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JOINT DISEASES;

TREATMENT BY REST AND FIXATION.*

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The application of rest as a principle in the treatment of joint disease, although very generally accepted, is yet frequently employed only as an adjuvant to other measures of relief, while its proper position is in the first rank, and all other means are but subsidiary.

The principle is capable of wide application in medicine. Splints—rest-producers—are applied in fractures and in wounds to limit inflammation. Inflammations of the pleura, liver, intestines, or peritonæum are best controlled by absolute recumbency. In joint inflammations, quietude, unaided and alone, is capable of effecting more in averting and subduing a developing disease than iodine, blisters, heat, cold, the cautery, *et id omne genus*. These measures, powerless in themselves, are, however, useful as supplemental treatment; but no surgeon is justified in trusting to their power when dealing with a disease which is so prone to develop the most serious results if neglected. As soon should

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he trifle with a bleeding femoral artery or a post-partum hæmorrhage. In osteitic cases, especially, the evil tendency is so strong that no time can be lost.

Those who advocate the "motion-without-friction" cure assert that motion is the normal condition of a joint, which statement, while true as regards normal articulations, is no more applicable to diseased ones than to inflamed muscles or other tissues.

Friction is constant during walking. I took occasion to count my steps for a single square to-day. Ninety times each of the joint surfaces of my lower limbs was concussed between the stone pavements and the superincumbent weight of my body in two minutes, or nine hundred times in a walk of a mile. If inflamed or roughened, the effect of such friction would be just as disastrous as the rubbing of a hard substance upon an irritated external sore or pimple, and the results, though temporarily concealed, would be none the less destructive. Nature evinces her aversion to motion by producing the most perfect rest which she is able to accomplish unaided. Muscular rigidity is the first and most common *avant-coureur* of danger.

When I speak of rest for a joint I do not mean that it should be that form of confinement to the house that allows the child to run up stairs, and play at games which will be more severe upon his articulation than walking. If the affected member is the lower limb, it should under no circumstances be placed upon the floor, and, until pain and all signs of acute inflammation have subsided, the recumbent position should be unceasingly maintained. If starting or spasmodic pains are present, weight and pulley extension should be employed, and fixation enforced until relief is secured. Then, and only then, should crutches and apparatus be used. By the careful enforcement of such a course, synovitis, if taken early, can be aborted, and articular ostei-

tis so modified that its evil effects will be reduced to a minimum. Surely if such results are compared with the terrible consequences which follow procrastination, or temporization with ineffective counter-irritative measures, the slight restraint put upon a child at a period of life when a few months or even years are of slight importance can not be considered for a moment.

The abortion of articular disease is considered impossible by some surgeons, but cases of traumatic origin can within the first ten days be easily checked. The skeptical maintain that such a case is not one of true joint disease. It certainly is not articular osteitis; but a flame is as much a fire, save in degree, when first started, as when it has become a conflagration, and every suppurating articulation had a stage when it was but a tiny spot of irritation. One week of proper early treatment is more efficient than months of later work. The one objection to absolute rest can be obviated by rigid rules in regard to the admission of fresh air to the room. Windows should never be closed night or day, as warmth can be secured by additional coverings.

My practice is about as follows: For use by day a narrow platform is constructed of light boards, with a handle at each end, and on it is placed a firm hair mattress. To one end is attached a grooved pulley-wheel, over which plays the extension cord, with from two to ten pounds attached —comfort regulating the weight. This bed can easily be picked up by two persons and laid upon rests beneath the trees or on the porch, or it can be placed and locked upon a child's express-wagon, or, better, upon a frame wagon with easy springs. If removal is painful, the entire fixture can be laid upon the couch at night, but ordinarily the sliding upon a bed is not harmful, provided extension is maintained.

By this method an abundance of fresh air and exercise

can be secured with little expense, and the patient will be contented and happy. When the starting pains are severe, and especially when the patient is intractable, the addition of sand-bags, or, better, of a Desault long splint, will be of service for the first ten days. This splint, covered with muslin or bandages, can be retained in position by an underwaist, to which it can be fastened by safety-pins. A rope stretched above from head to foot, together with a few toys and bent wires, will assist in sports and remove the great temptation to sitting up. After restlessness has ceased, the side-splint can be removed, and the freedom of sitting upright for an hour when weary does no injury, provided twisting is avoided. Should these means fail to relieve pain, the direction of extension should be changed and a plaster-of-Paris, leather, felt, or binder's-board splint be fitted. Wire gauze also has been applied, and constitutes an excellent dressing. It makes but slight difference how fixation is accomplished, and each surgeon will have his own particular method. I am speaking now of uncomplicated cases in their early stages, having in mind chiefly knee and hip inflammations.

