TREATMENT OF ARTHRITIS
BY INTRA-ARTICULAR INJECTION

DUDLEY M. BAKER, O.B.E., (Mil.), M.D. (CANTAB.)
Northwood
(Northwood, Pinner and District Hospital)

In a previous paper (1948) a clinic for the treatment of osteo-
arthritis was described and certain conclusions were drawn. The
technique used was that described by Waugh (1939). The value of
this method of intra-articular injection was considered proven but
the value of acid solutions not proven. It was felt that the success
was due to varying combinations of three factors. Firstly, the
injection of local anaesthetic allowed a pain-free period during which
"auto-manipulation" was carried out. Secondly, the liquid injected
into the (usually) dry joint cavity acted as a lubricant and presumably
"spread" the hyaluronic acid which tends to persist even in the
degenerate joint (Kellgren, 1961). Thirdly, the bringing together of
fellow sufferers at a clinic where relief was given coupled with the
advice as to active movements and exercises to be carried out as
homework, produced a progressive atmosphere far more helpful
than in some physiotherapy departments where so often the patient
feels the treatment is being done for him and requires no active
effort from him. One cannot exclude the effect of such group
therapy and must accept it gratefully as a constant adjunct to the
physical benefit achieved by the injection treatment alone.

Over the last 13 years I have seen little reason to change these
views. When suspensions of corticosteroids suitable for intra-
articular injection became available, these were tried. At the lowest
valuation it was felt they might provide an innocuous physiological
substance raising the osmotic pressure within the joint and thus
prolonging the period of "wetness" and lubrication—a substance
of high molecular size which might dialyse but slowly from the
joint. At the highest they might have some almost "magical"
rejuvenating effect on the degenerating tissues. In between these,
the anti-inflammatory qualities might reduce some of the muscular
spasm and periarticular fibrosis.

In an attempt to consider and compare the merits of corti-
costeroids over previous simpler substances, an analysis has been made of cases seen in a small clinic which was started in 1949 in an outpatient department of a small suburban general-practitioner hospital.

**Organization**

The clinic is held every fortnight in the outpatient department. The room is divided by a screen. On one side of the screen is a couch, used for hip injections; on the other, a chair for patients requiring injections in other joints. With this arrangement it is possible to treat one patient while a second is being undressed and the injection site receiving an initial cleansing by the nurse. A 2 per cent solution of cetrimide has been used for skin preparation and this has been found perfectly satisfactory.

A careful case history is taken at first attendance and x rays arranged. At subsequent attendances the progress is assessed. The range of movement is measured and the degree of crepitus and pain on passive movement noted. In weight-bearing joints the gait is watched. These are repeated after injection and any difference noted.

**Discussion of Individual Joints**

**Shoulder**

*Pericapsular arthritis or frozen shoulder.* Intra-articular injection of corticosteroids remains the most effective treatment. In my experience prednisolone trimethylacetate has not been obviously more successful than hydrocortisone. The approach used has been to inject medially below the middle of the outer end of the acromion, directed medially above the humeral head.

*Supraspinatus syndrome with or without calcification.* Injury seems to precipitate this on pre-existing calcification. Injection of corticosteroid in and around the calcified area seems to be very effective in enabling abduction to be used. Although there is subjective relief and restoration of function, it cannot yet be said if there is lessening of abnormal calcification.

**Carpometacarpal joint of the thumb**

This is one of the most important joints in the body. It may become worn as an occupational hazard from single violent trauma or is frequently affected in generalized osteo-arthropathy. The approach varies according to the individual joint. Usually after moving the metacarpal with the operator's finger and palpating on the joint, the joint-rim can easily be defined and entered posteriorly or radially, i.e., on one or the other side of the long abductor tendon. About 0.5 ml. of corticosteroid suspension Cb. 25 mg./ml. with 0.5 ml. of 1 per cent xylocaine is sufficient and is as much as can be
injected. Some patients have been under treatment for over 10 years and the range after injection has diminished little in this time. The patient comes for injection when the joint is losing effective range from pain or stiffness.

