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GENUINE GIANT CELL TUMOUR OF BONE. A QUANTITATIVE ELECTRON MICROSCOPIC STUDY

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The ultrastructure of five giant cell tumours of bone has been examined by stereological methods. The quantitative data are in good agreement with the traditional, qualitative opinion of the ultrastructure of stromal and giant cells. The average stromal cell contains more endoplasmic reticulum ($P < 0.001$) and Golgi complex ($P < 0.05$) than the average giant cell which instead contains more mitochondria ($P < 0.001$) and lysosomal structures ($P < 0.05$). Grade I tumours have stromal cells showing more lysosomal structures ($P < 0.05$) and less endoplasmic reticulum ($P < 0.001$) than those of Grade III tumours. Light microscopically, there is no obvious correlation between mean nuclear profile area and grading according to Jaffe. In culture, the stromal cells continue to grow and retain their ultrastructural characteristics while the giant cells fail to divide and show signs of degeneration.

HORMONAL REGULATION OF PROTEOGLYCAN AND DNA SYNTHESIS IN CHONDROCYTES FROM THE SWARM RAT CHONDROSARCOMA AND FROM ARTICULAR CARTILAGE

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The *in vitro* biosynthesis of proteoglycans and DNA in response to varying concentrations of insulin and to sera from streptozotocin-diabetic rats has been examined in a transplantable chondrosarcoma and in calf articular cartilage. The morphology of the tissues has also been studied. In the chondrosarcoma, physiologic concentrations of insulin significantly stimulate the biosynthesis of sulfated proteoglycans while the influence on DNA synthesis is much less pronounced. Sera from streptozotocin-diabetic rats significantly reduce both proteoglycan and DNA biosynthesis. In articular cartilage, insulin stimulates proteoglycan biosynthesis at somewhat higher concentrations that are close to the physiologic range. Ultrastructurally, insulin-treated tissue is characterized by a more extensive endoplasmic reticulum, a larger Golgi complex and larger intracellular accumulations of glycogen.

EFFECTS OF TRYPSIN OR LIDOCAIN ADMINISTRATION ON A TRANSPLANTABLE OSTEOSARCOMA

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Local daily administration of crystalline trypsin in the tumour region in mice resulted in accelerated growth of the osteosarcoma and significantly ($P < 0.001$) increased tumour weights after 29 days of observation. Inactivated trypsin locally or active trypsin given intraperitoneally had no significant effects.

Local administration of lidocain caused a retarded tumour occurrence and significantly ($0.025 < P < 0.05$) lower tumour weights compared with those obtained in control animals. The effects of lidocain were accomplished by daily cutaneous application of a 5 per cent ointment under plastic occlusion. The control animals were treated with ointment containing no lidocain. There was no influence on the tumour frequencies. The findings suggest effects on tumour membrane factors involved in the immune defence. In other studies, we have shown that the osteosarcoma evokes a specific cell-mediated immune response by the host.

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IMMUNE DEFENSE AGAINST A TRANSPLANTABLE OSTEOSARCOMA

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Tumor manifestation, growth, cell mediated and humoral immune responses were studied in intact and thymectomized mice and after thymosin treatment. The cytotoxic activity of spleen cells against the tumor cells was measured quantitatively, the natural killer (NK) cell activity was measured against YAC-1 cells and the specific cytotoxic antibody activity in serum and growth inhibiting antibodies. Thymectomy resulted in significantly decreased tumor frequency, significantly increased cell mediated cytotoxic activity and lymphocytic infiltration around the tumors. Thymosin treatment of thymectomized mice restored these parameters to those of untreated animals, whereas thymosin did not affect non-thymectomized animals at all. The levels of NK cell activity were significantly depressed in tumor-bearing animals when compared to controls, and increased in thymectomized animals.

MATRIX VESICLES IN HUMAN ARTICULAR CARTILAGE. A QUANTITATIVE ELECTRON MICROSCOPICAL STUDY OF NORMAL, OSTEOARTHROTIC AND CHONDROCALCINOTIC CARTILAGE

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The total cross-sectional area occupied by matrix vesicles and their individual diameters have been morphometrically estimated in biopsies from normal (3 cases), osteoarthrotic (5 cases) and chondrocalcinotic (2 cases) articular cartilage. All three types of cartilage contain matrix vesicles. In osteoarthrosis, even in the early stages, there is a pronounced increase of matrix vesicles. Quantitatively, the largest accumulations of matrix vesicles are found in chondrocalcinosis. The mean diameter of the vesicles is larger in osteoarthrosis (155 nm) and smaller in chondrocalcinosis (99 nm) than in normal cartilage (130 nm). The finding of an increased concentration of vesicles in osteoarthrosis supports the view of an abnormal calcification mechanism in this disease.

RAT GROWTH PLATE IN DIABETES AND MALNUTRITION: MORPHOLOGY AND PROTEOGLYCAN METABOLISM

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The biosynthesis of sulfated proteoglycans in the growth plate and its morphology have been examined in normal rats and rats suffering from streptozotocin-induced diabetes or malnutrition. In diabetes, significant decreases of the following parameters are observed: Growth plate height, the number of proliferative and hypertrophic chondrocytes per cell column, the uptake of sulfate on a weight basis, and the incorporation of sulfate into proteoglycans. Growth plates from malnourished and insulin-treated diabetic rats are intermediate between normal and diabetic rats. Diabetes is associated with abnormally short glycosaminoglycan chains. Inhibition of cell proliferation and proteoglycan biosynthesis in diabetes and malnutrition is probably due to a combined effect of decreased insulin levels, decreased somatomedin activity and increase of somatomedin inhibitors.

QUANTITATIVE MYOELECTRIC STUDIES IN IDIOPATHIC SCOLIOSIS

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One of the etiologic possibilities discussed in idiopathic scoliosis is impaired function of the postural control system at any level from the central nervous system to the muscles.

This EMG investigation includes 36 girls with AIS and 15 age-matched controls. All scoliotic girls had a right-sided primary thoracic curve with its vertex at T7 to T9.

A convex hyperactivity in the myoelectric signal amplitude (rms) was found for the primary and secondary curves, except in a few patients with minor curves. The hyperactivity increased with an increase in scoliosis angle. No difference between the two sides of the back was found in the healthy controls.

A fatigue index was calculated using power spectrum analysis. There was no difference in the development of muscle fatigue between the convex and concave sides in either scoliotic or nonscoliotic subjects. The results suggest that secondary compensatory mechanisms have taken place in the muscles, which have adjusted to their new working situation.

DEFECTIVE POSTURAL CONTROL – A POSSIBLE CLUE TO THE ETIOLOGY OF ADOLESCENT IDIOPATHIC SCOLIOSIS?

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There is a growing awareness of the possibility of defective postural control being an etiological factor in AIS. A cross-sectional study of scoliotic patients using stabilometry showed a significantly increased postural sway compared to controls. However, patients with lesser curves had a more pronounced sway suggesting that this might be a primary phenomenon. A longitudinal prospective study was designed to elucidate this question, and younger siblings of scoliotic patients are now being studied. The siblings are checked clinically and by means of stabilometry, x-ray, and moiré topography at fixed intervals. A total of 111 children aged 9–14 years have been followed for an average of 1 year. The siblings have a pronounced increased postural sway compared to controls. Out of 33 siblings at the 1 year examination 8 were found to have a progression of 5 degrees or more. These children showed an even poorer postural control.

RIB LENGTH IN SCOLIOSIS. PRELIMINARY REPORT

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Control material: Pairs of ribs, as a rule the 7th–9th, were removed at autopsy from 10 cadavers without clinical or radiographic signs of scoliosis.
Scoliotic material: The ribs of the apex vertebra as well as of the one cranially and caudally to it were removed from 5 cadavers with scoliotic deformity, considered to be idiopathic; mean Cobb angle 33°.
Methods: After cleaning, the length of the ribs was measured using a strip of thin tape. Mean differences between left and right ribs were computed for each person.
Results: The mean difference in rib length for the controls was 0.106 ± 0.517 cm and that for the scoliotics 1.070 ± 0.254 cm. The difference between the two groups was significant ($P < 0.05$). In the scoliotic group the ribs were constantly longer on the concave side in 3 cases and the difference was highly significant when compared with the normal controls ($P < 0.001$). In one case the ribs were longer on the convex side and an uneven distribution of the differences was found in one case.
Conclusion: These preliminary results show that there is a difference in rib length in idiopathic scoliosis, those of the concave side usually being longer. This finding supports earlier observations by the same authors indicating that asymmetric rib growth might be one etiological factor in the development of idiopathic scoliosis.

SCHOOL-SCREENING OF SCOLIOSIS – A COMBINED CLINICAL AND MOIRÉ METHOD

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The clinical study consists of a forward-bending test. All those with a visible asymmetry are moiré photographed. Moiré topography is a non-invasive method, describing the shape of the trunk in three dimensions. In scoliosis an asymmetry is observed between the two halves of the back. The extent of the asymmetry is evaluated as "deviation number of moiré fringes". A deviation of one contour line or more is positive and should be followed up; one fringe, check-ups at school. Two moiré fringes should be roentgenographed since there is a 50 per cent risk of finding a curve exceeding 20°. The aim here is to develop a simple, non-invasive technique for documenting the asymmetry and decreasing the number of X-rays.

