example, a patient with an arm amputation can do the job perfectly well with one arm and he has been tested out in our workshops and found fully able to do it, then we say he is fit. The more skilled the man before his disability, the easier it is to retain him, but if a completely unskilled lad who has just started his training has a severe motor-cycle accident with multiple injuries, it is probably on the whole better to let him make his start in civil life rather than run the risk of being behind in the very competitive field of service promotion. The more skilled the man and the longer he has been in, the bigger effort we make to keep him in. Very often it is possible to keep people with quite severe-looking disabilities in the service because disability and function are very often two entirely different things.

REHABILITATION OF THE ATHLETE

W. E. Tucker, *C.V.O.*, M.A., M.B., F.R.C.S.
(*Consulting Surgeon, Royal London Homoeopathic Hospital*)

I am including within my terms of reference concerning the rehabilitation of the athlete, the comprehensive treatment of athletic injuries, right from the start of the symptom through to the end when the athlete is rehabilitated to full activity. This means restoration of strength, stamina, speed and, as Ian MacQueen has said, " the other ' s '—(p)sychological status ".

The Southampton Football Club has the slogan "Treat and train", and this has always been our slogan too, so that whenever possible the patient is kept fit and in training while his injury is being treated. For example, there is the famous case of one of the British Lions rugger team in 1955 who broke his carpal scaphoid and his wrist was put in plaster; he became the greatest place-kicker in the team because for two months he did nothing but practise place-kicking.

We find also that athletes differ in their degree of fitness, according to that needed for their particular sport. For instance, the batsman does not require to be as fit as the fast bowler; and the professional rider takes a chance where the amateur need not.

Few medical practitioners have a clear conception of what is meant by the restoration of extensibility and flexibility of muscles. Often an athlete declares he has full range of movement in the elbow,

wrist and finger flexors when in fact he cannot extend his elbow and dorsiflex and extend his fingers to the extremes. The same thing occurs with extension; unless he can extend his elbow, flex his wrist and make a fist, he does not possess full extensibility of the extensors.

To counteract complications such as joint effusions, wasting of muscles, adhesion formation in muscles and loose flail joints, we adopt an active therapeutic approach. This consists of (*a*) appropriate first-aid treatment; (*b*) examination and diagnosis employing ancillary aids such as x-rays by the medical practitioner at the medical centre. He must decide whether the treatment is to be conservative or operative; (*c*) an outline of the treatment is given to the injured athlete so that he can help himself by self-treatment throughout his convalescence; (*d*) if a physiotherapist is employed as is usual in conservative treatment, exact instructions are given as to physiotherapy; (*e*) the trainer is brought in as soon as possible so that the athlete is never allowed to lose time in rehabilitation. I would refer you to my book on *Home Treatment*, to which Sir Harry Platt very kindly wrote a foreword.

Geigy, who are helping us today, have produced in one of their Documenta series *The Doctor and the Sportsman* and Ian MacQueen has a very good article in it on the various aspects of training. These include specific training for special groups of muscles and basic training which is now divided into circuit training, weight training and the Boy Scout practice of alternately running and walking, which was the basis of Bannister's running the mile in four minutes. He did a fast quarter and then a slow quarter, a fast quarter and a slow quarter, and all the time he was speeding up his slow quarters until he made it in four minutes.

Removable support if possible

If the patient is to have physiotherapy and do home treatment conscientiously he cannot do it in a closed plaster. Wherever possible we employ split plasters or some other form of removable support such as felt and elastic webbing. If the athlete is due to play in a game he may have to be strapped but this is not done until just before the event.

Manipulative therapy

This is extensively employed. Some people think that we pull the injured athlete about but we do nothing of the sort. We practise very gentle manipulative movements from the start. Of course one must be careful in cases of elbow joint injury because of the risk of myositis ossificans. Very often, however, by combining manipulative methods with other forms of physical treatment a sprained joint can be made to recover completely in four weeks,

whereas without correct manipulative therapy the joint only makes a 75 per cent recovery and sticks at that until it is manipulated under an anaesthetic and adhesions are broken down. Gentle manipulative techniques should include (*a*) traction and countertraction to pull the joint surfaces apart and stretch the capsule and overlying tendons to their normal extensibility; (*b*) carrying out the involuntary movements which are gliding, side bending and rotation, still with traction and countertraction applied; (*c*) finally the voluntary movements with traction and countertraction are carried out.

