

intercostal spaces. Under such circumstances, there are several characters of considerable importance in diagnosis—viz.:

a. The bulging of the side of the chest is more uniform in pleurisy, and not abruptly limited to the lower part, as in diseases of the liver.

b. In pleuritic effusion, the upper margin of the dull space is horizontal (Fig. 6), instead of arched as in enlargements of the liver.

c. In pleuritic effusion, the upper level of the dull space will often be found to vary with the position of the patient. In enlargement of the liver, it is the same in all positions.

d. In pleuritic effusion, the lower margin of the liver is not depressed upon deep inspiration, which is the case in enlargements of the liver, unless there be firm adhesions to the diaphragm.

e. Eversion of the lower right costal cartilages would indicate hepatic enlargement, and not pleuritic effusion.

f. When there is sufficient effusion into the pleura to cause downward bulging of the diaphragm, a depression may be sometimes observed between the lower margin of the ribs and the lowest upper surface of the liver, which is not met with in hypertrophy of the liver.

Effusion into the pericardium will be recognised by the outline of the area of dulness on percussion. It is the left lobe of the liver that is mainly displaced by it.

In arriving at a diagnosis, it must not be forgotten that inflammation of the pleura or of the base of the right lung may coexist with enlargement of the liver. This is a not uncommon occurrence in hydatid tumours or abscesses of the liver, and often precedes their bursting upwards through the diaphragm. So also after an hydatid tumour of the liver has burst into the pleura, extensive emphysema may coexist with great enlargement of the liver. I shall hereafter have an opportunity of bringing under your notice the particulars of a case in which this occurred.

VI. A tumour or collection of fluid between the upper surface of the liver and the diaphragm may also cause great depression of the liver, and apparent enlargement of the organ. The upper margin of hepatic dulness will be arched, and it will probably be impossible during life to distinguish the case from one of real enlargement of the liver. You will find a case recorded by the late Dr. Bright, where a large abscess situated between the diaphragm and the liver produced apparent enlargement of the liver.* Such cases, however, are rare.

VII. Various abnormal conditions of the abdominal viscera may displace the liver upwards, so that it encroaches upon the cavity of the chest, and appears enlarged. This happens not unfrequently in cases of ascites, and in ovarian and uterine tumours, in aneurism of the abdominal aorta, &c.; and hence elevation of the liver above its usual height must not, under such circumstances, be regarded as a sign of enlargement. Greater difficulty, however, in diagnosis may result from tumours in the omentum or in the right kidney, being in the immediate proximity of the liver, and appearing to be tumours of the liver itself. The difficulty will be increased if such tumours compress the common bile-duct, so as to occasion jaundice. The diagnosis of an omental tumour under such circumstances must mainly depend on the want of all uniformity in the apparent hepatic enlargement, the dimensions of the liver in every other direction being normal; while in tumours of the kidney the urine usually presents important changes, and at the same time, when the patient lies on his back, the finger can usually be inserted between the ribs and the upper part of the tumour.

Accumulations of feces in the transverse colon also constitute a condition which it is often most difficult to distinguish from enlargement of the liver. Such cases are constantly occurring in practice, and it is important to bear in mind that, if you are to rely on the patient's statements, these accumulations are far from being necessarily associated with constipation. The resemblance to hepatic disease in these cases may be further increased by the hardened scybala imparting to the tumour a nodulated character like that of cancer, and by the development of such symptoms as jaundice, vomiting, and hiccup. The diagnosis of these cases from true enlargement of the liver must rest mainly on—

1. The occurrence of spasmodic pains like those resulting from obstructed bowels, &c.

2. The disappearance of the tumour, and the amelioration of the symptoms under such treatment as poultices and fomentations, purgatives, enemata, and belladonna.

Lastly.

VIII. Abnormal conditions of the abdominal parietes may simulate enlargements of the liver.

Firm contraction of the bellies of the recti muscles, owing either to inflammation of the subjacent peritoneum or stomach, or, in cases of increased muscular irritability, to the mere application of the hand, is frequently mistaken by inexperienced observers for hepatic enlargement. It is distinguished by—

1. The situation, size, and form of the apparent tumour corresponding to those of the recti.

2. The sound on percussion being usually clear and tympanic.

The diagnosis may also be considerably embarrassed by an inflammatory swelling in the abdominal parietes over the liver. This has often been mistaken for an abscess of the liver itself. Not long since a remarkable instance of this sort came under my notice in a patient recovering from typhus fever with parotid buboes. For some days the diagnosis was very doubtful. The following characters usually suffice to distinguish this condition from hepatic disease:—

1. The margin of inflammation and of dulness on percussion is ill-defined, and does not correspond to the boundary of an enlarged liver.

