

against the practice, whilst still possessing great faith in the virtue of the drug. If I can influence you to place alcohol in your list of drugs, so that you may administer it with the same caution as you do the several articles in the Pharmacopœia, then the object of these remarks will be fully answered.

ON A

NEW METHOD OF TREATING COMPOUND FRACTURE, ABSCESS, ETC.

WITH OBSERVATIONS ON THE CONDITIONS OF SUPPURATION.

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PART I.—(Continued.)

ON COMPOUND FRACTURE.

THE next four cases occurred in the practice of my colleagues in the infirmary, who have kindly placed them at my disposal.

CASE 7.—MARY M—, aged sixty-two, was admitted under the care of Dr. Morton on August 13th, 1866, at eleven P.M., when she stated that about five o'clock in the afternoon of that day she missed her footing when going down stairs, and fell with violence, and on getting up found that her right forearm was broken and bleeding. A medical man was called in, who made various applications in order to stop the hemorrhage, but failed to do so, and she was advised to go to the infirmary. Mr. A. T. Thomson, the house-surgeon (to whom I am indebted for notes of the case), on removing the bandage, from which blood was trickling, found both bones of the forearm broken a little above the wrist, and a detached fragment of the radius projecting from a wound about as large as a fourpenny-piece, on the outer aspect of the limb. Having extracted this fragment, he applied liquid carbolic acid thoroughly to the interior of the wound. This rather increased the bleeding, which, however, he arrested completely by plugging the orifice with a bit of lint dipped in the acid. Over this he placed a mixture of blood and carbolic acid, covering it with a piece of dry lint. He then put up the limb in two well-padded Gooch's splints, retained in position with a continuous bandage. The apparatus was left undisturbed for five days, when, on removal of the splints, it was found that the piece of dry lint over the wound, though it had been saturated with blood, was quite dry, having become incorporated with the crust beneath. It was not interfered with except that the surface was touched with carbolic acid, and the splints were reapplied as before, the part being quite free from uneasiness.

On the twelfth day the splints were again removed and the crust was detached, when it was found that the piece of lint with which the wound had been plugged had become partly pushed out of the orifice. The plug also was now removed, when the surface beneath was observed to be granulating, but entirely free from pus. The sore was dressed with one part of carbolic acid to seven parts of olive oil applied on lint every second day, the use of the splints being continued till the 8th of September, when she was discharged, with the sore healed and both bones firmly united, two days less than four weeks after the accident.

This case is valuable as an example of a mode in which troublesome bleeding in compound fracture may sometimes be advantageously arrested. The entire absence of pus about the plug on the twelfth day after its introduction contrasts strikingly with the suppuration invariably caused within four days by a piece of lint inserted without carbolic acid into a wound.

CASE 8.—SAMUEL B—, aged thirteen, was admitted under Dr. Morton's care, on Aug. 30th, 1866, with a compound fracture of the left femur, about the junction of the upper and middle thirds of the shaft, and a simple fracture of the right thigh in a similar situation. He stated that about four hours previously he was engaged in some work about a steam-engine, when he was struck by one of the balls of the "governor," and hurled with great force against an iron pillar. The men who brought him to the infirmary said that when he was raised from the ground a piece of bone was seen to protrude from a wound in the left

thigh, but was restored to its natural position by a medical man who was called in to see him, and who applied a long splint and bandage to each limb. Mr. A. T. Thomson, on examining the boy, found a lacerated wound about three inches long at the upper part of the left thigh, running transversely from the middle of the inner side of the limb to its posterior aspect, and in this wound the upper fragment of the femur was visible, somewhat displaced, but not protruding. There was some bleeding, but not to any serious extent. He sponged out the wound thoroughly with a solution of one part of carbolic acid in three parts of olive oil, and then covered its lips with a mixture of blood and the undiluted acid spread upon lint, and over this a piece of sheet-tin, retained in position by means of a looped bandage. He next corrected the faulty position of the fragments and applied lateral splints of Gooch's material to the thigh, maintaining gentle extension by means of plasters applied to the integument of the leg after the American plan, and fixed to the foot of the bed, a perineal band being attached to the bed-head. While the left limb was thus kept readily accessible for changing the dressings, the long splint was employed as usual for the simple fracture on the right side.

Next day the surface of the crust was touched with carbolic acid, and a hot fomentation applied to the limb.

