recognised. I would urge the most careful examination of all patients suffering from visual derangements where there are no ocular changes to account for them. It is only by the painstaking analysis of symptoms and the careful recording of such cases, followed, where possible, by pathological examination, that we can hope to gain any further knowledge of the complex cerebral processes involved in vision, of which at present we can only form a very faint and imperfect conception.

ON THE TREATMENT OF IMPACTED FRACTURE OF THE NECK OF THE FEMUR BY BREAKING DOWN THE IMPACTION UNDER ANÆSTHESIA.

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IN THE LANCET of Nov. 17th, 1894, I called attention to the unsatisfactory result which attends the usual method of treating impacted extra-capsular fracture of the neck of the femur. This consists in simply keeping the limb at rest, no attempt being made to correct the characteristic deformity—the shortening and eversion (rarely inversion) of the limb, always present in a greater or less degree—for fear that if the impaction is broken down the fracture will not unite. The result is that the patient remains with the limb shortened and everted, and consequently more or less crippled for the remainder of life. A case of this injury occurring in a male aged twenty-seven years was described, where the fragments were loosened by forcibly breaking down the impaction under anaesthesia, and, the shortening and eversion having been corrected, perfect union took place without any deformity resulting. Three cases have since been treated according to the same method in the Manchester Royal Infirmary (two under my own care and one under my colleague, Mr. Whitehead) with satisfactory results, especially as regards the correction of the eversion, and as the patients were aged respectively fifty, sixty-five, and seventy-five years, a brief record of each may, perhaps, be interesting, for they illustrate the fact that advanced age is in itself apparently no bar to this procedure, the fracture in each instance readily uniting with an abundant formation of callus after the impaction had been broken down.

CASE 1.—A woman aged seventy-five years was admitted to the infirmary under my care on Dec. 20th, 1894. She was examined on admission by Mr. J. H. Ray, house surgeon, who found that the right lower extremity was shortened to the extent of an inch and a quarter and well everted; the trochanter was thickened; crepitus was absent, and the limb could not be inverted. The patient having been anaesthetised the fragments were loosened by Mr. Ray, who felt the bone give way with a “crunching” sound; the limb could then be inverted and moved freely about a point just internal to the great trochanter. A straight splint reaching from the hip to the ankle was bandaged to the outside of the limb, and extension was applied in the usual way by means of a weight (8 lb.). As some slight chest symptoms developed the patient was allowed to sit up in bed after a few days, and at the end of three weeks she was placed on a couch during the daytime with the limb between sand-bags, the extension being only applied at night. On Feb. 5th she went home. The limb was shortened to the extent of about half an inch and was very slightly everted. As she lay in bed she could flex the thigh to an angle of 45°, and the movements at the hip-joint were quite free. With support she was beginning to bear her weight on the limb and walk about the ward.

CASE 2.—A woman aged fifty years was admitted to the infirmary under my care on July 2nd, 1895. On examining her the following morning I found that she presented all the usual signs of an impacted extra-capsular fracture of the left femur—viz., shortening to the extent of about half an inch with slight flattening over and thickening of the trochanter in an antero-posterior direction, also marked eversion, the toes pointing directly outwards. There was an absence of crepitus. Attempts to correct the deformity by rotating the limb inwards caused great pain and produced no effect. Under anaesthesia the impaction, which was very

firm, was broken down with a grating sound, though it was not until the thigh had been flexed to an angle of 45° and the knee bent to a right angle that enough force could be brought to bear upon the limb to loosen the fragments sufficiently to completely correct the eversion. On making traction upon the leg after the fragments had been loosened it could be restored to the same length as the other. A Liston's long splint was bandaged to the outside of the limb and extension (9 lb.) applied. On July 29th the splint and extension were removed and the limb was fixed in a plaster-of-Paris bandage. When this was taken off at the end of a month the fracture was firmly united without any perceptible shortening or eversion of the limb. The movements of the hip-joint were quite free, and in the course of a few days she was able to walk without assistance.

