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LUMBAR RADICULOGRAPHY WITH METRIZAMIDE ("AMIPAQUE")

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Amipaque is a non-ionic water-soluble contrast medium for use in the subarachnoid space. The toxicity is lower than for other commercially available contrast agents. It can be injected without spinal anesthesia and gives good radiological contrast with an iodine concentration isotonic with the cerebral spinal fluid (170 mg I/ml). Serious acute complications have not been reported after more than 20,000 examinations. Late sequelae such as adhesive arachnoiditis have not been seen. The spasmogenic effect of the medium is very low and therefore the conus region can be included in the examination. For the same reason functional myelography can be carried out in cases of suspected lumbar spinal stenosis.

PROGNOSIS OF 158 SCIATICA PATIENTS

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The patients were admitted to the hospital for symptoms and signs of sciatica. Fifteen patients were operated on for cauda equina syndrome. An elective disc operation was performed on 116 patients (minimum length of history 2 months, average 4.6 months). A disc herniation was found in 108 operations (five false negative myelograms). No protrusion or other cause of nerve root compression was found in eight cases (four false positive myelograms). Compared with a series 10 years earlier, the frequency of of operation on two disc spaces had diminished from 30 per cent to 15 per cent and the frequency of unsatisfactory operative findings from 15 to 7 per cent. This we consider to be due to an improved myelographic technique and a better selection of patients for surgery. Postoperatively the frequency of radiating pain was 58 per cent at 3 months, 12 per cent at 6 months and 20 per cent at 12 months. When the clinical, radiological and operative findings were correlated with the results, a positive correlation was found only between an adequate operative finding and a good result. Conservative treatment was chosen in 27 cases where the clinical and radiological findings were not conclusive or when the patient refused to undergo an operation. One year later there were no significant neurological differences between this group and the group which had undergone surgery. In our earlier series we observed that the prognosis for 5 to 10 years did not depend on the operative result. We conclude that in spite of 40 years' experience and intensive research including the cognizance of spinal stenosis and improvements in myelography, the enigma of sciatica has only partially been solved.

INDICATIONS FOR ACUTE SURGERY IN HERNIATED LUMBAR DISC

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Recovery after compression of nervous structures depends on the acuteness, degree, and duration of the compression. Hence, patients with acute lower limb or urinary bladder paresis due to herniated lumbar disc are operated upon as soon as possible after emergency myelography.

With earlier types of water-soluble contrast media, operation was postponed for 6 hours. After the introduction of metrizamide, surgery has been performed immediately after the X-ray examination without adverse reactions.

Several patients were admitted to our department at varying times after onset. In a series of 107 patients with discogenic acute back, 35 patients had surgery within 48 hours of onset and 26 in the next 48 hours. In 31 patients there was a delay of more than one week.

All patients operated upon within 24 hours of onset, and the majority operated within the

next 24 hours, regained normal function. The recovery rate then decreased steeply. Although all patients benefitted from surgery, incomplete recovery was the rule when there was a delay of more than one week.

UNILATERAL AND BILATERAL ARCOTOMY FOR LUMBAR DISC PROLAPSE WITH UNILATERAL SCIATICA. A FOLLOW-UP STUDY OF 156 PATIENTS

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The best surgical approach for lumbar disc lesions is still open to discussion, and few comparative reports have been published.

Out of 250 patients operated upon for lumbar disc lesions between 1967–71, 156 were selected for review according to the following criteria: a) at least 6 months preoperative history, b) unilateral sciatica, c) L 4–5 or L 5–S 1 disc lesion, d) no previous disc operation.

Bilateral arcotomy was performed on 67 patients (Group I) and unilateral arcotomy on 89 (Group II). The follow-up was made 4–9 years postoperatively, and the patients in both groups were of similar age, sex and occupation. They had similar histories, symptoms and signs, and myelographic findings. No patient in Group I needed reoperation for recurrent prolapse whereas further surgery was required in four from Group II. At follow-up, 43 were symptom-free and 24 improved in Group I, while 30 were symptom-free, 44 improved, 2 unchanged and 12 worse in Group II. During the follow-up period 13 per cent of patients in Group I and 26 per cent in Group II had severe attacks of sciatica. At the time of follow-up 30 per cent in Group I and 51 per cent in Group II had low back pain.

Bilateral arcotomy proved to be the operation of choice. It caused no instability and did not predispose to the formation of adhesions opposite the lesion.

COMPARISON OF THE RESULTS IN PATIENTS OPERATED UPON FOR RUPTURED LUMBAR DISCS WITH AND WITHOUT SPINAL FUSION

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From 1967–1969 simple extirpation of the ruptured disc and excochleation of the intervertebral space were performed in 191 patients, whereas a combined extirpation and lumbosacral fusion, according to a modified Smith-Petersen's method, was performed in 68 patients.

Follow-up studies in 1974–1975 showed that during the first half postoperative year the results were similar in the two groups with a satisfactory result in 89 per cent of the patients without spinal fusion and in 88 per cent of the patients with fusion. Pain reappeared later in 26 per cent of the patients without fusion, and in only 14 per cent of the patients with the combined operation. Nineteen patients or 10 per cent of the patients without spinal fusion were reoperated upon for recurrency or another ruptured disc. One was operated upon for extradural scar formation and adhesions; 11 had further courses in physiotherapy. Recurrence of a disc protrusion in the area of a solid fusion has not been observed. Two patients with fusion had reoperations for pseudarthrosis in the graft, and one for a ruptured disc above a solid fusion.

After reoperation and physiotherapy the difference in the results was less marked. A satisfactory result was obtained in 76 per cent of the patients without fusion and in 85 per cent of the patients with the combined operation, after an observation period of 6–7 years.

Comparison of the present series with results in a previous investigation of 282 patients with spinal fusion also speaks in favour of the combined operation, particularly in younger individuals.

ANTERIOR LUMBAR INTERBODY FUSION

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Ninety-eight patients were treated with fusion (extraperitoneal technique, grafts from the iliac crest). Indications were incapacitating low-back pain caused by degeneration of the 4th/5th lumbar disc or spondylolisthesis. 135 discs were degenerated; 114 were fused. There were no complications in 75 per cent; 11 had thrombophlebitis, two fatal pulmonary embolism, four slight infarctions and three severe atelectasis.

At follow-up, 3–8 years later, the fusions were solid in 91 per cent and after re-operation in 94 per cent. Healing was not achieved in 21 per cent of the patients with spondylolisthesis. Seventy-three per cent felt better or cured. Thirty-one patients had constant pain (21: somatic explanation). Sixty per cent of the patients, operated upon after the age of 45, received disablement pension.

The most suitable patients for the operation are those who are motivated, energetic, nonneurotic and not adipose.

LUMBAR INTERVERTEBRAL DISC HERNIATION IN CHILDREN AND ADOLESCENTS

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During the period 1965–1975, 35 patients aged 10–18 years were operated upon for lumbar disc

herniation. There were 19 girls and 16 boys. The duration of symptoms was on average 20 months before diagnosis was made. Only 10 patients were referred to the hospital under the diagnosis of ischialgia. A previous trauma was found in nine cases.

Subjective symptoms were mild. Common objective findings were scoliosis, kyphosis and back stiffness. Changes in gait pattern were frequent. Lasègue's test was positive at a few degrees. Peripheral neurological signs were nearly always absent. Our clinical material indicates there is a difference in symptomatology of lumbar disc herniation in children and adolescents as compared to adults.

Mean follow-up was 5.8 years. Operative results were judged as excellent in 29 cases, fair in 6. Scoliosis disappeared in all patients.

FINDINGS AND RESULTS AFTER RE-OPERATION FOR LUMBAR DISC PROLAPSE

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Eighty-five out of 104 patients re-operated upon for lumbar disc prolapse replied to a questionnaire. Peroperative findings at re-operation were: prolapse in the same disc in 28 patients, prolapse in another disc in 16 patients, prolapse and perineural scarring in 10 patients and perineural scarring and/or bony excrescences in 31 patients. Results were stated as excellent by 31 patients, good by 29 patients and poor by 25 patients. True recurrences had very good results, but if in addition marked perineural scarring was found a little less than 50 per cent benefitted from the re-operation. The same was true if at operation only perineural scarring and/or bony excrescences was found. Myelography before re-operation gave positive or correct information in 68 per cent of cases. Age and method of exposure did not seem to be of any significance. The few backs with multiple operations had almost the same results as the others.

PROLAPSED LUMBAR INTERVERTEBRAL DISC: A 10-YEAR POSTOPERATIVE FOLLOW-UP

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A total of 174 patients were followed for variable periods up to 10 years and evaluated by questionnaire. The operation was hemilaminectomy and evacuation of hernia and the intercorporal space. No fixation was performed. Mean age was 39.9 years and the female to male ratio was 1 : 2.

At the 5-year follow-up (96 patients), 56 per cent had regained full working capacity and had no symptoms or only mild ones, 21 per cent had full working capacity but had some back symptoms and 27 per cent had a considerably lowered working capacity and/or major back complaints.

The following factors correlated with a good prognosis: age less than 40 years, no previous back complaints, short duration of symptoms at operation, preoperative work that was not back-straining, and high social position. A positive correlation was found between high social position and no back strain at work. Preoperative back strain at work had a minimal influence on the results, whereas social position was the most important factor.

Two to ten years postoperatively, the condition of the patients had changed only to a slight degree, the number of patients deteriorating slightly exceeding the number of patients improving. The postoperative symptoms of the individual patients were thus very stable after 2 years.

FINAL RESULT STUDY OF 544 PATIENTS OPERATED UPON FOR HERNIATED INTERVERTEBRAL LUMBAR DISC

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A follow-up study was made on 544 patients operated on, between 1962 and 1972, for herniated disc with removal of one or more discs. 36 per cent were women, 64 per cent were men. The average age at the time of operation was 40.3 years. The follow-up period was from 4–14 years, in average 8.4 years.

The history was acute in 25 per cent of the cases. Work was a direct causative factor in 40 per cent of the cases.