**Hip**

The lateral approach has always been used. The posterior superior "corner" of the greater trochanter is defined. After a skin bleb has been raised with 1 per cent xylocaine a size 14 needle is inserted inwards injecting as it is advanced. This is withdrawn; a "Hey-Groves" lumbar puncture needle is attached to a 10 ml. syringe containing 1 ml. of corticosteroid suspension and 9 ml. of 1 per cent xylocaine. The needle is directed toward the point where the femoral artery passes beneath the inguinal ligament. This should be painless until the periosteum is reached and the point of the needle will usually contact the junction of head and neck. Reference to an antero-posterior x ray of this joint will be of great assistance. Slight withdrawal of the needle followed by slightly more upward direction of the point will result in penetration of the thickened capsule and entry of the joint. Pressure of the plunger should reveal a stiff rubbery resistance and the injection is achieved against considerable pressure. After the injection, success is indicated by firstly, an immediate and measurable increase in flexion range and secondly, by a modification or elimination of the crepitus which was demonstrable before injection.

Sometimes when the range of an arthritic hip has been markedly increased the patient complains for the first time of pain whose origin appears to be the lumbosacral spine. This seems at first paradoxical as an increased hip range should throw less strain on the lumbar spine in sitting, etc. The only explanation would seem to be that the general increase of the patient’s activity produces pain from an osteoporotic spine. In such cases the introduction of a high protein diet and regular injection of a hormonal anabolizing agent seems, after some time, to stop the pain.

**Knee**

The approach used is usually from the medial side of the patella ligament thrusting upwards and inwards. In some joints there may be osteophytes or a large vein which makes approach from the lateral side more suitable. Penetration of the joint is recognized by the ability to inject fluid easily, cf., hip. The quantity used is the same as for the hip. The needle used is an exploring needle (B.W.G.21—2½ in. long). In cases of early osteoarthropathy (i.e., osteochondritis of the patella) the needle is thrust in through an advancing wave of 1 per cent xylocaine. Once the joint is entered, the needle is left *in situ*, and a 2 ml. syringe is charged with benzyl-
salicylate compound (0.2 ml. rising gradually to 0.5 ml. in succeeding injections) and about 1.5 ml. of 1 per cent xylocain (Ross et al. 1958). In more advanced cases steroid solutions are used as for the hip.

Metacarpophalangeal joint of great toe—‘‘hallux rigidus’’ or ‘‘hallux valgus’’

Injection treatment is useful in elderly patients or those in whom a general anaesthetic for operation is undesirable. The medial approach is used.

General Advice to Patients

A patient is warned that no joint should be forced to the extreme of its available range or beyond (e.g., hauling a leg borne upon an arthritic hip through too narrow a car door; riding a bicycle with crank too long so that an arthritic knee is forced beyond its available range of flexion.

Nor does a joint react well by being held for a long period at the extremity of its available region; e.g., a hand with an arthritic carpometacarpal joint of thumb is ill served by holding a sewing needle for long period when a large handled, carpet-making tool may be more beneficial since the joint is held in mid-range. The possessor of an arthritic knee should never stand for long periods with the joint braced in full extension.

After an injection of corticosteroid the owner of a weight-bearing arthritic joint is advised to rest for 24 hours. This is to make sure that the effect of the local anaesthetic has worn off before walking, lest an unguarded movement sprain the still anaesthetized joint. Thereafter exercise is encouraged but using movements designed not to exceed the available range of movement. Cycling, and walking on soft ground to strengthen the knee and hip muscles should be encouraged.

Analgesics such as aspirin and paracetamol are allowed if needed. Butazolidin can be most effective but its numerous contra-indications and frequent side effects limit its use.

Influence of weight

All patients with affected weight-bearing joints are brought to the clinic and returned home by the ambulance service.

The importance of weight in its effect on pain and disability in the weight-bearing joints cannot be over-emphasized. There is a frequent tendency for the patient’s weight to increase as disability decreases activity, and a vicious circle is rapidly set up. The reducing diet recommended by Dr H. L. Marriott is used and an attempt is made to reduce the patient’s weight as far as possible without affecting health. No appetite-suppressing drugs are used. The advantage of patients attending a clinic regularly is that they
rapidly come to know each other very well, to know each other's handicaps and problems and each is zealous to show his fellow-sufferers how well he is doing. This applies very much to weight reduction. Patients who are on a diet are weighed at each attendance and encouraged or reproved according to progress or otherwise.

**Discussion**

Tables I and II summarize the results of the writer of treatment by intra-articular injections. Although experience of the method is small there seems little doubt that the use of 10 per cent benzyl-salicylate solution in oil in the early stage of osteoarthropathy (i.e., chondromalacia) is of value. Of the five patients under treatment all have shown lessening of pain and crepitus. One patient under treatment for four years now has normal knees and is able to play eighteen holes of golf. Prior to treatment he was only able to hobble a few yards.