CASE 3.—A man aged sixty-five years was admitted to the Infirmary on Sept. 8th, 1894, under the care of Mr. Whitehead (who has kindly allowed me to include the case with the preceding). On examination the left lower extremity was found to be shortened to the extent of two inches; there was well-marked eversion, which could not be overcome by ordinary passive movement; crepitus was absent; and the trochanter was thickened. The patient having been anaesthetised, the impaction was broken down by Mr. J. W. Smith, resident surgical officer, assisted by Mr. Ray, and, the deformity having been corrected, the limb was fixed on a Liston's long splint, with 5 lb. extending weight. The patient was kept in the recumbent position, which was well borne, until Oct. 1st, when the splint and extension were removed; it was then found that firm union had taken place, the limb being very slightly everted and shortened to the extent of three-quarters of an inch. It was put up in a plaster-of-Paris bandage, and the patient left the hospital on Oct. 4th. He has since resumed his former occupation, that of a waiter, and though he walks with a limp and the limb slightly everted, wearing a thick sole to the boot, he is able to rotate the foot inwards and has good movement in the hip-joint.

I am indebted to Mr. Ray for notes of Cases 1 and 3.
Manchester.

MORTALITY FROM EMPYEMA IN CHILDHOOD.

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THE publication of the interesting statistics by Mr. Wightman in THE LANCET of Nov. 30th, 1895, has induced me to collect the cases of empyema which have been under my own care since May, 1879. The statistics alone, when read in connexion with the paper referred to, must be of value, because the percentage of recoveries at all ages is more favourable than in the lists supplied by Mr. Wightman. All my cases have been treated by free incision with the exception of two, where, owing to the grave condition of the child and the extent of the effusion, it was deemed to be wiser to relieve the chest by a limited aspiration some hours before proceeding to free incision. This I believe to be a very useful precaution, it being impressed very much on my mind in the case of an adult female who had an enormous left-sided collection after parturition. The total number of my cases was forty-five, the deaths being seven. In the foregoing list I find that only seven cases were under three years of age, and of these two died, one child being a year old and the second a year and nine months. The method of treatment in every case may be briefly summarised as follows: (1) free incision; (2) a single tube in infants, but a double-barrelled tube in all above the third year; (3) the complete emptying of the chest of fluid for the first week twice daily by turning the child on to his side as one would empty a barrel, this being assisted by an effort of coughing when the child is old enough to understand what is needed; (4) the early removal of the tube—i.e., at the end of the first week; and (5) allowing the patient to sit up and move about as soon after the first week as possible, thus helping the expansion of the lung. I may here add that I have never found it necessary to remove a portion of a rib in an acute case.

In connexion with the deaths the following facts are distinctly noteworthy: (1) that with one exception all the

fatal cases were those of effusion on the *left* side—this is very interesting, and confirms the belief held by some that left-sided pleuro-pneumonia is always more dangerous to life than when it occurs on the right; (2) in all there was a long history of illness before admission, varying from six weeks to three months; (3) in one gangrene of the lung was believed to exist, but this could not be proved post mortem; (4) of the two deaths occurring in children under two years of age, one was the direct sequence of chicken-pox, and in both the children were rachitic to a degree; and (5) one case suffered from thrombosis of the left iliac vein six days after operation, and he died on the eighth day.

The deductions I would draw from these facts are as follows: (1) that free incision when done early is very successful; (2) that the removal of a portion of a rib is never necessary in acute cases; and (3) that a fatal issue at any age is rather the result of the neglect to recognise the true nature of the case than from the operation itself.

Nottingham.

CURRENT FROM THE MAIN.

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SINCE the publication under the above heading of two articles on the utilisation of public supply currents for electro-therapeutic purposes¹ great progress has been made in the supply of electricity from central stations. The same interval has brought forth a variety of apparatus as well as a somewhat extensive literature bearing upon the points in question; but it cannot be said that by any writer has there yet been shown a complete grasp of the subject, nor by any instrument have the many serious difficulties of the case ever been adequately met. In view, however, of the great and increasing employment of these currents, and with an experience of their usefulness in medicine, the time seems to have arrived for a complete survey of the whole problem; and the following remarks offer themselves as an attempt at its solution.

Considering the improvement that has taken place in public supply currents, I am of opinion that for medical employment their chief danger now lies, not in the possible influx of strong currents or in the chances of a failure of supply, but in leakage currents and in the breakdown of transformers, and of these risks the greater is leakage.

