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W. H. Wagstaffe
to Wm Anderson
Jan 29th 95

1.—THE OPERATIVE TREATMENT IN PARALYTIC FLAIL JOINTS.

2.—A NOTE ON THE TREATMENT OF INJURIES ABOUT THE ELBOW.

BY

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? put in remarks made at meeting

Has his book yet been published?

Illustrations wanted to these papers.

THE OPERATIVE TREATMENT OF PARALYTIC FLAIL JOINTS.[1]

By Robert Jones, F.R.C.S.E.,

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I wish to draw attention to but one phase of treatment in connection with the after-effects of polio-myelitis. I allude to what may be called the operative treatment of flail paralytic joints; joints, in fact, deprived of function by complete, and not partial, paresis of all the muscles governing their movements. The discussion of the treatment of limbs less severely affected than this is absorbing, but too comprehensive for the present occasion. Suffice it to say that our leading surgeons are more prone to take a pessimistic view of the limitation of their art in this department than the possibilities warrant, and they are apt to relegate to the physician, functions, which they could themselves infinitely better perform.

Within the last ten years I have had under treatment over 600 cases of the effects of polio-myelitis, and of this number a not inconsiderable section exhibited complete paralysis of the muscles influencing movement in both knee and ankle, or in ankle only. The difficulty and expense connected with the purely mechanical treatment of these cases, extending as it does over the whole of a lifetime, will be readily appreciated, and it is this fact as much as any other which helped to persuade me to try and transform the flail limb into a member approximating as closely as possible to the splint which I wished to discard. In a large majority of the so-called complete paralyses of the lower limb the psoas and iliacus muscles are unaffected; and all mechanical means are therefore based, if to be of real use, upon the integrity of these muscles. The knee and ankle are kept fixed, and the psoas muscle is prepared to carry the leg, splint and all. In consequence, we are very apt to find our more weakly paralytics very easily tired by the weight of their support, and so they fail in availing themselves of the opportunity which presents to strengthen their only pair of muscles of progression.

The procedure I intend to bring before your notice is that of anchylosing the knee and of partially anchylosing the ankle, and in support of my practice I append a brief outline of fifteen cases upon which I have operated. These do not comprise all cases up to date, as there are eleven remaining, not included in the list, a sufficient time not having elapsed to render it advisable to publish results, although they promise very well.

[1] Read at the British Medical Association Annual Meeting, Bristol, 1894.

The operation consists in opening the joint, and with a scalpel or sharp gouge peeling the *superficial area of cartilage* off the whole articulation in the case of the ankle, and gouging the bone in the case of the knee, keeping the joint completely at rest for some weeks subsequently, and for a long period fitting the limb with a simple apparatus which will enable the patient to walk without throwing a strain upon the newly-fixed joints. An excision is more than the case requires, and involves a greater sacrifice of tissue than an already shortened limb can spare. To expose the knee I make an incision across the front of the joint, covering fully half its circumference, and curved so as to pass below the lower end of the patella. The flap is turned up and all the vessels ligatured. I next remove the semilunar cartilages, and with sharp, short bladed knife or gouge, peel away the cartilages and the underlying layer of bone, so as to leave a raw surface over the whole of their extent. The crucial ligaments are generally left intact. The structures are then carefully reunited by deep and superficial sutures, no drainage tube, of course, being employed, and the wound is well covered with perchloride wood wool wadding.

The operation may be carried out in the ankle-joint in one of two ways, according to the circumstances of the case. In old cases, where the foot is deformed and assumes the equino-varus variety, the astragalus is well to the front. In such, I force the foot into a position of extreme equino-varus, and make an incision immediately in front of the external malleolus, following the line of the ankle-joint and dividing all structures down to the astragalus, generally only severing the peroneous tertius tendon. The other tendons are held aside, and the articulating surface of the astragalus exposed. With a gouge or knife several grooved portions of the articulating cartilage are removed. If complete bony anchylosis of the ankle be desired it will be necessary to gouge bone. If a fibrous anchylosis be wished, it will be sufficient to peel off parts of the cartilage. The ankle is kept extended while some pieces of the articulating surfaces of the tibia and fibula are removed. A few vessels are tied, the foot is placed in its normal relation to the leg, and a suture or two close the wound. A pad of wood wool tissue applied over all and firmly bandaged completes the procedure.

In other cases the astragalus is more easily approached from behind, and in such the foot is firmly flexed on the leg and an incision down to the bone is made along the external border of the tendo-achillis. The posterior ligament is now freely divided, and the gouging takes place as in the former operation.

