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THE TREATMENT OF COLLES'S FRACTURE.

BY

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THE admirable short paper by E. D. Grasby and S.-R. Trick in the *British Medical Journal* of March 2nd (p. 391), following upon that of Edwards and Clayton in the *Journal* of January 12th, prompts me to offer a few remarks on the treatment of Colles's fracture.

Colles's fracture is at once the commonest (sharing this distinction with fracture of the clavicle), one of the easiest to treat, and generally the worst treated, of all fractures of the human body.

The first-mentioned paper is "an endeavour to ascertain the causes for the imperfect results that obtain from the usual methods of treatment at present adopted." The principal conclusions arrived at are:

"1. Colles's fractures without displacement yield uniformly good results, as observed two years after the injury.

"2. Where displacement was a marked feature of the fracture the results two years after the injury are invariably unsatisfactory.

"3. The disability was in each case due to osteo-arthritis in the inferior radio-ulnar joint, resulting from incomplete reduction."

From this we must infer that at a great London teaching hospital a Colles's fracture is never properly reduced. For, apparently, when the displacement is not considerable, reduction is not considered necessary, and, when displacement is considerable, the result is invariably unsatisfactory owing to incomplete reduction. We need not, however, infer that the results so candidly reported from this clinic are in any way exceptional. They are indeed the usual results of the methods of treatment at present adopted. I personally never, or hardly ever, see a case of Colles's fracture which has been properly reduced, although many of the cases that I see have had some sort of manipulation previously. The reason for these uniformly bad results is that the method of reduction almost universally employed—namely, that advocated by Sir Robert Jones—is entirely inadequate in the hands of the majority of those who have to treat these cases.

In the classical Colles's fracture—and most cases are of this type—there are three characteristic displacements of the lower fragment of the radius in relation to the upper—namely, (1) displacement upwards and backwards; (2) abduction to the radial side; and (3) rotation about a transverse axis—that is, backward tilting of the lower articular surface, the importance of which is rightly emphasized by Edwards and Clayton. Each of these displacements must be deliberately corrected if a good result is to be obtained.

Colles's fracture is produced by great force—that is, the whole weight of the falling body upon the fixed wrist—and it requires great force to reduce it. The reduction of a

Colles's fracture is a matter of sheer force; there is no trickery about it whatever.

General surgeons as a rule have no conception of the amount of force that orthopaedic surgeons can, and often do, employ in quite ordinary manipulations, and I think that some orthopaedic surgeons hardly realize it themselves. It may be that the powerful hands of Sir Robert Jones (and some others) can reduce a Colles's fracture in any manner that he chooses; but I am convinced that the method which he advocates is quite inadequate in the hands of the great majority of those who have to deal with Colles's fractures.

For general use there is no method to compare with that of *reduction over a wedge*. By this method the upper fragment is fixed, and the lower fragment is compelled by sheer force to go in whatever directions the operator wishes. Briefly the actual procedure is as follows:

The patient must be fully anaesthetized. Some expert anaesthetists can give gas or gas and oxygen for long periods, and can even obtain muscular relaxation (with luck), but this is quite exceptional. As ordinarily given, "a whiff of gas" is entirely inadequate for the proper reduction of a Colles's fracture. In these circumstances the reduction is always hurried, the patient is usually stiff or moving, and, above all, there is no time for a critical review of the reduction before he comes round, nor for a repetition of the manipulation if it should be found to be incomplete. The reduction should be done deliberately with the patient fully anaesthetized. I think that regional (brachial plexus) anaesthesia might be employed here much more often than it is.

For the manipulation the fracture is laid flexor surface downwards across the wedge,* so that the lower end of the upper fragment rests directly on the wedge. For the right side it is convenient to have the wedge lying on the table by the patient's side; for the left side (unless the surgeon is left-handed) it is more convenient to have it on an outlying small table. The upper fragment is firmly held by the surgeon's left hand on the wedge. The lower fragment is gripped by the surgeon's right hand with the thumb on top and the ball of the thumb directly over the prominence which the displaced lower fragment makes on the dorsum. The lower fragment is now forced downwards and forwards and towards the ulnar side. The amount of force required varies in different cases, but in all cases it is considerable, and I have many times put the whole weight of my body on to this fracture in order to reduce it properly. At the end of this manoeuvre the backward tilt of the lower fragment is corrected by a sharp forward flexion movement.