This screening programme has been tested in Malmö since 1976. Positive moiré findings have been encountered in 11 per cent in girls and 6 per cent in boys. X-rays were taken in 3.2 per cent of the girls and 0.7 per cent of the boys. The degree of the scoliosis at the diagnosis in cases later treated diminished significantly, compared to those diagnosed with conventional visual screening methods in Malmö. This also means that brace treatment is started earlier and fewer cases could be seen in which surgery was the only possible treatment.

ESTIMATION OF THE DEFORMITY IN SCOLIOSIS BY COMPUTER TOMOGRAPHY

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Computer tomography (CT) was used for determination of the longitudinal axis rotation of the apical vertebra, the rib-cage deformity and the rib hump.

In 65 patients with idiopathic scoliosis with a range of 20–112 degrees according to Cobb the mean rotation angle relative to the sagittal plane was 15 degrees. Curves with Cobb angles between 20–40 degrees were proportionally more rotated than curves with larger Cobb angles. Harrington instrumentation had no significant derotating effect whereas a 38 per cent correc-

tion of the rotation angle was obtained with the Boston brace.

A rib hump index (RHi) analogous to that of Götze (1973) and Thulbourne & Gillespie (1976) was used. There was a significant correlation between RHi and rotation angle. Increasing lordosis also increased the rib hump.

Harrington distraction rod instrumentation had a small but significant effect on the rib hump and reduced the sagittal diameter of the rib cage by 6 mm. The reduction was 12 mm if a compression apparatus was added. The distance from the apex vertebra to the rib-cage wall on the concave side was reduced postoperatively by 5 mm.

THE BOSTON BRACE TREATMENT OF IDIOPATHIC SCOLIOSIS

KLAS BURING

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Nachemson has earlier estimated the number of children with scoliosis needing treatment to be 3:1.000. In Sweden this means 300 additional cases per year. He further stated that 200 of these could be treated conservatively by brace, and that the remaining 100 would need surgical correction.

At Sundsvall, we have now had 4 years experience with the Boston brace. Serving an area of 280.000 inhabitants during the years 1977–1980 the brace has been used in 60 cases. The incidence of treated scoliosis has been 1:230 girls and a rough estimate of 1:3.500 boys. Extrapolating from these figures we now estimate the yearly increase in cases in Sweden to be 260. However, of these children the great majority, 250, could be expected to obtain good results with treatment in the Boston or Boston/Milwaukee brace only. Surgical correction would be needed in 10 cases only. Thus the new brace technique – especially the modified Boston brace with a high thoracic support – has greatly reduced the need for surgery in children with idiopathic scoliosis.

THE IMPORTANCE OF ALLERGY IN THE FIXATION OF METAL IMPLANTS IN BONE TISSUE

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Guinea-pigs sensitized to either Ni or Co, as well as an equal number of control animals, were used for the study. A screw was put in transversely through the distal femur and one through the proximal tibia on both sides in all animals. In order to study Ni allergy the animals received stainless steel screws, while Howmedica Vitallium screws were used to study Co allergy.

After 6 weeks neither allergy exerted a statistically significant influence on the mechanical fixation or the screws, but the mean values were marginally lower for both groups with allergy compared to their controls. The histological evaluation of the tissue surrounding the femoral screws revealed signs of inflammation especially in sensitized animals. As seen in microradiographs, the inflammatory tissue had an erosive effect on the bone which had formed around the screw.

The results indicate that allergy against metal does not compromise the mechanical fixation between metal and bone during the early period after implantation, but there is a risk that the long-term fixation may become affected.

PENETRATION OF DICLOXACILLIN INTO BONE AND EXTRACELLULAR FLUID

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An assay was developed for analysis of antibiotic in bone. Intravenous infusion of 2 g dicloxacillin 1–2 hours before operation gave concentrations of 0.5–6 μg per gram bone tissue; i.e. well above the M.I.C. value of 0.25 μg/g tissue. For studies of the antibiotic concentration in extracellular fluid a steel wire cage was operatively introduced subcutaneously in rabbits and the formed tissue cage fluid (TCF) could then be analyzed 6 weeks later. Dicloxacillin showed the same degree of protein binding in TCF as in serum (94–99 per cent). The penetration of the antibiotic into TCF was slow with maximum concentration after 6 hours. The elimination was very slow showing a half-life of 25 hours. Similar conditions may prevail for the penetration of dicloxacillin into bone tissue fluid.

RELATIONSHIP BETWEEN SYNOVIAL MEMBRANE AND METABOLISM OF ARTICULAR CARTILAGE PROTEOGLYCANS

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Medium (SM) from cultured calf knee joint synovium (non-rheumatoid) when applied to cultures of articular cartilage from the same animal resulted in a stimulation of proteoglycan degradation, principally by activating chondrocytes to secrete or activate their own enzymes. Culturing the synovium in medium containing dextran sulphate greatly enhanced the effect; glucocorticoids inhibited the effect and indomethacin had no significant effect. Adding PGE, or PGE_2 to the cartilage cultured

alone had no effect upon proteoglycan breakdown whereas PGE, or PGE_2 when added to cartilage at the same time as SM from synovium cultured in the presence of indomethacin resulted in enhanced breakdown. Similarly glucocorticoids alone had no effect upon cartilage breakdown but when combined with SM resulted in enhanced breakdown. Negative aspects of the use of glucocorticoids and indomethacin in the treatment of rheumatoid arthritis become apparent if the results regarding the enhanced cartilage breakdown under certain experimental conditions can be extrapolated to the *in vivo* situation.

EFFECTS OF GENTAMICIN IN ACRYLIC CEMENT ON BONE. AN EXPERIMENTAL STUDY IN RABBITS

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A hole was made in both tibias of rabbits and a pin which was made either from Palacos bone cement or Palacos gentamicin bone cement was introduced into the marrow cavity. Six weeks later the breaking strength at the hole was measured by three point bending.

In another group of rabbits with bilateral knee prostheses we also studied the effect of gentamicin in Palacos by microscopy of the bone cement interface.

We conclude that bone cement containing 0.5 g gentamicin per 40 g powder has a negative effect on bone function. This effect is small and *histologically* the bone formation around gentamicin bone cement does not seem to be impaired.

1α–OHD_2, A SELECTIVELY FUNCTIONING ANALOGUE OF VITAMIN D

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One effect of vitamin D is the mobilization of calcium from bone. According to Reeve, Schnoes & DeLuca (1978) 1α–OHD_2 may have less effect in this respect, while it is equally active in other vitamin D systems. We gave 0.5 μg of 1α–OHD_2 or 1α–OHD_3 orally to male fullgrown rats, some of which also received 1.5 mg prednisolone. All animals were fed a diet containing 0.3 per cent Ca and 0.5 per cent P. The experimental period was 6 weeks. Both substances were equally capable of promoting the intestinal absorption of Ca. Compared to 1α–OHD_3, 1α–OHD_2 caused less hypercalcemia, hypercalciuria and kidney calcification but seemed to be less rapidly inactivated. 1α–OHD_2 was more efficient in preventing phosphaturia and bone loss resulting from prednisolone therapy.

VITAMIN D METABOLISM IN PATIENTS WITH PRIMARY BILIARY CIRRHOSIS (PBC)

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Patients with chronic liver disease (PBC) had low serum levels of 25-OH vitamin D and those with asymptomatic PBC had normal levels. The 25-hydroxylation of vitamin D was, however, found to be normal. The intestinal absorption of vitamin D was severely impaired and related to the steatorrhea and probably also to a generalized absorptive disturbance. There was no change in the urinary excretion of radioactivity. The metabolism test used involved the absorption of orally administered ^{3}H-cholecalciferol and the conversion of intravenously administered ^{3}H-cholecalciferol into 25-OH vitamin D. The active vitamin D metabolites produced were studied in serum after elution on Sephadex LH-20 columns. The osteomalacia caused by the disturbance of vitamin D absorption responded promptly upon parenteral administration of 1,25-dihydroxy vitamin D as studied by quantitative computer-aided tomography of the proximal tibia.

HIP JOINT PRESSURE IN PATIENTS WITH INTRACAPSULAR FEMORAL NECK FRACTURES

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It has been suggested that an increased hip joint pressure caused by massive haemarthrosis after intracapsular fractures of the femoral neck might be important for the development of avascular necrosis. In a pilot study of 10 consecutive patients with intracapsular hip fractures the hip joint pressure was measured before and during nailing using the wick-in-needle technique. In neutral and outward rotation the hip pressures ranged between 0–15 mmHg with an average of 2 mmHg. In inward rotation the ranges were 40–125 mmHg in Garden group I–III fractures and 17–36 mmHg in group IV fractures, respectively. Thus, none of the 10 patients showed intraarticular hip pressures that could possibly cause avascular necrosis when the hip was in neutral or outward rotation. In the extreme inward rotation, used for reduction and nailing, high pressures which might cause circulatory deterioration were generated. Prolonged time in this position should therefore be avoided. The study does not support the theory that hip joint tamponade is a usual cause of avascular necrosis.

ARE THERE ANY NEGATIVE EFFECTS OF THE BOSTON BRACE ON RENAL FUNCTION?

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The effect of the Boston brace on renal function was studied in 8 scoliotic girls aged 11–16 years. Renal function was tested by clearances of inulin and para-amino hippuricacid (PAH) both without and with the brace applied at the start of the treatment and after 4 months of treatment.

