Wound healing in amputations of the lower extremity in relation to transcutaneous PO₂ measurements

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In 42 amputations (28 below-knee and 14 above-knee) the healing of the stumps was correlated to measurements of transcutaneous oxygen pressure (TcPO₂) measured preoperatively at the site of the planned incision. In 31 cases the TcPO₂ was 30 mm Hg or above and 30 of these healed. 4 cases had a TcPO₂ below 20 mm Hg and all failed to heal and required reamputation at a higher level. In 7 cases with a TcPO₂ between 20 mm Hg and 30 mm Hg uncomplicated healing was found in 3, but in 4 cases the course of healing was protracted and wound revision was needed. All four retained the initial level of amputation. The difference in number of failures in the group with TcPO₂ values below 20 mm Hg and the group with values above 20 mm Hg was statistically significant (p < 0.002, Fischer's test). It is concluded that the value of TcPO₂ is related to the rate of stump healing and that values above 20 mm Hg are required for uneventful healing. The results suggest that TcPO₂ measurements may be used to assess the viability of the skin in patients requiring amputation because of gangrene, but more data are needed about its applicability in the selection of the level of an amputation.

First lower extremity amputation in diabetics and non-diabetics

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April 1973 to December 1982, 81 diabetic and 135 non-diabetic patients had their first lower extremity amputation. The patients were analysed with respect to mortality, frequency of reamputation, pre- and postoperative complications, pre-operative hemoglobin levels and, in the diabetic cases, blood glucose levels. The diabetic females were younger than the non-diabetic females, but were the same age as the diabetic males. No difference in mortality was found during the period of hospitalization between the diabetic and non-diabetic group or between males and females. The percentage of diabetic females who were being treated for cardiovascular disease prior to admission was similar to the males. No difference in pre-operative hemoglobin level was found in the two groups, but the diabetic patients who had hemoglobin below 7.5 mmol/l did not need a reamputation as often as those who had a value above 7.5 mmol/l (2/16 vs. 20/65). Although the difference is not statistically significant the tendency is very strong and in accordance with the results previously published by Baily et al. (1979). Well-controlled diabetics had a lower mortality during hospitalization (5/42 vs. 8/39), did not experience re-amputation as often (10/42 vs. 11/39), and had fewer post-operative complications (19/42 vs. 29/39). These values are only statistically significant for postoperative complications. It is concluded that although the diabetic patients are younger, they show a similar rate
of complicating cardiovascular diseases as the non-diabetic patients, and especially the diabetic females seem to constitute a risk group. The pre-operative hemoglobin level may be used as a prognostic factor for the outcome of a lower extremity amputation, but with caution. However, the mechanism is unknown and further research is needed. The postoperative blood glucose level is correlated to complications and this emphasizes the importance of intensified, anti-diabetic treatment during hospitalization.

Pseudarthrosis of long bones

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From 1978 to 1983, 31 cases of pseudarthrosis of long bones were treated. The pseudarthroses were classified into 2 groups: atrophic and hypertrophic. The atrophic cases were treated with bone grafts, external fixation and asymmetrical pulsating direct current. The hypertrophic pseudarthroses were treated with external fixation, elastic compression and if necessary electrical stimulation. Union occurred after an average of 17 weeks. One patient died before union and 2 patients had a re-fracture. Twenty-eight patients were assessed as to their return to normal activity, pain during work, limitation of movement of the adjacent joint, malalignment, shortening and muscular atrophy. The study has shown a great difference in the healing time of atrophic pseudarthrosis (24 weeks) and hypertrophic pseudarthrosis (12 weeks). All 28 pseudarthroses were brought to union with few sequelae. One patient had to give up his profession, and one had to reduce his activity.

The development of non-union in fractures of the tibia

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From 1968 to 1982, 503 tibial fractures were followed until healing occurred. A diagnosis of non-union was made if union had not occurred within 6 months, and an operative procedure was performed to promote healing. Fifty-three fractures did not unite, giving a rate of non-union of 6 per cent in closed and 22 per cent in open fractures. The severity of the injury, degree of soft tissue damage, and the comminution of the fracture had a marked effect on the occurrence of non-union. In cases with internal fixation non-union was found in 6 per cent, and in cases with conservative treatment in 5 per cent respectively. Twenty per cent of the fractures that were initially fixed with a Hoffmann device did not unite, but on the other hand external fixation was primarily used in the treatment of open comminuted fractures. Eight of 16 patients with primary postoperative deep infection developed non-union. Malalignment of the fracture increased the rate of non-union 3 times. The non-united fractures were mostly treated with rigid internal or external fixation and bone grafting. 8 cases had to undergo more than one stabilizing procedure. In one patient the fracture failed to unite. The results in the 48 patients were evaluated according to the scale of Olerud & Karlström (1972). The result was considered to be excellent or good in 24 patients, while 17 non-unions (35 per cent) gave a poor result.

