the Dutton Laboratory, known as the "jacket" system. The new system has been installed with modifications in most of the new tonnage in the Australian and New Zealand trade, and during the year arrangements were made for officers of the Department to sail in some of the ships so equipped to examine its practical working. The basis of the investigation had to be wide, since the system involved changes in the method of carriage of all the ships' refrigerated cargoes, including butter, cheese, frozen meat, chilled meat in gas storage, pears, and apples.

The success that has attended the commercial development of gas storage of home-grown apples—that is, storage in an atmosphere containing just the right amount of carbon dioxide—is well known. A second investigation carried out with William pears and with Conference pears has shown that the pear responds to gas storage even better than the apple. When gas-stored the pears ripen more slowly on removal from store, thereby allowing the trade more time for marketing them.

To meet the increasing demands of the trade for information as to the behaviour in store of fruits and vegetables not previously stored in quantity, trials have been carried out

with strawberries, hot-house grapes, broccoli, and peas. The previous work with plums has been extended, and gas-storage trials with asparagus have begun.

The Shoe and the Foot

Interesting work has been carried out during the year by the Boot and Shoe Research Association arising from investigations on "walking research" in which moving-picture records are taken of the gait of various people to study in detail the way they walk. The full results of this investigation will not be available for some time. As a result of knowledge already gained, testing machines have been designed for laboratory investigations of the response of different kinds of shoes to the forces acting on them during wear. One of these is a flexibility meter. In dress shoes flexibility gives comfort and elegance, and an instrument, the report states, which imposes on a shoe the correct kind of deflection and gives a measure of flexibility provides a means of investigating the different ways in which this property can be achieved. A second instrument investigates the character of the shank or waist of the shoe, an important feature in high-heeled shoes; and a third, not yet completed, is a machine which will put shoes through the motion of walking and give the soles the treatment they receive during wear. The object of this machine is to give information on the materials and constructions likely to give maximum durability in various circumstances.

Another matter which has come up during the year is occupational footwear—the need for designs and specifications of boots and shoes suitable for various kinds of industrial occupations. For example, what is the best kind of boot or shoe for a waitress to wear, or a nurse, a shop assistant, a policeman, a railway porter, a factory machine minder, and so on. Many large concerns and authorities take a great deal of trouble, and have a high degree of organization, in the welfare of their employees, and doubtless they would not hesitate to specify a certain shoe as part of their employees' uniform if they knew with certainty the best type of shoe for their special circumstances. "Safety boots" for miners and quarry workers is a case in point.

Other Points from the Report

Over half a million clinical thermometers were tested at the National Physical Laboratory during the year and 7,000 thermometers of other types. The Scientific Instrument Research Association has carried out on behalf of a member firm an investigation into the best form of "lensing" of clinical thermometers to enable them to be easily read.

Measurements with the noise-measuring apparatus developed at the National Physical Laboratory have been made on motor vehicles on behalf of a committee of the Ministry of Transport; the results have led the committee to recommend that a noise level of 90 phons should not be exceeded by any new motor vehicle offered for sale or for use on the public highway. Measurements for the Home Office have been made of the loudness of certain portable sound-making instruments intended for use as local alarm signals in connexion with air raid precautions. The Building Research Station is now taking up the problem of ventilation of buildings, and methods and instruments have been developed which will be first used in carrying out ventilation surveys in existing buildings. The extent to which a wall admits or excludes heat and therefore its effect upon the amount of heat required to keep the room warm is being investigated, for different types of wall, in six chambers of 8 feet cube placed side by side with one wall of each facing north. Tests are being made first with three 9-inch solid walls and three cavity walls all of Fletton bricks arranged alternately.

Synthetic resins have been produced which have the property of removing small quantities of materials from water passed through them. The possibilities of using these resins for the removal of boron and fluorine from natural waters is under investigation. Boron to the extent of a few parts per million in water used for irrigation is detrimental to the growth of certain crops. With regard to fluorine, recent surveys in different parts of the world have indicated that fluorine in drinking water to the extent of one part per million causes the dental defect known as mottled enamel.

¹ Cmd. No. 5647. H.M. Stationery Office. (3s.)