having been tied in the patient was sent back to bed. About four hours later it was found by the house-surgeon that bleeding had recommenced and that the hypogastric swelling was already again in evidence.

Second Operation.—I was sent for, and on arrival an hour later determined that the right line of treatment would be to open the bladder in the suprapubic region. This revealed a mass of blood clot within the viscus, which was speedily scooped out with the aid of a spoon. Search was then made for a bleeding area, but as the blood welled up from the position of the trigone, and rendered a clear view impossible, pressure was exerted on the abdominal aorta which effectually controlled the loss. Even then no place from which blood had actually flowed could be seen. No papilloma, or remnants of one, nor any other growth could be discovered, though it is possible that in the manipulations employed in the removal of the blood clot some villous mass may have been dragged off. Removal of the fingers from the aorta immediately caused a renewal of the hæmorrhage, the blood, as has been said, welling up from about the internal meatus. Water at a temperature of 120° F. was then run through the bladder, and was successful in bringing about a cessation of the bleeding. A glass tube was inserted through the suprapubic wound into the bladder, and the patient returned to the ward.

After-History.—During the ensuing night he had much pain, and the urine that drained from the pubic opening was at times very considerably blood-stained. Hæmorrhage occurred at intervals for three days, after which it entirely ceased. The suprapubic tube was removed on the fourth day and the catheter on the seventh day. There was rapid healing of both the wounds, and the patient left the hospital but little the worse for his severe hæmorrhage on September 7th, eighteen days after admission.

This case is a good example of spontaneous and profuse bleeding within the cavity of the urinary bladder. Most probably this was the result of some laceration of a papillomatous growth, which was not discovered at the time of the suprapubic opening, but which may have been successfully, though unintentionally, removed at that time.

I have to thank my late house-surgeon, Mr. W. T. Rowe, for the excellent notes that he took of the case.

FORMALIN IN THE TREATMENT AND REMOVAL OF INOPERABLE MALIGNANT GROWTHS.

By WILLIAM MITCHELL, M.B., C.M. EDIN.,
Bradford.

THE treatment of malignant growths, which either on account of anatomical peculiarities or of the constitutional state of the patient, or on account of the refusal of the latter to submit to the knife, cannot be treated by ordinary operative methods, must at times be a source of trouble and perplexity to almost every surgeon; and any method which will enable us to deal with such cases in a simple and reasonably satisfactory manner will be welcome to most.

The method adopted in the following case might, I venture to hope, prove a useful addition to methods already in use. The patient had a sarcoma of the cheek (second recurrence) which two experienced surgeons refused to remove by operation. When she came to me the tumour was 4 inches in diameter, and fully as large as a man's fist. At one place a mass of sarcomatous tissue had forced its way through the integument, and was giving rise to constant and rather severe hæmorrhage. It was this latter symptom I was now called upon to treat.

I tried all the usual styptic methods, but with none of them succeeded in stopping the hæmorrhage for more than a few hours, so that 2 or 3 ounces of blood were being lost daily, and it seemed as if nothing short of tying the external or common carotid could arrest the bleeding.

Remembering, however, the great power of penetration and coagulation possessed by formalin, and the rapidity of its action in this respect on dead tissues, I determined to try its effect on the living. After applying a solution of caoutchouc to protect the surrounding skin, I soaked a small pad of absorbent cotton wool with a solution of formalin containing 20 per cent. of formic aldehyde, and applied this to the raw surface, then covered it with guttapercha tissue, and held it in place with a bandage.

My expectations were more than realised; for not only was the hæmorrhage entirely stopped, but in 24 hours there was produced a hardening and necrosis of the tissues, extending nearly a quarter of an inch from the surface.

This made me think that it might be possible to remove the whole growth by first coagulating the tissues with formalin and then cutting away some of the necrosed part daily, always however leaving sufficient of the latter to prevent a recurrence of hæmorrhage. I therefore scooped out with a scalpel and

sharp spoon as much of the necrosed part as I dared, and then filled up the cavity with cotton wool saturated with the formalin solution as before. Daily repeating this I was able in a very short time to tunnel right into the centre of the tumour, and eventually to remove it completely, notwithstanding that it was highly vascular, and during the process there has not practically been one drop of blood lost.

The formalin seems to exert its influence equally in all directions, and to be capable of penetrating to almost any depth if constantly applied. I have cut out a solid piece an inch in thickness at one time, although I have usually contented myself with less. On one occasion I cautiously tried injecting some of the solution into the tumour with a hypodermic syringe, but gave it up as I was afraid of producing embolism, and it gave no better result. The pain has occasionally been pretty severe, but has been held in check by small doses of nepenthe.

There has occasionally been considerable œdema of the lower eyelids and lips, and on one occasion of the cellular tissues of the neck. This caused me to suspend treatment for a few days, lest it should cause œdema glottidis. There has, however, never been any sign of such a condition. When the application of formalin is suspended for a few days, a line of demarcation forms with exactly the appearances seen in dry senile gangrene of the extremities.