On the third day the crust was removed through a misunderstanding, but it was resolved to follow out the treatment on the same principle, and with this view the wound was dressed twice a day with lint dipped in the mixture of carbolic acid and oil (one part to three), covered with the tin, as the crust had been before, while the fomentations also were continued. Meanwhile the limb remained free from pain, redness, or swelling, and there was a complete absence of constitutional disturbance.

On the sixth day, however, he was a little feverish, and remained so, though without any apparent local symptoms, till the twelfth day, when Mr. Thomson noticed that the central part of the wound, which had become covered with a whitish crust, was somewhat prominent, and, on careful examination, perceived a distinct sense of fluctuation. He therefore removed the white layer from that part, when eight ounces of perfectly odourless pus escaped. A probe introduced failed to detect any bare bone. Mr. Thomson now sponged out the cavity of the abscess with the mixture of carbolic acid and oil, and left in it a strip of lint dipped in the same, continuing the other dressings as before. The constitutional disturbance now at once subsided, and under the same dressing the cavity of the abscess quickly contracted, and in little more than a fortnight closed entirely. Six weeks after the accident the wound was completely healed, and both the thigh-bones were firmly united, with the limbs of equal length. In another week he was able to stand.

This case, which, I cannot avoid remarking, reflects great credit on the house-surgeon in charge, is interesting as another instance of the occurrence of abscess in compound fracture, independently of atmospheric influence. That it was so in this instance is clearly shown by the entire absence of constitutional symptoms for the first five days, the circumscribed character of the suppuration, and the odourless nature of the pus. The injured part suppurred, probably, from the same cause as a severe bruise may without any breach of the integument. The satisfactory results obtained by treating the wound with carbolic acid diluted with oil, instead of the undiluted acid, will naturally suggest the inquiry whether this would not always be the better practice. And I may mention that my former house-surgeon, Dr. A. Cameron, met with similar success in two cases in which he pursued the same treatment—one of them a compound fracture of the ulna at the elbow, the other a severe contused wound of the back of the hand communicating with a fractured metatarsal bone. But considering how much is at stake, and that the patient's life may depend upon entire destruction of the septic germs that lie in the wound, I am inclined to think it wiser to avail ourselves of the full energy of the pure acid, more especially since we have had sufficient evidence that any caustic effects it may have are not productive of serious consequences.

CASE 9.—WILLIAM C—, aged thirty-three, was admitted on the 29th of September, 1866, under the care of Dr. Eben. Watson, with a compound fracture of the left tibia, produced by an omnibus passing over the limb at eight o'clock P.M. The broken part of the bone was exposed in a wound six and a half inches in length, a little above the ankle. The skin in the vicinity was detached from the subjacent tissues for about two inches, and there was ecchymosis reaching some distance up the leg, with other evidence of severe contusion.

An hour and a half after the accident Dr. A. Forsyth, the house-surgeon, from whose notes these particulars are obtained, sponged out the wound thoroughly with undiluted carbolic acid, and placed over it layers of calico soaked with the acid; and, in order to provide for a sufficiently substantial crust, spread over the calico some paste composed of starch moistened with carbolic acid, covering the whole with a piece of block-tin secured with a bandage, the fracture being treated with a suitable apparatus. After the dressing, the patient, though unable to express his feelings, being dumb, appeared entirely free from uneasiness.

Next day the tin was carefully removed from the crust, the surface of which was touched with carbolic acid, and, the tin having been readjusted, hot fomentations were applied to the leg and foot. The pulse was now 96, the tongue clean, and appetite good. The same treatment was pursued till the thirteenth day, when the fomentations were discontinued, and the edges of the crust which were loose were clipped away, and lint moistened with water was applied to the granulating surface thus exposed, the remainder of the crust being still touched daily with carbolic acid. Meanwhile there had been no suppuration beneath the crust, and the patient had remained free from constitutional symptoms.

On the seventeenth day the crust, which had separated from the wound at its lower third, was removed, disclosing a healthy granulating surface, the bone being nowhere visible, while there was no appearance of pus, except a trifling amount towards the lower part. The sore, which was entirely superficial, was now treated like an ordinary ulcer, and healed quickly. The bone also united as in a simple fracture, and he was discharged eight weeks after the receipt of the injury, having been kept longer in the hospital than would otherwise have been necessary, on account of a head affection to which he was subject.

The above case, besides being a good example of the effects of the treatment of compound fracture with carbolic acid, affords an illustration of a practice which I have on several occasions found useful when there has been but little bleeding from the wound, a dough or paste composed of flour or starch, moistened with the acid, being employed in lieu of the compound with blood to render the crust sufficiently substantial.

