SOFT-TISSUE RELEASE OF THE HIPS IN CHILDREN WITH JUVENILE CHRONIC ARTHRITIS

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In juvenile chronic arthritis the hips are commonly affected and this becomes the most important reason for losing independence and mobility: the joint develops a painful flexion contracture with marked loss of movement. Soft-tissue release operations consisting of psoas and adductor tenotomies have proved a safe and effective method of relieving pain and improving function. We report 89 such operations in 52 patients. More extensive soft-tissue release operations or synovectomy of the hips offer no advantage and recovery is often more painful and prolonged.

The hip joint affected by juvenile chronic arthritis undergoes a spectrum of change from early synovial proliferation with effusion to total destruction and fibrous ankylosis. Changes result not only from the disease process but also from the secondary effects produced by loss of weight-bearing, deformity, loss of containment of the femoral head within the acetabulum, lack of movement and a rise of pressure within the joint. The hips thus affected stiffen with a marked flexion contracture; this makes walking difficult and imposes secondary deformities on other limb joints and on the spine.

As long as some joint space can be demonstrated, muscle tenotomies—especially of the adductor longus and psoas major—serve to reverse the early pathological changes in some patients and to prevent further deterioration in others. The operation achieves relief of muscle spasm, correction of deformity, decompression of the joint with relief of pain, and an increase in the total range of movement.

The prognosis with regard to continuing disease activity is unpredictable in any individual patient, although the operation we describe markedly improved the majority of hips. If disease activity abates, then some degree of healing and long-term improved function can be expected using this soft-tissue release (Figs 1 to 3). In those patients whose disease is unremitting, the joint will nevertheless be in a better position for limited walking and for possible joint replacement at a later date.

PATIENTS AND METHODS

The patients were under the care of the Juvenile Rheumatism Unit at the Canadian Red Cross Memorial Hospital, Taplow. All were receiving a full regime of basic medications, appropriate splinting and physiotherapy.

There were 52 patients (33 girls, 19 boys) with 89 hips needing operation (46 right and 43 left). The mean age of onset of disease was 4.1 years with a mean duration of 7.2 years before operation; the mean duration of hip involvement before operation was 4.2 years and the mean age at operation 11.3 years. The subgroups of the disease were as follows: 24 patients had had a systemic onset followed by polyarthritis, 23 a polyarthritic onset, while five had a pauci-articular onset. No seropositive patients are included in this report.

Because a flexed arthritic hip sometimes seems to lack all movement and radiographs appear to show fibrous ankylosis, a successful soft-tissue release operation may appear unlikely. In these difficult cases a preoperative arthrogram may prove helpful by outlining a residual joint space (Swann 1978), whilst a gentle examination under anaesthesia will detect any possible movement.

Operation. With the patient lying supine and each leg towelled separately to allow independent movement, a vertical incision is made high in the groin close to the origin of the adductor longus; this and the gracilis muscles are both divided. Access to the psoas tendon is obtained via the anterior surface of the adductor brevis, and the lesser trochanter can be readily palpated. A hook can be passed around the psoas tendon, displaying it adequately for it to be divided safely. The wound is closed in layers without drainage.

It is important that physiotherapy should recommence no later than the following day, supplemented when necessary by analgesia. The legs are held in the position of maximum abduction using skin traction and a foam wedge. Traction is continued during sleep and
rest, but at other times it is removed so that active and passive hip movement can be encouraged; the patient also spends periods of time lying prone to help prevent flexion contracture. The stitches are removed on the twelfth day and, immediately after this, intensive hydrotherapy begins; rehabilitation continues at home and the patients, their parents and others associated with their welfare are encouraged to participate in supervision. Home-traction apparatus is always made available on loan, but hydrotherapy may be less accessible.

RESULTS

All 52 patients (89 hips) were available for examination at six weeks and at one year after operation. At the three-year follow-up 20 hips had undergone total joint replacement and 23 had not yet reached three years since soft-tissue release. There were thus 46 hips available for study at three years. In children with polyarticular problems the assessment of results is difficult, since disease activity and the degree of involvement of other joints, particularly the knee, influence mobility.

Pain. There was immediate, sometimes total, relief of pain after operation, and this was most noticeable in those who had previously had pain at rest. Pain was assessed as follows: 0, none; 1, slight; 2, moderate; and 3, severe. The results are shown in Figure 4.

![Image](https://example.com/image.png)

**Fig. 1** — A girl aged seven years; when three she had a systemic onset of juvenile arthritis. Figure 2—Six months later there has been a good response to conservative treatment, including serial splinting of knees, ankles and feet, intensive physiotherapy and night traction; note that there has been some improvement in the position of her knees and feet but not of her hips. Figure 3—Three years later after soft-tissue release of the hips; the disease is now inactive. She has good functional mobility and attends a normal school.

**Fig. 4**

The average pain score recorded pre-operatively, post-operatively at six months and at one year in 89 hips, and at three years in 46 hips.

**Fig. 5**

Diagram showing the positions of the acetabular and femoral cartilage as viewed from the anteroposterior direction and from the lateral direction.
Range of movement. It was only found to be practical to consider flexion in this assessment. The children were examined lying on their backs and eliminating the effect of flexion of the knee by allowing the knees to hang over the side of the bed. The results (Fig. 5) are expressed as the range of active flexion without anaesthesia but with gentle passive assistance. An immediate lessening of the flexion contracture was gained in some cases under anaesthesia before operation began and was improved in the majority of cases immediately after the tenotomies. The results show that there is not only a reduction of flexion contracture, but also that the total range of flexion is increased and that this increase is maintained in those hips which were assessed at three years. Abduction was less improved after adductor tenotomy, and other movements were unaffected.