2. There is a greater amount of hardness and tightness of the superimposed integuments.

3. The constitutional symptoms are comparatively slight, and there are no indications of hepatic derangement.

Keeping in view these sources of fallacy, we may now proceed to consider the various causes of true enlargement of the liver.

(To be continued.)

ON A NEW METHOD OF TREATING COMPOUND FRACTURE, ABSCESS, ETC.

WITH OBSERVATIONS ON THE CONDITIONS OF SUPPURATION.

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PART I.

ON COMPOUND FRACTURE.

THE frequency of disastrous consequences in compound fracture, contrasted with the complete immunity from danger to life or limb in simple fracture, is one of the most striking as well as melancholy facts in surgical practice.

If we inquire how it is that an external wound communicating with the seat of fracture leads to such grave results, we cannot but conclude that it is by inducing, through access of the atmosphere, decomposition of the blood which is effused in greater or less amount around the fragments and among the interstices of the tissues, and, losing by putrefaction its natural bland character, and assuming the properties of an acrid irritant, occasions both local and general disturbance.

We know that blood kept exposed to the air at the temperature of the body, in a vessel of glass or other material chemically inert, soon decomposes; and there is no reason to suppose that the living tissues surrounding a mass of extravasated blood could preserve it from being affected in a similar manner by the atmosphere. On the contrary, it may be ascertained as a matter of observation that, in a compound fracture, twenty-four hours after the accident the coloured serum which oozes from the wound is already distinctly tainted with the odour of decomposition, and during the next two or three days, before suppuration has set in, the smell of the effused fluids becomes more and more offensive.

This state of things is enough to account for all the bad consequences of the injury.

The pernicious influence of decomposing animal matter upon the tissues has probably been underrated, in consequence of the healthy state in which granulating sores remain in spite of a very offensive condition of their discharges. To argue from this, however, that fetid material would be innocuous in a recent wound would be to make a great mistake. The granulations being composed of an imperfect form of tissue, insen-

* Clinical Memoirs on Abdominal Tumours. Syd. Soc. ed., p. 257.

sible and indisposed to absorption, but with remarkably active cell-development, and perpetually renovated as fast as it is destroyed at the surface, form a most admirable protective layer, or living plaster. But before a raw surface has granulated, an acrid discharge acts with unrestrained effect upon it, exciting the sensory nerves, and causing through them both local inflammation and general fever, and also producing by its caustic action a greater or less extent of sloughs, which must be thrown off by a corresponding suppuration, while there is at the same time a risk of absorption of the poisonous fluids into the circulation.

This view of the cause of the mischief in compound fracture is strikingly corroborated by cases in which the external wound is very small. Here, if the coagulum at the orifice is allowed to dry and form a crust, as was advised by John Hunter,* all bad consequences are probably averted, and, the air being excluded, the blood beneath becomes organised and absorbed, exactly as in a simple fracture. But if any accidental circumstance interferes with the satisfactory formation of the scab, the smallness of the wound, instead of being an advantage, is apt to prove injurious, because, while decomposition is permitted, the due escape of foul discharges is prevented. Indeed, so impressed are some surgeons with the evil which may result from this latter cause, that, deviating from the excellent Hunterian practice, they enlarge the orifice with the knife in the first instance and apply fomentations, in order to mitigate the suppuration which they render inevitable.

Turning now to the question how the atmosphere produces decomposition of organic substances, we find that a flood of light has been thrown upon this most important subject by the philosophic researches of M. Pasteur, who has demonstrated by thoroughly convincing evidence that it is not to its oxygen or to any of its gaseous constituents that the air owes this property, but to minute particles suspended in it, which are the germs of various low forms of life, long since revealed by the microscope, and regarded as merely accidental concomitants of putrescence, but now shown by Pasteur to be its essential cause, resolving the complex organic compounds into substances of simpler chemical constitution, just as the yeast-plant converts sugar into alcohol and carbonic acid.