If extension is commenced in the line of the deformity, a change for the better can soon be accomplished until gradually a more normal position can be secured. In many cases a cautious surgeon can gain considerable time by straightening the limb during anæsthesia, but such a procedure requires the utmost caution lest new inflammation be excited. Tenotomy and aspiration are often advantageous.

I have no doubt that strict confinement in bed would be sufficient without extension in slight cases, but it is difficult to prevent a child from quietly slipping off the couch unless some decided impediment is offered. The method may be temporarily adopted, however, where the other treatment is

viewed with disfavor, since, at the end of a weeks o great is, the mitigating power of time, the parents will acquiesce in a restraint which at first seemed unwarrantable to them. Counter-irritants can be used if desired, since they exert a good influence at least upon the attendants. All hygienic, supporting, and constitutional measures should be most carefully watched.

The time of confinement varies according to the conditions. In the hip much will depend upon the synovitic or osteitic character of the disease. If synovial, slight, and traumatic, a few weeks may be sufficient; but, if osseous in origin, several months should elapse after all cessation of pain before the crutches should be permitted. Night extension is often beneficial, even many months later. A simple over-gaiter is then the best foot attachment. If the knee is at fault, extension is rarely required for any length of time, simple fixation with rest being all-sufficient. These conditions are much more readily secured than at the higher articulation. It is better for the patient, however, to remain in bed during the acute stage, since more perfect quietude can be obtained. If the inflammation is violent, not only must fixation be secured by the adaptation of a posterior splint of wood, leather, felt, binder's board, tin, etc., but ice should be steadily applied in a rubber bag, or coil, or bladder. The action of this powerful agent upon the capillaries may be enhanced by covering the skin with lint wet with a saturated solution of sugar of lead, made anodyne in its properties by the addition of opium. Leeches also may be of service in an acute traumatic case.

In osteitic cases, however, the chief reliance must be upon rest, a condition which is most thoroughly secured by fixing the limb in the most comfortable position by gypsum or other material. If slight deformity with effusion has occurred, the procedures before alluded to must be prac-

ticed. Sponge-pressure or a close-fitting rubber bandage is of great service. If there is a tendency to posterior displacement of the tibia, extension must be made in two directions: one weight drawing downward, while another band is placed around the upper third of the leg, at right angles to the axis, and through a pulley in the ceiling the limb is suspended in such manner that forward traction is continuous upon the head of the tibia. Should this fail, tenotomy of the ham-strings will frequently hasten relief; but when displacement is great, of course, ligaments are destroyed, and even if restoration is accomplished it can not be maintained without absolute fixation.

In knee arthritis which is osseous in its origin, or when the joint is undergoing pulpy or fungous degeneration, when good position has been secured, or when ankylosis is to be desired, the complete incasement of thigh and leg is better than posterior splints. The enveloping ones of sole-leather, which can be laced and made removable, or the lighter ones, of partially tanned hide, are, however, very serviceable in the later stages. It is, of course, understood that all these appliances are intended to promote as perfect rest as possible, and that walking without crutches is absolutely to be forbidden, the injunction being that the foot shall *never* be brought to the ground. Without this restraint many steps about the house will be taken and great injury inflicted by friction. A high shoe upon the sound foot prevents the striking of the toe, and removes the temptation to walk.

Slight injuries or trifling synovitis may, of course, recover by counter-irritation, cold, etc., even though rest be but partial; yet even these cases are not without risk, and should receive the closest attention.

Osteitic cases, the old "white swellings," demand, from their inception, the most rigid enforcement of the principle

of complete fixation, while every available constitutional health promoter is brought actively into service.

In hip disease, after all pain has ceased for months, and earlier if the general health demands, some form of apparatus should be applied to prevent joint motion and yet permit the patient to move about on crutches, and with a high shoe on the sound foot.