About half of the patients sought non-medical treatment (quack-doctors or chiropractors) before hospitalization, which consequently was delayed. The results were better in the cases where the patients were operated upon within the first 2 months of the onset of symptoms, and they were better in younger than in older patients. There was a correlation between the myelography and the findings at operation in 91 per cent of the cases. There were only a few complications of myelographies and operations, and no mortality. 22 per cent were operated upon without delay. 75 per cent of the cases gained relief from pains in the back and the legs. The number with pareses was significantly reduced, but the number with disturbances of sensibility and reflexes was not reduced to the

same degree. The factor which most inhibited work was pain in the back and legs, whereas paresis hardly ever caused inability to work.

1000 MYELOGRAPHIES WITH MEGLUMINE IOTHALAMAT (CONRAY MEGLUMIN 282)

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One thousand myelographies were performed between 1969 and 1974. A total of 934 patients were examined (627 men and 307 women), 66 patients twice or more. Most of the patients (306) were 40–49 years, nine were 10–19 and five were 70–79 years old.

The myelographies showed prolapses in 404 cases. Among those 376 were operated on and in 345 cases true prolapses were found, whereas protrusion or degeneration of the disc was found in 27 cases. Roentgenologically there was a good correlation in 337 cases, fairly good in 26 cases and not so good in 13 cases.

In 19 of the myelographies regions of poor contrast or total blockage were found. Sixteen of these were operated on, and prolapses were found in 11 cases. One patient had a malignant tumour and two had lumbar stenosis. Roentgenologically there was good correlation in 14 cases, it was fairly good in one case and not so good in one case.

In 315 cases only minor changes, such as shortening of the root-sleeves, were found. A total of 153 patients were operated on, 55 with prolapses and 97 with protrusion or degeneration of the disc. Roentgenological examination showed a good correlation in 97 cases, fairly good in 97 cases and not so good in 10 cases.

In 262 myelographies there were negative results. Twenty-six of them were operated on, and in six cases prolapses were found. Protrusions were found in two cases and negative results in 18 cases. Roentgenologically there was a good correlation in 18 cases, fairly good in two cases and not so good in six cases.

Cramp was registered in four cases. In four other cases jerks of the lower extremities were experienced. Fifteen suffered from headache, and partial collapse was registered in five cases. Cramp and jerks were immediately relieved by intravenous injection of Diazepam (Valium) possibly repeated a few times.

EFFECTS OF CHYMOPAPAIN ON NERVE TISSUE

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Chymopapain chemonucleolysis as treatment for intervertebral disc disease has been widely used during the last few years. The literature on the subject reports differing opinions concerning indications, results, complications and the possible mechanism by which chymopapain relieves low back pain and sciatica.

Chymopapain which is injected into an intervertebral disc may leak out to the surrounding tissues and reach neural elements, e.g. local sensory nerves and a nerve root. The effects of chymopapain on such peripheral nerve tissue have been investigated in the present study. The tibial nerves of 63 rabbits were used for the experimental model and the effects of 1 ml of 0.4 per cent chymopapain were compared with those of 1 ml of isotonic saline. The following parameters were investigated:

1. Intraneural microcirculation and permeability of the perineurial sheath (fluorescent microscopy).
2. Axonal transport of proteins (radioactive protein determination).
3. Nerve function (neurophysiology).
4. Nerve fibre and intraneural connective tissue reactions (neurohistology).

The results showed that chymopapain had no acute effects on impulse conductivity or axonal transport. The enzyme induced, however, intraneural oedema formation by increasing the permeability of the intraneural microvessels and the perineurial sheath. The long-term effects were nerve fibre degeneration and intraneural fibrosis formation, leading to impaired nerve function.

CHYMOPAPAIN INJECTION FOR DISC HERNIA —PRELIMINARY RESULTS OF A CONTROLLED STUDY

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Although chymopapain injection treatment for disc hernias has recently been stopped in the USA it is still in use in Europe and Canada. In order to compare the results of chymopapain injection versus conventional disc surgery, a controlled study on patients with typical L 5 syndrome and a positive water soluble contrast myelography was performed.

Preliminary results of this strictly controlled study (half of the patients were operated upon and the other half received chymopapain intradiscally) show that injection treatment in this series of 18 patients (9 + 9), followed up for at least half a year by an independent examiner, appears to give some immediate advantages in the form of a shorter stay in hospital and a shorter sick leave period but it does not give as good end results as surgery. Thus three out of nine cases were reoperated upon within 2

months because of lack of improvement. The remaining six do not differ significantly from the operated cases.

TREATMENT OF POSTOPERATIVE DISCITIS WITH ANTICOAGULATION

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An account is given of 15 patients with postoperative discitis, who were treated with anticoagulants, Indometacin and bed rest. This treatment had the result that patients confined to bed were relieved of their symptoms after about 10 days treatment and later could be mobilized. With the aid of a lumbo-sacral support they could continue treatment as outpatients. The effect of anticoagulants suggested that a localized hypercoagulability might play a certain role, either as a pathogenetic or a pathophysiological factor. In the present series the clinical manifestations were: 1) constant, piercing local pain in the back, 2) tenderness to percussion at the sites of the affected vertebrae, 3) diffuse pain localized to both lower extremities and tenderness to palpation at the sides of the long saphenous vein and the femoral triangle (Scarpa's triangle), 4) acute abdominal pain, occasionally combined with paresis of the urinary bladder. The clinical symptoms occurred about 2 weeks before the vertebral lesions were roentgenologically demonstrable. Laboratory tests early in the course of the disease failed to provide data by which the diagnosis could be verified.

RESECTION OF PROCESSUS SPINOSUS IN 102 PATIENTS WITH CHRONIC LOW BACK PAIN

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Degenerative changes in the lumbar interspinal ligaments and processi spinosi may be a cause of low back pain. During the period 1963–1975, in 106 patients suffering from chronic low back pain, a localized tenderness was demonstrated between two lumbar processi spinosi. X-ray showed kissing spine and degeneration of one or more lumbar discs. The low back pain disappeared for 2–4 hours following repeated injection of 3 ml local anaesthetic into the interspinal ligaments and the operation was performed with resection of the lumbar processus spinosus and the interspinal ligaments. The duration of the operation was 15–30 minutes and the patients were discharged on the fifth postoperative day.

The average age of the patients was 46 years and the duration of symptoms averaged 9½ years. In a follow-up of 102 patients, 39 females and 63 males, 9 months to 10 years after the operation, 42 patients were improved with disappearance or relief of symptoms. Forty-two patients were unchanged and in 18 patients the pain was aggravated. Several patients in the last two groups, however, had relief of symptoms a few months after the operation.

MUSCULAR ATROPHY IN THE PROLAPSED LUMBAR INTERVERTEBRAL DISC

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In 30 per cent of sciatica patients, differences in circumference, usually 1 cm, can be measured in the lower extremities. In a leg segment 10 cm high, considered as a cone right truncated, 1 cm difference in circumference will represent a volume reduction of 60–90 ml. The principle of volume measurement is to "transfer" a leg segment to a cylinder of the same height. Then the segment volume equals the cylinder volume minus the rest volume.

Comparable segments are defined by two parallel planes vertical to the leg axis at a fixed reciprocal distance and at the same height over the base of the foot. For measurements, one rack for the thigh and one for the calf and adequate cylinders are needed. The leg encircled by the cylinder is placed in the rack with a levelled plate of foam rubber under the cylinder. Thin plastic foil covers the cavity, which is filled up with liquid. This liquid is then transferred to the other leg under same measuring conditions. The reduction of volume in one segment equals the difference between the two rest volumes. Volume differences are due to muscular atrophy, which may have local causes as well as being a result of affections of the lower motor neurones of various aetiologies. It indicates destruction of these cells. When a reduction of volume is measured during a disc protrusion syndrome, the symptom will be of great significance.

FACTORS INFLUENCING WORKING CAPACITY FOLLOWING DISC SURGERY

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Results of lumbar disc surgery in terms of total postoperative disability time and return to work were recorded. The analysis was based on a total of 366 patients. The number of recurrences and the percentage of disablement pensions were directly related to the length of the observation time.

A short interval between the onset of leg pain and the time of the operation was an important

prognostic factor. Patients with negative neurological and myelographic findings were poor candidates for disc surgery.

Fifty-seven per cent of the patients continued the same work, 24 per cent of the patients changed their work, 24 per cent received disablement pensions.

PSYCHIC AND SOCIAL FACTORS IN THE TREATMENT OF PATIENTS WITH LUMBAR DISC PROLAPSE

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This series consists of 54 patients suffering from low back pain and sciatica. Of these, 39 were operated on, ten received physiotherapy, and five manipulation of the back under anaesthesia. The patients were examined by a clinical psychologist before treatment and 6 and 12 months after treatment in order to create a model to predict the results of treatment. Medical factors (result of treatment), social factors (ability to work), and psychic factors (the patient's mental health and his opinion of the result of treatment) were taken into account. The results of treatment could be predicted by taking six factors into account in 55 per cent of the cases, and the ability to return to work, also using six factors, could be predicted in 68 per cent of the cases.

The following medical factors indicated a good result: no previous operations on the back; typical signs of a protruded disc; a short period of pain and of sick-leave before treatment; and operative treatment.

The most important social factors were as follows: intellectual work or labour where the working position could be changed; sick-leave of less than 3 months; education more than that of elementary school; operation as a semi-private patient; and age under 30 or over 40.

The most important psychic factors were: the patient considered it absolutely necessary to return to work; keen intelligence; no visits to the doctor for trivialities; hardly any psychic or psychosomatic signs; and the patient was self-reliant, his behaviour open, and his motivation to work good, even overemphasized.

The most important factors in the rehabilitation of patients with low back pain and sciatica are the duration of the disease and the influence of the disease on the ability to work and on the existing possibilities for the patient.

In a chronic disease the process of rehabilitation is a psycho-socio-economic problem rather than a medical one. An examination by a clinical psychologist may help the orthopaedic surgeon to avoid unnecessary operations on the back.

