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THE ORGANIZATION OF THE TREATMENT OF FRACTURES

BY

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Progress in any branch of medical practice is brought about by scientific discovery followed up by practical application. Beneficial results will only accrue if the first of these is implemented by the second. In malaria the mere discovery of the parasite in the blood of the mosquito would have had no practical results if measures had not been devised for the extermination of the insect. The identification of the bacillus in tuberculosis was a mere laboratory triumph, but the organization of open-air sanatoria has gone far to the cure of the disease.

In the matter of fractures the scientific discoveries have been that of Röntgen, by which the position of the broken bones could be seen instead of merely guessed at; that of direct operative treatment of fractures; and that of various mechanical devices whereby the displaced bones could be restored to a normal position and there retained. It has also been proved that recovery of a broken limb requires careful supervision for a long period, with functional exercise of the associated muscles. When, however, a large number of fractures are examined, it at once becomes apparent that the mere use of *x* rays, mechanical appliances, and physiotherapy has not been enough to ensure rapid or complete recovery. All these things have been in use since the beginning of the century, and yet at the present day there are many who are disabled for long periods or permanently crippled as the result of fractures. Investigation shows that the blame of this lies not with the scientific principles, but rather with the want of their application.

Nothing reveals this more clearly than the experience of the war. In the early days about 80 per cent. of the men suffering from gunshot wounds of the femur died, while, at the close, this figure was reduced to 10 per cent. And yet it may be fairly said that during that period no new method was discovered of treating wounds or fractures. The improvement was brought about chiefly by efficient organization—that is, by segregation, team work, and continuity of treatment. Now in times of peace, when the greater use of machinery and road accidents are increasing the number of fractures, it is incumbent upon us to ask why the lessons of the war should be forgotten, and why we should be content to allow unnecessary suffering, invalidity, and disablement when the means of prevention are so ready to our hand. This is the problem which was set for the Fracture Committee of the British Medical Association, and its report deserves the careful consideration of the medical profession, the administrators of the hospitals, the public health services, and the community at large.

It is only possible approximately to estimate the number of cases of fracture in this country. Probably there are about 141,000 every year treated in the voluntary and municipal hospitals, and this figure will be referred to again later on in estimating the financial loss suffered

through lack of organization. In the majority of these hospitals there is no organization of fracture work. The patients are treated as ordinary surgical cases in the wards and out-patient department, and usually, when the injury is severe, they are sent from one institution to another; while there is no record of final results.

Fortunately, however, there are a few hospitals where matters have been put on a more satisfactory basis, and this has been due chiefly to the energy and enthusiasm of individual surgeons. In Manchester and Liverpool complete fracture services have been instituted, and it is from these two centres that the figures cited below have been taken. A few of the London hospitals, voluntary and municipal, have also instituted fracture clinics, in which general and orthopaedic surgeons co-operate.

Some Illuminating Figures

We are now in a position to compare the results of treatment of a large number of the common types of fracture as produced on the one hand by the "organized fracture clinic" and on the other by unorganized treatment. By the latter it must not be thought that unskilled or neglectful treatment is implied. On the contrary, the majority of cases have been under the care of hospital surgeons of known repute, but there has been no unity of control, no continuity of treatment, and no "follow-up." *Most of the patients in the "unorganized" group have actually received more treatment than those in the "organized" clinic.* The following table of figures shows the average period of disability in weeks and the percentage of cases of permanent disability in 1,081 fractures treated in organized clinics, compared with 276 cases from general hospitals or private practice.

Type of Fracture	Average Disability in Weeks		Percentage of Permanent Disability	
	Organized	Unorganized	Organized	Unorganized
Colles's ...	7	29	0.4	23.6
Scaphoid ...	11	46	1.6	58.3
Clavicle ...	5	22	1.2	5.0
Patella ...	26	57	3.5	44.0
Femur ...	37	60	9.0	61.0
Tibia and fibula ...	21	62	0.7	25.0
Ankle ...	11	47	0	32.0

Taking the common Pott's fracture, for example, every case now costs about £70 10s. in compensation, whereas it ought not to cost more than £16 10s., so that by sending such a case to an organized clinic a saving of £54 is effected. And this is by no means the whole argument; for there will be 32 per cent., or nearly one in three of all

the cases, with permanent disability, which represents a serious additional charge. It would probably be an underestimate if £200 was taken as the figure which it would cost the insurance company for a final settlement in cases of permanent disability. Thus in 100 cases of Pott's fracture treated haphazard we should have £5,400 more paid in compensation than if the cases had been treated at an organized clinic, and £6,400 to the thirty-two cases of permanent disablement, making a total of £11,800. And this in only 100 cases, and quite apart from loss of wages.