In this department every surgeon has his particular modification, and believes that it alone is capable of giving good results. While pleading partially guilty of the same weakness, I am yet able to see merits in all fixation splints. As for the so-called extension appliances, although I have seen nearly all of them in service, I can not imagine that they exert any separation of articular surfaces. By adhesive-plaster and bandage-pressure their beneficial action is, however, probably exerted in controlling muscular action, and thus giving a certain amount of rest, fixation, and protection, particularly in those appliances in which hip-joint motion is transferred above the pelvis. I employ horizontal extension, not with any idea of pulling the bone from its socket, but simply to relieve muscular spasm, give quietude, and reduce deformity.

I am compelled also to differ with many skilled surgeons, who believe that the perineal straps and ischiatic rests are capable of acting as pelvic crutches, and thus doing away with axillary ones. The tissues covering the pubic rami are thin and the skin is sensitive, and, as I have always encountered these appliances, the patients either could not endure the pressure, or, as more frequently happened, the straps, except for an hour after the physician's visit, were so loose that the weight was borne upon the articulation, and relapse has been the result. Even when most perfectly adapted, the jar upon the hip is far greater at each step than is received during axillary locomotion, and the liberation of

the arm from restraint is not sufficiently compensatory for this harmful action.

Only a few weeks have elapsed since I saw a most lamentable instance of this effect, although the splint was in most careful hands and was one of the best of its kind. Hutchinson's plan of permitting the patient to go about with crutches and high shoe, without splint, is a method to which we are often obliged to resort among poor patients, but it compels the hip-guarding muscles to remain in a vigilant state during the entire day, in consequence of which increased congestion starting pains will continue throughout the night in spite of extension.

The surgeons who strive most earnestly to obtain a cure with motion are the ones who are obliged to perform the most resections. Decide upon the instrument that will give the most absolute rest, and you will make the best cure. The indications are to fix the joint, protect it from injury, maintain proper position, and yet be light and comfortable. Innumerable methods have been tried in order to secure these results at slight expense. Binder's board, leather, plaster (even when stiffened with tin strips)—all fail in the case of active boys, owing to the long leverage and great strength of the thigh muscles. Leather answers best, but in adults so large a piece is required that the expense is considerable. Vance's splint is a good form. Thomas's posterior bar and Agnew's modification answer a good purpose, but are open to the objection that sitting is impossible in a proper position. To accomplish it, therefore, the boy soon learns to twist his body, and also his hip, thus giving the joint each time a decided strain. This appliance, however, has many advantages which are not to be obtained in other forms, and is especially of service in dispensary and country work. Simple bars of cast-steel, one, two, or three sixteenths of an inch in thickness, and from one

half to one inch in width, can be easily cut to proper length and bent by wrenches or in a vise by any practitioner, so as roughly to fit the posterior part of the body from the thorax to the calf. Two tin strips to encircle the body, and one each for the thigh and leg, can be soldered or riveted to this upright, and, when all is fixed in position by gypsum bandages, a very rigid support is obtained. The encircling bands can be made of steel, which, when covered with leather and provided with buckles and straps, give a removable apparatus that, though less effective, is more comfortable and cleanly.

Any rigid material is as good as plaster. One great drawback to gypsum in its fixation uses has been the uncleanliness and annoyance of making the bandages. This is now avoided, since the instrument-makers are furnishing them for $2.50 a dozen, which is much cheaper than to make them one's self. The crinoline should always be open-meshed, and the plaster fresh. Oven-heating will often be of service. Muslin bandages will not retain sufficient gypsum. In order to secure the fixation of the joint and yet permit the sitting posture without the necessary twist produced by Agnew's or other instruments, I employ a lock joint, which is perfectly rigid except at the moment of sitting, when the simple lifting of a bolt from a mortise permits flexion, while at the same time no lateral or rotary motion is possible. On rising, the lock is easily managed under either male or female clothing, and the articulation is protected from blows on all sides. The joint is attached to Y-shaped arms, riveted to thigh and body enveloping bands of leather or felt. The trunk section must extend as high as to the lower angles of the scapulæ so as to embrace the thorax. For accurate adaptation, a plaster cast of body and thigh should first be taken; but approximation may be secured by leather cut to measure, then wet and fitted to the

body. Russian felt can also be employed, as it is readily molded when heated and sets quickly. Lace hooks complete the splint and render it removable at will.