THE SOCIAL STATE OF 615 PATIENTS BEFORE AND AFTER OPERATION FOR HERNIATED LUMBAR DISC

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A total of 615 patients were operated upon for herniated lumbar disc. 544 of these patients (92 per cent of the patients alive) were seen during a follow-up investigation which included a clinical examination and an interview concerning the social and economic consequences of their disease. The mean period of observation was 9 years.

A majority of the patients operated upon for lumbar disc prolapse had a low level of education and did hard physical work. Eighty per cent of the patients resumed work after the operation. 286 patients had changed their job at the follow-up investigation, 54.9 per cent of these because of the disease. Ninety-three patients were referred to centres for rehabilitation, 47.3 per cent with success. Two thirds of the patients who did not succeed in rehabilitation were over the age of 45 years.

OPERATIVE TREATMENT OF SPONDYLOLISTHESIS IN YOUNG PATIENTS

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A series of 91 patients under 20 years of age with lytic lumbar spondylolisthesis, treated operatively at the Orthopaedic Hospital of the Invalid Foundation, Helsinki, are presented. Sixty-six patients (73 per cent) showed a displacement of more than 30 per cent on admission. If the displacement exceeds 30 per cent, it often progresses to a total or subtotal olisthesis; fusion should be performed before the slipping exceeds one third of the length of the vertebral body. Posterior fusion was performed in 78 patients (87.5 per cent). In connection with fusion, laminectomy was performed in 18 patients. Ventral fusion was performed in three patients and posterolateral fusion in 10 cases, of these, four as a second operation. Laminectomy only was carried out in four patients, three of them having a total olisthesis and one a massive disc herniation. Laminectomy without fusion should be performed only in exceptional cases in young patients.

Non-union or uncertain union after the first operation occurred in 17 patients (19.5 per cent). Of these, 13 patients were reoperated upon. Two patients had two reoperations. The degree of slipping at the operation did not influence the results. A progression of displacement was observed in 14 patients in spite of dorsal fusion. The final results show that good results were

achieved in 55 patients (60.4 per cent), satisfactory in 23 (24.1 per cent) and unsatisfactory in 13 (15.5 per cent). Posterolateral fusion seems to be preferable to posterior fusion.

A ROENTGEN STEREOPHOTOGRAMMETRIC METHOD FOR STUDYING THE HEALING OF FUSIONS OF THE SPINE

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A roentgen stereophotogrammetric method is described for studying the movements between separate segments of the vertebrae following fusion operations. This method determines the rotations and translations about the X-, Y- and Z-axes with great accuracy. Rotations down to 0.1° and translations down to 0.1 mm are estimated. Three indicators are inserted in each vertebra. Two exposures of the patient are obtained simultaneously from two roentgen tubes on one film. A calibration cage is also double-exposed on the same film. In the walls of the cage, indicators, with known three-dimensional positions, are inserted. The measured two-dimensional positions on the film of the indicators in the cage and the object are then treated by data-processing as described by Selvik (1974). The coordinates of the indicators of the spine are then estimated in a Cartesian coordinate system bound to the calibration cage, and the general displacement of each vertebra in relation to another is described.

With this method the decreased movements in a fusion mass (the healing of a fusion operation) can be followed and defective healing (pseudarthrosis) will thus be detected. After a scoliosis operation the three-dimensional loss of correction can also be described.

Two cases with a fusion operation—one with a spondylolisthesis L5–S1 and the other with an idiopathic scoliosis—were demonstrated.

CAN SKELETAL MUSCLE FIBRE ATROPHY IN A CAST BE PREVENTED BY EXERCISE?

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Skeletal muscle fibres can be divided into two main types designated Type I (red or slow) and Type II (white or fast) fibres. The latter group can be further divided into A and B types where the II B fibres are the typical white fibres with a very low oxidative potential and poor endurance. Human skeletal muscles are a mixture of fibres with an average distribution of 50 per cent Type I, 34 per cent Type II A and 16 per cent Type II B. The relative distribution of fibres varies markedly between individuals but is much more consistent in muscles from the same person. No definite proof exists to show that a conversion of Type I to Type II fibres may occur with inactivity or activity, but the size of the fibres as well as their metabolic potential varies in relation to the use or disuse of the fibres.

Five to six weeks in a cast results in a significant reduction in size of both fibre types and in oxidative and glycolytic enzyme activity. These changes may explain the reduced strength and endurance of the muscles found after an extremity has been in a cast. The performance of maximal isometric contractions of the muscles, while in a cast, reduces the hypotrophy of Type II fibres which appear to be the fibre which is recruited predominantly in this type of contraction. In order to activate the Type I fibres and train their oxidative potential, light contractions performed over a period of 15–30 minutes are needed. Combining these two forms of exercises, the size of the fibres and their metabolic capacity will still be reduced after having the extremity in a cast, but only to a very minor degree. The advantage is that the recovery period can be shortened and normal activities and athletic training can be resumed earlier.

LIGAMENT INJURIES OF THE KNEE JOINT—THE DIAGNOSIS AND TREATMENT

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The difficulties encountered in the diagnosis of knee injuries are well known. Liljedahl et al. have shown that the uncertainty of clinical examination can be reduced by examination under anaesthesia or arthrography. Combined injuries present more difficulties than single ligament lesions. In 1973 we showed that arthroscopy is superior to other diagnotic methods in combined injuries. Since 1971 we have used the 5 mm Storz arthroscope introduced into the joint through the patellar tendon (Gillquist & Hagberg 1976). The joint is flushed with sterile water by an infusion pump. The water leaves the joint through a specially made "arthroscopy cannula" (Stille Werner, Stockholm, Sweden). For the inspection of the posteromedial and the posterolateral compartments a 70° telescope is used whereas the rest of the joint is examined through the normal 30° telescope. We have examined 800 injured knees by this method. Of special interest is a study of 84 examinations in the acute stage (Gillquist, Hagberg, Oretorp to be published). Haemarthrosis was usually due to rupture of the anterior cruciate ligament in combination with other injuries. Locking of the knee joint was an unreliable sign of a torn

meniscus, the diagnosis being correct in only half the cases. In a small series we have also removed free bodies percutaneously under direct inspection through the arthroscope.

MINOR SPORTS INJURIES: A 7-YEAR MATERIAL

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At a clinic for sports injuries in Oslo, 2729 athletic injuries have been treated over the past 7 years. The injuries were mostly minor, interfering with the athletes' ability to train or compete. Almost 50 per cent occurred in soccer, which reflects that soccer is the most popular sport in Norway. More surprisingly, injuries in runners came second. Eighty per cent of these injuries were "over use" or stress injuries. In contact sports 80 per cent were acute traumatic injuries. Whereas the acute injuries differed little from similar injuries suffered in non-athletes, 74 per cent of the stress injuries were found in four regions; the achilles tendon, the lateral femoral condyle, the patellar tendon and the medial or lateral aspects of the tibia. All responded well to treatment which consisted of physical therapy, altering or lowering the training load, and taping. An increasing number of the "over-use" injuries were found in adolescents, probably reflecting a tendency to treat children as "miniature adults", thus subjecting them to training loads exceeding the tolerance limits of their tendons and tendon insertions.

A PROSPECTIVE STUDY OF HORSE-RIDING ACCIDENTS

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During 1975, a total of 203 patients were treated at the Århus County Hospital for injuries sustained after horse-riding accidents. Seventy-four per cent were women and 26 per cent men. The average age was 18.7 years and teenage girls were particularly frequent victims. A total of 138 patients were injured while riding whereas 65 were injured by the horse before or after riding.

The accidents resulted in 231 injuries of which 72 per cent included soft tissue injury while 28 per cent were fractures. The majority of fractures were in the upper extremity. Eighty-seven per cent of the patients were treated as outpatients and 13 per cent were admitted to the hospital. In contrast to some earlier reports it is concluded that the majority of injuries following horse-riding accidents are rather insignificant. Adequate headgear would lessen the severity of several head injuries. It is believed that it is possible to reduce the number of accidents by better instruction of beginners.

MEASUREMENTS OF THE UPTAKE OF STRONTIUM-85 FOR THE DIAGNOSIS OF STRESS FRACTURES IN THE TIBIA

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Thirty-five athletes with pain in the medial aspect of the lower leg were investigated for possible stress fractures by measuring the uptake of Strontium-85. Eight of these patients had a normal uptake in the tibia and did not show any radiological signs of stress fracture; seven had distinctly localised increased uptake which corresponded to the radiological finding of a stress fracture. In the remaining 20 patients the uptake of Strontium-85 was increased along the entire tibial diaphysis. None of the latter group had any radiological signs of fracture.

The first group probably consists of patients with pain unrelated to bony structures. The second was classified as cases with stress fractures; two cases in this group had no radiological signs of fracture at the time of the uptake measurement but the diagnosis became evident later on.

The findings in the third group may be interpreted in several ways. Either these are cases with tibial stress fractures already radiologically healed, which is conceivable since these cases were usually measured later in the course. Another possibility is that we have here a separate clinical entity in which the increased uptake is caused by a periosteal reaction—tibial periostitis.

FASCIOTOMY FOR TREATMENT OF LOWER LIMB PAIN IN ATHLETES

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Pain in the lower leg is a common symptom in athletes, particularly in runners. Those athletes who have the symptom seem to have in common that they employ muscles in the tibialis posterior compartment and, particularly, toe flexor muscles, extensively. Upon the assumption that hypertrophy of the muscles by an increased pressure in the closed compartment may cause distension of the fascia attachment to the tibia, with ensuing pain, we have operated upon 31 cases with recurring or chronic symptoms by dividing, longitudinally, the fascia of the posterior compartment. At follow-up, 25 ± 15 months after operation, 23 cases out of the 31 studied were completely free of symptoms, five were improved and three unchanged. Twenty-one

patients had resumed their sporting activities completely whereas eight had decreased their activity as far as track training was concerned. Two patients had given up their sport although they gave reasons other than lower limb pain for this decision.