A beautiful illustration of this doctrine seems to me to be presented in surgery by pneumothorax with emphysema, resulting from puncture of the lung by a fractured rib. Here, though atmospheric air is perpetually introduced into the pleura in great abundance, no inflammatory disturbance supervenes; whereas an external wound penetrating the chest, if it remains open, infallibly causes dangerous suppurative pleurisy. In the latter case the blood and serum poured out into the pleural cavity, as an immediate consequence of the injury, are decomposed by the germs that enter with the air, and then operate as a powerful irritant upon the serous membrane. But in case of puncture of the lung without external wound, the atmospheric gases are filtered of the causes of decomposition before they enter the pleura, by passing through the bronchial tubes, which, by their small size, their tortuous course, their mucous secretion, and ciliated epithelial lining, seem to be specially designed to arrest all solid particles in the air inhaled. Consequently the effused fluids retain their original characters unimpaired, and are speedily absorbed by the unirritated pleura.

Applying these principles to the treatment of compound fracture, bearing in mind that it is from the vitality of the atmospheric particles that all the mischief arises, it appears that all that is requisite is to dress the wound with some material capable of killing these septic germs, provided that any substance can be found reliable for this purpose, yet not too potent as a caustic.

In the course of the year 1864 I was much struck with an account of the remarkable effects produced by carbolic acid upon the sewage of the town of Carlisle, the admixture of a very small proportion not only preventing all odour from the lands irrigated with the refuse material, but, as it was stated, destroying the entozoa which usually infest cattle fed upon such pastures.

My attention having for several years been much directed to the subject of suppuration, more especially in its relation to decomposition, I saw that such a powerful antiseptic was peculiarly adapted for experiments with a view to elucidating that subject, and while I was engaged in the investigation the applicability of carbolic acid for the treatment of compound fracture naturally occurred to me.

My first attempt of this kind was made in the Glasgow Royal Infirmary in March, 1865, in a case of compound fracture of the leg. It proved unsuccessful, in consequence, as I now be-

lieve, of improper management; but subsequent trials have more than realised my most sanguine anticipations.

Carbolic acid* proved in various ways well adapted for the purpose. It exercises a local sedative influence upon the sensory nerves; and hence is not only almost painless in its immediate action on a raw surface, but speedily renders a wound previously painful entirely free from uneasiness. When employed in compound fracture its caustic properties are mitigated so as to be unobjectionable by admixture with the blood, with which it forms a tenacious mass that hardens into a dense crust, which long retains its antiseptic virtue, and has also other advantages, as will appear from the following cases, which I will relate in the order of their occurrence, premising that, as the treatment has been gradually improved, the earlier ones are not to be taken as patterns.

CASE 1.—James G—, aged eleven years, was admitted into the Glasgow Royal Infirmary on August 12th, 1865, with compound fracture of the left leg, caused by the wheel of an empty cart passing over the limb a little below its middle. The wound, which was about an inch and a half long, and three-quarters of an inch broad, was close to, but not exactly over, the line of fracture of the tibia. A probe, however, could be passed beneath the integument over the seat of fracture and for some inches beyond it. Very little blood had been extravasated into the tissues.

My house-surgeon, Dr. Macfee, acting under my instructions, laid a piece of lint dipped in liquid carbolic acid upon the wound, and applied lateral pasteboard splints padded with cotton wool, the limb resting on its outer side, with the knee bent. It was left undisturbed for four days, when, the boy complaining of some uneasiness, I removed the inner splint and examined the wound. It showed no signs of suppuration, but the skin in its immediate vicinity had a slight blush of redness. I now dressed the sore with lint soaked with water having a small proportion of carbolic acid diffused through it; and this was continued for five days, during which the uneasiness and the redness of the skin disappeared, the sore meanwhile furnishing no pus, although some superficial sloughs caused by the acid were separating. But the epidermis being excoriated by this dressing, I substituted for it a solution of one part of carbolic acid in from ten to twenty parts of olive oil, which was used for four days, during which a small amount of imperfect pus was produced from the surface of the sore, but not a drop appeared from beneath the skin. It was now clear that there was no longer any danger of deep-seated suppuration, and simple water-dressing was employed. Cicatrization proceeded just as in an ordinary granulating sore. At the expiration of six weeks I examined the condition of the bones, and, finding them firmly united, discarded the splints; and two days later the sore was entirely healed, so that the cure could not be said to have been at all retarded by the circumstance of the fracture being compound.