Glomerular filtration rate (GFR) and renal plasma flow (RPF) decreased from rather high values when the brace was applied. They were still decreased after 4 months. Fractional sodium excretion decreased significantly when the brace was applied. After 4 months of brace treatment it had increased somewhat in the test with the brace on and increased further when the brace was taken off. The immediate effect of the brace on renal function thus is a decreased GFR, RPF and urinary sodium excretion. Further studies are needed to see whether this functional decrease is reversible when the brace treatment is finished.

RADIOLOGIC MEASUREMENT OF SPONDYLOLISTHESIS – METHODOLOGICAL ASPECTS

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A total of 105 patients with spondylolysis diagnosed before the age of 40 were included in a radiologic and clinical follow-up after an observation time of at least 30 years. After studying the radiologic measuring techniques described in the literature we selected the following measurements as radiologic parameters: 1) vertebral displacement as a percentage of the width of the relevant vertebra; 2) lumbar vertebral index, i.e. the vertebra's posterior height as a percentage of its anterior height; 3) lumbosacral angulation measured between the lower margin of L3 and the upper margin of the sacrum; 4) sacral inclination, i.e. the angle between the vertical plane and the posterior margin of the sacrum, in patients radiographed standing up. In order to assess disc degeneration we also measured narrowing of the disc space at the level of vertebral displacement in comparison with conditions at the second level above this. This preliminary study showed that the average age at diagnosis was 26 years. The level of displacement was L5 in 90 patients, L4 in 13, and L3 in 3 cases. The lumbar vertebral index approached the normal value of 90 per cent, whereas the average lumbosacral angulation was increased. At the time of diagnosis almost half of the patients had no disc degeneration, while severe degeneration was noted in 15 per cent. These figures were reversed at follow-up.

OPERATIVE TREATMENT FOR SPONDYLOLISTHESIS IN CHILDREN AND ADOLESCENTS

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A report of 10 cases of spondylolisthesis in children and adolescents operated upon successfully was presented at the annual meeting of this society in 1978 (*Clin. Orthop.* 1981, **147**, 192–199.) Another 10 young patients have been operated on since then. The follow-up time for 2 cases is too short to be included, the total load of cases thus being 18. Four were boys and 14 girls; mean age at the time of operation 14.5 years (range ½ to 14 years). Sixteen patients were operated on by anterior extraperitoneal interbody fusion. Altogether 14 patients had signs of tight hamstrings. The symptoms disappeared in all cases except one with unilateral affection where there was still an impaired gait pattern 12 months after the operation. Safe bony fusion was obtained in every case and all patients but one were free of subjective complaints and had returned to normal activities at the time of the latest follow-up. The overall results were thus considered excellent in all 18 patients.

PROGRESSIVE SPONDYLOLISTHESIS IN THE ADULT

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Eighty-seven patients with spondylolisthesis diagnosed in adulthood (20–40 years) were included in a clinical and radiological follow-up after an observation time of at least 30 years. Progressive slipping (> 1 cm) was noted in 19 patients (20 per cent). The lumbar vertebral index was found to remain unchanged over the years and was not correlated with progressive slipping. The lumbosacral angulation was normal in half of the patients showing progressive vertebral displacement. The degree of disc degeneration showed a general increase with advance in age, but was more pronounced in cases with progressive slipping. Daily low-back pain was reported by more than half of all the patients, and sciatic pains by one-third, independent of progressive vertebral slipping. No correlation could be established between spondylolisthesis, trauma and/or heavy labour. A low sick-leave rate was noted for the entire series, regardless of whether vertebral slipping had progressed.

RELIABILITY OF NEONATAL HIP EXAMINATION

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Examination of the hips of all newborns at Huddinge Hospital during a period of 12 months was carried out by a senior orthopaedic surgeon and a paediatrician. Both examinations were performed and recorded independently within an interval of 3 hours. Altogether 2.400 newborns were included in this study. Nineteen underwent treatment because at least one of the examiners diagnosed either positive Palmen's or Ortolani's sign. In 6 cases pathologic findings were recorded by both examiners. In 13 cases the hip was considered as normal by the one but pathologic by the other examiner.

Diagnosis of slight instability – no positive Palmen's or Ortolani's sign – varied so much between the two examiners that coincidence between the two examinations did not exceed the level of random observations. Two cases of late subluxation of the hip were diagnosed at the age of 3 months. They were considered as normal by both examiners at the neonatal hip examination.

LATE CONGENITAL DISLOCATION OF THE HIP – REDUCTION AND TREATMENT BY ABDUCTION SPLINT

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Seven children (mean age 4.2 ± s = 1.5 months) with unilateral non-reducible dislocations of the hip were diagnosed during the years 1977–1980. After diagnosis the children were placed in splints holding the hip joints in flexion and abduction (frog-position). The hip joints were not fixed in forced abduction but left so that the child had freedom to move the joint when kicking. The children were then seen at 1 week intervals. The dislocated hips all showed a successive increase in abduction in the flexed position. The splints were accordingly tightened into increased abduction. Thus all hips were reduced after 2–4 weeks of treatment.

After reduction the hip joints were continously treated in the frog-position until the radiographic examination showed a normalization of the acetabular dysplasia. During the short observation period (mean 11 ± s = 5 months) a complete normalization of the acetabular angle had been achieved in 6 children. The remaining child had 3 degrees of residual acetabular dysplasia after 5 months of treatment.

SEPTIC ARTHRITIS TREATED BY NEEDLE ASPIRATION AND IRRIGATION

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During the period 1970–1979, 31 patients, including 23 children, were treated for septic arthritis. All patients received identical treatment, i.e. daily repeated needle aspirations and thorough irrigations of the infected joint in combination with high dose antibiotics. The mean observation time was 4.8 years.

An excellent result, i.e. a normal clinical and radiographic examination, was achieved in 84 per cent (26/31). The main parameter resulting in sequelae after the joint infection was the time from debut of symptoms until the treatment was instituted ($P = 0.02$). All patients with a duration of symptoms of less than 4 days before treatment had normal joints at the follow-up examination.

Provided treatment is started at an early stage repeated needle aspirations and thorough irrigation is considered an adequate method for drainage of a septic joint. Only when adequate aspiration is technically difficult or impossible or the therapeutic response to treatment is inadequate should open arthrotomy be considered.

CONGENITAL INDIFFERENCE TO PAIN

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Congenital indifference to pain, i.e. congenital absence of a normal cerebral perception of pain stimuli, is an exceedingly rare disorder. A now 16-year-old boy with this disease has since 1972 been observed and treated by us. The following abnormalities have been observed: Recurrent spontaneous fractures of the metatarsal bones, huge osteochondritis-like lesions of both knees and ankles, soft-tissue calcifications around the joints, painless movements despite severe arthritis, progressive grotesque joint deformities and recurrent corneal ulcerations. Laboratory blood examinations and electromyographic studies have been normal. Histopathologically, degeneration and necrosis of bone and cartilage have been observed. Weight supporting devices have not been tolerated due to development of pressure sores. Despite the extensive disease, the boy has never complained of pain. The progressive course of the disease has not been successfully altered by any form of treatment.

SUPRACONDYLAR FRACTURE OF THE HUMERUS IN CHILDREN

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Seventy children with supracondylar fracture of the humerus were re-examined after 2–6 years. Forty-four of the 70 fractures were moderately to seriously displaced.

Treatment. Twenty-five fractures were treated operatively, 21 with closed reduction, 21 with plaster immobilization only and 3 with overhead traction.

Results. One child developed a Volkmann contracture after closed reduction and plaster immobilization. Seven children developed neurological involvement, but only temporarily. Increased varus or valgus angulation was found in 8 cases. Slight restriction of flexion and extension was found in 10 patients. No correlation between angulations/reduced mobility and open reduction was found.

Summary. The high incidence of operative treatment in our material gave good clinical and radiological results. It is extremely important especially after closed reduction to make a thorough radiological examination after 3–5 and 7–10 days to ascertain if the fragments are in the correct position. As angulation was also found in patients with undisplaced fractures it is recommended that the function be checked about a year after the fracture.

TRIPLANE ANKLE FRACTURES IN CHILDREN

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Intra-articular fractures of the ankle in children known as the Tillaux and triplane fractures of the distal tibia are caused by a supination-eversion trauma. In order to determine the three-dimensional configuration of these fractures CT was performed in one case with a Tillaux fracture and in four cases with triplane fractures.

The triplane fractures consisted of two to four fragments representing three types of fracture, depending on the type of investigation.

In one case with a three fragment fracture diagnosed by conventional tomography and CT, a four fragment fracture was revealed at operation. This patient had, in addition, a fracture through the antero-medial part of the growth plate without displacement.

According to this and previous investigations the Tillaux and triplane fractures represent five different anatomical patterns of intra-articular supination-eversion injuries.

SURGICAL TREATMENT OF POSTTRAUMATIC OSSEO-FIBROUS DEFECTS OF THE GROWTH PLATE

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There are various causes of progressive angular deformity in the lower limbs in children. Spontaneous correction is not common. Surgical treatment includes osteotomy, stapling or Langenskiöld's operation. Standard radiographs are not sufficiently sensitive and therefore can not detect post-traumatic deformity. Roentgen stereophotogrammetry has made it possible to analyze longitudinal growth with high precision.

Conclusions: 1) Spontaneous correction occurs in some cases following partial closure of the growth plate. A bony bridge radiographically in many cases represents a fibrous defect. 2) Corrective osteotomy should be considered in cases with progressive angular deformity. Postoperative normal growth is possible. 3) Stapling on the opposite side of a localized defect within the growth plate can be considered in the distal femur and proximal tibia. 4) Langenskiöld's operation, resection of a localized defect of the growth plate, is an attractive approach for the correction of a progressive angular deformity.