I know Sir Harry Platt has practised these methods for years; Robert Jones also practised them, and Sir James Paget wrote about them in 1868. However, many doctors still fail to give gentle manipulative treatment.

In considering manipulative therapy, the joints above and below the injured joint must be restored to full range of movement as well. For example, muscles coming from the shoulder affect the elbow and those going from the elbow affect the wrist. Thus in restoring the movements of an injured elbow we must be sure there is full movement also in the wrist and shoulder joints.

I still believe that septic foci play a part in precipitating injury or retarding recovery. Only yesterday a doctor was telling me that after he had had a tooth out a certain muscle which had torn repeatedly had ceased to tear. We must remember also that the older athlete may be a gouty person, so that he may be helped by butazolidin, tanderil, aspirin, benemid or colchicine.

I describe what I call the negative and the positive phases of healing. A direct injury which may result in a large haematoma and tearing of tissues is, at the beginning, in what I call " the negative phase ". When the haematoma is absorbed and the torn tissues begin to mend, " the positive or healing phase " commences. However in the older athlete with a shoulder injury there may be a degenerative state associated with cervical spondylosis superimposed on his injury. In a case of this type therefore it is sometimes difficult to be certain what phase the injury is in. There are difficult cases as well, such as tendinitis of the tendo-achilles. Some of these get better with injections of xylocaine (lignocaine) in so-called red solution, which contains urea and salicylic acid. With support, injection therapy and physiotherapy, a large majority of these cases get better, but there is a hard core of cases of inflammation of the tendo-achilles which do not recover until they are subjected to operation. Hydrocortisone must be employed with great care in cases of tendinitis as its use can precipitate a complete rupture.

Generally, muscle and joint injuries can be divided into degrees of injury such as mild, moderate and severe. As a rough rule a

mild muscle or joint injury should be symptom free in a week, but it may take a further week for the athlete to be a hundred per cent fit; a moderate one may take two weeks and a further two weeks for full recovery; whereas a severe one needs three weeks to be symptom free and a further three weeks to return to full activity. If it has not fully recovered at the end of six weeks, the possibility of there being a damaged intra-articular structure, such as a meniscus tear in the case of a knee injury, should be considered.

One of the aims of active treatment is to avoid the complications of haematoma formation which can sometimes persist for years. They include the formation of:

(*a*) a fibro-fatty mass in the subcutaneous tissue
(*b*) an encysted haematoma with serum in the centre
(*c*) a clot undergoing fatty or pigment changes
(*d*) painful thickenings—
  (i) where converging tissue planes form " dead " areas or
  (ii) near main blood vessels
(*e*) myositis ossificans in muscle or a fibrotic muscle
(*f*) pus from infection of an encysted haematoma.

A haematoma in the thigh muscles which spreads down to the knee is often associated with myositis ossificans but we no longer have this trouble as we give injections of local anaesthetic such as hyaluronidase and varidase, or chymoral by mouth. If possible we aspirate the clot or make small incisions through the deep fascia and express much of the haematoma. With the active therapeutic approach which includes faradism and gentle activity, the haematoma is absorbed quickly and myositis ossificans therefore does not form.

A hobby horse which I ride on all occasions is the prevention of injury by the practice of what I call "active alerted posture". Everybody should be able to stand in this posture for eight hours a day, provided he sits or lies in the passive-supported posture for the other sixteen hours. To demonstrate this, at the present moment I am in the active alerted posture; my weight is on the outer side of my feet, my abdomen is pulled up, my knees are slightly bent, the buttocks are tucked under, and the shoulders are up and slightly forward. If you are driving a car in this position you are alerted and can see what is happening. Hundreds of athletes are examined each year whose posture and execution of basic movements are wrong. We analyse their movements up to the time of the accident and try to correct their faulty techniques. All low-back sprains and strains, are governed by slumping posture. Most people slump forward all the time, and are coming down on the front parts of their intervertebral discs and the nucleus pulposus of the lower lumbar discs are being pushed backwards, eventually perhaps to become herniated.