This, no doubt, was a favourable case, and might have done well under ordinary treatment. But the remarkable retardation of suppuration, and the immediate conversion of the compound fracture into a simple fracture with a superficial sore, were most encouraging facts.

CASE 2.—Patrick F—, a healthy labourer, aged thirty-two, had his right tibia broken on the afternoon of Sept. 11th, 1865, by a horse kicking him with its full force over the anterior edge of the bone about its middle. He was at once taken to the infirmary, where Mr. Miller, the house-surgeon in charge, found a wound measuring about an inch by a quarter of an inch, from which blood was welling profusely.

He put up the fracture in pasteboard splints, leaving the wound exposed between their anterior edges, and dressing it with a piece of lint dipped in carbolic acid, large enough to overlap the sound skin about a quarter of an inch in every direction. In the evening he changed the lint for another piece, also dipped in carbolic acid, and covered this with oiled paper.† I saw the patient next day, and advised the daily application of a bit of lint soaked in carbolic acid over the oiled paper; and

* Carbolic acid is found in the shops in two forms—the glacial or crystalline, solid at ordinary temperatures of the atmosphere; and the fluid, which sometimes passes under the name of German creasote. The fluid variety is sold in various degrees of purity. The crude forms are objectionable from their offensive odour; but the properly rectified product is almost fragrant. Different samples, however, differ much in energy of action, and hence, though I have hitherto employed the liquid kind in compound fracture, it would probably be better to use the crystallised form, melting it by placing the vessel containing it in warm water for a few minutes. Carbolic acid is almost absolutely insoluble in water, but dissolves readily in various organic liquids, such as the common fixed oils or glycerine.

† A cheap substitute for oiled silk, devised by the late Dr. M'Ghee, of the Glasgow Infirmary, and very useful for covering poultices, &c.

* See Works of J. Hunter, edited by Palmer, vol. i., p. 429.

this was done for the next five days. On the second day there was an oozing of red fluid from beneath the dressing, but by the third day this had ceased entirely. On the fourth day, when, under ordinary circumstances, suppuration would have made its appearance, the skin had a nearly natural aspect, and there was no increase of swelling, while the uneasiness he had previously felt was almost entirely absent. His pulse was 64, and his appetite improving. On the seventh day, though his general condition was all that could be wished, he complained again of some uneasiness, and the skin about the still adherent crust of blood, carbolic acid and lint, was found to be vesicated, apparently in consequence of the irritation of the carbolic acid. From the seventh day the crust was left untouched till the eleventh day, when I removed it, disclosing a concave surface destitute of granulations, and free from suppuration. Water-dressing was now applied, and by the sixteenth day the entire sore, with the exception of one small spot where the bone was bare, presented a healthy granulating aspect, the formation of pus being limited to the surface of the granulations.

I now had occasion to leave Glasgow for some weeks, and did so feeling that the cure was assured. On my return, however, I was deeply mortified to learn that hospital gangrene attacked the sore soon after I went away, and made such havoc that amputation became necessary.

While I could not but feel that this case, by its unfortunate issue, might lose much of its value in the minds of others, yet to myself it was perfectly conclusive of the efficacy of carbolic acid for the object in view. At the same time it suggested some improvement in matters of detail. It showed that the acid may give rise to a serous exudation apt to irritate by its accumulation, and therefore that a warm and moist application would be advantageous to soothe the part, and also ensure the free exit of such exuded fluid. At the same time it appeared desirable to protect the crust with something that would retain the volatile organic acid more effectually than oiled silk or gutta percha, through which it makes its way with the utmost facility. For this purpose a metallic covering naturally suggested itself, and as ordinary tin-foil is unsuitable from its porosity, I employed thin sheet-lead, and afterwards block tin, such as is used for covering the jars of anatomical preparations, superior to lead on account of the facility with which it can be moulded to any shape that is desired.

For a long time, however, I had no opportunity of giving this improvement a trial, the compound fractures admitted into my wards during the next eight months being merely two cases with small wounds. One of these was a fracture of the ulna into the elbow-joint in a woman so old that suppuration, had it occurred, would probably have proved fatal. The orifice in the integument was extremely small, and all would most likely have gone on well had the bit of dry lint applied to check the free bleeding from the interior been left undisturbed, instead of being saturated with carbolic acid as it was. This, however, could not but be an additional safeguard, and at the same time it was satisfactory to find that the caustic application did not interfere with the usual healing by scabbing, cicatrisation being found complete when the crust was removed.