RUPTURE OF THE TENDO ACHILLIS. A FOLLOW-UP INCLUDING MEASUREMENT OF THE POWER OF PLANTAR FLEXION

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During the period 1970–1974, 71 patients were treated for subcutaneous ruptures of the tendo Achillis at the Orthopaedic Department, Odense University Hospital, Denmark. Sport was the reason for 81.8 per cent of the lesions. Operative treatment comprised suture and plastic repair with a strip of the tendon of the gastrocnemius muscle in 38 patients, suture only in 16 patients and non-operative treatment with plaster of Paris in 12 patients. At follow-up, from 14–77 months after the injury, 66 patients, or 97.1 per cent of all surviving patients, were re-examined. Complications were most common in patients treated surgically with plastic repair. Significant complaints were found in 12.1 per cent of the patients, while 59.1 per cent had no symptoms at all. The circumference of the calf was less in the affected than in the unaffected limbs ($P < 0.001$). The power of plantar flexion averaged 10.1 per cent less in the affected than in the unaffected limbs ($P < 0.001$), but only slight positive correlation was found between circumference and power ($r = 0.32$). In two patients only the working capacity was reduced because of the injury, but seven out of 54 patients had abandoned sport because of the injury and 10 for some other reason. The power of plantar flexion correlated in most cases with the ability to return to sport.

PROGNOSTICATED AND ACTUAL DURATION OF INCAPACITY AFTER SPORTS INJURIES

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A total of 721 emergency room outpatients with regular work aged 15–65 years were followed up and the period of incapacity after their accident was studied. Eighty patients were hurt while playing sport. The casualty officer estimated the expected number of lost days (prognosticated incapacity). By letter the patients gave information as to what date they started work again (actual incapacity). Eighty-nine per cent replied.

A graphic picture of the prognosticated and the actual incapacity period showed two almost parallel curves, indicating a constant and therefore acceptable prognostication. In the total material there was an underestimation of the time of incapacity. The ratio between prognosticated and actual incapacity following sports injuries was 1.27. Sports injuries resulted in a longer period of incapacity than other injury groups with identical diagnoses (e.g., industrial accidents). The mean prognosticated incapacity period for sports injuries amounted to 10.2 days —the actual was 12.9 days. The difference between the two figures was reduced in cases of overestimation of the incapacity. The average error of judgment for sports injuries was 7 days, and it was a little less for light traffic and industrial accidents.

Prognosticated time of incapacity in number of days was a simple means of measuring the severity of the lesions, and in our material it was a considerably better measuring devise than the D-diagnosis and the E-code.

RADIOGRAPHIC MEASUREMENT OF THE STABILITY OF THE KNEE JOINT IN INJURIES TO THE LIGAMENTS BASED ON A MATERIAL OF ATHLETES

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The measuring method consisted of mechanical action upon the joint in different directions by well defined hydraulic forces, using a special apparatus, the gonylaxometer, while radiographs were exposed. Looseness was measured on the film. Normal values were arrived at by studying a material of 50 subjects. The 97½ per cent upper limits for normal knees were 2 mm for medial and lateral collateral looseness and 3 mm for anterior as well as posterior looseness (measured as the difference between the sound and the traumatized knee). The pathological material comprised 153 knee lesions, the majority in athletes. The stress-radiographic findings were compared with the operative findings and with the primary clinical evaluation and the evaluation of lateral, medial and antero-posterior looseness with the patient under general anaesthesia preoperatively. Evaluation of the procedure as a diagnostic method in acute casualities was carried out by calculation of the predictive values of positive and of negative tests. Local anaesthesia was used for lesions up to 3 months, but not over 3 months. Rotation-instability, caused by isolated medial or lateral lesions, and complex rotatory instabilities could also be demonstrated.

TREATMENT OF MUSCLE RUPTURES

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Partial and total ruptures of muscles usually occur in runners and members of various team sports. Muscle ruptures are divided into two groups: ruptures by distension and ruptures by compression. Compression ruptures are most common in the deep layers of the thigh muscles and the lower leg. The diagnosis is made by clinical examination, X-ray and electromyography. Compression ruptures can be confused with soft tissue tumours. The differential diagnosis is made by fine needle biopsy. In one of the cases a false aneurysm and in another a liposarcoma simulated a compression rupture. Both cases were correctly diagnosed and treated.

Small ruptures are treated conservatively. Layer ruptures with a large haematoma should be operated on. The haematoma is evacuated and the ruptured muscle tissue sutured. Distension ruptures may safely be operated on after several months. In some of these cases no spontaneous healing of the rupture has been observed, in spite of the operation having been performed after 6 months.

DYNAMIC ANTERIOR CRUCIATE LIGAMENT IN RECONSTRUCTION OF THE KNEE JOINT

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A dynamic anterior cruciate ligament was constructed in 40 patients with a traumatic lesion of the ligament. In 15 cases it was a sports injury. The patients had 75 ligament lesions in all. The most common combination, found in 21 cases, was rupture of the anterior cruciate and tibial collateral ligaments.

Twenty-five patients had been operated on previously 31 times because of the same knee injury. Twenty-four patients had a lesion of a semilunar cartilage.

The tendon of the gracilis muscle was cut off at the insertion and led through the joint along the normal course of the anterior cruciate ligament and through a bony tunnel from the eminentia intercondylica tibiae to the front surface of the bone where it was fixed. The postoperative immobilization time was 6 weeks.

The results were estimated on an average 2 years after the operation. The result was excellent or good in 23 cases, fair in 12 cases, and in 5 cases the function of the joint was unimproved. After the construction of a dynamic cruciate ligament the patients can usually walk, run and squat without trouble. The method is a good alternative to be considered when planning treatment of patients with anterior cruciate ligament lesion of the knee joint.

END RESULTS OF SURGICAL TREATMENT OF FRESH INJURIES TO THE MEDIAL COLLATERAL LIGAMENTS OF THE KNEE

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The results of primary suture within 2 weeks after trauma were analysed on the basis of a follow-up of 24 patients, 2 to 10 years after treatment. Sixteen patients were more than 40 years old. Only five had sustained their injuries during sport. Sixteen had injured the medial meniscus and undergone meniscectomy. The distribution into different groups according to subjective complaints, "good", "fair" or "poor" was based on written answers to definite questions in a questionnaire. All patients underwent a physical and roentgenological examination.

Eight patients had no complaints at all and the others complained to varying degrees. The result was "good" in 12, "fair" in 8 and "poor" in 4. Slight instability was found in 8 cases but seemed to have had no influence on the result. Only one had instability due to non-union of the ligament and the result was "poor". Crepitation in the joint was found in eight cases and four cases had slight radiological osteoarthritis. Twelve cases had para-articular ossifications, four with local tenderness but the influence on the complaints was slight.

The results indicate that rupture of the medial collateral ligament of the knee should be treated with suture and a stable ligament can be obtained without grafting. The unsatisfactory results were mostly due to factors other than stability of the ligament.

HEMARTHROSIS IN KNEE INJURY

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Out of 276 consecutive knee injuries hemarthrosis was found in 106. In those cases who did not have hemarthrosis there was only one serious knee injury whereas more than half of the cases with hemarthrosis had fracture or total ligamental rupture. Of the hemarthrosis cases half of those with direct trauma had fracture. Those with a knee distorsion injury sustained a fracture in only a few cases, whereas partial or total ligamental ruptures were common. Cases with hemarthrosis and trauma, that could not be clearly defined, had fractures as well as total ligamental ruptures. Also all the patellar dislocations were found in this group. It is proposed that with knowledge of the type of trauma, after puncture of the joint in suspected cases and roentgen examination of those with hemarthrosis, a group of patients can be distinguished who have hemarthrosis

after a joint distorsion or after a less well-defined trauma who need further investigation such as stability tests under anesthesia in order to exclude total ligamental ruptures.

KNEE INJURY RATE IN FOOTBALL PLAYERS AND IN THE POPULATION AT LARGE

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One hundred male football players (soccer) chosen at random among retired and active players in divisions 1–4 were studied together with 108 males in the same age group (30–40 years) chosen to represent the male population of Göteborg, Sweden. Physical activity, previous injuries and diseases were explored. A clinical investigation including objective studies of lateral stability and X-ray studies of the knee joints was carried out.

Sixty-five per cent of the football players had sustained an injury, complained of present difficulties, or had pathological findings at the time of investigation. In the population as a whole the corresponding figure was 34 per cent, and, when football players in this group were excluded, 24 per cent. Injuries to the menisci and medial collateral ligaments were the most frequent. Twenty-nine per cent of the football players had sustained lesions of the menisci and 16 per cent lesions of the ligaments. In the population the percentages were six and four, respectively, and when football players were excluded four and two.

Complaints were few in this age group. Clinical instability was present in 8 per cent of all those investigated, in 38 per cent of subjects with previous injuries, and in 44 per cent of subjects operated on for meniscus lesions. Osteoarthrosis, with reduced joint space medially, was found in four knees.

MENISCECTOMY. A 10-YEAR FOLLOW-UP OF 150 ATHLETES

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The object was to elucidate the consequences for an athlete of injury to and removal of the meniscus, and the social cost of meniscal injuries sustained during sports activities.

The study included 154 meniscectomized patients who had sustained their injury while playing sports. Three per cent were lost to follow-up. The median age at operation was 24 years. More than half the injuries had occurred during football games. The median follow-up period was 4 years (range 2–11). Patients with a short follow-up period ($\leqq$ 47 months) had received a more intensive physical training than had those with a long follow-up period (altered regime in the Unit). However, this entailed no change in the number of lost working days (median 30 days).

Seven per cent had a poor subjective result. Twenty-eight per cent had given up sport or had been obliged to restrict their athletic activities because of the meniscectomy. The most common complaints were pain on weight-bearing, a sensation of instability, and intermittent effusion into the knee. Among patients with a short follow-up period 19 per cent had radiological osteoarthrosis as compared with 27 per cent among those with a long follow-up period (NS). There was no correlation with the subjective complaints. Fairbank's changes (flattening of the femoral condyle, formation of marginal osteophytes on the tibial condyle) correlated positively with the subjective complaints and with osteoarthrosis.

Hospital expenses and production loss per patient were calculated to amount to about 13,600 kroner (1975 prices).