^{99}Tc-MDP SCINTIMETRY IN TRAUMATIC AND OPERATIVE GROWTH ARREST

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The problem of early localisation and quantification of traumatic or surgical growth arrest is well recognized. Standard radiographs give insufficient information regarding growth conditions. Experimentally, growth can be studied by intravital marking of the enchondral calcification process with tetracycline. This calcification can also be demonstrated with bone seeking radio-nuclide agents. A significantly lower deposition of ^{99}Tc-MDP can be visualized at growth arrest. With the introduction of roentgen stereophotogrammetry, a clinically useful method was made available to register longitudinal growth with high precision. Five children, operated upon with staples according to Blount, and three with localized growth disturbances following fracture in the distal femur and distal tibia were examined with ^{99}Tc-MDP and the results were correlated with the simultaneously performed stereophotogrammetric analysis.

Conclusions: 1. ^{99}Tc-MDP scanning is useful to identify traumatic or surgical growth arrest. 2. Good correlation was found between the uptake ratios from ^{99}Tc-MDP scanning and the roentgen stereophotogrammetric analysis. 3. ^{99}Tc-MDP scanning is a clinically useful tool to demonstrate growth disturbances.

LONG-TERM RESULTS OF SLIPPED CAPITAL FEMORAL EPIPHYSIS WITH NO PRIMARY TREATMENT

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In order to study the long-term results after slipped capital femoral epiphysis, the case records of all patients with this condition registered at the orthopedic departments in Lund, Malmö and Helsingborg have been collected, and from these, 44 cases having had no treatment or only symptomatic treatment were selected and examined clinically, using the d'Aubigné-Postel hip rating system, and radiologically for the degree of deformity and arthrosis.

Results: During the observation period of 20–62 years only 4 out of 44 cases have had operations in adult life (2 arthrodesis and 2 arthroplasties). In the remaining 40 cases, the clinical results show in most cases only minor problems regarding pain, walking distance and range of movement. Concerning the radiographical results, there was a good correlation between the initial displacement of the femoral head, the actual deformity and the degree of arthrosis, most frequent in the older patients.

Conclusion: The long-term results after slipped capital femoral epiphysis with no treatment are not as bad as would be expected and better than after treatment with osteotomy of the femoral neck, closed reduction and/or osteosynthesis with heavy nails.

OSTEOSYNTHESIS WITH THE HOOK-PIN IN SLIPPED CAPITAL FEMORAL EPIPHYSIS

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Osteosynthetic materials have caused peroperative problems because of increased displacement and postoperative problems because of bone resorption and growth of the femoral neck resulting in loosening of the osteosynthetic material and reslipping. Premature closure of the growth plate has also been registered.

In order to avoid these problems, a hook-pin was developed. This device has now been in use for 6 years and has been applied in 40 cases (79 hips), the pin being placed in a drilled channel with the hook in the femoral head. The operation has been performed on the slipped and on the asymptomatic side.

No avascular necrosis has been noted in 78 hips pinned *in situ* or after closed reduction. Avascular necrosis occurred in one hip after femoral neck osteotomy. Only one hip required reoperation because of resorption around the hook-pin. After the end of the growth period the hook-pin was extracted without problems.

EFFECT OF AUTOTRACTION AND CONSERVATIVE TREATMENT OF LUMBAGO-ISCHIAS

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During the years 1979 and 1980 a total of 155 patients with lumbago-ischias were treated with autotraction supplemented by a very strict conservative regimen. The majority of the patients had long-standing therapy-resistant sciatica (mean duration of symptoms = 9 ± s = 10 months) with a mean age of 42 years. The mean observation time was 14 months (min. 6 months). The overall results showed that 53 per cent of the patients considered the treatment to be very effective or effective. A moderate effect was reported by 19 per cent, 22 per cent experienced no effect and 5 per cent were worse. Twenty patients in the last two groups were subsequently operated on for prolapsed disc hernia. Fifty-two per cent of the remaining patients had returned to their original profession.

The main parameter contributing ($P = 0.0001$) to a good or excellent result was the experience of marked improvement during a specific traction. Of these patients 97 per cent had experienced the improvement during one of the first six treatments.

AUTOTRACTION AND THE TREATMENT OF LUMBAR DISC HERNIAS

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Autotraction according to Gertrud Lind has been applied regularly since 1978 for patients with severe lumbago-ischias. Compared with the previous treatment regimen autotraction had no influence upon the operation frequency for lumbar disc hernia. The findings at operation were recorded in all 97 operations performed in 1975 through 1980. Autotraction + operation did not influence the findings at operation compared with rest + operation. The frequency of a free sequester which had penetrated through the posterior longitudinal ligament into the spinal canal was 49 per cent; non-perforating disc sequester 29 per cent; bulging disc 19 per cent; postoperative scar tissue problems 2 per cent and negative findings 1 per cent. Thus, autotraction did not worsen the disc hernias nor was there any influence upon the operations for bulging disc. Disc sequester ought to be operated primarily. Autotraction + operation was not preferable to rest + operation. Nevertheless, autotraction may be used at orthopaedic back care units for specialized treatment of acute lumbago-ischias in younger individuals.

LUMBAR BACKACHE IN 18-YEAR-OLD MEN AND ITS CONSEQUENCES

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Among a total of 5798 men completing 10–12 months military service during the period 1972–1977, 7.2 per cent were referred for specialist examination because of back complaints. Orthopaedic consultation took place once a week with one and the same orthopaedic surgeon. Constitutional weakness (back insufficiency together with psychosomatic symptoms such a gastritis, nervous insufficiency, etc.) was present in 2.0 per cent, back insufficiency alone (muscular and/or disc) in 2.9 per cent and disc pains (injuries) in 2.2 per cent of all men. The consequences of the back complaints were investigated for the period 1978–1980. The category constitutional weakness experienced continuous backache in 12 per cent compared with 4 per cent for the two other categories and 1 per cent for a control group. Their frequencies of periodic backache were 81, 66, 77 and 48 per cent. Interrupted working ability was reported in 20, 13, 12 and 6 per cent. Their frequencies of re-education were 15, 10, 18 and 6 per cent and non-working 12, 12, 7 and 16 per cent. The rehabilitation help given was efficient in this age group. The results stress the importance of rehabilitation early in the course of back disease.

LUMBAR BACKACHE DURING PREGNANCY AND DELIVERY

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A study was made of the frequency of back pain in 294 women giving birth in 1977. Fifty per cent of the women had never experienced back problems, 17 per cent had always had back pains and in 33 per cent the back pains had started during or after their first pregnancy. Women with lumbar back pains had a high frequency of radiating pains to the lower extremities (24–28 per cent), sensory disturbances (6–16 per cent), and muscular weakness (28–35 per cent) though these complaints were subjective and of a minor degree. Of the back complaints persisting 4 years later 74 per cent were in the category of continuous back pains and 50 per cent in the other backache category. The analyses showed that lumbar backache started during pregnancy in 16.5 per cent of all women, during delivery in another 2 per cent and that another 17.3 per cent experienced continuous back pains. Hormonal influences may be of importance for backache in women.

A CORSET – IS IT RIGHT?

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After a historical review of fashion corsets the results are presented of two inquiry – investigations carried out in Uppsala in 1967 and in Örebro in 1980. A total of 205 women (82 and 123, respectively, from Uppsala and Örebro) aged 50–85 years answered questions regarding occurrence of low back pain, sick pension, X-ray examination, physical therapy, consumption of analgetics, number of pregnancies, other relevant diseases and corset-wearing.

Fifty-six and 86 per cent of the women respectively had worn a corset, in most cases for more than 15 years, and had obtained good relief of low back pain thanks to the corset.

OPERATIONS FOR HERNIATED LUMBAR DISCS

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A total of 158 patients, 51 women and 107 men, were operated on for herniated discs of the lumbar spine from 1975 to 1978. At follow-up (2–5 years postoperatively) the patients received a questionnaire and this was returned in all but 7 cases. A preoperative myelography was done in 129 patients.

The results after surgery were good or fair in 80 per cent. Four out of 10 patients with cauda equina symptoms had an acute operation (all examined by myelography preoperatively.) The outcome for these patients was better than for the 6 whose operations were delayed for some days.

Lumbar phlebography did not give any further information in our material.

Summary. Patients with a negative myelography and diffuse symptomatology should not be operated upon. All patients with cauda equina symptoms should be treated as acute cases and with positive findings at myelography operated upon as soon as possible.

FRACTURES OF THE SCAPULA

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Ninety-four scapular fractures in 88 patients were reviewed in the years 1973–1979. The average age at injury was 46 years. The mechanism of injury was a simple fall in about 30 per cent; sporting injuries, falls

from a height and road accidents were the causative factors in about 20 per cent of cases each. The fractures were divided into five types according to X-rays of the scapula. All types received the same treatment; a short period of fixation of the arm and thereafter early mobilisation. Eighty-nine fractures in 83 patients were assessed with the aid of a questionnaire or by phone 0–7 years after the injury. Of these 57 (68.7 per cent) had no disability at all and 25 (30.1 per cent) complained of only slight disability. The most common complaint was slight pain during heavy work with the arm. The patients assessed less than 1 year after the injury had the highest incidence of complaints. All types of scapular fractures can give long-lasting disability but of a minor nature.