Many surgeons make a point of first disimpacting the fracture by dorsiflexing the wrist and temporarily increasing the deformity. This is harmless, but unnecessary. The only objection to it is that it is apt to make a surgeon think that he can reduce the fracture by some clever manoeuvre instead of by force. In reducing over a wedge disimpaction occurs just as readily as soon as the lower fragment is made to move, and then all that is necessary is to force the fragment into its proper position.

After the reduction the fracture should be critically examined. The positions of the styloid processes should be noted and compared with the normal. The prominence on the dorsum should be felt for, to make sure that it has quite disappeared, and it should be seen that the forward concavity of the lower end of the radius is restored. Lastly, the position of the hand as it hangs freely in relation to the lower end of the radius should be noted. If any part of the deformity remains uncorrected, the manipulation should be repeated.

There is very little tendency for the deformity to recur after a Colles's fracture has been properly reduced, unless the wrist is dorsiflexed, or the splint which is applied presses the lower end of the radius backwards.

The popular Carr's splint, as originally designed and as supplied to general practitioners and commonly used by them, is a bad splint, because it presents a flat surface to the normal forward concavity of the lower end of the radius and so causes the lower fragment to be tilted backwards. As padded up and applied by experts it is, no doubt, quite efficient, but then it is no longer a "Carr's splint."

* The so-called orthopaedic wedge is merely a short round horizontal bar covered with rubber, standing about four inches high on a firm base. For those who want one occasionally and have not got one, I may add that an ordinary flat iron, borrowed from the kitchen, with its round horizontal handle covered with a folded towel or other soft material, makes a perfectly good "orthopaedic wedge."

Colles's fracture should be put up with the wrist moderately flexed. The best position is that in which the hand hangs naturally when it is unsupported and the muscles are relaxed under the anaesthetic. No splint is more efficient or more comfortable than a plaster strip moulded to the flexor surface of the forearm and hand, leaving the fingers free.

The proper use of plaster-of-Paris requires a little practice, but I would submit that the putting up of a Colles's fracture in plaster is within the capacity of any practitioner; it requires less special knowledge and skill than the alteration of an unsuitable splint in order to make it suitable.

An assistant supports the elbow and steadies the limb by making light traction downwards and forwards on the middle fingers. The part is wrapped in a layer of cotton-wool over which an ordinary bandage is applied firmly, but not tightly. A four-inch plaster bandage is placed in warm water, and, when bubbles have ceased to rise, it is lightly squeezed and then applied evenly round and round the limb from the elbow to the middle of the hand. Three or four bandages are applied in like manner, and as soon as the plaster is set it is cut up each side with a sharp scalpel, and the top or dorsal half is removed. The lower half remains as the splint, and it is kept on with an ordinary bandage.

It has been suggested that this fracture should be put up with the forearm supinated, as is usually done with other fractures of the radius and ulna. But the supinated position is much more irksome to the patient, and I doubt whether it is really necessary in this case. Colles's fracture is produced by a fall on the pronated hand and it is impacted in the pronated position. In reducing it by the method described the lower fragment is forced back into its original—that is, normal—position in relation to the upper fragment, and if it is allowed to heal in this position normal movements should follow.

Massage and movements of the fingers are usually begun a day or two after the reduction, and movements of the wrist-joint in about ten days to a fortnight. But these times are of little importance as compared with the complete reduction of the deformity.

In conclusion, is it too much to hope that surgeons in charge of fracture departments allow their house-surgeons and dressers not merely to watch, but actually to do these manipulations with their own hands? Outside the immediate vicinity of large hospitals the great majority of Colles's fractures will be and must be treated by general practitioners, and the actual reduction of a few of these fractures under supervision is worth more to the future practitioner than all the demonstration that can be given.

VALUE OF THE HINTON TEST IN THE SERUM DIAGNOSIS OF SYPHILIS

IN COMPARISON WITH THE KAHN AND WASSERMANN
REACTIONS.

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HAVING seen with interest the results of the new Hinton test as applied in the Wassermann Laboratory of the Harvard Medical School and in the pathological laboratory of the Massachusetts General Hospital, Boston, U.S.A., and been fired with Dr. Hinton's enthusiasm during a personal demonstration and discussion of his test, we decided to examine it in a comparative manner with our routine "Wassermann" specimens from the Somerset Hospital, the Peninsula Maternity Hospital, and, in a special series of cases through the kindness and courtesy of Dr. C. Kevin O'Malley, from the venereal disease clinics of the Health Department of Cape Town. One of us (J. H. F.) is responsible for the Hinton tests, the other (E. C. G.) for the Kahn and Wassermann reactions.