Objection has been raised to my apparatus, that it permits motion; but experience shows that the simple temporary flexion movement is far less injurious than the twist necessitated by other fixation splints, since it is impossible to restrict patients to standing and lying. Chance's splint, like my own, embraces the thorax—a condition which I consider essential, since pelvic bands permit compensatory motion too near the hip. Crutches, and a high shoe on the sound foot, are always used with this appliance. Its total weight for a child need not exceed one half pound. While not an extension splint, its action is to relieve the articular surfaces by controlling muscular action and by distributing the pressure over a large area of surface, just as a plaster or leather jacket relieves the vertebræ by transferring weight to the material through skin contact. The great support given to the hip by this splint is markedly evidenced in its employment for ununited intra-capsular fracture and in paralysis. If we prefer extension apparatus, we have a choice among many varieties—Taylor's, Sayre's, Gibney's, Judson's, Bauer's, Stillman's, and a score of others. I have already stated my objections to them. Each has its advocates, and doubtless each surgeon can report good cures; but it is not a particular splint which cures hip disease. The good progress of a case depends upon the fidelity and care which both surgeon, nurse, and patient give to the proper guarding of the joint, to the carrying out of all the little details of treatment, to the strict obedience to the command of non-use of the limb, to the persistence of all these through the years of first, second, and third stages. Each case will test the ingenuity of the surgeon and the patience of the sufferer.

I have purposely omitted the treatment of the suppura-

tion stage of the separate joint diseases, with all the various complications, since their discussion would lead us on to excision and the later stages, which our space will not allow; but the principle of rest is at all times applicable and beneficial. I can not forbear, however, to insert one word in regard to diagnosis. Whenever muscular rigidity is present about any articulation, too much attention can not be given to its significance, due as it is to the fact that neighboring joints and muscles are supplied by the same sets of nerves, and irritation of an articular branch fortunately displays the warning signals—*muscular fixation* and *starting pains.*

At the ankle and foot immobility can be secured by wood, binder's board, felt, silicate of sodium, starch, oxide of zinc and glue, gypsum, or any other convenient means, rest of the inflamed surfaces being the result to be obtained. The means of securing this will vary with the joint affected, whether ankle, tarsal, metatarsal, or phalangeal. The principle is applicable to all stages, and, as caries of the bones almost always co-exists, it will be found that gypsum will answer best, since it can be easily windowed, and, if varnished, is quite non-absorbent of pus. A tightly fitting stocking is the best under-dressing. The more absolutely rest is insured, the less will be the inflammation and the smaller will be the suppurative results.

If the case is of long continuance, a molded leather splint which can be laced is of advantage. Walking without crutches is never allowable. Long-continued suppuration is the rule, and free drainage must be established. Gouging, excision, and amputation are, unfortunately, often required in the later stages.

The primary fixation position in this articulation, as in all others, should be the one which gives greatest comfort.

Extension knee and ankle splints are in no wise superior to fixation ones, and are far less comfortable. They can

not safely be used without crutches, and are useful only so far as they give quietude to the joint, a result which can be secured with much greater ease and benefit to the patient by other means, at one tenth the trouble and expense.

When strumous inflammation attacks the sterno- or acromio-clavicular articulations, the osseous structures are almost sure to be primarily or secondarily affected. In a case which came under my care last June, a few weeks sufficed to cause destruction of the ligaments and head of the bone. Tissue-death continuing, the anterior two thirds of the clavicle perished, and, protruding through an integumentary opening, were easily removed.

To retain these two articulations in a position of quietude, the same means should be adopted as are employed in shoulder disease.

At the shoulder we have a joint which, though but seldom the subject of articular osteitis, yet when attacked is, from the movable character of the scapula, so difficult to keep at rest that ankylosis, suppuration, and bone-death are very frequent results. If "extension with motion" was the true theory of treatment, we ought here to have most admirable results, since the weight of the extremity makes an excellent extending force; but, on the contrary, we are usually doomed to disappointment.