A PROSPECTIVE STUDY ON THE TREATMENT OF COLLES' FRACTURE

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A total of 106 patients with Colles' fracture were randomly allocated to receive one of three treatments: (A) manual reduction of the fracture using local anaesthetic infiltration, and subsequent immobilisation with a dorsal plaster splint; (B) reduction of the fracture using mechanically applied continuous traction without anaesthesia and subsequent immobilisation with a circular plaster; (C) same treatment as in group A but a circular plaster was applied. During reduction only 8 per cent of the continuous traction patients had pain, whereas 32 per cent of the other patients had pain ($P < 0.05$). Twenty-seven per cent of the patients treated with a dorsal splint developed recurrent fracture dislocations. This occurred in only 10 per cent of the patients treated with a circular plaster ($P < 0.05$). Frykman's classification is suitable for grading the treatment. Using Lidström's classification, treatment with a circular plaster showed better end results at the 6 months follow-up. It is concluded that Colles' fractures can be painlessly reduced using mechanically applied continuous traction without anaesthesia and that circular plasters give better immobilisation.

THE ETIOLOGY OF AMPUTATION STUMP FATIGUE IN PATIENTS CONTROLLING MYOELECTRIC PROSTHESES

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Amputation stump fatigue causes discomfort and control difficulties for patients using myoelectric prostheses. The degree of fatigue is very individual and its etiology is unknown. In two unilateral below-elbow amputees the EMG-signal used for prosthesis control was analyzed for the presence of localized muscular fatigue during the control task. It was found that the susceptibility to muscular fatigue was higher in the amputation stump than in the normal arm and, in addition, that the maximal endurance for work at a given level of muscular fatigue was shorter in the stump. From this we concluded that the etiology of amputation stump fatigue is an increased susceptibility to localized muscular fatigue in combination with a lowered endurance for muscular work in the stump. The lowered endurance can be caused by pain from neuromas and scars or from the socket pressure. Muscular training, improved surgical amputation techniques and proper sockets may therefore be factors that will diminish amputation stump fatigue.

REDUCTION NEEDS OF SUBCAPITAL FRACTURES OF THE 5th METACARPAL BONE

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To analyse the final outcome of subcapital fractures of the 5th metacarpal bone a follow-up investigation was performed. Out of 611 consecutive fractures of the upper extremity 5 per cent were of this type. Twenty-one patients were investigated 1–1½ years after sustaining the fracture. The patients' opinion of the functional and cosmetic outcome was registered, as well as angulatory or rotatory deformity, objective appearance and limitation of motion. The grasping force was determined and a roentgenographic analysis was performed according to a new technique. A significant angulatory deformity on the fractured side was found, ranging up to 32 degrees. There was no difference in angulatory deformity or grasping force between those patients with functional complaints and those without. Patients with a visible knuckle deformity did not differ from the group as a whole. It is concluded that the presence of an angulatory deformity does not inevitably lead to disability. Thus, the angulatory deformity was not a predictor of the functional outcome.

MUSCLE STRENGTH AFTER TIBIAL FRACTURE

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For a period of 18 months, in 1972–1973, 51 consecutive patients with closed extraarticular tibial fractures

were treated with plaster immobilization and early weight-bearing according to Sarmiento's principles. The patients have been reexamined during 1980. Calf muscle strength was tested in a Cybex II isokinetic dynamometer. The maximum isometric and isokinetic muscle strength was registered as the torque during dorsal and plantar flexion of the ankle joint both in the fractured and sound limb. For various reasons only 25 patients were tested.

1. A significant decrease of the calf muscle strength was noted in patients with persistent discomfort after the fracture.
2. Patients with fractures caused by traffic accidents showed the most pronounced reduction of calf muscle strength in the fractured limb.
3. Functional rehabilitation of the calf muscles depends on what kind of violence caused the tibial fracture.

OSTEOSYNTHESIS BY AO PLATING FOR FRACTURES OF THE SHAFT OF THE TIBIA

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Twenty-nine males and seventeen females were treated by the AO plating method for fracture of the shaft of the tibia over a period of 6 years. Average age at operation was 44 years (range 16–77 years). Fourteen of the fractures were segmental or comminuted and 5 were open. Traffic accidents and falls were the most common causes of injury. Most of the patients (31) were operated within 2 days after admission. Forty-two fractures healed fully within 3–5 months whereas in 4 cases healing was delayed. Three patients had superficial necrosis and wound infections. In no case did osteitis, pseudarthrosis or refracture occur. Average time of hospitalization for 39 patients without other injuries was 12 days (range 2–52). For 33 patients with jobs incapacity varied from 6 to 38 weeks (average 19 weeks). Very rewarding results were obtained by AO plating in this small series. However with the development of more conservative methods we have increasingly changed over to these. However, specific fracture problems are in our opinion more effectively solved by AO than by other methods and it will therefore remain in our armamentarium.

VENTRALIZATION OF THE TIBIAL TUBERCLE AT CHONDROMALACIA PATELLAE

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In this study patellar pain in 32 knees has been treated with ventralization of the tibial tubercle. No arthrotomy was done. An anterior displacement of 12 mm was aimed at. Seventy-two per cent of the knees improved according to the opinions of the patients. Sixteen per cent were unchanged and 12 per cent worse. Extension did not deteriorate in any knee. No serious complications were encountered. Seven patients had to be reoperated on: 3 with a femoro-patellar prosthesis, 2 with reventralization, 1 with shaving and fenestration of the patella and 1 with shaving of the patella. It is suggested that patellar pain should be subgrouped into hyperpressure, instability and intraosseous venous hyperpressure groups in order to find the causal treatment.

CHONDROMALACIA PATELLAE TREATED BY CHONDRECTOMY AND DRILLING OF THE SUBCHONDRAL BONE

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Chondrectomy with drilling of the subchondral bone was performed in a series of 41 knees with chondromalacia at the medial joint facet of the patella as the only pathology. The material consisted of 39 patients, 21 males and 18 females, one patient of each sex being operated on in both knees. All patients had a history of 1 year or more of disabling patello-femoral pain, in 24 cases including pain at rest.

At operation 21 cases were found to have Outerbridge grade I, 11 grade II and 9 grade III lesions. At follow-up 9 months – 2 years (mean 1½ years) postoperatively 35 per cent had no knee symptoms, 45 per cent were improved but had some residual minor symptoms, 10 per cent were unchanged and 10 per cent were worse than preoperatively.

Preoperative data or degree of cartilage degeneration in this series did not permit prediction of the results.

POSTERIOR DISLOCATION OF THE SHOULDER ASSOCIATED WITH GENERAL SEIZURES

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General convulsive seizures may in rare instances cause bilateral fracture-dislocations of the shoulders. Hitherto, 11 cases of posterior bilateral fracture-dislocations caused by seizures have been reported in the medical literature. In this communication, another four cases of posterior fracture-dislocation, three bilateral and one unilateral, are presented. Moreover, we report three cases of anterior fracture-dislocation, two unilateral and one bilateral, also caused by general convulsions without any associated direct trauma. Besides the action of the muscle forces, the position of the glenoid cavity at the onset of seizures seems to be the main determinant for the direction of dislocation. No relationship has been found between the cause of convulsions and the direction of the resulting dislocation. The diagnosis is often overlooked and should always be considered when patients with stiffness of the shoulder and/or pain are seen after a generalized convulsion.

LONG-TERM RESULTS OF ROTATOR CUFF REPAIR

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Forty-three shoulders in 42 patients with an average age of 70 were evaluated between 12 and 19 years after rotator cuff repair. The long-term results were good in 58 per cent, fair in 28 per cent and poor in 14 per cent. In comparison with the results of an initial evaluation 6 months after operation there were no significant differences. Radiological examination of 35 shoulders and autopsy findings in one patient showed recurrence of the rupture in one-third of the cases but most patients with re-rupture could be rated as good.

INTRACOMPARTMENTAL FOREARM PRESSURE DURING REST AND ACTIVITY

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In the leg, a non-traumatic chronic compartment syndrome causing pain and muscle weakness has been described. Fasciotomy is the cure. In the present investigation the pressure in the dorsal (extensor) forearm compartment using the wick-catheter technique was determined in 11 healthy volunteers during rest and exercise. The mean pressure was 6 (2–11) mmHg at rest. It increased markedly during exercise. There was no obvious difference between men and women or between the dominant and non-dominant arm.

The intracompartmental pressure was determined in 11 patients with effort-related dorsal forearm pain of unknown origin. Six of them had pressure values during rest and/or exercise exceeding the reference values, or exercise pressure more than twice that in the healthy arm. These patients underwent subcutaneous fasciotomy of the dorsal forearm compartment. Four of them achieved pain relief, and those examined postoperatively had normalized their pressures. Thus, there seems to be a relationship between intracompartmental pressure and symtoms.

ROENTGEN STEREOPHOTOGRAMMETRIC ANALYSIS OF PROBLEMS AFTER HIP ARTHROPLASTY: MIGRATION, LOOSENING, INSTABILITY

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Roentgen stereophotogrammetry has been used to evaluate problems after arthroplasty of the hip.
Material: Sixteen cases (18 hips) with hip arthroplasty according to Charnley, Lubinus and Brunswick. Ten cases with JRA (12 hips) with hip arthroplasty according to Wagner.
Method: Under local anaesthesia 3–4 0.8 mm tantalum balls were implanted percutaneously in the iliac crest and major trochanter. Roentgen stereophotogrammetry was performed with the patient loading and unloading the hip. Error of method 0.2–0.4 mm.
Results: Charnley prostheses with no problems were found to be stable. In 15 hips with problems loosening of the acetabular prosthesis was found in 8 hips and of the femoral prosthesis in 4 hips. In the asymptomatic group of Wagner prostheses (10 hips) loosening was found in 5 acetabular and 2 femoral components. Hips with symptoms showed loosening. This is associated with osteoporosis, multiple joint problems and low demand on the hips.