THE HINTON TEST.

Our basis for the test is the technique used by Dr. Hinton in June, 1923, which embodies some important modifications (then unpublished) of his original test as appearing in the *Boston Medical and Surgical Journal* of June 16th, 1927 (pp. 993-996).¹ We have used the test with this technique throughout, and have also subjected the procedures to critical experimentation and study, as will appear in the sequel.

The details of the Hinton test, as we have it in a personally annotated reprint with Dr. Hinton's own unpublished modifications (to June, 1928), are briefly set forth as follows:

The test is an "agglutination," by syphilitic serums, of a suspension of cholesterol in *glycerinated* hypertonic saline containing a mere trace of the alcohol-soluble, ether-insoluble extractives of beef muscle. The addition of the glycerol is the main feature of difference from the Kahn, the Sachs-Georgi, Sigma, Meinecke, and other "flocculation" methods of diagnosing syphilitic serums.

Preparation of Reagents.

The "antigen" or "indicator" is prepared from beef muscle (preferred by Hinton to beef heart). The method follows that described by Neymann and Gager,² and by Kahn.³ A small quantity, say 1/2 lb., is freed from fat and connective tissue, chopped and minced, and dried for four or five days on a tray in an oven with a thermostat set at 55° C. It is then powdered, and extracted by vigorous hand-shaking in a stoppered graduate, using ether in the proportion of 1 gram of powder to 4 c.cm. of ether. The process is repeated four or five times until the ether comes away clear, and the residue collected on filter paper and dried. It is then extracted in a glass-stoppered bottle with 95 per cent. alcohol in the proportion of 1 gram of dried residue to 5 c.cm. of alcohol. Extraction is continued for three days at room temperature, and the "indicator" ("antigen") is then filtered off. To every 1 c.cm. of extract is now added 9 c.cm. of a 0.7 per cent. solution of cholesterol in absolute alcohol (prepared several days previously).

The "stock indicator," as Hinton calls it, keeps indefinitely in stoppered bottles of 50 to 100 c.cm. capacity in a dark cupboard at room temperature. The "indicator" actually used for the test is a glycerinated suspension of the cholesterolized antigen freshly made up with sodium chloride solution on the day it is to be used. Hinton now makes up a 3 per cent. as well as a 5 per cent. sodium chloride suspension. Two parts of the 5 per cent. (or 3 per cent.) NaCl are added to one part of "stock indicator" pipetted with a clean dry 5 or 10 c.cm. pipette into a 100 c.cm. stoppered graduate. This is shaken vigorously and left for half an hour. Twelve parts of saline are added, the suspension is shaken, and finally, after adding fifteen parts of 50 per cent. glycerol, again shaken thoroughly.

Hinton finds it unnecessary to "inactivate" the serum to be tested, but where routine Wassermann tests are being done it will have been "decomplementized" by heating to 55° C. for half an hour.

The test is carried out in three 10 mm. and 100 mm. (serum) tubes conveniently held in a numbered (Wassermann) rack. This should be of brass and have three shelves to stand immersion without upsetting the serum tubes.

To Tube 1 is added 0.1 c.cm. of serum and 0.5 c.cm. of 5 per cent. NaCl suspension.

To Tube 2 is added 0.3 c.cm. of serum and 0.5 c.cm. of 3 per cent. NaCl suspension.

To Tube 3 is added 0.5 c.cm. of serum and 0.5 c.cm. of 3 per cent. NaCl suspension.

The tubes are shaken thoroughly and placed in a shallow water-bath at 37° C. for six to sixteen hours. The test needs about 1 c.cm. of serum, and the quantities are easy to pipette.

A positive reading consists in a definite "agglutination" of the cholesterol suspension into more or less coarse clumps, with a complete clearing of the medium. A good positive reading in at least one tube (generally the first) constitutes a positive diagnosis of syphilis.

Modifications of Technique.

As a result of our experimentation with the test we submit the following conclusions and modifications of the technique:

1. The saline emulsion of our antigen* when made up with 5 per cent. NaCl is slightly too unstable, tending to "auto-agglutinate," whereas the 3 per cent. NaCl suspension is definitely too stable and too "inert," giving few positives. We found that a 4 per cent. NaCl-glycerol suspension gave uniformly better results, without the needlessly extensive range of sensitiveness intended with the more complicated two-dilutions technique.

* Antigen preparations would appear to vary slightly in sensitivity, as we have noticed in using different batches of antigen.