THE ABDUCTION METHOD

CONSIDERED AS THE EXPONENT OF SURGICAL
PRINCIPLES IN THE ROUTINE TREATMENT OF
FRACTURE OF THE NECK OF THE FEMUR *

BY

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I take the invitation to represent conservatism at this meeting as a formal endorsement of the proposition that I have upheld for many years—namely, that fracture of the neck of the femur is amenable to the rules that govern the treatment of other fractures, and is entitled, therefore, to the same consideration. What may be termed the old or negative standard which has determined the character of the treatment for the past hundred years may be credited to Sir Astley Cooper.¹ For, having demonstrated the inadequacy of artificial appliances to assure the essentials of repair, he succeeded in establishing legal immunity for the surgeon, on the ground that he could not be held responsible for a result over which he could have so little control. Cooper's conclusions were afterwards supported by investigations of the blood supply, which seemed to indicate that impaction, which preserved the continuity of the blood vessels and assured contact of the fragments, offered the only hope of repair. Finally, it was assumed that the fracture was essentially an attribute of old age. Thus the typical patient of the textbooks has always been of the type that would justify neglect of the fracture in the interest of the patient.

For these reasons, to quote from a standard American treatise,² "the ideal object of treatment, restoration of form and function, is rarely to be attempted or even sought." This conclusion as applied in practice is illustrated in a British textbook³ published in 1932! "The patient should be propped up in bed with the limb between sandbags. After about a month the patient should be encouraged to use the limb as much as possible, since union is not aimed at." In theory this teaching applied only to the medial or so-called true fracture. Actually, the distinction between extra- and intra-capsular fractures until comparatively recent years was conjectural, and in quality treatment has been alike for all—symptomatic and perfunctory—"limited to making only so much reduction of deformity as can be expected by moderate traction, and to immobilization by cushions or by a fixed dressing."⁴

The results, both immediate and remote, were quite in accord with the negative standard. According to a Victorian authority⁵ "our prognosis must always be unfavourable. In many instances the injury soon proves fatal, and in all the functions of the limb are forever impaired. No matter whether the fracture has taken place within or external to the capsule, whether it has united by ligament or bone, shortening of the limb and lameness are the inevitable results." Forty years later this prognosis was confirmed by a New York surgeon,⁶ who, from observation of the treatment as conducted in three of the leading hospitals of that city, concluded that "if the patient escapes with his life he must be contented with loss of function, loss of symmetry and equipoise, even if he is not permanently crippled."

Anatomical Mechanics

From this introduction it will appear that the abduction method, which substituted anatomical for artificial mechanics, struck at the foundations of the old order. For by this means deformity might be corrected and displaced fragments apposed with ease and certainty, as was apparent on technical analysis and physically demon-

strable. The application to the patient, however, of what is now classed as conservative treatment was quite another matter, since in applying it one must disregard all the time-honoured inhibitions. Thus the adventurous surgeon in correcting deformity might commit the "surgical crime" of breaking up an impaction, the only hope of union, and, in enforcing the necessary restraint, might imperil the life of the patient. Furthermore, the command of anatomical mechanics for the attainment of a definite purpose, to be supplemented by the construction of a comfortable and efficient plaster splint, required a much higher standard of technical preparedness than had ever been at the command of this neglected injury.

In the course of years, however, in spite of active opposition and the inertia of standardized neglect, the abduction treatment has come into general use, and this experience has discredited all the assumptions which have supported the negative standard. The fracture is relatively common at any period of life, even in childhood, and in the great majority of the cases effective treatment of the fracture is the most conservative treatment of the patient. For, paradoxical as it may seem, the plaster spica, which has always borne the brunt of the adverse criticism of the abduction treatment, by preventing bed-sores and static congestion of the lungs, formerly the chief factors in the mortality rate, has made positive treatment of the fracture practicable even in old age.

Capacity for Repair

Of 441 cases of medial fracture treated by this method and reported by several observers, 126 were over 70 and fifty-seven were over 80 years of age. Successful results in the eighth and ninth decades have become commonplace, and one has been reported at the age of 102. Yet the mortality that can be attributed to the treatment must be small indeed, since in several hundred cases reported by different surgeons the average rate was less than 7 per cent.