No mishap has occurred in any of my series of twenty-six cases. Each wound has healed by first intention, and, contrary to expectation, those cases where trophic changes were most marked healed as readily as those whose nutritive conditions were nearer normal. (Bearing upon this point, I may mention that if a fracture occurs in these dwindled, mottled, blue, cold limbs as I have on occasions observed, it unites without any appreciable delay.) There is little or no pain attending the healing of the wound. If I have to operate upon both knee and ankle, I apply two splints, one a flexible metal splint so designed as to permit of early dressing of the ankle wound, and a Thomas's bed splint for the knee. These can be used admirably in combination. During the stage of getting about, the Thomas's splint can be altered to admit of walking, and the ankle is in that way saved from every harmful influence.

I have not included in this list a similar operation which I perform in talipes calcaneus often accompanied by pes cavus. It gives to my mind very much more satisfactory results than the shortening of the tendo-achillis as suggested by Mr. Willett. Some years ago I operated on several tendons in the prescribed manner, but I can only recall two cases where the improvement was maintained for any length of time, and in these, prior to operation, there was considerable muscular power in the muscles related to the tendo-achillis and in their opponents. The moment we try to pit a paralysed tendo-achillis, shortened by operation, against the superincumbent body weight exercised during locomotion, it can only have one result, and that is a fresh and speedy yielding of the tendon. We must have some vitality in the gastrocnemius and soleus. If Willett's operation, plus exsection of cartilage, be performed, we shall obtain considerably better results, for on exhibiting the joint from behind we can remove and shorten the tendo-achillis, and remove just sufficient cartilage to limit the action of the ankle to about 20°. The same procedure may with benefit be applied where, in addition to an elongated heel tendon, the tibiales have been completely paralysed, producing a deformity of calcaneo-valgus which cannot be rectified by the hand.

The following are the rough outlines of fifteen cases which I trust I have sufficiently abbreviated to avoid tiring you:—

It is necessary in all cases to prolong for a considerable period the use of apparatus, as it takes a considerable time for the joints to become so securely fixed as to bear the body weight and the ankle lever strain. These, however, can be discarded as soon as the surgeon finds that the knee

TABLE

ILLUSTRATING MR. ROBERT JONES'S CASES OF OPERATION FOR FLAIL PARALYTIC JOINTS.

No.	Sex	Age	Age at Onset.	Muscles Affected.	Past Treatment.	Condition prior to Operation.	Operation and Date.	Result and Subsequent History.
1	M.	9	1 year 9 months.	Muscles controlling ankle.	Electricity, massage, calliper splint	No voluntary movement of ankle or toes—nutrition impaired. Valgus deformity.	Cartilage peeled off ankle joint January, 1894. Incision in front of ankle joint.	Patient walking with high boot and side iron Expresses himself as being much stronger on the leg. Ankle in good position with ten degrees of movement. No valgus deformity.
2	M.	13	2 years 3 months	Muscles controlling ankle.	Electricity, shampooing.	Slight movement of toes no movement of ankle. Stands on inner side of tibia. Leg cold, somewhat blue.	February, 1894. Cartilage peeled. Incision in front.	Five or six degrees of motion at ankle. Patient walking with small outside splint which reaches from below knee into heel of boot. Much less discomfort in walking.
3	M.	7	3 years.	Muscles controlling knee and ankle.	Faradism — massage, calliper splnt.	No voluntary motion in knee or ankle.	February, 1894. Shaved cartilages off knee gouged bone, leaving the crucials in situ. Shaving off patella. Ankle joint opened and upper layers of cartilage removed.	Now walking with calliper. Can lift leg and ankle without aid of splint. A little movement in ankle, less than ten degrees. Walks distinctly better than before operation.
4	F	11	2½ years.	Muscles controlling ankle.	Faradism--massage —shampooing. Very heavy side iron	Patient walking on inside of ankle. Joint quite flail — nutrition fair.	March, 1893. Joint opened in front. Cartilage peeled off.	Walks well with light side support. No tendency to eversion of foot. Few degrees of movement at ankle.
5	F.	17	2½ years.	Controllers of ankle complete.	Thickened boots, side irons. Willett's operation.	Ankle quite flail. Nutrition good. Could slightly move toes Knock knee due to short limb and flail ankle.	Ankle joint gouged through small opening in front. January 3rd, 1894.	By aid of side iron could manage to walk three miles without becoming tired. Could stand on ankle without inducing deformity. Fifteen degrees of motion.
6	M.	13	2¼ years.	Controllers of ankle complete.	Calliper splint — massage.	Nutrition good. Ankle quite flail. Walks on inner side of foot.	January 20th, 1894. Ankle joint laid open by semicircular opening and carti-	Patient now in Ireland. Parent writes, "Stiff foot is a godsend."