CASE 10.—Thomas M'B—, a labourer, who gave his age as fifty-two, but had the appearance of a much older person, was admitted at noon on the 2nd of January, 1867, under the care of Dr. G. Buchanan, having been knocked down an hour before by the shaft of a luggage waggon, the wheel of which passed over his left leg, producing a compound fracture in the lower third of the limb. Mr. James Robinson, the house-surgeon, who has given me notes of the case, found a wound from which blood was oozing, about an inch and a half in length, exposing part of the tibia, and communicating with the seat of fracture. The tissues were pretty severely contused. Undiluted carbolic acid was applied freely to the interior of the wound by means of lint held in a pair of dressing forceps, and a crust was formed of blood mingled with the acid, covered with lint, over which a cap of tin was placed, well bulged out to correspond to the substantial crust, and large enough to overlap to a slight extent the sound skin in the vicinity. The fragments having been brought into proper position, the limb was put up with lateral wooden splints, with a hot fomentation. At the conclusion of the dressing the patient expressed himself as greatly relieved. The pulse was then 65.

Next day he was free from pain after a fair night's rest. The pulse was 74, and the tongue clean and moist. The surface of the crust was touched with carbolic acid, the limb being still fomented; and the same treatment was continued daily for the following fortnight, during which the limb was entirely free from pain, redness, or suppuration, while his constitution was quite unaffected by the injury, the tongue remaining clean, and the pulse varying only between 72 and 85.

I was present when the crust was removed, eighteen days after the accident. Not a drop of pus existed beneath it. On the contrary, the superficial sloughs of the cutis occasioned by the caustic action of the acid first applied remained still undetached. The exposed surface was treated with water-dressing, and in two days presented the appearance of an ordinary granulating sore, which healed without interruption. Six weeks and three days after the receipt of the injury the splints were removed, the bones being satisfactorily united.

This is an excellent example of the effects of the carbolic-acid treatment in a compound fracture of the leg of average severity. No simple fracture could have caused less disturbance, either local or constitutional.

CASE 11.—The following case, though incomplete, is given on account of the conclusive evidence it affords regarding a complication of compound fracture of much interest both practically and theoretically—viz., emphysema of the limb in consequence of air being introduced into the wound, and diffused among the interstices of the tissues by a pumping action of the fragments of the broken bone when freely moved through restlessness of the patient or carelessness of his attendants before he comes under the surgeon's care. Such a state of things may seem at first sight to render it impossible to prevent decomposition of the extravasated blood, since it would be out of the question to attempt to apply carbolic acid to all the emphysematous tissues. But I have long indulged the hope that, the air entering in small successive portions, its floating organisms might be arrested by the first blood with which they came in contact, and remain for some time confined to the vicinity of the external wound, in which case, by squeezing out as much blood as possible from the orifice in the integument, and introducing carbolic acid freely, we might get rid of all causes of decomposition in the limb, the mere atmospheric gases diffused more remotely, however abundant, being entirely innocuous. This hope, it now appears, was not ill-founded.

John D—, aged fifty-five, a calico-printer, of intemperate habits, was admitted under my care in the Royal Infirmary at six P.M. on the 4th of April, 1867, having broken both bones of his right leg about an hour before by jumping out of a window into the street, from a height of between fifteen and twenty feet, while in a state of intoxication. He was carried up-stairs to his lodgings, kicking about in his drunken frenzy. A cloth was then put round the leg, but no efficient means were employed to steady it, and he was conveyed to the hospital from a distant part of the city in a cab, moving the limb recklessly during the whole journey. His friends stated that he had lost a great deal of blood, and the cloth which was round the limb on his admission was saturated. Mr. H. Cameron, the house-surgeon, found a wound about half an inch in length, situated over the spine of the tibia, at the junction of the middle and lower thirds of the bone, the fracture being half an inch lower down, and obviously communicating. The wound was bleeding very freely, and the leg was considerably swollen through extravasation of blood into it. On manipulation, Mr. Cameron found the tissues about the seat of fracture emphysematous, the characteristic crackling sensation being experienced fully four inches above the wound and two inches below it, and also on the opposite side of the limb, over the fibula; and as a result of the handling, a frothy mixture of blood and air, in larger and smaller bubbles, escaped from the orifice. The fragments were much displaced, the foot being greatly everted.