In former years the capacity of the complete medial fracture for repair was a debatable question, and union was usually attributed to the character of the fracture rather than to the efficiency of the treatment. Thus, of 136 cases of medial fracture treated at the Charity Hospital of Berlin, reported by Hübner⁷ in 1930, union was attained in but 6 per cent. Of 169 cases reported by Katzenstein of Berlin in 1928, the proportion of union was 11.6 per cent., which according to Axhausen⁸, who discussed the paper, fairly represented the general experience.

The lowest percentage of union⁹ reported of the abduction treatment is over 53. From this it ranges to 90 per cent. Henderson of the Mayo Clinic¹⁰ estimates the prospect of repair at 90 per cent. in patients under 60 and at 65 per cent. in those beyond that age. Yet Stern¹¹ in a group of seventeen patients over 70 reported union in 78 per cent.

Thus far this exposition has followed conventional lines, in considering only the question of repair of the medial fracture. Those at the base have received little attention, because in the words of an authority, "they get well anyhow, under good or bad treatment." Yet in spite of this inherent capacity for repair this type of fracture furnishes a large contingent of the disability once supposed to be inevitable after this injury. Thus of 341 cases of fracture at the hip among the inmates of a Poor Law infirmary, reported by Stebbing, 67 per cent. were extracapsular.

Now that the positive standard has been established the correction of the deformity characteristic of fracture at the base is of equal importance to the adjustment of the fragments of the medial fracture. Since, therefore, both forms are treated effectively by the same method

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the old distinctions are no longer of any immediate therapeutic importance. From this standpoint the report of Löfberg²⁰ on 264 cases of fractured hips treated by the abduction method is of interest. In 172 of these the fracture was intracapsular. Bony union was attained in 67.5 per cent. and good function in 90 per cent. Ninety-two were extracapsular. In all of these union and satisfactory function was attained. The death rate was 6 per cent. It seems fair to conclude, therefore, that in this comprehensive sense one may count on satisfactory results in 80 per cent. of the cases in which the abduction treatment has been efficiently applied, as contrasted with 23 per cent. of the eighty-six cases of the same mixed types investigated by the British committee.

Operative Treatment

Operative intervention, with which conservative treatment is to be contrasted, has changed its status in recent years. Formerly the argument in its favour was based on the futility of conventional treatment. Even as late as 1924 Koenig¹² advocated immediate removal of the head and fashioning the base of the neck into an oval surface, which, when implanted in the acetabulum, might serve as a stable support in locomotion. The spiking operation also, with which this discussion is particularly concerned, was introduced by Nicolaysen¹³ forty years ago as the only means of apposing the fragments securely. Its most notable exponent in recent years has been Delbet.¹⁴ In 1921 he reported on thirty-five cases in which the fragments had been fixed by a screw. In four of these bony union was attained. Even this small proportion he considered as encouraging, as he had never before seen union of a medial fracture.

The present status of the spiking operation must be credited to Smith-Petersen.¹⁵ He based it on the logical proposition that since the capacity for repair had been so amply demonstrated by the abduction treatment, the percentage of failure might be materially reduced by more accurate adjustment and fixation of the fragments. With this design the fractured surfaces were completely exposed, adjusted by direct manipulation, and fixed by the flanged nail, now generally adopted. In 1931 he made a careful report of the final results of seventeen operations, which from a personal communication I am able to complete to date. In a first series of 24 cases union was attained in 75 per cent. In a second group of 26 cases the percentage of union was slightly over 70. Several deaths occurred during treatment, but none was caused directly by the operation.

The experience of others has been less fortunate. Böhler,¹⁶ for example, has reported on twenty-two of these operations; five patients died within a few days; there was post-operative infection in five; and in five instances it was necessary to remove the nail. Bony union was attained in 59 per cent.