7	F.	14	3 years.	Controllers of knee and ankle joint complete.	Calliper splint — massage.	Nutrition very good, leg warm. Ankle and knee quite flail. Hyper-extension of leg on the thigh. Toes curled.	May, 1894. Ankle and knee joint laid open and cartilage removed. Crucial ligaments left.	Patient can walk short distance without splint and without deformity. Can lift leg when lying on back. Fifteen degrees motion in ankle. Slight movement in knee. Limb guarded by calliper splint.
8	M.	13	1 year 5 months.	Controllers of knee partial, ankle complete.	Crutches until 11 years. Calliper splint and massage.	Nutrition Bad. Ulcer of leg. Foot valgoid on standing.	May, 1894. Ankle cartilage cleared by incision from front.	Considerably improved with thickened sole and outside iron; walks with but little limp. Much stronger on leg. Still wears calliper splint.
9	F.	6		Controllers of knee partially, ankle completely.	Calliper splint and massage for three years.	Foot valgoid. Considerable displacement backwards of astragalus.	Cartilages removed. Incision from behind.	Left with measles. Rather too much movement still in ankle, which is in much better position. Some valgus deformity remains. Will operate again.
10	M.	9	2 years.	Controllers of ankle complete.	Mechanical massage	Ankle flail. Valgus deformity. Pes cavus, backward displacement of astragalus. Nutrition good.	Ankle opened by incision to outside of Tendo achillis. May, 1894.	A few degrees of movement in ankle. Walks much better with cork sole and outside iron.
11	F.	8	2½ years.	Controllers of knee partial, ankle complete.	Calliper splint.— Electricity massage.	Valgus deformity on standing. Inner malleolus touches ground.	February, 1894. Cartilages peeled off ankle.	Position of ankle much better. No appreciable lateral movement. Flexion to ten degrees. Walked for four weeks against surgeon's wish. Improved position of foot maintained.
12	M.	10	2½ years.	Knee and ankle.	Crutches.	Nutrition very bad. Hyper-extension of the knee, curled toes, pes cavus. Displacement of astragalus backwards	January, 1894. Knee opened round patella by anterior flap. Ankle from behind.	Walks (with calliper splint) well. Ankle quite anchylosed. Knee still betrays a little movement. July, 1894. No deformity excepting cavus.
13	F.	19	2 years.	Ankle controllers	Crutches — early tenotomy of hamstrings.	Nutrition good. (*a*) Contracted knee. (*b*) Genu valgum. (*c*) Flail ankle.	January, 1894. (*a*) Ankle joint cartilage cleared. (*b*) Contracted knee forcibly straightened. (*c*) Osteotomy for genu valgum.	Ten degrees movement of ankle joint. Knee quite straight. Patient walks admirably with calliper. Can stand without deformity on removal of splint.
14	F.	19	3 years.	All muscles below knee.	Calliper splint — massage.	Nutrition much impaired. Toes curled. Marked valgus deformity.	Ankle joint opened in front. Cartilages grooved Dec., 1893.	Fibrous anchylosis. About ten degrees motion. No deformity; can walk long distances.
15	F.	8	2½ years.	Controllers of knee and ankle.	Calliper splint — massage.	Impaired nutrition, cannot stand.	April. Ankle opened in front. Cartilage removed, same in knee.	Scarlet fever. Long before she recovered. Making good progress. No deformity, some little movement in knee and ankle.

is completely anchylosed, and a limited but free movement in the ankle varying from five to fifteen degrees is sharply and firmly checked in front and behind.

In looking up the literature of this subject a few days back I find that Albert first suggested *excision of the knee* in paralysis, and that other operations have been reported by Wolff of Berlin, and Zinsmeister. This of course is only interesting from the historical aspect. I am conscious that a sufficient time has not elapsed to fully test the integrity of these altered joints, but I feel very confident from present appearances.

If I succeed in persuading some of my surgical friends to adopt these operative methods, it cannot fail to result in rendering much needed assistance to a sadly neglected group of cripples.