The whole conception of muscle strain from postural, occupational and recreational causes, leading to joint strain and disc degeneration and osteoarthritis in the spine, and osteoarthritis in the weight-bearing joints, is one which may account for so-called 'fibrositis'. These fibrotic nodules cannot be seen under the microscope but nobody has yet tested them chemically; it would seem there is something in the muscles which behaves exactly as a bruise.

If you go to bed for a month and then get up, your feet will swell because you have lost tone in the muscles and the peripheral venous pump is not working efficiently. In the same way if one adopts a slumping posture the muscles are not working efficiently and waste products remain in them which make them tender and are the cause of so-called fibrositis. Correct posture I think makes all the difference in the prevention of injury. If you get your weight on the outer side of the feet and grip with your toes, your feet are like a bow, and when you move you are the arrow and can take off. Your knees go up and down in a piston action whereas in the flat-footed person there is a cross drag on the patella with wearing of its articular surface. The athlete must hold his shoulders up, so that when he does something he does it against a firm prime fixing level. If I send you away with the idea that you must hold up your tummies, I shall feel that I have accomplished something. Our slogan is to develop " a rock bottom and pinch proof posterior ".

Having been to the United States and seen what is being done by orthopaedic surgeons such as Don O'Donoghue in Oklahoma City and Austin Moore in Columbia, South Carolina, I feel that in England we must get the rehabilitation of athletes on a better basis. There are certain places now which do specialize in rehabilitation of athletes, but generally there are not adequate facilities. The orthopaedic departments of hospitals are dealing with a vast amount of road and industrial fractures, and most of the physical medicine departments are treating rheumatism and arthritis, so that unless the athlete has a friend at hospital, it is difficult for him to get ideal treatment under the Health Service. That is why some of us think that there must be established in this country, as there is in every other country, an institute of sports medicine. For example, whenever we get the opportunity we send our injured athletes to such places as the R.A.F. Rehabilitation Centre at Headley Court, because it is an ideal place for recovery to full activity.

Salient points in the rehabilitation of the athlete should include:

(*a*) co-ordination in the work of every member of the team—first-aid workers, the doctor and his staff, the patient himself, the physiotherapist and the trainer. It obviously includes the fullest co-operation of the athlete

himself in carrying out his home treatment.

(*b*) the greatest gentleness in dealing with damaged tissues. Muscles in spasm are coaxed out of spasm by the application of heat, cold and gentle manipulative technique.

(*c*) the active therapeutic approach appreciates the right amount of rest from strain and activity without strain.

(*d*) the appreciation of the phases of healing, the negative and the positive.

(*e*) the application and use of new drugs such as hydrocortisone and hyalase by injection, combined with local anaesthetic; chymoral and varidase by mouth or injection.

(*f*) the aspiration or expression by incision of traumatic swelling such as haemarthrosis and haematoma formation.

(*g*) the purposeful aggravation of the injured structure at the appropriate time.

Summary

The object of all treatment is the restoration of the damaged tissues to as near normal as previously, so that the athlete does not suffer loss of strength, stamina, speed or psychological status.

Problems to solve—what is there to treat?

Direct injury to muscles: contusion, bruises, haematoma formation

Direct injury to joints, bursae, tendon sheaths: contusion, bruises, haematoma formation, synovial effusion

Indirect injury to muscles: tearing of tissues, haematoma formation

Indirect injury to joints, bursae, tendon sheaths: tearing of tissues, haematoma formation, synovial effusion. Often the structures in this type of injury are torn on one side of the joint, whereas those on the opposite side are compressed and contused

Effects of injury

Loss of resilience of tissues
Loss of muscle extensibility, flexibility and tone
Haematoma formation and its complications

How these effects are counteracted by the active therapeutic approach

First-aid treatment

Medical centre—surgeon, examination, diagnosis, operative, conservative (Suelmex—*su*pport, *el*evation, *m*assage and *ex*ercises)