The third form of operation, described by Johansson¹⁷ in 1931, was a revival of the extra-articular method of Nicolaysen with modern improvements, making it a composite procedure. The fragments were apposed by the abduction method and fixed by the Smith-Petersen nail. His own contribution was the introduction of a slender drill as a guide, on which, after the adjustment had been verified by x-ray examination, the modified nail was threaded and driven home. This type of operation has been generally adopted because it is comparatively free from operative risk. Although the adjustment of the fragments cannot be as accurate as by the open method, the results are said to be even better, because of the lessened injury to the blood supply. The most attractive feature of the spiking operation to the surgeon is the relief from the responsibility that the construction and adjustment of the plaster spica entails;

and to the patient the curtailment of the period of restraint and inactivity. Thus, according to Wescott:⁸ "In a few hours the patient is ready for a wheeled chair and may at once if so disposed enjoy the use of crutches." Böhler permits weight-bearing in a month. Others are more conservative, but all consider the nail as a secure support independent of the progress of repair. Both Johansson and Wescott published their reports within a few months of the first operations and subsequent writers have been more concerned with the immediate treatment than with the functional results. Thus one might infer from the literature that the determining factor in success is the proper adjustment of the intramedullary splint.

Criticism of Operation

Smith-Petersen's report furnishes positive evidence to the contrary, for it demonstrates that this method, even in the hands of its originator, has not lessened the percentage of failure. Indeed, it might be suggested that the insertion of the nail must impair the capacity for repair by injuring the cancellous tissue on which it depends. Furthermore a certain degree of disintegration of tissue often precedes union, as indicated by shortening of the neck. In that event the fragments would be separated by the means designed to appose them.

The early resumption of activity as presented by Wescott, the most attractive feature of the spiking operation, is of doubtful advantage from the functional standpoint. The cortex of the femur in elderly subjects is often fragile and it might give way under the strain that leverage and weight-bearing must place upon the nail and thus prevent repair. The most constant factor in the disability once supposed to be inevitable after this injury is restriction of the range of abduction. Even after the limb has been fixed for weeks in full extension and abduction, it has been found necessary to carry out a routine of what the patients call stretching in these directions to check the tendency to progressive limitation of the range of motion essential to the normal gait. It may be questioned, therefore, if spiking the fragments will so reduce the sensitiveness of the joint during the prolonged period of repair as to control the tendency of the limb toward flexion and adduction so characteristic of injury or disease of the hip-joint.

As has been noted the object of the campaign that has been carried on for a full generation has been to establish surgical principles as the rule of practice. In the treatment of other fractures these principles may be applied by a variety of methods. In this instance, because of the shape and position of the neck of the femur, it is only by utilizing anatomical mechanics that the opportunity for functional repair may be assured.

According to Mosenthal²¹ "the real obstacle to the adoption of the abduction treatment as a standard routine had been inability to meet its requirements." Yet in competent hands these requirements are very modest, since neither elaborate apparatus nor skilled nursing is essential, as is evidenced by the results attained under the hard conditions of country practice.

From this standpoint operative methods considered as a substitute for conservative treatment must have a very restricted scope, except, it may be suggested, in a new direction.

Thus far the leading hospitals have played a very minor part in the establishment of the positive standard. Now, however, an operative method that requires technical skill and the control of the accessories required to make it effective may open wards from which these patients in the past have been excluded.

Thus a further contingent may be diverted from the path which, according to Sir Robert Jones, has led the majority to the Poor Law infirmary.

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SHELLFISH AND THE PUBLIC HEALTH*

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That sewage-polluted molluscan shellfish can transmit the infection of typhoid fever and other diseases to the human consumer was established beyond controversy about forty years ago, the names of Broadbent in this country, and of Conn in America, being conspicuous in this connexion. Public confidence received a severe shock, and ever since that time the industry in this country has been, and rightly, under a cloud. Although the incidence of typhoid fever from all causes has greatly diminished, cases attributed to the consumption of shellfish, some of them terminating fatally, are still reported from time to time; whilst cases of gastro-intestinal disturbance are by no means infrequent.