A NOTE ON THE TREATMENT OF INJURIES ABOUT THE ELBOW.[1]

By Robert Jones, F.R.C.S.E.,

During late years the subject of injuries about the elbow joint has received considerable attention from the profession. The difficulties experienced by surgeons in making an accurate diagnosis, the facility with which serious blunders can be made in prognosis and treatment, and the fear shared by so many of subsequent limitation of function serve to render injuries in the neighbourhood of the elbow less attractive than they might otherwise have proved.

In 1892 I treated upwards of seventy cases of severe injury to the elbow; in 1893 I tabulated one hundred and ten; and this year to the end of July sixty-three cases have passed through my hands. I mention this for one reason only, and this is to show at the outset that I have based my conclusions upon a somewhat unique and extended experience, and not upon the success or failure of a few cases. In the present note I do not intend to tabulate these cases, nor to discuss at any length the varieties and diagnosis of fractures and dislocations, but will rather endeavour to describe the method of treatment, which in my experience has been an unquestionable success.

Some years ago, feeling dissatisfied with the outer and inner rectangular support then and even now in vogue, I introduced the posterior rectangular thin sheet iron splint, with the kettle handle interruption at the elbow. This allowed of a much more careful adaptation of fragments, and was so constructed as to lessen the need of tight bandaging. This splint, which met with a favourable reception at the hands of surgeons, I now very rarely use; indeed I may say only in those cases of compound fracture with loss of bone where dressings have to be combined with rigid fixation, and where anchylosis may be confidently expected. During the time I used this splint I was uufortunate enough to meet with two bad results. The one was a case of inter-condyloid fracture in a boy of fourteen, which, at the end of six weeks, seemed firmly anchylosed, and the other in a girl of twelve, who, at the end of five weeks, after a simple backward dislocation with apparently no complication, exhibited a moderately firm anchylosis not attended by limitation to supination or pronation. In the first case I forcibly extended, supinated,

[1] Read at the British Medical Association Annual Meeting, Bristol, 1894.

then acutely flexed the elbow. I applied a bandage round the neck, and for three or four weeks kept it so without indulging my curiosity to the extent of making an examination. My second case was treated in similar fashion, and both made good recoveries with excellent motion. My object in acute flexion was, in the first place, to secure for the bones a position sufficiently changed as to lessen the risk of a re-uniting of old adhesions, and at the same time to attain for the articulation absolute rest after its manipulation. The late Mr. H. O. Thomas, with whose practice I was intimate, advocated a flexed position a little less than 45°/₀ in his treatment of tubercular elbows, and his results I have never seen equalled. These results were brought about, I am convinced, by reason of the fact that no constrictions in the shape of splint and bandage interfered with the physiological activities of the joint. This factor of splint and bandage has, in my opinion, much to answer for in the stiff joints which follow injury. A week never passes without my seeing some child several weeks after accident with a stiff and useless elbow. Hardly one of these cases but gives the usual history of rectangular splint, pads, bandage and early passive motions. I used to experience similar results until my observations of Mr. Thomas's tubercular cases led me to adopt the acutely flexed position for all injuries of the elbow, excepting fracture of the olecranon. The treatment I would advocate then is that all injuries of the elbow, excepting fracture of the olecranon, should be fixed at an acute angle, and kept there until all inflammatory symptoms have subsided. This routine should be adopted whether an accurate diagnosis has been made or not, for I find it is only those gentlemen of very limited experience who never fail to diagnose an elbow lesion.

When a child is brought with injury to the elbow of recent origin, one observes his demeanour. If he carries the arm at an angle of about 70°/₀, does not support the hand, appears in no great pain, his forearm pronated, I immediately suspect that rather common outpatient condition generally called subluxation of the head of the radius. If so I put my left thumb into the bend of the elbow over the radial head, supinate and acutely flex the arm. Almost invariably a small click under the thumb confirms the diagnosis. In a week or nine days the child will be able to freely use the arm. If the case should happen to be one of sprain, simple or severe, I again supinate and acutely flex, for in that position the elbow cannot be further flexed, checked as it is by the neck, nor will the halter admit of extension.

Should the next case be one of separation of epiphysis or fracture above the joint I again extend, supinate and flex, for by these means you most effectively correct the usual forward displacement of the lower end of the humerus and that without the baneful influence of pads. If it be a dislocation backwards, extend and supinate and acutely flex, for unless the dislocation be completely reduced you cannot place the hand to the neck so that one is assured of reduction and success by this routine.