Mr. Cameron, having squeezed out as much blood as possible from the wound, introduced melted crystallised carbolic acid in a piece of calico held in dressing-forceps, which he passed in various directions for more than two inches beneath the integument and about an inch and a half among the deeper structures of the limb, using three different pieces of calico soaked with the acid, and leaving the last in the wound as a plug to check the very free hæmorrhage, which the treatment had considerably increased. He then applied several layers of calico steeped in carbolic acid and smeared with blood, so as to make a pretty thick crust overlapping the skin by about half an inch, and adapted to the crust a cap of block-tin of slightly larger dimensions, pressing it down upon the skin by means of a looped bandage encircling the leg. Having next corrected the displacement of the fragments, he moulded a pasteboard splint to the outer side of the leg and foot, strengthening it with a temporary Gooch's splint, and laid the limb on its outer side upon a pillow with the knee bent. The patient now stated that the pain he had suffered was greatly relieved. His pulse was 100. Two hours later, as a good deal of oozing of blood was still going on, a folded cloth was placed upon the tin cap and pressed down upon it with a bandage. The limb meanwhile was considerably more swollen, from bleeding into its interior, kept up, no doubt, by the sudden jerking movements which in his unreasoning condition he could not be prevented from making. The pressure employed greatly diminished the external hæmorrhage, but did not entirely arrest it; and when two hours more had elapsed Mr. Cameron asked my advice. I recommended the use of a well-fitting internal splint, to procure greater steadiness of the fragments, and so get rid of the irritation which perpetuated the bleeding. Mr. Cameron, however, on removing the compress, found that all tendency to oozing of blood had ceased. The patient was now sober, but continued very restless. The internal splint was therefore applied, and thirty drops of solution of muriate of morphia were administered.

During the night he suffered a good deal, and got no sleep at all. Next morning, however, he complained rather of a general sense of weariness and sickness, the consequences of his debauch, than of pain; the pulse had fallen to 76; and he took his breakfast pretty well. The surface of the crust was touched with carbolic acid, and this was repeated in the afternoon, when a hot fomentation was applied to the inner side of the leg, and over this a sheet of stout block-tin, to serve, as in some previous cases, the double purpose of ensuring the efficiency of the fomentations, and acting as an internal splint. The limb was now quite easy. At night the pulse was still 76. He had made a pretty hearty supper, and felt only occasional twinges in the limb. The fomentation was changed, and the crust again touched with carbolic acid, and the opiate repeated.

He passed the following night like the preceding, without getting any sleep whatever; and in the morning his pulse was 90, although the limb was free from pain or inflammatory blush, and he made a hearty breakfast. Fearing the approach of traumatic delirium, I ordered a larger opiate to be given at night. Fifty drops of the morphia solution were accordingly administered; and after this dose he slept for about five hours. Nevertheless, he grew more restless, and was found in the morning with the leg fully extended and resting on the calf instead of on its outer side. His pulse continued at 90; and although the state of the limb and his appetite were all that could be wished, he exhibited in the afternoon unmistakable signs of delirium tremens, jerking out his tongue when asked to show it, twitching his hands in an excited manner, and declaring that his bedclothes were creeping away from him, while the restless movements of the limb were continued. I ordered a dose of castor oil, to be followed, as soon as it should have operated, by a drachm of the solution of muriate of morphia, to be repeated if necessary. He took the opiate about eight o'clock P.M., and soon afterwards dozed a little; and at eleven his pulse had fallen to 82. After this he fell into a sound sleep, from which he did not wake till six A.M.; and from this time forth he was perfectly tranquil and rational.

It is needless to enter into particulars regarding his subsequent progress further than to say that it has been in all respects satisfactory; and on the tenth day after the accident, when I saw him last, his pulse was 76, his appetite excellent, and he had the appearance of a man in perfect health. The limb was still free from pain, while the swelling due to extravasation of blood had disappeared, and the skin was of natural aspect. After the second day from the accident, there had not been even any discharge of serum from beneath the crust, which had been daily touched with carbolic acid, the fomentations being also continued, as he found them comfortable.

I need not hesitate to say that all danger in this case is over; and that the compound fracture is already converted into a simple one under circumstances which, even for a simple fracture, would have been trying.

In revising the proof, after nine days more have elapsed, I may add that all has continued to go on well.

(To be continued.)

ON
CASES OF INJURY FROM RAILWAY
ACCIDENTS;
THEIR INFLUENCE UPON THE NERVOUS SYSTEM, AND
RESULTS.

By THOMAS BUZZARD, M.D. LOND.