To sum up, I consider the points in favour of this method are as follows:

1. It is simple in the extreme, requiring no special apparatus, and can be applied without an anæsthetic.
2. It produces no shock.
3. It does not, like electrolysis, set up a diffuse suppurative process, being not only aseptic, but powerfully antiseptic.
4. It is bloodless, and can be applied to very vascular growths, as this case shows.
5. It has very much greater penetrating power, and hence effects a more rapid removal than the usual escharotics, and its application does not like those give rise to a disintegrative or caustic process, with the resulting discharge, but is what I might term a necropoietic process, and with no discharge whatever.
6. As there is no discharge scarcely any dressing material is required, and an economy is thus effected.
7. During the paring away of the necrosed parts the macroscopic limits of such a tumour can be easily seen on the dry clean-cut surfaces, and an indication is thus given as to the direction in which it is necessary to proceed further. The pieces removed can be subjected to microscopic examination for the same purpose.
8. Above all the process appears to be efficient and safe if care is taken.

The drawbacks are: (1) The pain, which is at times pretty severe, but can of course be relieved by an anodyne; and (2) the œdema, which is always annoying, and might if extending to the glottis be fatal.

The systemic absorption of the formalin is apt to, and in this case did, produce an annoying general urticaria, thus showing its relationship to formic acid. There was at the same time a slight rise of temperature. The urticarial irritation was easily subdued by carbolic acid lotion.

THE TREATMENT OF TRAUMATIC TETANUS WITH ANTITOXINS.

By STANLEY COPLEY, M.R.C.S., L.R.C.P.,
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DURING the past two years I have had the opportunity of observing and treating 4 cases of traumatic tetanus. In all of them the symptoms were well marked, the spasms severe, and in all 4 there was a definite wound in a septic condition. Also in each case there was the probability of infection from soil or horse dung. In 2 the incubation period was ten days, in 1 six days, and in the other indefinite, since the infection probably took place through a chronic ulcer which the man had allowed to become foul.

The first case I saw was interesting for this reason, that the patient, a lad of 16, came under my care for his injury on the day of his accident. He had a badly-lacerated wound of his thumb, with fracture of the metacarpal bone, caused by a gun accident. It was extremely dirty-looking.

from powder chiefly, and many shot were extracted. Doubting at the time my power to render such a wound aseptic by ordinary methods, I packed it with sulphur for the first twenty-four hours. The slough separated as usual, and I thought a healthy granulating surface remained. However, on the tenth day trismus and a stiff neck developed, and he had a sharp attack of tetanus. When the thumb was amputated after the development of the tetanus, a shot was found on the deep surface of the fractured metacarpal.

Distribution of Spasm.—The symptoms varied somewhat in the four cases. In "R.C.," in whom the point of inoculation was in the right thumb, the parts affected were, in order, the neck, the jaw, the abdomen, the right arm, the left arm, the back, and not the lower extremities at all. In "G.K.," in whom the lesion was in the right leg, the order of invasion was the jaw, back, abdomen, and face all about the same time; the legs, and later the arms, to a slight extent only. In "T.T.," in whom the lesion was on the back of his left hand, stiffness in the neck appeared first, then difficulty in swallowing, some stiffness of the jaw, slight opisthotonos, and hardening of abdominal wall. In twenty-four hours all these parts became much more affected, swallowing impossible, and he died cyanosed from spasm of the diaphragm. The limbs were not affected at all. In "A.F.," aged 14, the lesion was in the right ring finger; the arms, back, and abdomen were the first parts affected, the legs next, and the jaw not until the third day of the disease, and then only slightly. To sum up: Hardening of the abdomen and opisthotonos were present in all within the first twenty-four hours. The trismus was present early in three cases, but very late in the fourth. There was a tendency for the severity of the disease to fall upon the upper half of the body and upper limbs when the lesion was in the upper extremity, and upon the lower half when in the lower extremities. Moreover, in the case of "G.K.," he was positive that the severe spasms always started from his wounded leg. This tendency for the symptoms to extend transversely in preference to longitudinally suggests that the poison diffuses itself in the spinal cord, and that in it the ferment-like bodies are stored which set free the tetanus toxins. To carry the idea further. Is it possible that, as in hydrophobia, the primary poison tracks along the nerves to the central nervous system?

Effect of Antitoxin.—The treatment adopted in three of the cases was subcutaneous injections of tetanus antitoxins, combined in two with occasional draughts of chloral and bromides. These three cases recovered. In the fourth case, admittedly the most severe, I was unfortunately unable to procure the antitoxins in time. He died within twenty-four hours of my first seeing him. In my first case ("R.C.") I used Tizzoni's antitoxins. In the second I began with Tizzoni's, and completed the case with the British Institute of Preventive Medicine antitoxin, which has the convenience of being fluid. In the third case the British Institute of Preventive Medicine antitoxins were used throughout.