REOPERATION OF TOTAL HIP REPLACEMENTS IN SWEDEN 1980

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This prospective multicenter study of reoperations performed after total hip replacement was started in January 1979. All except one of the departments of orthopaedic surgery are represented in the study and furthermore some surgical departments and altogether 44 hospitals are included. In the year 1980 it was found that 4.441 primary hip replacements were performed and of those only 2 per cent were surface replacements.

In the same year 476 reoperations were reported and the reason for the reoperation was mechanical loosen-

ing in 44 per cent, infection in 20 per cent and luxation in another 20 per cent.

At the reoperation one or both of the components were changed in 60 per cent and furthermore it was found that in only 7 per cent were both components extracted. A great number of complications of these reoperations were reported. During the first month 107 early complications occurred, several of them being serious complications. Luxation was the most frequent complication but deep infection was also noted to be a serious and frequent early complication. Four patients died within the first month after the reoperation.

TWENTY-FIVE RESURFACING ARTHROPLASTIES IN 18 PATIENTS WITH SEVERE HIP DISABILITY

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Thirteen patients (18 hips) had juvenile chronic arthritis. The youngest was 14 years and the mean age 23 years. The average follow-up time was 20 months. All but two of the patients are pain-free with increased mobility and better walking capacity. In one patient, pain-free for 7 months, the femoral cup slipped and a total hip replacement was performed. In another patient, pain-free for 2 years, the acetabular socket loosened and was replaced with good results. One pain-free patient with oligoarthritis, operated on both sides, who started jogging, had radiographic signs of asymptomatic loosening of all four components. In another pain-free patient the femoral cup slipped into 10 degrees varus.

The improved quality of life for these young patients justifies surface replacement. A revision to total hip replacement can easily be performed later if necessary.

NON-SEPTIC LOOSENINGS IN A MULTI-CENTER STUDY OF 1686 THR

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Nine Swedish departments performed 1686 THR in a study comparing the prophylactic effect of systemic antibiotics with gentamicin-containing bone cement. When the patients had been followed for 2 years non-septic loosenings had occurred in 68 out of 759 patients with Christiansen (trunnion-bearing) prostheses, in 5 out of 714 with Brunswik or Lubinus prostheses and in one out of 112 patients with Charnley prostheses. The greater loosening frequency in the Christiansen group suggests that the prosthesis design is questionable. The loosening frequency was also highest in the group of patients operated on with a bone cement of the lowest viscosity.

REVISION OF TOTAL HIP ARTHROPLASTIES FOR ASEPTIC LOOSENING

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Between October 1969 and January 1981, 1734 total hip arthroplasties were performed at the clinic (before October 1975, Vanföreanstalten, Härnösand). By January 1981, 60 of these had been revised because of aseptic loosening (3.5 per cent). With the most usual types of prostheses, the relation between loosenings/primary arthroplasties (per cent; time of observation) is as follows: McKee-Farrar 41/392 (10 per cent; 7–11 years), Brunswik 16/690 (2.3 per cent 3–7 years), Lubinus 1/639 (0–3 years). Reoperation was most frequently performed 2–3 years after primary arthroplasty in the McKee-Farrar and Brunswik series, and rarely was necessary after 8 and 5 years, respectively, for these two types of prosthesis. Thirty-four loose femur components and 31 loose acetabular components were excised. In 18 cases the femur component, though not loose, was also excised. One arthrodesis, 5 Girdlestone excision arthroplasties and 54 exchange arthroplasties (45 with gentamycin cement) were carried out.

Two patients died postoperatively. Complications amongst the exchange total hip arthroplasties were: 3 postoperative infections (5.0 per cent), and 9 repeated aseptic loosenings, demanding revision (16.7 per cent). Both complications occurred about five times more frequently after exchange total hip arthroplasties.

PROSTHESIS LOOSENING

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The practice of fixing endoprostheses to spongious bone with cement must be abandoned. This statement is based upon experience gained over a period of 7 years (1951–1958) using acrylic prostheses in combination with metal and cement and 22 years (1958–1980) applying the principle of prosthesis anchoring without cement. Metal and cement cannot form a strong enough bond because stresses between the two materials lead to fractures in the cement and prosthesis loosening. This complication causes pain and sometimes requires reoperation. Spongious bone is not strong enough to anchor a prosthesis. Instead the strong compact bone must be used, and the surfaces between the bone and the prosthesis must be made as large as possible. Nature's

way of keeping a foreign body under control by fibrous encapsulation (periproteseum) must be completely accepted and the construction of the prosthesis and its mounting into the bone must take this fact into consideration. The prosthesis is supplied with a tight elastic anchorage to bone capable of bearing weight, and the joint system develops some sort of inner sensibility which protects against overloading.

REVISION ARTHROPLASTY OF THE KNEE AFTER MECHANICAL FAILURES AND FAILURES CAUSED BY INFECTION

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Nineteen knee arthroplasties were revised. There were 12 with mechanical failures after small polycentric, total condylar and hinged prostheses. Eleven were changed in a one-stage procedure to spherocentric knee prostheses. One case needed several bone grafts before rearthroplasty. All patients improved concerning pain but walking ability was increased in only a few cases. An additional 7 artificial knees, most of them hinges, were revised because of infection. All these patients had R.A. The prostheses were changed in a two-stage procedure with 2 weeks of suction irrigation in the intervening period. All these knees showed severe bone destruction and open sinuses. All were changed to spherocentric knees fixed with Palacos with Gentamicin. Reoperation was successful in 6 of the 7 knees with reduction of pain, closed sinuses and so far no loosening.

DEFORMATION AND LOOSENING OF THE TIBIAL COMPONENT IN UNICOMPARTMENTAL PROSTHESES. A ROENTGENOLOGICAL FOLLOW-UP AFTER THREE TO FIVE YEARS

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EIGHTY-FIVE KNEE ARTHRODESES AFTER FAILED KNEE ARTHROPLASTY. A MULTICENTER INVESTIGATION

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Eighty-five knee arthrodeses after failed knee arthroplasty from a Swedish multicenter investigation are reviewed. One-third of the arthrodeses were performed because of biomechanical failure and two-thirds because of infected knee arthroplasties. In 15 cases a long modified intramedullary Küntscher nail has been used in order to achieve fusion. In two-thirds of the remaining cases an external double frame and in one-third a single Charnley frame was used. Based on this material the following principles could be advocated.

1) In non-infected cases a bone transplantation can be performed at revision. 2) In infected knee failures a two-step procedure is recommended with temporary implantation of gentamicin beads for 4 weeks in combination with systemic antibiotics before spongious bone transplantation is performed. 3) Fixation can be either external or internal with a modified long Küntscher rod. When internal fixation is used in infected failures a dorsal plaster is applied for the first 4 weeks. 4) In cases with a hinged prosthesis and an increase in the bone defect a repeat bone transplantation should be performed if stability is not achieved within 4 months. 5) Antibiotic treatment should be continued until there are no further signs of deep infection and radiological bone fusion has taken place.

THE BIPOLAR ENDOPROSTHESIS FOR ARTHROPLASTIC TREATMENT OF HIP JOINT FRACTURES

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In order to avoid the disadvantages of hemi-arthroplasty according to Moore/Thompson, particularly acetabular protrusion, Monk developed a bipolar hip joint endoprosthesis in 1970.

On the basis of biomechanical considerations, this prosthesis provides for mobility of the polyethylene cup in relation to both the acetabulum and the metal cup of the prosthesis.

X-ray examinations and scintigraphic studies in patients show only a small degree of tilting motion of the cup in relation to the acetabulum.

The problems involved in assessing a possible rotation of the cup by X-ray examinations are discussed.

Clinical data are presented from 232 patients in whom 232 bipolar prostheses were implanted because of fractures, in the period from 1977 to 1981.

The function of the prosthesis is assessed on the basis of differentiated follow-up examination results in a representative group of 53 patients.

In conclusion, the question of the acetabular protrusion is discussed. In addition, comments are made and results presented on long-term observations.

HIP ENDOPROSTHESIS AD MODUM DUO-KOPF: A ONE-YEAR FOLLOW-UP STUDY OF 50 PATIENTS

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Fifty consecutive patients who underwent hip surgery *ad modum* Duo-Kopf during 1979–80 were reviewed 1 year after surgery. Indications for prosthetic replacement were fresh displaced fractures of the femoral neck (8 cases) and failure of a nailing procedure (42 cases). One-year mortality rate was 18 per cent (9 cases); one patient was lost to follow-up. The remaining 40 patients were given a clinical examination and in most cases X-rayed.

Complications were one case of luxation and three cases of wound infection, one of which was deep. Two patients fractured the femur close to the tip of the prosthesis during the follow-up period, after a new adequate trauma.

The results show that 95 per cent were free of pain and 95 per cent had good or excellent mobility of the hip joint. Out of 35 patients able to judge the result, 33 were satisfied with the function of the hip.