Walking ability. Twelve patients were unable to walk before operation but were able to do so at one-year follow-up; a closer analysis of these patients showed that the hip had been the dominant cause of their lack of mobility. Persistent disease activity is often associated with further deterioration of hip function; however, 20 total hip replacements had been performed before the three-year follow-up, and a further seven hips were awaiting replacement.

Disease activity. The assessment of the results of soft-tissue release in patients with polyarthritic disease must include a knowledge of the disease activity both at the time of operation and at follow-up, and these results must then be correlated with the natural history of the condition. Juvenile chronic arthritis runs a variable course, the overall prognosis being good, with the disease becoming burnt out in the majority of patients; this trend was seen in most of our patients, in line with their overall improvement.

Radiological change. There was radiological evidence that some improvement occurred in about half the hips at one year after operation; there was an increase in joint space, a clearer and denser definition of the femoral head and acetabulum and a lessening of the overall osteoporosis (Figs 6 and 7). In this disease the radiological appearance of the hips is so variable that other parameters were found to be of no value (Larsen, Dale and Eek 1977).

DISCUSSION

Disease of the hip in juvenile chronic arthritis is the most common cause of limited mobility (Ansell 1978). The clinical manifestation and radiological appearance result from a progression of events starting with inflammatory synovitis and compounded by other factors including pressure within the joint, muscle imbalance, and loss of normal weight-bearing function. Synovial swelling and effusion produce lateral displacement of the femoral head, and increased joint pressure may result in tamponade of the intracapsular vessels. Later the femoral head may become eroded and destroyed, but in the meantime...
the hip becomes flexed to achieve the position of maximum comfort (Soto-Hall, Johnson and Johnson 1964). The psoas muscle is paramount in holding this deformity, with some contribution from the adductor muscles. The spasm from these muscles not only holds the hip flexed and adducted but also encourages subluxation if the capsule remains distended and lax. Later, capsular contracture often occurs, with a marked tendency of the hip to stiffen after the disappearance of the initial effusion; this is a particular feature of seronegative juvenile arthritis.

Active disease within the hip lasting for several years has a direct effect on its growth and development. The psoas tension produces an overgrowth of the lesser trochanter (Fig. 8), and the medial rotator function of this muscle possibly contributes to the marked anteversion of the femoral neck (Wilkinson 1963). In addition, the capital epiphyseal plate closes earlier than normal. These effects produce the typical stance seen in these children (Figs 9 and 10).

Soft-tissue release operations to relieve contractures of joints in conditions such as poliomyelitis are well known. Jakubowski and Ruszczyńska (1967), citing one of the earliest descriptions of tenotomies in juvenile chronic arthritis, advised that early operation had a prophylactic effect; they performed nine tenotomy operations in patients with active disease but their reported results are not related to hip operations alone. More extensive operations with multiple releases, such as those described by Soutter (1914) which were designed for the treatment of poliomyelitis, have been advocated by some authors, while others have divided the hip capsule and performed a synovectomy. Granberry (1977) found that extensive release operations were ineffective in 33% of his cases, although he does not mention whether he divided the psoas muscle. Mogensen et al. (1983) reported that adductor tenotomy alone in 10 hips, and combined with tenotomy of the sartorius, tensor fascia lata, and rectus femoris in six others, gave poor results; the average age of their patients at operation was 14 years (range 8 to 30 years), and this series therefore included adults with burnt-out disease. They suggested that a more extensive release plus synovectomy might have produced better results; psoas tenotomy, however was not included in their procedure. The same authors had previously reported the results of synovectomy of the hip in juvenile chronic arthritis (Mogensen et al. 1982): relief of pain was obtained in 13 of 16 patients, but
mobility and walking capacity were not changed and radiographs showed progression of the disease.

Division of the psoas tendon reduces the contracture, allows a greater range of flexion and corrects the muscle imbalance round the hip, thus reducing intra-articular pressure. The latter effect probably contributes most to the relief of pain and to the improved function of the joint. In the treatment of Perthes’ disease, Salter (1966) advised a psoas tenotomy together with innominate osteotomy to reduce the pressure in the hip, whilst the alternative operation of intertrochanteric varus osteotomy (Axer 1965) slackens the psoas tendon. Spastic and paralytic dislocation of the hip is treated by psoas tenotomy or transfer (Sharrard 1964) and earlier operations for osteoarthritis of the hip obtained temporary relief by psoas division (O’Malley 1959).

Our series shows that psoas and adductor tenotomy not only reduced flexion and adduction contracture and resulted in overall improvement in the range of movement, but also that half the patients had radiological evidence of improvement. All had been operated on before growth had ceased. Even in those with persistent disease activity which militated against long-term improvement, it has been possible to delay more radical operation until growth was complete. The procedure also facilitates subsequent operations such as total hip replacement by reducing the pre-operative deformity.

Psoas and adductor tenotomy has proved a simple, safe and effective treatment in improving the function of hips affected by juvenile chronic arthritis. If the disease burns out or damps down sufficiently, it is possible that the gain in painless movement will contribute to healing. Other more extensive procedures, or synovectomy of the joint, seem to offer no advantage and are more painful for the patient. Should the disease be unremitting, hip destruction may later necessitate total replacement but the joint is in a better position and the patient better able to benefit from the procedure.

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REFERENCES