The average period of disability is more than three times as long in the patients in the "unorganized" group as in the "organized," and the percentage of disability is thirty-seven times as great. In the 276 cases treated without organization there was a loss of £13,000 in unnecessary compensation, and of £15,000 in wages to the men and women concerned. If there are about 141,000 fractures in this country in a year, and if not more than 41,000 are treated in organized clinics (and this is a very liberal estimate), the remaining 100,000 treated in an unorganized fashion would represent a loss of more than four and a half million pounds in compensation and of more than seven millions in wages each year. The matter is clearly one of great national economic importance.

Exactly the same thing has been demonstrated in Vienna by Dr. Böhler, who has produced the most practical evidence that "it pays" to organize the treatment of fractures. In Austria for many years there has been a State insurance against accidents. In 1911 there was no organized fracture treatment, but in 1929 Böhler had established his accident hospital. One hundred and twenty-four cases of fracture of the long bones of an exactly similar nature were compared in the two periods, and the amount of compensation paid was noted for comparison as follows:

Total Compensation (Expressed in Thousands of Austrian Schillings) after a Two-year Period of Observation

Number of Cases	Type of Fracture	1911	1929	Saving
19	Femur	192	134	58
24	Leg bones	158	33	125
31	Ankle	106	37	69
9	Humerus	43	11	32
41	Forearm	129	42	87
Total 124	Fractures of the Long Bones	£28	257	371

The saving effected was almost equal to the total maintenance cost of the hospital in that year (396,000 schillings), so that the other 6,000 accident cases were treated free of cost. The matter may be summarized as follows. There are at least 100,000 persons every year in this country who suffer from fractures, and whose treatment is so conducted that they suffer disability three times as long as they need, and 36,000 of them are left permanently disabled when they might have made a complete recovery.

But mere numerals make very little appeal to most of us, and it may be helpful to consider individual cases in order to understand the reasons for prolonged and permanent disability. I have arranged the following cases under three groups: (1) those in which failure has been due to lack of supervision; (2) those in which it has been due to error in primary treatment; and (3) those in which it has been due to divided responsibility. But in reality there are usually many factors contributing to the bad result in each case.

Lack of Supervision

CASE I

A man, aged 25, was brought into the casualty department of a general hospital on a Saturday evening with a severe injury to the right ankle, and was seen by the casualty officer, who was only recently qualified. The *x* rays were not available. The leg was put up on a back splint and foot-piece and the man sent away, being told to report on Monday. On Monday he called in his own doctor, who, finding the leg neatly bandaged on a splint, allowed him to remain at home "for a time." This extended to four weeks, and the patient then went back to hospital, where a typical Pott's fracture was revealed by *x*-ray examination. He was put down for admission, and was received three weeks later. There was firm union in a bad position. Operation was declined, and permanent disability resulted. (Fig. 1.)

Comment.—*X* rays should always be available, and if this is not possible any serious accident should be admitted or transferred to another hospital.

CASE II

A girl of 12 was brought to the casualty department with an injury to the elbow, diagnosed as a fracture of the lower end of the humerus. No bed was available, and the arm was put up in plaster and she was sent home. She reported again in two days' time, when pain was very severe and the hand was blue and swollen. The plaster was removed. There was ischaemic paralysis, and permanent disability resulted. (Fig. 2.)

Comment.—It is unjustifiable to treat serious injuries without proper supervision. If the child had been admitted the pain and swelling would have been ample warning of danger, and the plaster would have been split or removed.

CASE III

A man, aged 27, healthy and strong, had a football accident and suffered fracture of the tibia and fibula without much displacement. The leg was encased in an "unpadded" plaster cast, and the patient was sent home. Two days later he returned in great pain, when the toes were found to be blue. The plaster was removed; there was gangrene of the foot, and amputation followed. Comment seems needless. (Fig. 3.)

These three cases are examples of what is happening with great frequency. The casualty officer of a general hospital usually has no beds at his disposal, and unless the case is likely to be acceptable to the general surgeon his easiest course is to deal with it himself in the first place and to defer transferring it to the surgeon. Emergency beds are always available for ruptured viscera, but not for broken bones.