Home treatment by the patient
Physiotherapy
Trainer

Home treatment by the patient

Rest from weight-bearing or strain (either complete, moderate or minimal)
Exercises; at first without strain, later resistive
Baths
Home massage
Poultices
Support

Treatment by the physiotherapist

Heat (lamps and shortwave), massage, faradic stimulation, anodal galvanism

and sinusodal, ultrasonic, deep x-ray, ultra violet light
Manipulative therapy
Interferential therapy

The salient points in treatment

Co-operation of whole team
Gentleness stressed: force never used
Muscle spasm coaxed
Advances in treatment—drugs which help absorption
Decompression (expression and aspiration)
Injections
Role of corticosteroids
Graduated movements
Manipulative therapy—see figure
Progressive daily improvement

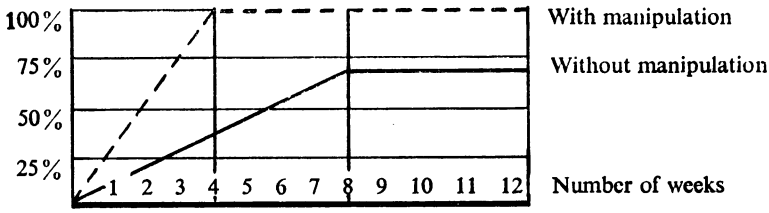

Figure 1.

Chart showing percentage of restoration of movement with and without manipulative treatment

Broken line indicates both voluntary and involuntary movement given

Continuous line indicates voluntary movement only given

Prevention of injuries

Accident precautions stressed
Alerted posture universally taught
Athlete made conversant with the mechanics of movement as applied to his particular sport.
Accidents analysed—faults corrected
The necessity of a concentrated, balanced training programme is accentuated

Phases and stages of recovery

Negative and positive phases which coincide with—acute, subacute and chronic stages

The difficult case to make symptom-free quickly

Factors to be considered:
Age of patient: in the older patient recovery not so rapid
Severity: the more serious the injury the slower recovery
The duration of injury before active therapeutic approach commences
The negative phase may be associated with night pain and vascular disturbance
Presence of septic foci: recurrences are common
Reaction to treatment: purposeful aggravation

Various types of athletic injury

Muscle—mild, moderate, severe, including rupture

Joint—	mild:	ligamentous, no synovial effusion
	moderate:	synovial effusion, slight tearing of ligaments
	severe:	synovial effusion, severe tear or rupture of ligaments, with possible involvement of intra-articular structures such as in the knee, the menisci.

DISCUSSION

Question: Is there any early time limit to injecting torn muscles with a haematoma; how soon would you inject them—at once, or would you rather wait until you think the bleeding has stopped?

Mr Tucker: I can give you an instance of a man bumping himself in a squash court and feeling nothing until he had a bath and then felt a little stiff. By nine o'clock that night his thigh was swollen like a rugby football, and he was in agony with sciatica. The pain was stopped by injection—not of hydrocortisone but of local anaesthetic and making a little incision next day. Some people will tell you to do nothing for 48 hours, but I think that with a cold compress and varidase or chymoral, perhaps even hyaluronidase, for the first 48 hours a tremendous lot can be done to lessen the amount of haematoma.

Question: During the last 12 years I have had to read a good many case papers from men in the Army, the Navy and the Air Force; I have been struck by the excellent presentation of case notes from the R.A.F. and I wonder whether the Army and the Navy have specialized rehabilitation centres like the one at Headley Court.

Wing-Commander Wynn Parry: The Army has one at Chester, but we use these on a regional basis; for example, if a soldier needs rehabilitation in the South of England he will come to us, and an Air Force patient in the North of England might go to the Army place. The Navy had an extremely good centre during the war, but they stopped it shortly afterwards. I've seen a film of their original centre, and it looked absolutely first-class, but the trouble with rehabilitation in the Navy, as I understand from my naval colleagues, is that you have to be so fit if you are going to be on board ship in all weathers that only the very fittest persons are retained. I think it is true to say still (it certainly was when I was in close contact with