INJURIES IN NORWEGIAN FOOTBALL PLAYERS. A FIVE-YEAR INSURANCE MATERIAL

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All Norwegian football players are covered by insurance through the Norwegian Football Association. No team is allowed to play obligatory matches until the insurance premium has been paid.

Football injuries are registered by the football association. 3616 injuries from the period 1970–1974 have been analyzed. First division clubs seem to have a higher injury rate per club than clubs in other divisions but they also have more players and spend more time playing football. Adult players have an injury rate five times higher than adolescents. Fifty-two per cent of the total number of injuries are located in the lower extremities. Fractures represent 42 per cent of the injuries. Fractures of the leg amount to 13 per cent of the injuries, 25 per cent of the compensation money and 30 per cent of the number of days lost from work. The insurance company paid 1.5 million N.kr. to the injured players during the period.

91,500 days lost from work were registered, but this is a minimum figure since usually only injuries resulting in more than 14 days' sick-leave were registered.

RUPTURE OF THE LATERAL LIGAMENTS OF THE ANKLE JOINT IN ATHLETES: OPERATIVE VERSUS NON-OPERATIVE TREATMENT

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Two series of patients with ankle sprains were compiled from two accident services in Aalborg. In one, arthrography was used and the torn ligaments were sutured, in the other the sprains were non-operatively treated.

In the surgical material 40 per cent were athletes and soldiers, the mean age was lower, and men dominated. In the conservative series 20 per cent were athletes, the mean age was higher and there was no sex difference.

At the review it appeared that 39 out of 41 sutured cases had regained full athletic activity; 32 with unlimited athletic activity had no complaints, while 7 had slight discomfort but full activity. Of the 23 non-sutured cases, 20 had regained full athletic activities, but 9 had slight discomfort.

CLINICAL, ROENTGENOLOGICAL AND SOCIAL CONSEQUENCES OF RUPTURE OF THE LATERAL LIGAMENT OF THE ANKLE

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149 patients (95 men and 54 women) with rupture of the lateral ligament of the ankle were followed up with an observation time from 3 to 6 years, the average being 4.2 years. The average age of the material was 26.7 years. The diagnosis was based on an inversion-stress radiograph, showing a difference of more than 6° in talar tilt between the injured and uninjured side. The treatment was plaster of Paris (4–6 weeks) in 130 cases, elastic bandage in 14 and operation in five cases.

Work and sport were responsible for 62 per cent of the ruptures. 20 per cent had residual symptoms at follow-up, mainly functional instability, but only 2.7 per cent had severe symptoms. Plaster of Paris and elastic bandage treatment gave equal results.

We found no connection between the degree of talar tilt immediately after the ligament rupture and the residual symptoms. There was no connection between the talar tilt at follow-up and residual symptoms. Ninety-two of the patients were sportsmen, 46 football players. Twenty per cent of the football players had to give up football. Other sports were not affected. The ability to work was not affected.

ISOMETRIC STRENGTH MEASUREMENTS OF THE CALF MUSCLE IN 30 YOUNG, NORMAL SOLDIERS AND IN 146 PATIENTS TREATED CONSERVATIVELY FOR RUPTURE OF THE LATERAL LIGAMENT OF THE ANKLE

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In 30 normal, young soldiers there was no statistically significant difference in strength between dominant and non-dominant legs, but a significant difference in strength was found in favour of the right leg in relation to the left leg. The difference was slight, less than 5 per cent, and without any clinical consequence. There was no correlation whatever between isometric strength and circumference of the calf.

In 146 patients, treated conservatively for rupture of the lateral ligaments of the ankle, there was reduced strength in the affected legs. The difference was slight, about 5 per cent, but statistically significant. In 27 cases, with residual symptoms after 4 years of observation, there was a greater difference between the affected and unaffected legs, about 7 per cent. Also the unaffected legs had a reduced strength, indicating asthenia in the legs of patients with residual symptoms after rupture of the ligaments of the ankle. There was no correlation between strength and circumference of the calf muscle.

THE EFFECT OF OESTRADIOL ON BONE METABOLISM

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Castrated female rats were treated with different doses of oestradiol, and the collagen metabolism in bone was studied *in vivo* and *in vitro*. The results were compared to the findings in normal uncastrated and castrated untreated animals.

Castrated animals had the highest collagen resorption rate and the highest collagen synthesis rate. Most of the treated groups did not differ significantly from normal controls in any respect. Oestradiol had no effect on collagen metabolism in bone of hypophysectomized rats. In castrated thyroparathyroidectomized animals oestradiol had approximately the same effect as in castrated controls. PTH added *in vitro* produced an elevated collagen resorption rate, while oestradiol added *in vitro* had no influence on this effect.

EFFECT OF INDOMETHACIN ON FRACTURE HEALING IN RATS

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The healing of closed, standardized mid-diaphyseal left femoral fractures was studied in 129 male adolescent albino rats divided into two weight-matched groups given indomethacin 2 mg/kg/day and placebo, respectively. The first dose was given immediately after each fracture was made. Immediate weight-bearing was allowed without fixation. Isolated femur-callus specimens were subjected to radiological examination and mechanical strength testing on days 6, 9, 12, 18 and 24 after fracture. Eight fractures were studied histologically on days 9, 12, 18 and 24.

In the control animals the fractures healed within 18 to 24 days. In contrast, indomethacin 2 mg/kg/day given orally seriously impaired fracture healing.

ELECTRICAL STIMULATION OF OSTEOGENESIS IN TWO CASES OF CONGENITAL PSEUDARTHROSIS OF THE TIBIA

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The two 4-year-old patients with congenital pseudarthrosis of the tibia had both been operated on twice previously without lasting healing when in 1975, as an alternative to amputation, we started treatment with electrical stimulation. We used—with some modifications—the method developed by Jörgensen (1972).

After closed correction of the angular deformity, an external fixation frame was applied to which the stimulator was attached. The bone screws served as electrodes, the one next to the pseudarthrosis as the cathode. The stimulator delivered monophasic current pulses with pulse amplitude of 30 μA, pulse duration 0.5 s, and frequency 1 Hz.

The boy, M.A., was treated with electrical stimulation for two periods of time. The pseudarthrosis was considered healed after the first period of 4.5 months. Two months later he got a spontaneous fracture in spite of wearing a long leg brace. This fracture healed radiographically in 6 weeks and clinically after 3 months of treatment. The girl, J.P., was treated with electrical stimulation for 3 months. Healing was recorded by clinical stability examination and by radiography. The stimulation time—i.e. total time in hospital minus skin healing intervals—was for the boy 11 and 9 weeks and for the girl 7 weeks.

The advantages of this method are: 1) the effective and light external fixation as compared to a plaster cast, 2) the possibility of stimulating 24 hours a day, 3) the possibility of free movement during stimulation time without confining the patient to bed or to any apparatus and 4) the minimal discomfort for the patient.

Jörgensen, T. E. (1972) *Acta orthop. scand.* 43, 421–437.

EXPERIMENTAL TRANSPLANTATION OF OSTEOCHONDRAL ARTICULAR FRAGMENT. A PRELIMINARY REPORT

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In the treatment of osteochondritis dissecans of the knee the loosened osteochondral fragment can be fixed to its bed using thin autogenous cortical bone pins. To test the experimental basis for this operation, a study, using rabbits as experimental animals, was planned. An osteochondral defect in the articular surface of the medial femoral condyle was created with a low speed drill. The defect was reconstructed by using a local fresh autogenous osteochondral fragment, homogenous transplant or a fragment which was left free in the joint and fixed later. A stable fixation was achieved by using autologous cortical bone pins. The results were evaluated by using clinical testing, histology, tetracycline labelling and microradiography. The preliminary results show that good stability can be achieved by using the bone pin fixation. The tip of the bone pin gradually disappears from the articular surface and is replaced by fibrous cartilaginous tissue. The remodelling in the osteochondral fragment occurs over a long period. Good anatomical reconstruction of the articular surface ensures the best operative results. The experimental observations correlate with the clinical experiences.

OSTEOCHONDRITIS DISSECANS. DRILLING AND BONE PEGGING

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In addition to internal fixation using stainless steel nails, we have gained some experience of bone pegging of osteochondritic fragments in the knee (Lindholm & Pylkkänen 1974).

Sixteen patients with a mean age of 20 years, suffering from an osteochondritis dissecans lesion in the femoral condyle, were operated on. In all cases the fragment was totally or partially connected to the weight-bearing surface of the joint and appeared at site (12 cases), connected with a stylus (3 cases) or as a loose body (1 case).

Measures were modified with respect to the pathological situation of the fragment. In some

cases spongeous bone was transplanted to the bed of the fragment. Holes were drilled through the fragment, and cortical pins obtained from the upper tibia were used for fixation in some of them.

All patients were followed up for an average of 4 years after grafting, 16 years being the longest period. All fragments united after an average of 4 months. A resorption process was recognized in the distal ends of the pins. Slight osteoarthritic changes were observed in one patient. Nine patients were symptom-free, whereas the others sometimes noted slight tenderness in the joint. They all walked normally, one had a slight recurrent hydrops, and six a quadriceps atrophy of about 1–2 cm. A small deterioration of movement was recorded in three knees. According to the subjective symptoms and the clinical re-examination, including X-rays, the follow-up results were classified as excellent in 5, good in 8 and fair in 3 cases. No poor results were noted.

Lindholm, S. & Pylkkänen, P. (1974) *Acta chir. scand.* **140.**

POROUS CERAMICS AS A BONE SUBSTITUTE IN THE MEDIAL CONDYLE OF THE TIBIA

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A new porous ceramic material consisting of Al_2O_3 (99 per cent) and CaO, MgO and SiO (1 per cent) was tested for possible use as a bone substitute in regions mainly exposed to compressive forces. The pore size varied from 100 μ to 1000 μ; the compressive strength of the material was, on average, 27 MN/m^2.

The porous ceramics were implanted into the medial condyle of the tibia in adult sheep and left in position for 3, 10 and 12 months. The operated tibia was removed at sacrifice, and the results were evaluated by radiography, microradiography and transmitted light microscopy. The short-term implants were also studied by scanning electron microscopy.