Apart from harbouring and transmitting pathogenic organisms, shellfish from unclean beds are manifestly a dirty food. How dirty it is may be realized when the list of unpleasant things which go down sewers is considered, coupled with the fact that an average-sized mussel or oyster can filter out, and retain within itself for a considerable period, practically all the suspended matter from at least ten gallons of water in twenty-four hours.

It may be said that, had we set out to devise a method of ensuring the continued existence of typhoid fever in this country, we could hardly have thought out a better plan than that of turning out the crude sewage from large centres of population on to a shellfish bed, and then distributing such shellfish all over the country. The success of our experiment might be doubly assured by importing, as we do, shellfish from countries in which the incidence of typhoid is much greater than in our own. The intentional pollution of a dairy water supply would hardly be as efficient; at any rate, any resulting infection would tend to be spread over a less wide area. The disposal of sewage by discharge into the sea, etc., is described as "purification by dilution." In the presence of shellfish the process might almost be described as "purification by concentration."

The role of shellfish as agents in the perpetuation of typhoid fever was emphasized by Sir George Newman, in a Report issued in 1920: "... as long as sewage-polluted

shellfish are consumed by large numbers of the population, it is doubtful whether the incidence of the disease [typhoid fever] will be reduced much below its present level." Since that date the amount of sewage discharged in the vicinity of shellfish beds has increased. Migration to the coastal areas, due to increased facilities for locomotion, has been one of the chief factors at work.

Previous Remedial Measures†

Attempts to grapple with the situation have been made, but the measures adopted have been ineffective. Removal of pollution by the deviation of sewers is impracticable owing to cost. Processes for treatment, or so-called purification, of sewage offer no solution of the problem. Sterilization of sewage effluents by chlorine has been successfully applied on a small scale, but the costs of installation and proper supervision of operations put it out of court as a safeguard of general application. Relaying on unpolluted ground is impracticable, especially in the case of mussels, for which suitable relaying grounds can rarely, if ever, be found. If they could, the cost of inspection to ensure that the relaying was properly done, and that the shellfish were not repolluted by storage in foul inshore waters prior to marketing, would be prohibitive. Moreover, relaid polluted mussels rapidly foul relaying grounds, rendering them a source of danger. Several mussel-relaying schemes were inaugurated some twenty years ago, and one at least is still operated in a desultory fashion, but the conditions are such that improvement in the mussels can hardly be looked for. Oyster relaying is practised on a somewhat larger scale, but in no case are conditions ideal, and in certain instances they are open to severe criticism.

Closure of polluted fisheries by Administrative Order, under the Ministry of Health Shellfish Regulations (1915 and 1934), has been resorted to on a considerable scale, approximately two-thirds of the mussel beds in England and Wales being closed. A similar ban has been placed on certain oyster fisheries. In view of ever-increasing pollution, further restrictions would appear to be inevitable. The resultant gap in the supply is filled, to a large extent, by imported shellfish; but these, in turn, are often seriously polluted.

Wholesale closure of shellfish beds, while crippling the home industry, fails to provide adequate protection from the public health point of view. The Public Health Acts interdict only the taking of shellfish "for sale, distribution or exposure for sale for human consumption." Any one is at liberty to collect shellfish for his own consumption, or for sale for bait. Evidence is not lacking that mussels, ostensibly taken for these purposes, find their way to local and remote markets. The difficulty of presenting evidence sufficient to secure a conviction for these evasions of the Closing Orders, together with the lack of enthusiasm sometimes displayed in the administration of the Orders, accentuate the unsatisfactory nature of the position. (In two cases, control of a fishery is secured by Regulating Order under the Sea Fisheries Act of 1868, the taking of shellfish for any purpose, except deposit for purification, being banned; but legal and other considerations render unlikely further resort to this procedure.)

Purification Systems

The conclusion that we must accept a gross and constantly increasing sewage pollution of shellfish beds as an accomplished and *unalterable* fact is inescapable. Twenty-one years of study of shellfish and close association with the shellfish industry has confirmed my original conclusion that the only solution of the problem lies in the application of a satisfactory system of purification, under con-

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