Dosage of Antitoxin.—This is a most important point. Large doses, 30 c.cm. at once, and repeated at least every six hours till some improvement is seen even in a case which promises to be mild, is the only fair way of testing the antitoxins. I began in my first and second cases very cautiously, as the remedy was new to me, but in my second case I observed no improvement until I had injected 50 c.cm. within eight hours, that was 30 c.cm. at 10 A.M. and another 20 c.cm. at 6 P.M. This man nearly died from the severity of the spasms, and I feel sure that if I had begun larger doses earlier he would not have reached such a dangerous condition. In any case which, from the shortness of the incubation period, the large surface infected, and, I believe, the number of the nerves involved, threatened to be a severe one, I should not hesitate, while the patient was under an anæsthetic, to inject 50 c.cm. at once, and repeat the dose in four hours' time. I think tetanus differs from diphtheria in this—while in diphtheria a second dose is frequently not needed, it seems that in tetanus repetition of at least twelve-hourly intervals is advisable. One of my cases needed 10 grams of Tizzoni's antitoxin to complete the cure spread over seven days, and another 13½ grams of Tizzoni's and 180 c.cm. of the B.I.P.M. extending over ten days. The only disagreeable symptom I could ascribe to the antitoxins was an irritable rash, either urticarial or erythematous. Cases of traumatic tetanus treated with antitoxins are frequently reported, in which 10 c.cm. is the dose administered at first, and one constantly reads that the antitoxins did no good. [Surely

this is hardly a fair test. It would seem rational that the surgeon, instead of abandoning the treatment when 10 c.cm. did not succeed, should proceed quickly to increase the dose until some effect was produced. I do not myself believe that any harmful effect would follow 100 c.cm. injected at one dose distributed over five injections.

In two of my cases which recovered, the infected part was amputated; in the third, the ulcer was scraped and cauterised with fuming nitric acid; in the fatal one, the edges of the wound were excised, together with a metacarpal bone, and the wound cleansed with formalin solution (1 in 80).

MEMORANDA:

MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, Etc.

A CASE SHOWING THE VALUE OF LATE INJECTIONS OF DIPHTHERIA ANTITOXIN.

I WAS called to see a baby aged 7 months on December 27th, 1898, in order that I might treat it for croup. It was a healthy breast-fed girl and its mother and grandmother gave independently a history of its having had "croup" for the past seven days; they were quite sure that the child had had the difficulty of breathing continuously during that time; but as the difficulty lasted for so long and became decidedly more marked on this the eighth day they sent for a doctor.

When I saw it the case was exactly one of those which when brought into a London hospital is tracheotomised as promptly as possible. The respirations were 36, the pulse 154, and the temperature 99.2°. Croupy cough, great sucking in of ribs and triangles of neck, etc.; no cyanosis of lips. The fauces were normal, except for slight congestion of the ridges of tonsils. I was by no means sure that the case was diphtheria, though subsequently plenty of Klebs-Loeffler bacilli were found in some tracheal mucus sent to the Jenner Institute. I waited a short time to try the effect of ipecacuanha and hot applications, but as the dyspnoea increased I advised tracheotomy, not to save life, but to render the mode of death less distressing to the parents and the patient. In pre-serum days diphtherial croup in a child of 7 months was practically always fatal. I thought that the injection of antitoxin on the eighth day of the illness would have little or no beneficial effect. However, having laid these considerations before the parents I performed tracheotomy and injected 1,500 units of antitoxin (Jenner Institute). The usual relief to the dyspnoea followed, and next morning I injected another 1,500 units. The respirations were then 42, pulse 156, and temperature 99.4°. Of course the urgent dyspnoea and then the operation necessitated sudden and complete weaning.

The case improved uninterruptedly; there was no pneumonia and not much bronchitis. The temperature never rose above 99.4°, the pulse above 156, and the respirations above 42. The tube could not be removed till the seventh day after tracheotomy. The convalescence was commonplace and the child is now perfectly well. It is possible that the croup during the first few days was merely catarrhal and that the child was infected with diphtheria only two or three days before I saw it. The great probability is that the case was diphtheria from the beginning. In the past three months there had been two cases of diphtheria in adjacent houses.

I publish the case as one illustrating in a very striking manner the value of diphtheria antitoxin injected even so late as the eighth day of the illness.

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A SORE DIAGNOSED AS CANCER OF THE LIP IN EARLY LIFE: RECOVERY WITHOUT OPERATION.

PERMIT me to communicate a recent case of so-called early cancer parallel to those cases quoted by Mr. Roger Williams where clinical and pathological diagnosis seem at variance.

I had this case under observation already for some months when the interesting discussion on the point appeared in the BRITISH MEDICAL JOURNAL. The patient, J. N., between 17 and 18 years of age, consulted me in May, 1898. A diagnosis of cancer of the lip had then been made. He had a diffuse eczematous affection on the lower lip, with a patch of ulcera-