

ON THE BIER TREATMENT OF INFECTIONS AND SEPTIC WOUNDS OF THE EXTREMITIES.

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DURING the last four months I have had the opportunity in the Out-Patient Department at the Massachusetts General Hospital to make a fairly extensive, though I must admit, somewhat superficial, test of the Bier treatment. During June, July, August and September I have been in charge of the male surgical room, and a goodly proportion of the average daily attendance have been cases in which this method of treatment has been applicable. The following brief remarks are in no sense to be taken for a scientific paper; I intend them for mere personal statements of my experience and resulting opinions. My opportunity at the hospital has been taken advantage of to try this treatment, and it seemed to me that perhaps some of the readers of the JOURNAL might be interested to know what I think of it. It has seemed to me quite useless to present a long series of cases with detailed reports, for such cases present such an infinite variation in degree of severity and in individual idiosyncrasy that such reports would confuse rather than aid the reader. I suppose that every surgeon, as his experience grows, imagines that he can take better and better care of what we call "septic fingers" and "palmar abscesses." Certainly, during the last six services at the hospital I believe that my own results have been better and better, and it is possible that the excellent results this year have been due to my experience in the years which have gone before; but I frankly confess that I consider them due to the application of the Bier treatment.

At our own hospital ten years ago the ideal treatment of a septic finger, for instance, was to make a free surgical incision, down to the tendon or bone. Sometimes the finger was laid open as if split to broil and the tendon left bare in the middle. This was a period of reaction from the despised old-fashioned "medical incision." The result of the "split to broil" method was invariably loss of a portion of the tendon and frequently amputation of the finger. On the other hand, it was supposed that safety from general infection was secured; perhaps it was, but not infrequently while the tendon was sloughing out, the process again extended up the fiber, a new sheath became infected and the palm and perhaps the forearm had to be split.

During recent years the treatment of these cases has been greatly affected by the example of Dr. C. A. Porter. Instead of the old-fashioned, blind, splitting operation in which the tendon was exposed willy nilly, Dr. Porter has applied a tourniquet, and then with great care dissected down to the seat of the pus unhampered by the bleeding. By this method it is frequently found that the pus lies not in the sheath itself, but in the fatty and areolar tissue adjacent to it, the tendon, quite unimpaired, although, perhaps, lying in the closest proximity to necrotic fascia. He found that a careful excision of the

necrotic part frequently saved the tendon if it were unmolested and not disturbed by gauze packing.

Thus his method gave safety from general infection by free drainage and yet minimized the damage to the tendon.

Now comes the Bier treatment. It is claimed that by this method the danger of general infection is lessened and at the same time the expulsion of necrotic tissue is aided. In other words it has the advantage over excision of the necrotic portions that it leaves all tissue capable of living, some of which the gross fingers of the surgeon must remove in his effort to excise the dead portions, and further it does not remove what inflammatory wall had already formed.

Suppose a case of septic finger: you fear two main things,—extension of the sepsis and future impairment of function. The Bier treatment claims to lessen both,—it prevents extension by mechanical congestion of the adjacent tissues and by increased pressure in the tissues it tends to throw off only the absolutely necrotic portions.

We all know that if we dare leave felons and boils alone that if they do not extend they heal with less damage than if we use a knife on them. If we knew they would not extend our only reasons for opening them would be to relieve pain or to hasten recovery. The "medical incision" suffices for the former and the hope of a more perfect recovery suffices for the latter.

A medical incision is by no means contraindicated in the Bier treatment, and in my experience the recovery is more rapid than by incision and curettage.

We have applied the treatment in the following manner: When an old (*i. e.*, one who has been seen before) patient arrives in the morning his dressing is taken down and the wound examined and its condition recorded. A rubber strap two inches wide and provided with a buckle is applied about his arm or leg well above the lesion. This is drawn as tight as possible without stopping the pulse. The wound is covered with moist corrosive gauze and the patient sits down and waits an hour. The part is looked at from time to time to be sure that the circulation is not too greatly checked. At the end of the hour a moist dressing and splint is applied. The wound is not as a rule packed or drained. The same routine is followed each day.

After the first few minutes the pain is considerable, and if pain has been present before it is usually relieved. Patients not infrequently bring a book or a newspaper to read during the hour. While the tourniquet is on the wound secretes more profusely, usually serum with particles of pus and necrotic tissue. In several cases after the treatment it was noticed that adjacent pockets had broken into the main one or on the surface. If slough presented at the surface of the wound we have not hesitated to pick it out, but on the whole delving and probing in the wound have been discouraged.

The nature of the cases in which we have used the treatment has been various. Almost all the cases of acute suppuration from whatever cause on the extremities has had the Bier treatment in addition to the usual dressings.