At 3 months the implants were found to be bound to the adjacent bone by ingrowth of bony tissue, in some regions to a depth of 2–3 mm. In the long-term observations no signs of loosening or collapse of the implants were seen. The maximal depth of bone invasion was slightly increased, being 3–4 mm. Some ossification was still taking place. The ceramics were well tolerated; however, some foreign body cells were seen.

Based on these experimental results a clinical trial has been started with porous ceramics as a bone substitute in compression fractures of the tibial condyles. Fibre reinforced ceramics are under development in order to produce a ceramic material more suitable for prosthetic devices.

FRACTURE REPAIR AFTER RIGID PLATE FIXATION WITH AND WITHOUT COMPRESSION

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Experimental transverse osteotomy through both mid-tibial shafts was stabilized in 52 rabbits with a six-hole dynamic compression plate (ASIF). On the right tibia, axial compression was applied to the plate, whereas the left tibia of the same animal was plated without concomitant compression. In addition, both mid-tibial shafts were plated in a similar way in 50 rabbits without transverse osteotomy of the bone. Specimens of bone under the plate were investigated radiologically, histologically and by fluorescence microscopy.

Fracture union was achieved uniformly within 12 weeks, regardless of the use of compression. Primary healing of the osteotomy gap could be observed, characterized by a negligible amount of periosteal callus, enlargement of the Haversian canals, appearance of cutter heads in the bone and formation of new bone in the resorption canals traversing the bone transection. Porotic transformation was a common feature both in osteotomized and intact bone, causing cancellous transformation of the cortex, subendosteal resorption and thinning of the cortex. The magnitude of porotic changes were the same in bones plated with compression and without compression.

The results indicate that rigid plate fixation induces porotic changes in the cortical bone and that axial compression applied to the plate does not have any additional beneficial or untoward effect on the rate and mode of fracture repair.

BIOMECHANICAL EVALUATION OF FRACTURE HEALING AFTER RIGID PLATE FIXATION

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The repair of experimental transverse osteotomies through the midshaft of the tibio-fibular bone was analysed in rabbits by microradiography, histology and measurement of the torque capacity of the bone. In 52 animals, the right and the left tibio-fibular bone was osteotomized and stabilized with a 6-hole dynamic compression plate (ASIF). On the right side compression osteosynthesis was made, whereas on the left side the plate was attached to the bone without axial compression. The animals were sacrificed from 1 to 24 weeks after the operation and the tibio-fibular bones tested to breaking point in a torsion machine. Samples

of bone from the osteotomy site and adjacent areas were, additionally, microradiographed and studied histologically.

The torque capacity of the bone increased gradually from the third week after the operation. The osteotomy united on both sides within 6 weeks, after which the torque capacity equalled that of the adjacent bone. Increasing porotic changes were observed, however, in the bone under the plate. Due to these structural changes, the torque capacity data obtained remained subnormal throughout the experiment.

The results indicate: that rigid plate fixation of a transected tubular bone provides conditions for swift primary healing of the fracture gap; that axial compression added to the metallic implant has no significant beneficial effect on the mode of repair or on the torque capacity of the injured bone; and that rigid plates induce structural changes in the cortical bone which adversely affect the torque capacity of the operated bone after union between the fragments has been achieved.

EXPERIMENTAL OSTEOARTHRITIS IN THE RABBIT KNEE JOINT

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The arthrotic-like changes in the rabbit knee joint following resection of the crucial ligament were studied. Thirty-five animals were operated upon including five where only the medial meniscus was removed as a control. Histological investigations, including microradiography, were performed on undecalcified and decalcified specimens. In all animals scintigraphic recordings with radioactive fluorine and technicium polyphosphate were made once or several times and in some cases microangiographic investigations with perfusion of micropaque were performed. The earliest changes consisted of deficient metachromatic staining of the cartilage. This was followed by fibrillation and formation of cell clusters. About 1½ months after the operation changes in the subchondral bone appeared with hyperaemia and formation of osteophytes through penetration of vessels into the cartilage. Scintigraphic results indicated that hyperaemia reaches a maximal value about 3 months after the operation and then diminishes despite further development of the arthrotic changes. In the control animals only slight arthrotic changes appeared and the uptake of radioactive indicators was less pronounced.

FRACTURES OF THE FEMUR IN YOUNG CHILDREN

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The degree of anteversion in the femoral neck was radiographically measured in eight adults, who at the ages of 1½ to 3½ years had sustained dislocated fractures of the shaft of the femur. All had been treated with adhesive plaster traction applied vertically to the injured leg. One patient, suffering from osteogenesis imperfecta, had been treated three times in this way for repeated fractures of the same femur. At the follow-up investigation, radiographic measurement of the anteversion of the femoral neck revealed that the difference between the unaffected and the previously injured femur did not in any case exceed 9°. The results indicate that adhesive plaster traction applied only to the affected leg is sufficient treatment for fractures of the femur in children under 3 years of age.

EPIPHYSEAL GROWTH AS A CORRECTING FACTOR OF DEFORMITY

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Spontaneous correction of post-traumatic deformity of a growing long bone is a clinical fact, but the mechanism of this process and the factors influencing it are not known in detail. The authors have so far been able to demonstrate that correction of position subsequent to experimentally produced deformity takes place to a considerable extent through epiphyseal growth. By changing the experimental method so that a fixed point in the diaphysis permitted exact measurement of the direction of the axis, the role of epiphyseal correction could be calculated separately.

A valgus osteotomy was created in the legs of 20 young dogs and fixed with bent plates. From radiographs taken at intervals of 2 weeks the epiphyseal and axial angles were measured. It was found that the axial angles corrected rapidly during the first 60 days and more slowly towards the end of the period of study, 160 days. The epiphyseal angle which was zero in the beginning, increased gradually and the average correction during the 160-day period was $12.5 \pm 0.3°$.

Some animals were given tetracycline 10 to 20 days before death. Results of calculations made from these specimens agreed exactly with the radiological measurements. When these results were compared with the total correction of the deformity it could be concluded that the epiphyseal correction accounted for roughly half of the total correction. Some other factors are

certainly involved in the process, but their role in the correction is so far unclear.

PSEUDARTHROSIS OF THE SCAPHOID BONE

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The late results of treatment in 58 patients with pseudarthrosis of the scaphoid bone were analysed. Eleven patients were immobilised using plaster of paris, eight patients had a radiocarpal arthrodesis and 39 patients were treated by transplantation of autogenous bone or by compression osteosynthesis.

Re-examination approximately 5½ years later revealed a good clinical and radiological result in 88 per cent of the patients treated by compression osteosynthesis or autogenous bone grafts. Among the conservatively treated patients the result was successful in 62 per cent.

A third of the patients still had a pseudarthrosis, but many of these reported a reduction in subjective complaints.

HIP-SCANNING IN PATIENTS WITH INTRACAPSULAR FRACTURE OF THE FEMORAL NECK

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The series included 22 patients (17 women and 5 men) with an average age of 73.5 years. The fractures were divided into 12 subcapital and 10 transcervical fractures. There was no difference in femoral head activity between the subcapital and the transcervical fractures. However, there was an increased activity in the caput femoris in cases with poor fracture alignment, and this difference increased at the 3-month scanogram.

FRACTURE OF THE FEMORAL NECK—A SOCIO-MEDICAL PROBLEM

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Out of 878 patients treated for femoral neck fracture during the period 1970 to 1974, 675 cases have been analyzed with regard to their social background as related to length of stay in hospital, functional result of treatment and rehabilitation.

The youngest patient was 8 years old, the oldest one 100 years; the mean age was 71. The majority of cases belonged to the age group 70–79 years. Seventy-seven per cent of the patients were brought in from their homes; only very few came from old people's homes, and the rest from nursing homes and geriatric wards.

The usual treatment is plate-nailing, but femoral head prostheses have been used increasingly in the treatment of displaced medial femoral neck fractures in patients more than 70 years old.

On the whole, men were outnumbered 3:1 by women as regards incidence. However, in the younger age group the proportion of men was relatively larger, while over 70 years the proportion of women increased rapidly. Married men had a shorter hospital stay than married women, but no other difference in length of hospitalization related to marital status could be encountered.

Seventy-nine per cent of patients below 50 could walk without any aid 6 months after injury, but only 26 per cent of patients over 90 could do this.

LOCAL CHEMICAL TRAUMATIZATION OF BONE CEMENT

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It is known that methyl methacrylate monomer leaks from polymerizing bone cement. As the monomer is cytotoxic, a local tissue injury can be expected.

By intravital microscopy in the hamster's cheek pouch it was shown that monomer leakage caused severe, localized and irreversible microvascular changes.

Small cylinders of cement were then inserted through 3.6 mm drill holes on the proximal medial side of the rabbit tibia. One tibia received cement in the doughy state and the other received already polymerized cement. The cement volumes were so small that no significant temperature rise took place.

Observation times were 10, 20, 30 and 70 days, and methods of analysis were histology, microangiography, microradiography and fluorochrome labelling.

No difference in the tissue response to the test and control implants was seen. A 100–300 micron necrosis was seen round both implant types, and during the course of the experiment new bone formation took place. It is concluded that in this experimental model the monomer leakage causes less tissue injury than the already minimized surgical trauma.

^{99m}Tc-PYROPHOSPHATE SCINTIGRAPHY IN LOOSENING OF TOTAL HIP JOINT REPLACEMENT

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Scintigraphy was performed on 30 hips more than 1 year after Weber total hip joint replace-

ment. 10 mCi ^{99m}Tc-pyrophosphate was administered i.v. 4 hours before scintigraphy, using a gamma camera connected to a computer unit. The radioactivity was calculated both as a count index, comparing hip activity with normal bone activity in the lumbar spine, and subjectively from the gamma camera picture.

An increased activity around a component of the replacement correlated well with the clinical and radiological signs of loosening and with the operative findings in 20 cases reoperated upon. However, there were also cases with false negative as well as false positive findings at the scintigraphy.