CASE IV

A man, aged 34, had pain and swelling following a fall on the right shoulder. An *x*-ray in the antero-posterior view appeared to show impacted fracture of the neck of the humerus in good position. The arm was fixed by bandage to the side, and the patient was sent to his own doctor in the country. Six weeks later the arm was still stiff and painful. Further *x*-rays from the axilla showed gross displacement. There was operation and prolonged disability. (Fig. 4.)

Comment.—In a fracture clinic this mistake would have been found on the occasion of the first weekly attendance, when it could have been rectified.

CASE V

A painter, aged 43, fell from a ladder on his feet. He was not detained in hospital, nor were any *x*-ray photographs taken. Several months later, after being kept in bed at home, he was sent to the out-patient department, where it was found that the os calcis had been crushed in both feet. There was permanent disability. (Fig. 5.)

Comment.—This patient should have been kept in hospital, or at any rate *x*-ray examination should have been made, in the first place. The inaccessibility of the *x*-ray apparatus at odd times for accident cases is a very serious defect in many hospitals.

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.—A, Neck of humerus. Displacement missed. Only antero-posterior x-ray taken. B, As seen from axilla six weeks later. Prolonged disability.

FIG. 5.

FIG. 6.

FIG. 7.

FIG. 8.

FIG. 9.

FIG. 10.

FIG. 11.

FIG. 12.

FIG. 13.

FIG. 14.

A

B

C

D

E

F

G

FIG. 15.—A, On admission to surgical ward. B, After traction. C, X-ray department; traction removed for x-ray. D, Plated. E, Plate removed after six weeks. F, Massage and passive movements. G, Walking appliance; permanent disability.

CASE VI

In this case the patient, a man aged 50, had a Pott's fracture with displacement of a large triangular fragment from the lower posterior margin of the tibia. He was admitted to hospital and the fracture was reduced under an anaesthetic and put up in plaster from the toes to the knee. He was sent home after a week. Secondary displacement occurred with dislocation of the foot backwards. A policy of inactivity was pursued for more than a year; finally, an arthrodesis of the ankle had to be performed. There was permanent disability. (Fig. 6.)

Comment.—If there had been continuous supervision and repeated x-ray examination the dislocation would have been detected in time to be corrected by open operation or double transfixion.

Errors in Primary Treatment Followed by Discontinuity in After-care

CASE VII

As the result of a motor smash the patient in this case suffered closed fracture of the upper end of the femur. Both local doctors agreed that a specialist was required. He came, accompanied by an anaesthetist, an assistant, two nurses, and the full equipment for operating. The femur was plated by a six-inch plate and six screws, but there was no external fixation. The upper part of the plate loosened and three screws came out, resulting in gross angulation. The plate was removed, and the leg laid between sandbags. There was union with gross angulation, four inches shortening, and permanent disability (£3,000 compensation from the insurance company). (Fig. 7.)

Comment.—Quite apart from the debatable subject of the propriety of plating as primary treatment for a fractured femur, the tragedy was really a question of the patient "falling between two stools." If the two country doctors had treated him at home with a Thomas splint, or if the city specialist had taken him to his own clinic, he would not have suffered this disaster.

CASE VIII

In this case there was open fracture of the tibia and fibula in a man of 20. The tibia was plated the next day, and the leg put on a Thomas splint. The wound broke down, and the patient was transferred to hospital in his own home town after six weeks. There was extensive sepsis and necrosis, and the leg had to be amputated. (Fig. 8.)

CASE IX

A woman, aged 25, as the result of a motor accident, had an open fracture of the lower third of the femur. She was taken to a cottage hospital, and a surgeon was summoned from a distance. The femur was plated; this was followed by brisk suppuration, and the plate was removed. There was osteomyelitis with formation of a sequestrum, and the knee was stiff. Permanent disability resulted. (Fig. 9.)

Comment on Cases viii and ix.—Personally I consider that the plating of open fractures is fundamentally wrong, but when, added to this primary error, the patient is operated upon by one man and taken charge of by another, disaster is likely to follow. I am aware that brilliant results are obtained by Sherman and his colleagues in plating open fractures, but let no one attempt to follow this practice who has a less perfect organization of team and technique!

Discontinuity of Treatment

CASE X

A man, aged 32, with a Pott's fracture, was admitted to the wards of a general surgeon. The latter, not very pleased at having his beds taken up by this type of case, instructed his house-surgeon to "put him up" and get rid of him. Imperfect reduction was performed under anaesthesia; the leg was put up in plaster, and the patient was transferred to a municipal hospital. The leg was kept in the original plaster for six weeks, when the plaster was removed. There was marked varus with some foot-drop. Massage, etc., was given for six months, but permanent disability resulted. (Fig. 10.)