Should the radius be dislocated inwards and forwards the same treatment is indicated. The extension and supination reduces the displacement and the acute flexion prevents the recurrence of the deformity. If the fracture be intercondyloid or T shaped the position of acute flexion has this advantage—viz., that it secures at once the right of way before exudation of callus and displaced condyles can prove obstructive. Should the injury be separation of the inner epicondyle, there is no better way to keep it from the common downward displacement than by acute flexion to relax those muscles which govern its direction. It is impossible in the right-angled position to secure replacement of the lower end of the humerus without pads, and it is unfortunately quite possible to only partly reduce a dislocated elbow or a dislocated radius while the arm can easily be maintained in a rectangular posture.

If I am correct in assuming that this position is the best attainable what consolations it offers us in the matter of treatment and prognosis. All we have to do is, in every case doubtful or otherwise, to extend, supinate and acutely flex. Then we simply leave matters as they are. I generally apply the Thomas halter, which is simply a bit of leather tubing to protect the neck, through which a piece of bandage is attached to a leather band round the patient's wrist. The ball of the thumb rests against the neck. No splints should under any circumstances be applied; and in accordance with the conditions that are present the arm should be kept in that position for from three to six weeks.

At this stage I may offer a word of warning against the routine use of passive movements. In my own practice I never use it until the stage of consolidation and inflammation has passed, and I would emphatically discard the advice so frequently given—to commence passive movements from the second to the third week. If there be fracture this advice means more exudation of callus; if inflammation of joint structures, more plastic effusion; and where neither of these graver conditions exist there can be no object in so prolonged a restraint as to render passive

movements necessary. The object of the surgeon in treating fractures about the joints should be:

1. To allow free circulation in the limb.
2. To obtain complete rest for the injured structures until they assume their normal condition.
3. To *posture so that the callus exudation shall not unduly hamper* the joint movements.

It is impossible to apply with advantage splints round the elbow joints of children. The plaster and bandage has to so tightly surround the arm that swelling and interference with reparative processes invariably result. The halter secures absolute rest from the normal movements of the elbow. Fixed to the neck no further flexion is possible, and the halter effectively debars extension. All movements are performed at the shoulder.

In confirmation of this argument I refer you to the two ancient cases where an anchylosis was rectified by extension, supination and acute flexion; and I would further point out that this is the principle, and only principle, upon which the restoration of movement in old, difficult, traumatic elbows can be conducted. In cases of old dislocations it is sometimes necessary to flex the arm in two or three stages, with two or three days interval, rather than jeopardise the integrity of the olecranon. Even where a sham reduction has alone been aimed at and effected the approximation to the normal can only come by acutely flexing the arm. Such sham reductions, many of which my predecessor, Mr. H. O. Thomas, and I have performed, give a most extended range of movement, indeed quite as much as though we had fully reduced the ancient dislocation. If these are the methods adopted for securing the best available movements in ancient cases they should suggest to us the need of giving them our allegiance in recent cases also. We should discard the rectangular or straight position in the treatment of fractures about the elbow, those of the olecranon of course being excluded.

The question is now asked, when should the sling be discarded? In the case of a dislocation in from three to four weeks, in the case of a fracture through shaft or condyles of humerus in from five to six weeks. This should always be done in experimental fashion. When the surgeon thinks the time for movement is about due, he should slacken the sling so that the hand falls about a couple of inches. In three or four days the patient is asked to raise his hand to the position from which it has dropped; if he fails, the sling has to be re-adjusted, if he succeeds, then the sling can be either dropped lower or altogether dispensed with. If, so to speak, the hand fails after a few

days opportunity to respond to the invitation offered by the slackened bandage to drop it two inches, then one may fear an anchylosis and act accordingly in the interests of a useful limb.

To sum up, I conclude from a singularly extended observation of cases, treated by various methods both in the practice of my predecessor, Mr. H. O. Thomas, and in that of my own.

(*a*) That splints should be discarded in all cases of injury of the elbow joint, excepting in those cases of compound fracture and dislocation where anchylosis is assured, and in fractures of the olecranon.

(*b*) That passive motions should be avoided until the consolidation of bone has been completed, and until all inflammation has subsided.

(*c*) That whether a diagnosis can be made or not the arm should be forthwith extended, supinated and acutely flexed, and kept in such position until recovery has taken place.

If these principles are adhered to anchylosis will prove a rare result. Sometimes with separation of either condyle cubitus varus or cubitus valgus will remain as a deformity. It is, however, of no consequence either from an æsthetic or functional aspect. Sometimes the joint falls short by a few degrees of complete extension; but I am fully persuaded that the best results in the greatest number of cases can only be realised by extending and supinating the arm, and acutely flexing the elbow.