In some of the cases a fairly radical operation by Dr. Porter's method has been done, but in most merely a "medical incision." In a few, which I should in other years have incised, I have made no incision and the process has disappeared. On the whole, the cases which have done the best have been frank suppurations of the staphylococcus type while the streptococcus or erysipeloid type has been less markedly affected. "Fish fingers" have not been particularly satisfactory as they get well in time with no treatment.

In a number of cases it has been interesting to see that the affected finger remains stiff and swollen and edematous looking for many days after the treatment is stopped, but eventually normal motion has returned and the swelling has subsided. I imagine that in these cases there is a certain amount of gumming of the tendon sheaths with plastic lymph, which is gradually absorbed.

The Bier treatment in these cases seems to me to have many points of analogy with the Ochsner treatment of appendicitis. It seems to me that both aim to assist nature to build a barrier about the necrotic focus, and aim when this barrier is built to remove the focus. The application of either requires the judgment which comes of experience. As the Ochsner treatment has done much to aid pre- and post-operative treatment, I think the same will be the case with the Bier treatment. Evisceration and finger splitting belong to the same surgical era.

The comparison may also be carried to the question of pain. The patient undergoing Ochsner's treatment certainly is more comfortable than when his walling off was prevented with cathartics and the patient with Bier treatment is more comfortable than when his lymphatic spaces were opened up by the knife and curette. Perhaps in both we are again swinging to the old-fashioned medical treatment, but I am personally satisfied that the septic wounds of the extremities in my clinic this summer have done better in point of severity, pain and post-operative deformity than in previous years.

I must add, too, that my application of the treatment has been crude and given in a routine manner. It is not unlikely that varying the degree of pressure of the strap and the time of its application may still further improve its efficiency.

Finally, let me say that I have been very reluctant to admit the value of this treatment and began it with a strong prejudice against it. Nevertheless, I do not hesitate to indorse it to those who have not had as good an opportunity to try it. I believe it is safer in the hands of the inexperienced than an attempt at a radical operation, and that it is a valuable adjunct to the "medical incision," and *vice versa*.

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A DECEIVING CASE OF HEAD INJURY.

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WHILE leaning back from his car to adjust a trolley pole a conductor of the Worcester Consolidated Street Railway lost his balance and fell to the street. He apparently struck on his head but was only slightly dazed and was brought on his car to the center of the city. He told the inspector correctly about his change and walked a short distance to the office of the railway surgeon. The surgeon found nothing wrong with his head, concluded he was not seriously hurt and sent him home in an automobile. The conductor was assisted into his house and lay down on a couch. He was not inclined to talk much to his wife who was in the room and, after a time, he appeared to her to be dropping off to sleep. She did not attempt to rouse him until nearly three hours later when she noticed him breathing more heavily, with an occasional groaning noise. At the same time she noticed some convulsive movements of his body and limbs, but could not remember afterward their localization.

Finding it impossible to rouse him she sent for the surgeon who had seen him three or four hours previous. Before the surgeon's arrival the patient's breathing became more stertorous and he is said to have had two or three general convulsions. After examination the surgeon ordered the patient's removal to the Worcester City Hospital, three miles distant, and sent a message for me to meet him there in consultation.

My examination was made about six hours after the accident and I found the patient, who was about twenty-five years old, in an extremely critical condition. He lay on the bed in deep coma with a flush more evident over the upper part of his body. Every palpable muscle was in a state of tonic spasm, occasionally varied with clonic movements, especially in the arms and hands, of equal strength and frequency on both sides. Both hands were in extreme flexion and pressed into the abdomen. Both feet were in plantar flexion. There was involuntary passage of urine.

The respiration was striking. Though it was in general of the Cheyne-Stokes type, every deep respiration was with extreme stertor and, without intermediate stage, the respiration would cease entirely for several seconds so that once the patient seemed to be at his end.

The pulse was intermittent and irregular with the full beats slow (about 50) and tense at the wrist.

Examination of the head through the hair failed to disclose any bruise or sign of fracture of the skull. The eyes were fixed, the lids partly closed and the conjunctivæ somewhat injected but without ecchymosis in the subconjunctival space. Neither pupil reacted at all to light. The right pupil was dilated more than the left. The right eye was also everted.

The usual deep reflex tests were practically impossible to obtain on account of the tonic spasms of all muscles. The Babinski reflex, however, was present and exactly equal on both sides. All tests in any way subjective were, of course, unobtainable.

The "lucid interval" after injury, followed later by signs of extreme cerebral pressure, made me confident we were dealing with a large extradural hemorrhage; but the absolute lack of observation of the symptoms of onset, the absence of external marks of injury and the equality of most of the signs on both sides of the body presented unusual difficulty in the way of localization. Banking, however, on the greater degree of the third