1. *Leakage currents.*—This source of danger has hitherto been either under-estimated or completely ignored, but it is nevertheless a very serious one, and in the absence of suitable precautions may lead to accidents of a grave kind. Those stations which supply by direct distribution, or distribution from transforming centres, are undoubtedly, and for obvious reasons, more subject to earth leakage than are those in which transformers are used at or near the house. Again, stations supplying electricity on the three or five wire systems, even if they do not actually connect to an earth plate or water pipe, are likely to have the middle wire (the "neutral") at practically earth potential. It is true that any connexion to earth of a main supplying current direct to houses is forbidden by the Board of Trade, but when, for purposes of its own, it suits a company to earth its middle wire this regulation does not seem to bar the practice. Now, if under these circumstances the patient be placed in contact with one of the outer mains (positive or negative) what may be expected to happen? If the connexion to earth be good, even a damp floor, such a patient would be subjected to the full pressure of supply, usually 100 volts or more. It is obvious that if the contact be of low resistance (for instance, if the patient be in an uninsulated bath) the resultant current through the patient's body might be one of considerable and even dangerous magnitude, perhaps approaching 400 milliamperes. It would be useless to interpose resistance between the patient and the uninsulated (neutral) pole, as this portion of the circuit would be shunted by the leakage current, and if the milliamperè meter was also placed in this portion of the circuit it

would fail to register any of this leakage. The following diagrams² will serve to illustrate the electrical conditions that exist—for example, in a bath—when an earth connexion is made.

There is one "series" $R = 80$ and there are two parallel branches ($R = 600 + 2 + 10$ and $R = 1$). Then the total resistance $= \frac{612 \times 1}{612 + 1} + 80 = 80.998$, and the total current $\left(\frac{115}{80.998} \right) = 1420$ m.a. Of this total the body will take an average of 25 per cent.³—that is, it will receive 355 m.a. The current in the respective parallel branches will be as 612 : 1—in other words, the milliamperè meter will register 2.3 m.a. Had the patient been placed in contact with the uninsulated (neutral) wire and the resistance been interposed between him and the insulated pole (positive or negative) he would not, even if placed in an uninsulated bath, have been in the circuit of any earth current. This would hold good only so long as the condition of the mains was good. Should a fault break out on one of the outer wires (positive or negative) the state of affairs would be in no way different from the case just considered. What, then, is the remedy for this risk? Clearly insulation. It should be taken as an axiom that the current from public supply mains should *never* be applied either as a shunt or direct to the patient without interposing between him and the earth an insulating substance of such a nature as would undoubtedly stand the full main pressure across it without passing a current of 1 m.a. In the case of three wire systems the "full main pressure" would be double that of supply, and in five wire systems four times that of supply. This necessity for insulation would apply equally to all systems, whether continuous or alternating, direct or transformed. In the usual electrical applications security would be attained by standing on a very dry floor or, more certainly, on a varnished kamptulicon mat. But in the case of the water bath, connecting as it does with a good earthing device in the shape of waste pipes and water pipes, the case is altogether different, and certain additional precautions then become necessary. With these duly carried out effective insulation can certainly be secured. In the first place it is obvious that the bath should not be made of metal. Hard wood or porcelain are suitable materials, the latter by preference. The bath should stand upon glass mushroom insulators filled with a heavy resinous oil (similar to those used for insulating storage batteries) or it might be placed upon hard vulcanised rubber blocks. The inlet stopcocks for both hot and cold water should be placed some distance from the bath, and in such a position that it would be impossible for the patient, when in the bath, to accidentally make contact with them. An insulating piece of porcelain or vulcanised rubber should be inserted in both inlet pipes between the stopcocks and the bath. If the waste pipe be attached to the bath an insulating piece should be inserted as close to the bath as possible. But danger may be even more easily and effectually averted by fixing directly below the waste outlet of the bath

² These diagrams are only intended to show by an example the possible danger to a patient from leakage currents. 115 volts is the full pressure of the mains. The total current under the above conditions is 1420 m.a., and the resistance in the respective branches is 612 ohms and 1 ohm, and, as current is inversely proportional to resistance, the current in the circuit of high resistance (the galvanometer circuit) will be 2.3 m.a., and in the earth circuit 1417.7 m.a. But both circuits are common to the bath.

³ My most recent experiments, shortly to be published, prove this—a conclusion in startling contrast with former surmises.

¹ Current from the Main. By W. S. Hedley, M.D., THE LANCET, Dec. 19th, 1891, and April 9th, 1892.