FRACTURES OF THE PROXIMAL END OF THE FEMUR IN GÖTEBORG, SWEDEN 1940–1979

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A total of 3.435 fractures of the proximal femur occurring in Göteborg, Sweden in 1965, 1969, 1970, 1975, 1978 and 1979 were reviewed and compared with earlier published epidemiologic data from Göteborg collected by Mårtensson (1962) for the years 1940–1959. A statistically significant age-specific increase in fracture incidence was found for trochanteric as well as cervical fractures, and for both women and men.

Thus from 1940 to 1979 the yearly fracture frequency increased from 104 to 788. The mean age for women and men was 71 and 75 years, respectively. The ratio women to men was 3.4 to 1 for cervical and 2.4 to 1 for trochanteric fractures. In 1979 the incidence per 1000 was 6.6 for women and 2.8 for men. The incidence will double in 16 years in men and in 30 years in women if the present trend continues.

EARLY DIAGNOSIS OF FEMORAL HEAD NECROSIS AFTER FEMORAL NECK FRACTURE

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In order to determine the femoral head blood circulation after femoral neck fracture, two methods have been used. Circulation (and metabolism) after fracture but before operation was determined by administration of tetracycline to the patient and examining a peroperative biopsy specimen under the fluorescence microscope. The postoperative blood circulation was determined by TcMDP scintimetry at regular intervals. The preoperative circulation as measured by tetracycline was intact in 15 per cent, deficient in 13 per cent and reduced in the remaining 72 per cent of the patients. In the first postoperative scintimetry, performed within 3 weeks after operation, about 50 per cent of the patients showed evidence of circulatory deficiency. To date all cases who have developed redislocation/pseudarthrosis and/or femoral head collapse belong to this latter group of patients. The patients with intact circulation preoperatively and the patients with defect circulation preoperatively both retained the same pattern after operation as judged by scintimetry. In the large group of patients with a slight or marked reduction of the preoperative circulation, however, the outcome of the postoperative scintimetry varies from total vascular insufficiency to increased vascularity. It is probable that the technique of osteosynthesis and the quality of reduction and osteosynthesis are the main responsible factors for the outcome of the postoperative circulation in these patients.

FEMORAL NECK FRACTURES TREATED WITH THE DEYERLE DEVICE: THE SIGNIFICANCE OF STABLE FIXATION

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The occurrence of late segmental collapse of the femoral head (LSC) at a 2-year follow-up and its correlation with postoperative shortening of the femur during the first year was analysed in 66 patients. All had been treated by the method of Deyerle (a cortical plate, multiple pinning and powerful impaction of the fracture). The shortening of the femur was estimated from consecutive routine radiographs by measuring the change in position of the centre of the femoral head along an "axis" through the geometric centre of the head and the medial part of the eminence on the tibia.

For the patients with and without LSC, the mean shortening was 4.8 ± 1.66 mm and 2.34 ± 0.51 mm, respectively, at 3 months ($P < 0.05$), 8.8 ± 1.82 mm

and 2.78 ± 0.41 mm respectively at 12 months ($P < 0.001$). The incidence of LSC at 24 months was significantly lower ($P < 0.05$) for the group where the shortening of the femur at 12 months did not exceed 2.0 mm than when it did (7 against 31 per cent).

The results indicate that an unstable fixation of the fragments at the time of the operation may delay union and thus also revascularization of a primary necrotic head and that this delayed process may lead to LSC.

SMITH-PETERSEN OR LATERAL APPROACH COMBINED WITH TROCHANTERIC OSTEOTOMY FOR SURFACE REPLACEMENT OF THE HIP?

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This study concerns 32 cases of surface replacement using a Wagner prosthesis; the follow-up time ranges from 6–24 months. In 16 hips the Smith-Petersen approach was used, and in 16 cases a lateral exposure including trochanteric osteotomy was performed. The blood loss was reduced and the operation time was shorter in the latter group. No femoral neck fracture occurred after osteotomy. In one case trochanter malunion occurred but the patient was asymptomatic. A somewhat higher incidence of ectopic bone formation was observed in cases with the Smith-Petersen exposure confirming earlier reports by others.

We conclude that the lateral approach including trochanteric osteotomy is at least as safe and reliable a procedure as that described by Smith-Petersen for surface replacement of the hip. It may therefore safely be chosen by surgeons who are more familiar with the technique of lateral exposure.

TOTAL HIP REPLACEMENT – WITH OR WITHOUT OSTEOTOMY OF THE GREATER TROCHANTER

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The aim of the study was to analyse whether osteotomy of the greater trochanter influences the results of total hip replacement. A follow-up study was made of patients operated upon during the years 1975–1978 at the Karolinska Hospital, Stockholm. Minimum follow-up time was 2.5 years and the patients had had no previous hip surgery. In 54 patients the operation included osteotomy of the greater trochanter and in 78 this was not performed. Differences between the two groups were noted as regards operating time and the rate of pulmonary embolism, thrombosis, loosening of the prosthesis and limping. In the group with trochanteric osteotomy the mean operating time was 35 minutes longer. They also had an increased rate of thrombosis. The rate of pulmonary embolism, limping, and loosening of the prosthesis was lower for this group. Osteotomy of the greater trochanter increases the operating time but, on the other hand, gives a better view of the operating field, thus facilitating proper positioning of the prosthesis, especially in reoperations.

OPERATIVE TREATMENT FOR OUTWARD ROTATORY SYNDROME OF THE KNEE

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Decreased outward rotatory ability of the hip gives the knee joint an appearance which is called "squinting patella". This hip malalignment is often followed by increased outward rotatory ability in the knee. These patients often complain of anterior pain in the knee. However, increased outward rotatory ability in the knee, without hip malalignment, seems to be a more common explanation for such pains. The Q-angle of these patients is often, but not always, increased. On the other hand, it seems unusual that patients with increased Q-angle have normal rotatory ability.

A new operative procedure, which reduces the outward rotatory ability of the knee joint, and follow-up results 1–3 years after surgery, are presented. The operative method seems to give good results in terms of running and climbing stairs and improves the giving-away phenomenon, but, however, not such good results are achieved for "movie sign" and squatting.

INFECTED KNEE ENDOPROSTHESIS TREATED WITH REVISION ARTHROPLASTY – 13 CASES

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In the years 1976–1980, 13 knee arthroplasties with either fistula to bone or endoprosthesis (9 cases) and/or three or more positive bacterial cultures out of five (taken at the revision) (4 cases – 3 Marmor) were revised.

Knee ailment: Twelve rheumatoid arthritis and one osteoarthrosis.

Primary endoprosthesis: Nine hinges, one Attenborough and three Marmor.

Bacteriological findings: Five cases of staph. epidermidis and only one of staph. aureus.

Follow-up: One to five years.

Results: Three healed and one probably healed but on antibiotics (2 Marmor and 2 hinges, 3 out of 8 one-stage revisions and 1 out of 5 two-stage revisions, 3 cases of staph. epidermidis and one of enterobact. cloacae).

Nine not healed (3 fistulas, 2 septic arthritis, 2 ex-

traction and fusion, 1 extraction and brace and one amputation).

Conclusion: In cases of infected stem endoprosthesis – fusion while there is still enough bone. In infected surface replacements (without fistula) – revision arthroplasty with gentamicin-containing bone cement in one or two stages.

PRINCIPLES FOR REVISION ARTHROPLASTY OF THE INFECTED KNEE

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Fourteen infected knee prostheses are reviewed after revision arthroplasty. The criteria for a diagnosis of infection has been either fistulation in total joint or at least three out of five positive peroperative tissue cultures.

The principles for the revision are outlined and technical advice is given.

In the infected hinged prostheses all except one are still fistulating 2 years after the revision and arthrodesis is advocated in all these cases instead of exchange arthroplasty. In unicompartmental prostheses revision should only be attempted in patients with multijoint engagement.

Two-step exchanges are recommended in all cases.

TOTAL KNEE REPLACEMENT AFTER TUMOUR RESECTION OF THE DISTAL FEMUR

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Seven patients with malignant or aggressive tumours of the distal femur have been treated with local resection and total knee replacement with a custom-made hinge prosthesis. The extent of resection was determined by preoperative X-ray and the prosthesis was made according to these measurements. The resected tumours included: 2 leiomyosarcomas, 2 osteosarcomas, 1 chondrosarcoma, 1 fibrosarcoma and 1 giant cell tumour. The length of the resected part of the femur was 11–16 cm (mean 13.7 cm). No early complications were noted. There were three late technical complications: one loosening of the femoral component, two mechanical failures of the hinge. Two patients had a recurrence of the tumour disease and succumbed 10 and 12 months postoperatively. The evaluation was made according to the knee function assessment chart recommended by the British Orthopaedic Association. Three patients were satisfied, one was non-committal. On the basis of the clinical assessment three patients were graded as excellent-good and one was graded as fair (mean follow-up 28 months).

THE PAINFUL RHEUMATIC SHOULDER: CLINICAL AND RADIOLOGICAL OBSERVATIONS

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Sixty-nine painful shoulder joints in 40 rheumatic patients, with an average age of 62 and with a mean duration of rheumatoid arthritis of 20 years, were evaluated clinically and radiologically. The shoulder ailment caused functional disability in a very high percentage of the patients. Assessment of shoulder motion, tested in five different directions, showed severe restriction of total range of movement in more than half of the shoulders.