Phosphate complexes labelled with ^{99m}Tc have many advantages compared with the formerly used agents such as ^{85}Sr, ^{87}Sr and ^{18}F, and though there are differences in biochemical behaviour between these agents they seem to give similar clinical information. The method can be useful in differential diagnosis of complaints after total hip joint replacement. The interpretation of the scintigraphy is difficult and the degree of uptake of the tracer is not conclusive but it can be used as another objective sign and as a complement to clinical and radiological findings.

MECHANICAL LOOSENING OF THE CHARNLEY STEM PROSTHESIS

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Between 1968–1972 altogether 351 Charnley hip replacements were performed. Of these 69 hips had infection or loosening of the acetabular prosthesis. Out of the remaining 282 hips, observed for at least 1 year, 83 (29 per cent) showed radiological signs of mechanical loosening. A radiolucent zone, 1–12 mm wide, along the lateral edge of the stem appeared between 1–70 months postoperatively. Insufficient cement fixation at the calcar level as well as under the distal end of the prosthesis was significantly more frequent in cases with loosening. Loosening was significantly more frequent in men than in women and in younger and heavier as compared with older and leaner patients. Only half of the patients with loose stems had weight-bearing pain, and it is suggested that the radiological signs of loosening precede the clinical symptoms and that the proportion of patients with symptoms may increase with time. A sufficient amount of cement at the level of the femoral calcar and below the end of the prosthesis is of importance in preventing loosening. Also, a varus position should be avoided.

FRACTURE OF THE CHARNLEY STEM PROSTHESIS

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Since the Charnley total hip prosthesis was introduced in Sweden in 1967, 10 fractures of the stem prosthesis have been recorded. The fractures were noticed 14–62 (40 ± 15) months after surgery and were always preceded by radiographic signs of loosening. Nine occurred in males and one in a female patient. These patients were heavier than average but did not deviate in age. In only one patient was the contra-lateral hip normal. Five of the fractures were overlooked initially but were found when the radiograms were reviewed. Eight of the fractured stems were in a varus position, two in a neutral position and only one in valgus. It is concluded that heavy male patients with the prosthesis in varus and with a poor proximal and a rigid distal cement fixation are predisposed to this complication.

RESULTS OF REVISION OPERATIONS OF LOOSENED AND INFECTED TOTAL HIP PROSTHESES

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In 1967–1973, 545 McKee-Farrar total hip replacements were performed. A revision operation was necessary in 38 cases. Four hips operated on originally in other hospitals were included in the series. Reapplication was done in 34 patients and excision of the prosthesis in eight infected cases. The reason for reoperation was loosening in 38, recurrent dislocation in two, perforation of the femoral cortex by the stem and malpositioning of the stem with a fracture of the proximal femur, each in one case. Previous operations were important causative factors as regards loosening. A deep infection was the cause of loosening in 12, trauma in nine, malpositioning of the prosthesis in six, other factors (cobalt allergy, spontaneous fractures, non-matching parts of the prosthesis) in five, and unknown factors in six hips. The acetabular part loosened in 30 patients, between the bone and the cement in every case. The femoral part loosened with the cement in five and without the cement in 15 patients. If the prosthesis loosened at the time the patient began to have pain on weight-bearing, this took place immediately after the operation in seven and during the following year in 11 cases. In the course of time loosening occurred less frequently.

The results were evaluated according to the system of Merle d'Aubigné & Postel. Twenty-one hips were classified as good or fair and 13 as

poor. Relatively good results were achieved when the cause of loosening was trauma or malpositioning of the prosthesis (12 good or fair, 6 poor results). Poor results were achieved with infected or dislocated hips. Our experience of the use of a cement mixed with gentamycin and massive antibiotic treatment in the reapplication is limited so far. Without these precautions a simple excision is indicated in infected hips.

CONGENITAL DISLOCATION OF THE HIP

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In the city of Malmö, 58,759 newborn children were examined for congenital dislocation of the hip during the years 1956–1972. In 548 children the diagnosis was made within 48 hours. In four children the condition was not noticed initially. This is extremely few but in accordance with the findings of other investigators.

In order to investigate the late results of treatment, 111 children treated with the von Rosen splint during the years 1956–1964 were re-examined. Clinically all were normal. Radiologically the general appearance was found to deviate in two children. In one hip the femoral head and neck were slightly enlarged as the result of early avascular necrosis and in one hip the acetabular roof was somewhat steep. Otherwise, acetabular development (measured as the CE angle) and the roundness of the femoral head (measured as the spherical index) were identical in treated children and in a control group of normal children with the same age and sex distribution.

Thus, all, or almost all, children with congenital dislocation of the hip can be diagnosed at birth. If correctly treated a completely normal development of the hip can be expected.

THE LOAD ON THE HIP JOINT—PAUWELS' THEORY

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The pressure on the caput under normal conditions in the normal hip joint, and in hip joints affected by coxa valga and coxa vara has been reviewed.

The following symptoms are characteristic of dysplasia of the hip: Low-back pain radiating to the hips, and pain in the adductor muscles and pedes anserinae.

Physical examination demonstrates hypermobility in the hips, tenderness on palpation posteriorily, laterally and anteriorily over the hip joint and tenderness of the adductor muscle and pedes anserinae.

Pauwels' technique endeavours to obtain better conditions of load in the hip joint thus preventing pain and osteoarthritis.

COXA VALGA TREATED BY VARISATION OSTEOTOMY *AD MODUM* PAUWELS

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Pauwels' technique has been modified to avoid hip plaster. A wedge of approximately 20° is excised between trochanter major and minor, the base medial-anterior, the apex lateral-posterior. The osteotomy is fixed with a children's nail and Hubbard's plate by means of 3–4 screws.

67 hips have been operated upon in 54 patients, 21–63 years of age. One died 6 weeks after the operation due to pulmonary embolia and two later of unrelated disease.

The subjective condition at follow-up was excellent and good 40, fair 6, poor 5. The clinical condition at follow-up was excellent and good 40, fair 8, poor 3. Radiographic examination of the 67 hips demonstrated: excellent and good 57, fair 5, poor 5.

The longest observation period was 13 years. Long-term observation ought to be 20–40 years.

DISLOCATION OF THE HIP IN MYELOMENINGOCELE

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The main reason for hip dislocation in myelomeningocele is muscular imbalance. This is especially liable to occur at level L_3–L_4. At this level there are active hip flexors and adductors, and paralysed extensors and abductors. Treatment aims at restoring muscular balance. This can be done by transferring m. iliopsoas to trochanter major *ad modum* Sharrard. Forty-three hips (29 patients) have been operated on in this way over the last 10 years.

The results were as follows: the caput in a good position in 16 hips, improvement but dysplasia/subluxation in 11 hips, failure (luxated as before) in 13 hips and in three hips the observation time was less than 6 months.

The results are mediocre if considered from a purely dislocation-of-the-hip point of view. However, in this severely handicapped group of patients the following points should be emphasized: All patients have major paresis and gluteal insufficiency. All use splints and crutches. None has pain. Most important are the contractures, found both in dislocated as well as in nondislocated hips. Thus, hip dislocation is of relatively little importance. Moreover, these pa-

tients have paralysed legs, pressure sores, urinary incontinence, threatening hydrocephalus and social problems. They constantly require follow-up or treatment.

Iliopsoas transfer should be done at an early stage, preferably within 1 year. Later, nothing more than the correction of contractures is advocated.

BONE SCINTIGRAPHY IN CALVÉ-LEGG-PERTHES' DISEASE

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^{99m}Tc-pyrophosphate was used to study circulation and metabolic activity in the femoral head in CLP. The material comprises 35 patients having CLP at different stages.

In the early stage, when X-ray showed only minor changes, the scintigraphic picture disclosed reduced activity in parts of the femoral head. Later in the course of the disease, areas were found with increased activity, and in the final stage a normal distribution of radioactivity was observed.

The method seems helpful in the diagnosis and in the study of the course of CLP.

FEMORAL OSTEOTOMY IN COXA PLANA

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The radiographic results after femoral derotation and varisation osteotomy in coxa plana were evaluated in 47 hips. These results were compared with those obtained after conservative treatment (Thomas' splint) in 45 hips. The material was grouped according to the primary degree of necrosis of the epiphysis (Catterall 1972).

The evaluation of the epiphyseal and joint surface quotients showed that no differences in the results existed when operative treatment was compared with conservative treatment. Significant correlations (r = 0.78–0.54) were found between these two parameters and the primary degree of necrosis.

The influence of type of treatment, age, sex, side and primary degree of necrosis on the results, derived from a general assessment of the radiographs (Table 1), was evaluated by stepwise regression analysis. This analysis showed that the degree of primary necrosis was highly correlated to the results ($P < 0.001$). A weak correlation was found to age ($0.05 < P < 0.01$). No correlation existed between the results and type of treatment, sex or side.

Table 1. Results derived from a general assessment of the radiographs.

	Osteotomy Degree of necrosis			
	1	2	3	4
Good	100%	35%		
Fair		61%	50%	43%
Poor		4%	50%	57%
No. of cases	2	26	12	7
	Thomas' splint Degree of necrosis			
	1	2	3	4
Good	100%	44%		
Fair		56%	67%	33%
Poor			33%	67%
No. of cases	8	16	12	9

ARTERIAL INJURIES CAUSED BY BLUNT TRAUMA OF THE EXTREMITIES. ASPECTS OF DIAGNOSIS AND TREATMENT

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The purpose of this report based on 25 "orthopaedic vascular cases" is to emphazise the importance of early recognition of ischaemia in cases of blunt non-penetrating trauma to the extremities. Arterial spasm without damage to the arterial wall is extremely rare. The attitude of wait and hope for spontaneous improvement is dangerous. Treatment with sympathetic block is a waste of time. Preoperative arteriography is useful if performed without delaying the arterial repair. In traumatic arterial occlusions due to blunt trauma (compression, dislocation, fracture) rupture of the intima followed by an occluding thrombus is a frequent mechanism. The aim is to restore a pulsative arterial flow in the injured artery within 6–8 hours. Resection of the injured arterial segment and reconstruction with autogenous reversed vein graft end-to-end is the method of choice. If too small a resection is performed followed by direct arterial suture under tension reocclusion is apt to appear. Loss of distal pulses in the postoperative period demands immediate re-exploration. If massive swelling is present preoperatively or develops during or after surgery fasciotomy should be liberally used. In cases of fracture associated with arterial occlusions stabilization of the fracture by internal fixation or Hoffmann transfixation, before arterial re-

pair, has advantages. Saving the limb from permanent damage can be achieved by early arterial restoration and subfascial decompression. Apart from the extent and level of injury, time-lag is the most critical single factor. Injured extremities should be carefully observed as regards distal circulatory status and function.