The other case was a fracture of the humerus a little above the elbow in a young man, caused by a fall from a height of thirty-five feet, the wound, which was not quite half an inch in length, being situated at the inner side of the limb, where it must necessarily be covered by a splint. Dr. Watson, then my house-surgeon, applied lint dipped in carbolic acid covered with a slightly concave piece of sheet-lead about as large as a shilling, and put up the limb in pasteboard padded with cotton. At the end of ten days the inner side of the limb was uncovered for the first time, and merely as a matter of curiosity, when the lead, with the lint adhering to it, dropped off, disclosing a small superficial granulating sore without the slightest suppuration, just as in ordinary healing by scabbing. This case is interesting, not so much because the compound fracture was converted into a simple one, for this might have occurred under ordinary treatment, but because it showed that in any case of fracture complicated with a small wound, we have in carbolic acid a means which enables us to disregard the wound altogether after the splints have been applied, instead of being under the necessity of daily disturbing the apparatus to change the dressing.

At length a case presented itself well calculated to test the value of carbolic acid in compound fracture.

CASE 3.—John H.—, aged twenty-one, a moulder in an iron foundry, was admitted on May 19th, 1866, with compound fracture of the left leg, produced in the following manner. He

was superintending the raising by crane of an iron box containing sand ready for a casting, the box and its contents weighing about 12 cwt., when one of the chains by which it was suspended slipped, and the box fell from the height of four feet with unbroken force upon the inner side of his leg, which was planted obliquely beneath it. Both bones were fractured, the tibia about its middle, and a wound an inch and a half in length, and three-quarters of an inch broad, was made at the inner aspect of the limb, on a level with the fracture of the tibia, and obviously communicating with it. At the same time the soft parts generally were much contused, as was evident from the great distension of the limb with extravasated blood. Dr. A. Cameron, my house-surgeon, finding, on manipulating the limb, that bubbles escaped along with the blood, implying that air had been introduced during the movements of the leg as the patient was being carried to the infirmary, thought it best that I should see the case, which I did at three P.M., three hours and a half after the accident. In order to expel the air I squeezed out as much as I could of the clotted and fluid blood which lay accumulated beneath the skin, and then applied a bit of lint dipped in carbolic acid slightly larger than the wound, and over this a piece of sheet tin about four inches square. Finally the limb was placed in pasteboard splints, resting on its outer side with the knee bent. At eight P.M. some more acid was added with another piece of lint, so that the crust of clots, carbolic acid and lint, was about one-third of an inch in thickness. A hot fomentation also was applied over the inner aspect of the leg, the crust being protected by the tin. Next day he was pretty easy, and had passed a quiet night, though occasionally awakened by starting pains; the pulse was 90, but he took some food with relish. The surface of the crust was touched again with carbolic acid, and the fomentation was continued, and in place of the internal pasteboard splint, a large sheet of tin was applied over the flannel from the knee to the ankle, being retained in position by looped bandages. This proved a very satisfactory arrangement, the tin having sufficient firmness to answer the purpose of a splint, while it most effectually retained the moisture of the flannel, which, again, served as an excellent padding. The fomentation was changed night and morning, and gave great comfort to the patient, and once a day carbolic acid was applied lightly to the crust.

Two days after the accident the limb was easier, but the circumferential measurement of the calf continued the same, and the pulse was 96, though soft. On the fourth day—the critical period with reference to suppuration—the limb was free from pain, and the calf less tense, and distinctly reduced in dimensions; while the pulse had fallen to 80, and the patient had enjoyed his food after a good night's rest. After this the swelling steadily subsided, the skin remaining, as it had been from the first, free from the slightest inflammatory blush, and his general health was in all respects satisfactory. Seven days after the receipt of the injury there was some puriform discharge from the surface of the skin where the carbolic acid, confined by the smaller piece of tin that covered the crust, had produced excoriation by its caustic action; and to prevent needless irritation from this cause, the tin was reduced so as to leave only a narrow flat rim round a bulging part which corresponded to the crust.