**TABLE I**

<table>
<thead>
<tr>
<th>Joints included in this survey</th>
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<tbody>
<tr>
<td>Knees—single</td>
</tr>
<tr>
<td>Knees—bilateral</td>
</tr>
<tr>
<td>Hips—single</td>
</tr>
<tr>
<td>Hips—bilateral</td>
</tr>
<tr>
<td>Metacarpophalangeal</td>
</tr>
<tr>
<td>Shoulders—single</td>
</tr>
<tr>
<td>Shoulders—double</td>
</tr>
<tr>
<td>Total (51 patients)</td>
</tr>
</tbody>
</table>

In groups II and III where loss of joint cartilage is partial and complete but where the shape of articulating surfaces are not grossly altered there is no qualitative difference in response to the different fluids used, i.e., lactic acid solution, hydrocortisone suspension or suspension of prednisolone trimethyl acetate (ultracortenol). The period of relief, however, is in most cases more prolonged when corticosteroid solutions are injected. In these two there seems to be very little difference in response between hydrocortisone and "ultracortenol". These conclusions have been arrived at by subjective and objective assessment; the type of solution used has never been revealed to the patient.

In group IV there is marked difference in the response. In this group there is gross deformity and disorganization of the joint anatomy. Any unguarded movement or repeated strain beyond the anatomical limit of range will inevitably lead to sprain of part of the capsule or an extracapsular ligament. This leads to protective muscle spasm and painful range limitation. In this group the
response to xylocaine or lactic acid is brief—lasting only as long as the local anaesthetic effect. In the corticosteroid groups the effect is much more prolonged since the substances seem markedly to reduce the protective spasm and encourage healing of the ligamentous sprain.

The hydrocortisone dialyses out of the joint more rapidly than the "ultracortenol"—the effect of the latter is much more prolonged and dialysis is much slower (Will and Murdoch, 1960).

**TABLE II**
**GROUPING OF RESPONSE**

<table>
<thead>
<tr>
<th>Degree of joint degeneration</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>5</td>
<td>11</td>
<td>2</td>
<td>3</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>8</td>
<td>27</td>
<td>12</td>
<td>4</td>
<td>51</td>
<td></td>
</tr>
</tbody>
</table>

**Degree of Joint Degeneration**

I (Applies in this sense to knees only)
Post patellar crepitus
Osteochondritis—No x ray change.

II Slight narrowing of joint space
(i.e., incomplete erosion of cartilage)
Pain—but often little loss of range.

III X ray—loss of joint space but little disorganization of joint anatomy.

IV Gross deformity and disorganization, e.g. hip joint which becomes a "roller" rather than a "ball and socket" joint.

**Conclusions**

In osteochondritis 10 benzylsalicylate solution in oil is the solution of choice. Where there is loss of joint cartilage without loss of anatomical shape, hydrocortisone should be used—only 25 mg. of hydrocortisone as against 70 mg. of prednisolone trimethylacetate. The latter represents a vastly greater dose of corticosteroid and the
danger of systemic "spill-over" and suprarenal cortical depression is far greater. A number of surgeons hold the view that the systemic effect of high dosage intra-articular corticosteroids on the suprarenal must indeed be considered.

For group IV where joint disorganization is marked, the benefit of high dosage corticosteroid is so much greater than that of other solutions that the administration is justified. Where however, such patients have to undergo any surgical procedure, the surgeon must be made fully aware of the treatment that has taken place.

Summary

1. The organization of a clinic for the intra-articular injected patient with degenerative arthritis is described and discussed.

2. The effect of different fluids is contrasted and compared.

3. The indications for intra-articular corticosteroid therapy are discussed and the relative merits of high and low dosage steroids compared.

4. The use of high dosage steroid therapy should be limited to those advanced cases where repeated capsular sprain causes protective painful muscular spasm, and the possibility of suprarenal suppression must be appreciated.

Acknowledgment

I would like to thank Messrs Ciba for their encouragement and for generous supplies of "ultracortenol" (prednisolone trimethylacetate), Sister Phillips, Miss Mary Johnson, Mrs Jane Webb, and especially Mrs C. V. Wass for valuable help in the running of the clinic and for typing this article, and all those who have referred patients to me.

REFERENCES

WILL, G. and MURDOCH, W. R., Brit. med. J. 1960, 1, 94.