Arthritic changes were found radiologically in 88 per cent of the shoulders. The most serious complications of rheumatic synovitis of the gleno-humeral joint seem to be total rupture of the rotator cuff and destruction of the joint cartilage. In this study there were radiological signs of rotator cuff rupture in 52 per cent and of cartilage destruction in 54 per cent of the shoulders.

RECONSTRUCTIVE SURGERY IN SEVERE RHEUMATOID ARTHRITIS

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Fifty-one rheumatoid patients with widespread joint destruction were operated upon in the years 1974–1978; altogether 121 primary operations and 12 exchange operations for loosened prostheses were performed. Right and left (R + L) knees were replaced in 20 patients; R + L knees + 1 hip in 5 cases; R + L knees + R + L hips in 3 cases; fusion C_1–C_2 followed by prostheses of the R + L knees or R + L hips or other reconstructions was performed in 7 patients and miscellaneous reconstructions in the remaining 16 patients. Exchange operations were performed for loosened Geomedic knee prostheses in 7 patients; loosened Dee elbow prostheses in 2 cases and Wagner resurfacing hip prostheses in 2 patients. There were no other complications.

The functional results showed 38 patients to be walking without any support; 2 with one stick and 6 with two sticks. Only one patient is using a walking-table and two a wheelchair. There were 2 deaths 2 years after the last operation; one because of cardiac infarction and one because of paraparesis at C_2–C_3. The reconstructive programs, with a low risk of complications, have meant that the patients are not longer confined to a wheelchair.

DEEP VEIN THROMBOSIS FOLLOWING CHARNLEY AND ICLH HIP ARTHROPLASTY

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In a prospective trial, the frequency of deep vein thrombosis was investigated in 32 patients undergoing Charnley total hip replacement and the ICLH-resurfacing technique. Sixteen consecutive operations were studied in each group. The frequency of vein thrombosis determined by venography was 55 per cent in the Charnley group and 30 per cent in the ICLH group. This difference between the groups was not statistically significant. Isolated muscle vein thrombosis was found in five patients in the Charnley group as against two in the ICLH group, but deep vein thrombosis of the leg was found in three patients in each group. None of the ICLH patients had thrombosis of the femoral vein but this was the case in one of the Charnley patients. Clinical features suggestive of non-fatal pulmonary embolism developed in two patients in the Charnley group but in no patient in the ICLH group. It is concluded that in patients undergoing total hip replacement the type of prosthesis and the operative technique can be of importance in reducing the frequency of deep vein thrombosis but this study has to be extended before we can prove that the difference is statistically significant.

OSTEONECROSIS IN RENAL GRAFT RECIPIENTS: INCIDENCE, RISK FACTORS AND PREVENTION

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In a large series of renal graft recipients with a long graft survival the occurrence of osteonecrosis was examined and patient groups with and without this complication were compared with respect to various clinical factors, immunosuppressive therapy and the results of biochemical analysis during the first year after the transplantation. The effect of attempts to avoid factors found to increase the risk of osteonecrosis was also examined.

Osteonecrosis was detected in 11 per cent of the patients. The serum phosphorus concentration 2 months after the transplant operation was lower in the group with osteonecrosis ($P < 0.01$): stepwise discriminant analysis disclosed that the incidence of osteonecrosis increased with age and inversely as the rate of normalization of renal function.

After the prednisone dose had been lowered ($P < 0.00001$) and phosphate-binding antacids had been replaced by non-phosphate-binding agents in most of the recipients with hypophosphataemia, none of the recipients developed osteonecrosis ($P < 0.1$). The recipients given non-phosphate-binding antacids showed a higher serum phosphorus concentration than those given phosphate-binding agents ($P < 0.005$).

SYNOVECTOMY WITH OSMIC ACID IN COMPARISON WITH SURGICAL SYNOVECTOMY OF THE RHEUMATIC KNEE JOINT

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Twenty-five knee joints with synovitis and pain because of R.A. were treated with injection of osmic acid according to Berglöf. The results as regards pain and swelling were observed after 6 months and 1 year. Thirteen knee joints had no X-ray signs of arthritis whereas 12 had moderate signs of arthritis on the X-ray. If a transient effect lasting from 3–5 months was included 60 per cent had a good effect of the treatment. After 1 year only 30 per cent were free from pain and synovitis. The results are unsatisfactory in comparison with the very good results in 30 knee joints treated with surgical synovectomy where almost all were without pain and synovitis after 1 and 3 years. Synovectomy with osmic acid can only be recommended in very special cases when the patient because of medical or social reasons can not afford the stress and time which the surgical synovectomy demands.

HUMAN FIBRINOGEN AND THROMBIN IN SYNOVECTOMY OF THE KNEE – A NEW HEMOSTATIC TECHNIQUE

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In synovectomy, as in many other surgical procedures, coagulation of all vessels in the cut surfaces is difficult to achieve. This involves a risk of massive postoperative hemarthrosis, which after knee surgery may lead to impaired quadriceps function. By applying highly concentrated human fibrinogen and thrombin (Tisseel) to promote hemastasis, postoperative bleeding and secretion could be virtually eliminated. Minimal postoperative swelling allowed rapid mobilization and considerably reduced the period of hospitalization and rehabilitation. The usual postoperative impairment of mobility could be prevented or reduced by using the described technique. The technique is suitable not only for major joint surgery, but also for amputation and tumor surgery and must be regarded as an ideal procedure in the treatment of hemophiliacs.

LOWER LIMB AMPUTATIONS IN STOCKHOLM DURING THE YEAR 1978

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In Stockholm with a population of 1.5 million, amputation surgery, during the year 1978, was performed both by general and orthopaedic surgeons at nine surgical and five orthopaedic clinics. The prosthetic care of amputees is always the responsibility of the orthopaedic departments. Several studies in recent years have shown that refined surgical techniques to a great extent permit a higher frequency of primary healing in BK amputation for vascular insufficiency. The aim of this study was to find out whether the ratio BK/AK showed any difference between 1) junior and senior surgeons, 2) general and orthopaedic surgeons and 3) different methods used at BK amputation.

During the year in question, 306 amputations were performed on 287 patients, 112 of whom were diabetics. The study has shown that AK amputations were relatively common in 1978. No significant difference could be established between the results found for the two different groups of specialists or between junior and senior surgeons. There was a tendency towards a better end result when Ghormley's or Tracey-Persson's methods were used in BK amputation, but the differences were not significant.

VIDEO-TAPE RECORDING – AN ADDITIONAL AID FOR AMPUTEE TRAINING

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Lower limb amputee training aims at teaching the patient a technique of walking which will minimize abnormalities in the pattern of movement. Video-tape recording was used as an additional aid in walking training of amputees. The method makes it possible for the patient to view his own movements from all sides and he is not forced to divide his attention between the effort of walking correctly and studying the effect in a mirror. The aim of the present study was to find out whether the patients had any negative feelings about viewing themselves and having their gait pattern commented upon.

Fifty patients were interviewed about their reaction to the TV recordings. The patients were uniformly positive in their attitudes to the method and there were no negative or depressive reactions among the patients interviewed.

EARLY MOBILISATION OF UNILATERAL AND BILATERAL FRACTURES OF THE CALCANEUS

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Orthopaedic textbooks state that the best treatment for comminuted fractures of the calcaneus is bed-rest with the foot-end of the bed elevated. The patient should perform frequent toe, foot and ankle exercises. This treatment is to prevent the development of stiffness of the subtalar joints. The patient's foot has to be elevated until all soft tissue swelling has subsided. This normally takes 3 weeks. Direct weight-bearing on the heel is not allowed for 3 months. In the case of bilateral fractures the period of time in hospital is prolonged.

The purpose of this presentation is to report a method of reducing this prolonged period of hospitalisation and allowing an early mobilisation of the patient. At Sundsvall hospital we have treated bilateral and unilateral crush fractures of the calcaneus with a PTB orthosis by means of a special appliance placed under the foot. The foot hangs free in the orthosis and this allows the patient to perform joint exercises. The orthosis is applied over a compressive stocking. This treatment will reduce the period of time the patients with uni- and bilateral crush fractures of the calcaneus spend in hospital to less than 1 week.

CONTROLLED PRESSURE-IRRIGATION IN ARTHROSCOPY WITH LOCAL ANAESTHESIA AND SERUM CONCENTRATIONS OF PRILOCAINE (CITANEST)

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Nineteen patients were examined with arthroscopy. The examination was performed under local anaesthesia with a continuous pressure-irrigation system. A 0.2 per cent prilocaine-saline solution was used as irrigation fluid. The serum concentration of prilocaine was determined from 5 minutes up to 6 hours after the beginning of the prilocaine irrigation.

All the patients tolerated the examination well. The diagnostic accuracy was high partly due to the joint distension.

The serum concentration levels were low and after 1 hour the mean peak value was 0.28 μg/ml. No unfavourable side effects were observed.

OBLIQUE METATARSAL OSTEOTOMY FOR TREATMENT OF METATARSALGIA

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In May 1975, Helal described an operative treatment for patients with metatarsalgia. We have since then used this method for patients suffering from primary metatarsalgia with reactive plantar keratosis, who are resistent to conservative methods of therapy.

A retrospective follow-up, including 38 patients with 41 operated feet, was performed to evaluate the operative result. The observation time ranged from 1 to 5 years after surgery with a mean of 2.5 years. In 81 per cent of the patients the results were excellent or good as regards functional pain, and 27 per cent had residual plantar keratosis.