About a fortnight after the accident a sense of fluctuation was experienced over the seat of fracture, but, as all was going on favourably otherwise, I hoped that this was due simply to serum from the effused blood; and in a few days it had completely disappeared, not a drop of pus meanwhile having escaped from beneath the crust. About this time the edges of the crust became softened by the superficial discharge from the surrounding parts, and these softened portions were daily clipped away with scissors. Thus the circumferential part of the crust which had overlapped the skin was removed, and that which lay over the extravasated blood in the wound was also reduced to smaller and smaller size.

On the 7th of June, nearly three weeks after the accident, an observation of much interest was made. I was detaching a portion of the adherent crust from the surface of the vascular structure into which the extravasated blood beneath had been converted by the process of organisation, when I exposed a little spherical cavity about as big as a pea, containing brown serum, forming a sort of pocket in the living tissues, which, when scraped with the edge of a knife, bled even at the very margin of the cavity. This appearance showed that the deeper portions of the crust itself had been converted into living tissue. For cavities formed during the process of aggregation, like those with clear liquid contents in a Gruyere cheese, occur in the grumous mass which results from the action of carbolic

acid upon blood; and that which I had exposed had evidently been one of these, though its walls were now alive and vascular. Thus the blood which had been acted upon by carbolic acid, though greatly altered in physical characters, and doubtless chemically also, had not been rendered unsuitable for serving as pabulum for the growing elements of new tissue in its vicinity. The knowledge of this fact is of importance; as it shows that, should circumstances appear to demand it, we may introduce carbolic acid deeply among the blood extravasated in a limb, confident that all will nevertheless be removed by absorption. A few days later all traces of the little cavity had become obliterated by the granulating process.

At the close of the third week the application of carbolic acid to the crust was discontinued, and the original internal pasteboard splint padded with cotton was again employed, instead of the tin and fomentation. What remained of the crust was still kept protected with the tin cap, with the view of ascertaining how long it would continue to adhere; and at length, nearly four weeks after the accident, I tore it off from the vascular surface beneath, which bled as I did so. The crust had preserved the subjacent parts from disturbance as effectually as if it had been a piece of living integument; and it is worthy of remark that the vascular surface below had not the pulpy softness of granulations, but was comparatively firm and substantial. The bit of crust still smelt of carbolic acid, though none had been applied for five days.

At the expiration of six weeks from the receipt of the injury the fragments were found firmly united in good position, just as if the fracture had been a simple one, though the cicatrization of the rather extensive sore was not complete till a later period.

CASE 4.—James W—, aged ten, was engaged in a turner's factory worked by steam power on the 8th of June, 1866, when his right arm was drawn in between a strap and a shaft turned by it. He called out for assistance, but thinks two minutes must have elapsed before the machinery was stopped, and during the whole of this time the strap, which was still moving while he held the arm steady, was cutting into the ulnar side of the forearm, breaking through the ulna about its middle, while the radius was bent with "green-stick" fracture. He was taken at once to the infirmary, where the wound was found to be about an inch and a half in depth, occupying more than half the circumference of the limb, chiefly at the dorsal aspect, but extending round also to the palmar side. The upper fragment of the ulna was protruding about an inch, and two strips of muscle, about a quarter of an inch in thickness and from two to three inches in length were hanging out; the lacerated state of the parts confirming the boy's account of the accident.

On seeing him about two hours afterwards, I sawed off the protruding portion of the ulna, and the tags of muscle having been previously clipped away, I applied carbolic acid freely to the whole interior of the wound, including the exposed surface of the bone; and having straightened the radius, which gave way during the process, placed the limb upon a wooden palmar splint. Avoiding any attempt to approximate the lips of the wound, I covered it with a piece of sheet-tin, sufficiently large to overlap the sound skin about a quarter of an inch in every direction. The limb was fixed to the splint by a bandage, so arranged as to permit the removal of the tin without disturbing the apparatus; and hot fomentations were applied over the whole. A few minutes after the carbolic acid was applied he said he was perfectly easy. At seven o'clock he asked for food, and took it. His pulse was then 84. At eight P.M. I saw him again, and applied beneath the tin a piece of lint dipped in carbolic acid, about as large as the wound. Noticing some distortion in the upper arm, I found that the humerus also was broken in its lower third, and applied splints accordingly, the limb being kept supported upon a pillow beside him. He slept a good deal during the night, though moaning and starting occasionally. Next day his pulse was 108; but he took his breakfast heartily, and the tongue was healthy, while he complained only of a little uneasiness about the elbow, and even this disappeared on changing the fomentation cloth. A piece of sheet-tin was now arranged so as to form a sort of cover for the forearm, including the hand. Being retained in position by looped bandages, it increased the steadiness of the limb, while it ensured efficiency of the fomentation.