ATLANTO-AXIAL INTERLAMINAR FUSION

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At the departments of neurosurgery and orthopaedic surgery in Odense, 36 patients have had atlanto-axial interlaminar fusion in the period November 1966 to April 1975, carried out as a team effort between the neurosurgeon and the orthopaedic surgeon and with a specially developed technique. Specially shaped bone grafts from the iliac crest with grooves for the two laminae and a graft for the right and the left side are fixed with wire.

Twenty-one patients had a fracture of the dens axis, five of them with pseudoarthrosis. Ten had atlanto-axial instability caused by rheumatoid arthritis and seven a horizontal instability with a distance of 12 mm from the dens to the anterior arc of the atlas. Five had a vertical dislocation with the apex of the dens 8 mm cranial to foramen magnum. Eight had medullary symptoms. Two patients had os odontoideum with trauma and instability, and three had other lesions. All fusions were solid at follow-up at least 1 year after the operation. All fractures had healed except one. Great relief from symptoms was achieved with a minimum of restriction of movement of the cervical spine.

OCCIPITOCERVICAL AND ATLANTOAXIAL FUSION IN CHILDREN

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This material consists of four cases, two with congenital deformity and two with a traumatic aetiology. The age at the beginning of symptoms was 7–9 years and the time between the beginning of symptoms and operation was 5–10 months. Indications for operation were: tetraparesis (one patient), inability to open the mouth and painful neck (one patient) and painful torticollis with restricted movement of the neck (two patients). Both patients with a traumatic lesion had a fixed rotary atlantoaxial luxation.

The operation was performed in skull traction. Three patients were treated with occipitocervical and one with atlantoaxial fusion. The postoperative treatment consisted of skull traction for 4–6 weeks followed by a brace for 8–10 weeks. Fusion of the intended area was achieved in all cases.

The time of follow-up was from 2 to 3 years. All patients were free of subjective symptoms and pursued normal activities. The posture was almost normal in all. The movements were moderately restricted in one patient with a severe atlantoaxial luxation and tetraparesis before operation. In the other three the flexion, extension and rotation were restricted by 10–20 per cent and the lateral bending by slightly more.

It is concluded that occipitocervical and atlantoaxial fusion in the age group 7–10 years is a safe procedure with little risk and surprisingly little restriction of movement.

RECURRENT POSTERIOR SHOULDER DISLOCATION TREATED BY THE TRANSPOSITION OF PECTORALIS MINOR TO THE ANTERIOR BICIPITAL RIDGE

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Results indicate that the treatment of recurrent posterior shoulder dislocation has generally been less successful than that of the corresponding anterior dislocations. The need for a better operative procedure is therefore evident. From a functional viewpoint, transposition of pectoralis minor from the coracoid process to the proximal portion of the anterior bicipital ridge should have a favourable effect in counteracting the tendency for a posterior dislocation. The transposed muscle will exert a force directed antero-medially on the humerus, opposite to the direction of dislocation. In addition, on progressive internal rotation of the shoulder joint it will act with increasing effect as an external rotator, a role that is decidedly beneficial in this case, since internal rotation is one component of the shoulder movement known to provoke a posterior dislocation.

The author has used this method for treatment of recurrent posterior shoulder dislocation in four cases. Two of these were traumatic in origin while two were habitual in nature. Observation time was from 6 months to 3 years. The results were good in all cases with no recurrence of the dislocation in any of the patients. The method is extremely simple and the author cannot find any previous reports of its use for treating recurrent posterior dislocations.

NEEDLE ARTHROSCOPY UNDER LOCAL ANAESTHESIA

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Arthroscopy under general anaesthesia is being used with increasing frequency as a routine method to establish the diagnosis after knee trauma. This may cause an increased burden on the facilities of the operating theatre. Sports medicine is an area where it is most important to establish a fast and correct diagnosis and needle-arthroscopy under local anaesthesia is of great value. In 72 patients, arthroscopies were performed with 1.7 mm or 2.2 mm needles and after gaining initial experience with the technique good visualization of the knee pathology was obtained. Multiple puncture using anterolateral, posterolateral and posteromedial approaches has added valuable information.

ULNAR NEUROPATHY AT THE ELBOW

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During the period 1961–1975, 31 men and 24 women were treated for ulnar nerve palsy at Kronprinsesse Märthas Institut, Oslo. The age range was from 16 to 78 years. Thirty-four nerves on the right arm and 27 on the left were operated on with anterior transposition.

The neuropathy was secondary to trauma or disease at the elbow in 35 cases, and primary with a normal elbow in 26 cases. At operation, it was found that the neuropathy was due to fibrous compression in 36 per cent and to hypermobility in 21 per cent. In 43 per cent there were no macroscopic reasons for neuropathy.

The result in 51 patients, in the mean 5.2 years after the operation, was excellent in 47 per cent, good in 30 per cent, unchanged in 12 per cent and poor in 11 per cent. The result was independent of duration of symptoms before the operation and independent of the surgical findings at operation. The result was the same whether the nerve at the transposition was placed intramuscularly or subcutaneously.

INGUINAL PAIN IN ATHLETES

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Groin pain, sometimes with femoral radiation, is a frequent complaint in a sports clinic. Often the underlying cause may be an adductor tendinitis or a partial rupture of the quadriceps muscle and does not pose any major diagnostic problem. From a differential diagnostic standpoint our interest has been focused on three more rare conditions: 1) entrapment of the ilio-inguinal nerve, 2) entrapment of the femoral nerve, 3) atypical hernias of the abdominal wall visualized by herniography.

In the first instance excessive training of the abdominal muscles by sit-ups and straight leg rising may cause strangulation of the ilio-inguinal nerve in its zig-zag course through the abdominal wall. When a conservative approach fails, symptoms are relieved by exploration. The pain distribution often mimics that of an adductor tendinitis. In the second instance three patients with long-standing pain in the groin and weakness of the thigh during activity (soccer or ballet dancing) have been explored and strangulation of the lateral branches of the femoral nerve noticed. The individual variations of the nerve in this area are stressed. Thirdly, 15 cases of atypical hernias where initial clinical investigation failed to make the correct diagnosis were demonstrated by herniography. Positive contrast media was introduced intraperitoneally (by a technique of Åke Gullmo, M.D., Helsingborg, Sweden). A direct relation to a tear of the m. abdominis transversus was noted in two cases.

MORTON'S METATARSALGIA—A FOLLOW-UP STUDY OF OPERATED PATIENTS

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The material comprised 46 patients, operated upon for Morton's metatarsalgia in the period 1966–1975. Four patients had been operated bilaterally. The results were evaluated at least 6 months postoperatively(½–9 years) and in 40 patients after more than 1 year. The results are based on a review of the records, answers to a questionnaire and follow-up examinations in cases with persistent or recurrent discomfort of some importance.

Six patients had been reoperated upon, three of whom were considered cured after reoperation. One had too short an observation time. A total of 9 out of the 50 feet had discomfort of some importance. Five out of nine had characteristic pain and were considered for reoperation. Four of these five had been operated upon under local anaesthesia.

Recurrence after operation seem to occur to a considerable extent. Reoperation can cure and should be considered in patients with recurrent discomforting "Morton pain". Detailed symptom analysis is needed for correct preoperative diagnosis. A thorough excision of the neuroma is probably of great importance for good therapeutic results. General anaesthesia and tourniquet is recommended. Pathoanatomical diagnosis is recommended to verify the diagnosis.

CHONDROCALCINOSIS AS A SECONDARY PHENOMENON

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The frequency of radio-opaque deposits in joints and semilunar cartilages—chondrocalcinosis—was studied in various conditions. In normal knee joints the frequency was about 1 per cent. In patients treated for osteochondritis dissecans in the femoral condyles in childhood the frequency of chondrocalcinosis was not increased above normal. However, in no less than 26 out of 41 patients, operated on in adult age for osteochondritis dissecans, chondrocalcinosis was found at a radiological follow-up 25–55 years later. The same follow-up of cases operated on for torn semilunar cartilages yeilded 14 cases of chondrocalcinosis out of 41 patients. In patients with gonarthrosis no chondrocalcinosis could be found in the initial radiogram, the one that gave the diagnosis. However, 10–18 years later 1/5 had radiological signs of chondrocalcinosis.

THE BLOOD ALCOHOL CONCENTRATION AMONG TRAFFIC CASUALTIES

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Among 5,904 consecutive acute injuries over a 3-month period traffic accidents were responsible for 339. On arrival at the casualty department a blood sample was requested from all traffic injured persons for the measurement of alcohol concentration. Some refused to attend the investigation and we have excluded all cases in which the blood sample was taken more than 2 hours after the accident. The final material then consisted of 200 drivers and 53 passengers and pedestrians.

The investigation showed a positive alcohol reaction in 34.5 per cent. Of the drivers, 18.5 per cent had more than 0.1 per cent alcohol in their blood. The 15- to 19-year-olds formed the greatest risk group but the maximal influence of alcohol in accidents was in a 10-year older age group. Alcohol-related accidents took place first and foremost during leisure time. Of the male drivers 25 per cent had a more than 0.1 per cent blood alcohol content but no female drivers reached that level. Of the drivers who sustained accidents between 9.30 p.m. and 3.30 a.m., 61 per cent had more than a 0.1 per cent blood alcohol content, whereas in the daytime only 5 per cent had this level. The police had only registered 25 per cent of the slight injuries and 42 per cent of the more severe injuries. Therefore, the police and in that way official statistics were only acquainted with 22 per cent of accident drivers having had more than 0.1 per cent alcohol in the blood.