To produce partial rest, the arm should be bound to the side of the body, borated or salicylated cotton being interposed between the two skin surfaces. If the patient is young, a large body-waist or broad muslin strip is better than bandages. The shoulder can be still left exposed for counter-irritation, if desirable. Should maceration of integument take place in the axilla, a sling may be worn for a few days, with a shoulder-cap of binder's board.

At the elbow it is not difficult to maintain rest, but, as the majority of cases of arthritis met with at this joint are

strumous, and commence in the humerus, extensive suppuration is the rule. A permanent splint is better than one that is removable, and nothing answers better than plaster of Paris. The angle of fixation should at first be the one that will relieve pain, but changed from time to time so as to give a good position in case of ankylosis, the hand being placed slightly in pronation, so as to avoid the tendency of the head of the radius to displacement as disorganization advances. If the swelling diminishes, the incasement can be slit and tightened, or a new one applied. Traps can be cut for counter-irritation or to give exit to discharges. The aspirator should be used early, sponge or elastic pressure being afterward applied. Suppuration from the humeral condyles is common, and excision is frequently demanded. A laced leather splint is often convenient.

The wrist joint, like the ankle, is subject to a strumous form of inflammation which may extend to the bones, or, as is perhaps more frequently the case, an osteitis may involve the joint and pass to all the carpal bones and articulations. To apply the principle of rest, we have here, first, to tightly wrap the wrist and hand with an adhesive-plaster bandage, which exerts pressure and tends to prevent the posterior displacement of the carpus which is so common when the dorsal ligaments give way. Over this should be applied a gypsum bandage, the hand being held during the hardening process midway between supination and pronation. This dressing answers much better than a palmar splint, and windows can be cut as required. If one prefers any other form of immovable dressing, it may answer just as well; but, if salt is added to the water in which the bandages have been soaked, the quickness of setting is decidedly in favor of plaster over any other material. Shingles and stiff paper are, of course, more constantly at hand, but require careful subsequent attention and are not nearly so cer-

tain in their fixation powers, since bandages will constantly loosen. In chronic cases a removable leather splint is useful.

The caries of bones and the fungous degeneration of the synovial membranes very frequently demand partial or complete excision or amputation. Unfortunately, surgical interference is frequently followed by increased bone-death, as is also the case in the tarsus.

To sum up in outline:

1. Rest subdues joint inflammation more effectually than all other means combined, often aborting, always lessening, an impending process. Its employment is indicated by nature; its beneficial influence is seen in every domain of medicine; in theory it is rational, in practice it fully proves its power.

2. The more perfect the rest, the greater will be the diminution of pressure, friction, tension, and inflammation, and the less will be the resultant ankylosis and suppuration.

3. The means for securing rest and fixation are exceedingly simple, and can be applied by every intelligent practitioner.

4. Counter-irritation is but of secondary importance.

5. In inflammations of the sterno-clavicular, acromio-clavicular, and scapulo-humeral articulations the arm should be fastened to the body, which takes the place of a splint.

In elbow disease the member should be immovably fixed in a semi-flexed or in an extended position; pressure, aspiration, puncture, drainage, excision, etc., to be employed as necessary.

In the wrist and hand articulations the same principle is to be enforced, long-continued rest being necessary. Early exit of purulent accumulations must be secured antiseptically by the bistoury, and the progress of caries carefully watched, the surgeon interfering only when nature is unable to properly accomplish separation or health fails.

In the ankle and foot the same will hold true, fixation by plaster or other rigid material being complete and permanent. Locomotion for even one step without the aid of crutches should be positively forbidden—an injunction which is equally applicable to diseases of the knee and hip.

At the knee, the question of counter-irritation, immobilization, or rest in bed with extension, will depend largely upon the amount of traumatism and the existence or absence of muscular rigidity. When nature indicates by the last-mentioned symptom that motion is harmful, delay in enforcing one of the latter measures is criminally negligent.

Serous effusion should be aspirated, pus evacuated antiseptically, free drainage maintained, and excision practiced as soon as it is decided that destruction has occurred.

Permanent rest and fixation, with the use of crutches, are far better than any form of extension that can be applied in the upright position.

In hip disease, horizontal extension with fixation answers best for the acute stage. Three months after the cessation of pain, if deformity has been largely reduced, the erect position may be assumed, provided the joint is put at rest by a fixation apparatus and the high shoe and crutches are used.

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