Comment.—This is all too common. The patient has nominally been under the care of Mr. A., a consulting surgeon of repute. Therefore the medical officer of the municipal hospital does not interfere with the treatment, and when the plaster is removed it is too late. Actually Mr. A. has never seen the patient, and the only active treatment has been carried out by a house-surgeon, qualified a couple of months.

CASE XI

A woman, aged 50, had a Colles's fracture; the arm was reduced and put up on a Carr splint. After one week she was sent to the massage department with no special instructions. The splint was removed daily, and massage and passive movements applied assiduously. There was marked pain, swelling, and decalcification, associated with secondary displacement. Permanent disability resulted. (Fig. 11.)

Comment.—If this case had been in an organized clinic, seen at least once a week, the secondary displacement would have been noticed and the fracture would have been reset and fixed.

CASE XII

A boy, aged 12, had supracondylar fracture of the humerus without much displacement. The arm was put up with full flexion of the elbow, and he was sent out with instructions to the doctor that "movements should be carried out daily." The boy was daily held down by his father while the doctor carried out forcible movements. This continued for some weeks. Result: marked myositis ossificans, with stiff elbow. Permanent disability. (Fig. 12.)

Comment.—Such cruel, useless treatment could never have been carried out if there had been the unity of control and continuity of treatment of an organized clinic.

CASE XIII

A man, aged 27, suffered open fracture of the tibia and fibula in a motor accident. The wounds were infected. He was taken to a cottage hospital, and the leg was put up on a splint and foot-piece. He was retained for two and a half months for the infected wounds to heal. There was firm malunion, with a two-inch shortening and some valgus. Finally he was sent to an orthopaedic surgeon. Reconstructive operation was refused, and he was fitted with a walking appliance. There was permanent disability. (Fig. 13.)

Comment.—This case affords an example of one of the commonest errors. A severe case is accepted in a hospital, where efficient treatment is not carried out at the time, and the patient is then sent to a specialist too late.

CASE XIV

A man, aged 33, had a comminuted fracture of the lower third of the right femur. He was taken to a cottage hospital, where skeletal traction was applied. The pin was removed in two weeks, the surgeon having handed the case over to a colleague. The patient was kept for ten weeks with the leg lying on a cradle splint. There was gross malunion, angulation, shortening, and a stiff knee, with consequent permanent disability. (Fig. 14.)

Comment.—If an x-ray examination had been made at the end of a month the bad position would have been seen and could have been corrected. Skeletal traction should have been continued for at least six weeks.

CASE XV

Through a riding accident a man, aged 30, had a closed oblique fracture of the tibia and fibula. He was placed in a general surgical ward and traction applied, with apparently good results. He was also sent to the x-ray department (traction being discontinued for transport). Naturally, overlapping had occurred. So-called failure of conservative methods suggested operation. Plating was carried out in the approved fashion, and the plate was removed after six weeks as a matter of principle. The patient was then sent for massage and passive movements. After a few weeks there was marked pain, swelling, and angulation, and no callus; the bones were atrophic. A physiotherapist and a biochemist were consulted. Light, diathermy, deep x rays, calcium compounds, ostelin, etc., were administered. After a year there was definite non-union with painful false joint. The patient was fitted with boot and irons, and suffers permanent disability. (Fig. 15.)

Comment.—If there had been skeletal traction for six weeks all this would have been avoided. The bones were devitalized by plating, and then the plate removed and passive movements applied at the very moment when the bones were in their weakest condition.

The B.M.A. Model Scheme for Fracture Clinics

These cases provide fair examples of why so many fractures are slow in recovery and why so many patients suffer permanent disability. Unnecessary suffering and unemployment are being inflicted on thousands, while millions of pounds are wasted by insurance companies, and further millions are lost by workmen. It is easy to prescribe the remedy for this state of affairs, but desperately difficult to have this remedy carried out. The remedy is, of course, organization of treatment, with its triple conditions of unity of control and responsibility, continuity of treatment, and efficient follow-up. The model scheme for an organized fracture clinic is set out by the Fracture Committee of the British Medical Association, and may be studied in actual working in Manchester, Liverpool, and London. Every large hospital, whether voluntary or municipal, should have such a clinic.