(Continued from p. 454.)

THE delay which sometimes takes place in the development of symptoms leading to death, after blows upon the head or spinal column, is a point which is very necessary to be remembered in our prognosis of injuries from railway accidents. Illustrative cases are found in considerable number scattered through medical literature. The following* is a good example of death arising from a blow, the effects of which had appeared in great measure to have passed off.

3. An artisan, aged twenty-two, of good health, but rather intemperate habits, had received a blow upon the forehead

from a skittle-ball *nine months* before admission into Guy's Hospital. The blow had stunned him at the time, but the bone was not injured. He had afterwards occasional pain in the head, but continued pretty well until two days before he was admitted, when he was attacked with pain in the stomach and nausea, followed by headache and drowsiness. He had passed the previous night in convivial society, and on the day following he was delirious, but not violent. The delirium continued, and he lay constantly muttering, moaning, and turning about in bed. There were no convulsions. He died the day following his admission.

Autopsy.—The sinuses and veins in the cranium were full and turgid; the pia mater was much injected; the arachnoid upon the convexities of the hemispheres was slightly opaque. There was effusion of semi-opaque, yellowish, albuminous matter in the fissures between the convolutions, on the hemispheres, on the vermiform process of the cerebellum and adjacent parts, and on the pons Varolii.

One must recognise the possibility, in this case, that the intemperate habits of the patient bore their part in producing the arachnitis from which he died, though the occasional pain in the head which followed the blow seems to show that this was the active determining cause.

The occasional fatality attendant upon a comparatively trifling blow upon the spine is another point of interest in the present inquiry. I extract the following case from THE LANCET, vol. ii. 1831-32, p. 93:—

4. A man, aged thirty-five, the day before admission into St. Bartholomew's Hospital, whilst coming down stairs, suddenly slipped, and fell on his back two or three steps. He felt some little pain in the loins, but continued his avocation during the remainder of that day. Next day he had violent pain, with inability to move either his arms or legs, and came to the hospital. No fracture, displacement, or external injury about the spine could be detected, and the patient was unable to refer to any particular spot as the situation of the blow, at the same time complaining of pain generally in the lumbar region. He also felt a great uneasiness about the chest, and a "tingling" in his fingers. There was no pain in the head. There was complete paralysis of the lower, and partial paralysis of the upper, extremities. No motion or sensation in the legs or thighs. He could lift the arm, but the will had very slight influence over the muscular power of the hand. The urine and fæces were discharged involuntarily. Tongue whitish; pulse small. Depression and anxiety alternately depicted on the countenance. Mr. Lawrence thought it curious that the nerves supplying the *upper* extremities should be affected, as they had their origin above the part to which the patient referred the principal pain. Eleven days afterwards he regained command over the bladder and rectum. Four days more, and sensation was restored in the upper and lower extremities, except in the feet. In seven days more (twenty-two from the accident) the patient died, after a severe struggle, during the night.

Unfortunately, no post-mortem could be obtained, so that we are left in doubt as to whether death arose from sudden extravasation of blood into the spinal canal, or from rapid inflammation of the membranes with consequent effusion.

The fact that, in this case, improvement took place after admission, and that symptoms of paralysis, existing at first, gradually disappeared, removes it from the category of cases of death from concussion of the spine, of which several are on record. I subjoin a few from a work by Dr. J. L. Casper.* He quotes a case given by Valsalva, where concussion of the spine from a fall killed in four hours. After a heavy fall upon the spine, Saviard saw palsy follow immediately, and death after twelve hours; and yet he found nowhere any trace of fracture or luxation. A grandson of Peter Frank's brother, he says, observed concussion of the spine in four men who fell upon their backs from a high tree, and all died.† Nothing worth remarking was found after death. Boyer saw a stocking-maker die from paralysis who had been thrown into a ditch upon his loins. Nowhere was there to be found in the corpse any reason for the death. Aurray (quoted by Demissy) gives a case of a man who fell out of bed upon his crupper, striking a paved floor. He became immediately paralysed, and died in eight days. Nothing remarkable was found post mortem. A man fell down from a lofty tree, whereupon loss of sensibility and palsy, sinking of the pulse, pain in the back of the neck, priapism, &c., ensued. Death took place fifteen hours after the fall. Extravasations of blood were found in the cavi-

* Über die Verletzungen des Rückenmarkes, &c. 1823. Berlin.
† P. Frank's "Kleine Schriften."

* Guy's Hospital Reports, 1844.