Two days after the accident the oozing of blood and serum, which had been considerable during the previous twenty-four hours, had nearly ceased; but he still experienced comfort from the fomentation, though any pain which he felt was connected with the simple fracture of the humerus. His pulse was 88; his tongue clean and appetite good after a sound sleep at night;

and from this time onward his general health continued perfectly satisfactory. On the fourth day a small quantity of pale, grey, slimy discharge was observed from beneath the crust at one part; and thinking that this might, perhaps, have occurred for want of proper action of the carbolic acid, I applied the latter with unusual freedom to the surface of the crust. This was repeated at night; and the same energetic use of the carbolic acid, twice in the twenty-four hours, was continued on the fifth day. Yet, on the sixth day, the discharge from beneath the crust, instead of being diminished, was increased, and more puriform to the naked eye; while, under the microscope, there was clear indication of new cell-formation, whereas, on the day before, nothing but fibrinous material, with granular and other debris, had been discoverable. On the seventh day the discharge was still greater in amount; yet the limb remained free from pain, and was steadily diminishing in circumference, and pressure in the neighbourhood of the crust failed to induce any increase of the discharge, which appeared to be merely superficial.

In the course of the next few days it became apparent that this discharge, so far from being the result of insufficient action of the carbolic acid, was caused by the stimulating influence of the acid itself, applied with greater freedom over a crust much thinner than that of Case 3. Suppuration from this cause is, however, productive of no mischief, as will be better understood from the sequel. That such was the case in this instance was manifest on the fourteenth day, when the crust, which was nearly detached, was removed, disclosing an appearance for which I confess I had not been prepared. In place of the deep and ragged wound was a granulating sore, nearly on a level with the skin, and pretty uniform in surface, except at one part about its middle, where there was a depression about half an inch in depth, at the bottom of which a small portion of the outer surface of the ulna was visible, bare, but of pink colour. Not only had the compound of blood and carbolic acid which had existed in the depths of the wound been organised, but the portions of tissue killed by the violence to which they had been subjected in the accident, and also those destroyed by the caustic action of the carbolic acid, had been similarly acted on, and all had been, so to speak, fused together into a living mass, without the occurrence of any deep-seated suppuration.

By the nineteenth day the exposed part of the bone was covered, and the depression in the sore obliterated by granulation, without any exfoliation occurring; and two days short of seven weeks after the accident the sore was entirely healed.

The extensive loss both of bone and of the soft parts made osseous union of the ulna a matter of difficulty, and on the 5th of August the limb was placed in a starched apparatus, to promote complete consolidation, and he was soon after discharged from the hospital.

About six weeks later he presented himself at the infirmary, and the bandage was removed in my absence, when, the bone appearing firm, he was allowed to dispense with the apparatus, and was unfortunately not directed to show himself again. In the course of a few weeks, however, he appeared with the fragments again movable. The starched bandage was therefore reapplied, but when I last saw him, some weeks ago, bony union had not yet occurred. A good deal of osseous formation had, however, taken place, so that the fragments now overlapped each other; and should the cure be still incomplete when he next shows himself, the case will be a fair subject for Bickersteth's method of treating ununited fracture by drilling. Meanwhile, the radius being firm, and the injured extensors of the fingers having completely regained their powers, he will, in any event, have a very useful hand.

This case indicated a greater range of applicability of the treatment by carbolic acid than I had anticipated, and encouraged me to employ it under the almost desperate circumstances of the following case.

(To be continued.)

A GOOD SAMARITAN.—In the little village of Thornton, in the North, on the 20th of last month, an Irish mendicant gave birth to a child on the high road. It seems that one of the guardians of the parish passed the poor woman on the road, but did not listen to her complaint further than to tell her that she ought "to go to a lodging-house," and that she would mend up. A large-hearted gentleman, Mr. H. Pickering, finding the woman in such a deplorable state, instantly procured assistance for her, sent for a medical man, and had her taken to, and well cared for in, his own house, his wife doing her utmost to give the poor creature every needful comfort. Such charity is uncommon.