Fracture cases must no longer be treated by casualty officers and house-surgeons, and then the patient sent away home, or to the municipal hospital, without adequate instructions. Cases must no longer be treated at two or three different hospitals, without proper co-ordination of the staffs. If cases of bad fractures are admitted into cottage hospitals they should be transferred to the nearest clinic within a short period and not kept for months, or else a special surgeon should be available for consultation at such hospitals, with power to carry out treatment or to advise transfer.

At first sight it would appear that the municipal hospitals are the institutions where the reformed system can most readily be instituted, since these are all under the control of the Ministry of Health. But this is unsatisfactory unless there is an honest liaison between the voluntary and municipal hospitals. Unless there is co-operation, cases will be taken first to voluntary hospitals and early treatment carried out, and then they will be transferred to municipal hospitals; thus the evil of divided responsibility will dominate the situation. Therefore the voluntary hospitals must be prepared to organize their own fracture clinics and then co-operate with the municipal hospitals with one staff, one head, and an efficient follow-up system. In cities where there is more than one voluntary hospital each institution should either organize its own fracture clinic or else refuse to treat fractures, and refer the patients to the hospital which has such a clinic. At present most voluntary hospitals are so overwhelmed by the problem of financial stringency that the managing bodies are disinclined to adopt any new policy which cannot pay its way. The provision of extra paid assistants in the new fracture clinic, the installation of portable x-ray apparatus, the payment of clerical staff to keep the follow-up records, all involve the outlay of money. But we have also to face another difficulty, which is that specialization in the treatment of fractures is not a remunerative job and therefore does not attract many young surgeons.

Consider what happens when a motor accident occurs in which the car is smashed and the driver's bones are broken. The car is sent to the works and the man to hospital; the car is paid for, but the man's bones have to be mended as a matter of charity! It would be only just and fair for insurance companies to be asked to pay for the repair of the broken bones. But they certainly would only do this if compelled by legal enactment, and the innovation would be an addition to their present liabilities. On the other hand, if insurance authorities

could be convinced that organization of fracture treatment would effect so much saving in compensation as more than to cover the cost of the treatment, then the matter would bear quite another aspect.

We claim to have proved that this actual saving would be effected. Böhler has proved it in Vienna, where the national insurance company profits by his organization. Therefore, we are asking insurance companies not to incur further liability, but rather greatly to lessen their present liability. The proper payment of a fracture clinic would involve from £500 to £1,500 a year at hospitals of 100 to 300 beds. This would cover the payment of the director for part-time work, one to three assistants for whole-time work, and the clerical staff. If some force of reason or persuasion could induce the insurance companies to offer the sum I have suggested to every suitable voluntary hospital which would properly organize a fracture clinic, I believe that the present system of *laissez-faire* would give way to one of eagerness to adopt the new suggestion.

ANALGESICS IN LABOUR*

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Discussions on analgesics in labour are so often confined to a series of cases recited with results to mother and child that I intend to approach the subject from a somewhat different aspect, and for the following reasons. (1) Whatever analgesics are employed the results to mother and child in most published series are essentially the same—good; in a search of the literature on the subject I can find no series in which the conclusion reached by the author is that his or her special analgesic is either of little value or even harmful. (2) It is usually left to the critic, who is often an advocator of some different method, to find the fallacies in the therapy employed by others. (3) It is difficult enough to follow a series of statistics from a monograph, but it is still more difficult to follow them when a few lantern slides, bristling with mortality rates, are thrown on a screen just long enough for the observer to fail to read the last line, and almost impossible to do so when the figures are rapidly read out as part of the text of an address. (4) The literature on the subject is voluminous, and having read with a mixture of pleasure and weariness a large part of that published in the last ten years or so, I have come to the conclusion that, though many of the methods described are sound in theory, in practice they are impossible to put into effect as a routine, more particularly in domiciliary midwifery—the practice in which most of us are mainly interested. My reading has led me to the conclusion that a great proportion of the writing on the subject only deals with one part of labour—namely, the second stage—and that no differentiation seems to be made between analgesia, amnesia, and anaesthesia.

Now by analgesia I mean the relief of pain, and when the term refers to labour it must obviously apply to the whole of labour—that is, from its commencement to the termination of the third stage. This brings me on to the dangerous ground of just how far analgesia is desirable and expedient in the interests of the mother and the child for the whole of a labour, as well as the degree to which the analgesia should be pushed. We are all agreed that complete analgesia can be secured by full doses of chloroform, but even the most ardent advocates of complete analgesia

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