Lengthening of the femur and tibia a.m. Wagner

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Twenty-nine lengthenings of the lower extremity in 28 patients were performed from 1974 to 1984, applying the Wagner method. The aetiology of leg shortening was polio, trauma, osteomyelitis, and congenital deformities. The observation period ranged from 1 to 10 years. The average age was 14.1 (9.5–25.5) years. The average preoperative leg length discrepancy was 7.8 (3.5–25) cm. The average length gained was 6.4 (2.0–10.3) cm. The average daily lengthening during the procedure was 1.3 mm. In all cases internal fixation and bone transplants were used. The time until union occurred varied from 3 to 18 months and complete practical equalization of leg length was obtained in 23 cases. In one case a planned overcorrection of 2 cm was achieved. There were four cases of residual leg length discrepancy, ranging from 3.5 to 15 cm. In 25 patients in whom treatment has been completed the time of hospitalization varied from 20 to approximately 200 (average 64) days. Uncomplicated pin-tract contamination was encountered in the majority of cases. There were 2 cases of deep infection, but both healed, one, however, with 1 cm loss of correction. There was
one case of persistent non-union 15 months after osteosynthesis and in 3 cases a transient peroneal nerve palsy was encountered. Two cases of fatigue fracture of the tibia occurred 3–4 months after plate removal. These healed without complications. One case demonstrated a severe limitation of flexion of the knee.

It is concluded that the Wagner technique may be considered an effective, reasonably safe method for diaphyseal equalization of limb length discrepancies in patients who are not yet fully grown. The complications did not significantly affect the intended equalization of the limb length.

The importance of the lateral compartmental structures in knee stability
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We investigated the importance of the anterior cruciate ligament (ACL), and the lateral compartment ligaments with special attention to the popliteal tendon (PT) in relation to valgus-varus, axial rotation, and anterior-posterior instability. Mobility patterns were drawn from 15 osteoligamentous knee preparations after successive transections of the structures. Even if combined lesions involved the lateral collateral ligament (LCL), the PT, and the posterolateral capsule (PLC), anterior tibial displacement did not occur until the ACL was cut. The lateral structures acted as secondary restraints to anterior displacement, and prevented simultaneous anterolateral rotation during application of the anterior force.

LCL and PLC transection affected varus stability in full extension, and instability increased on additional section of the PT, even if the ACL remained intact. Maximum instability after combined lateral lesions occurred at 40 degrees of flexion. Further flexion caused a rapid decrease of instability. The PT was shown to restrain varus instability effectively from 0–90 degrees of flexion.

It was experimentally established that marked posterolateral instability did not occur with an intact PT. Maximum instability was recorded at 30 degrees of flexion after combined lesions to the lateral structures. Even in extension, considerable posterolateral instability was observed. The restraining effect of the PLC was prominent in extension.

Computed tomography and mechanical strength measurements of trabecular bone in the proximal tibia
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The proximal tibial epimetaphyses from 6 cadaver knees were CT-scanned in 12 consecutive 2 mm planes from the deep aspect of the subchondral bone plate. The scanned areas were then cut into three 8 mm slices and bone cylinders were removed in a reproducible pattern. The cylinders were rescanned in an acrylic phantom. Half in the cylinders were then tested to compressive failure, and half were subjected to a penetration test (Hvid & al. 1984).

There was a highly significant correlation between CT-values and ultimate compressive strength (r = 0.74 for scans in situ, r = 0.81 for phantom scans, N = 165). A similarly close correlation was found for the penetration tests (r = 0.80 for both scan types, N = 101). Comparison of in situ and phantom scans revealed a correlation coefficient of 0.90 (N = 269). This variation was probably mainly due to uncertainty in the reproduction of the Z-position (in the direction of the long axis of the tibia) of the scan plane. This source of variation cannot be avoided with the scanner used.

The correspondence between CT-values and strength parameters was found to be acceptable for clinical work. Clinical measurements are in progress to study the density response at the proximal tibia during the period following total knee arthroplasty.

Tc⁹⁹-MDP uptake in nonsuppurative arthritis and haemarthrosis of the immature knee
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Bone metabolism in haemarthrosis (HA) and nonsuppurative arthritis (NSA) of the knee was investigated in mongrel puppies. Induction of unilateral HA or NSA was achieved by intraarticular injections of autologous blood (N = 4) or 1% carrageenin (N = 4), respectively. Bone metabolism was studied by scin-
timetric technique on static bone scans every 2nd week during induction of arthropathy for 3 months and in a postarthritic phase of another 3 months. Tc$^{99m}$-MDP uptake was present at 2 weeks. The induction phase was dominated by decreased uptake in the calcification zone of the epiphyseal plates (ratio 0.4 in NSA, 0.6 in HA) and a moderately increased condylar uptake (ratio 1.3 in NSA and 1.2 in HA). The postarthritic phase was characterized by normalization of growth plate uptake and a marked increase of condylar uptake (ratio 1.8 in NSA). The condylar uptake was mainly located at the periphery of epiphyseal bone, around bone cysts and osteophytes, whereas central epiphyseal bone was osteopenic with decreased uptake of Tc$^{99m}$-MDP. No qualitative differences between the uptake in HA and NSA were encountered. In conclusion, the total uptake of Tc$^{99m}$-MDP in juvenile arthropathies may be either increased or decreased in active disease, depending on the duration of joint inflammation and the age of the patient.

The relation of the juxtaarticular intraosseous pressure of the hip joint to variable traction and intraarticular pressures in dogs
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In order to illustrate the influence of traction on the juxtaarticular intraosseous conditions of the hip under variable intraarticular pressures, an increasing traction force applied through the femoral condyles corresponding to 0–25 per cent of the animal's weight was established in 13 dog hips. Simultaneously the juxtaarticular intraosseous pressure was registered. After the induction of an intraarticular pressure cannula through the acetabular roof, the increase in traction force in 11 dog hips was repeated at an intraarticular pressure of 50, 100 and 150 mm Hg respectively. The animals were monitored continuously as the aim was to keep blood pressure, arterial blood gas values and body temperature in a steady state.

It is concluded that traction treatment of the hip joint does not alter the juxtaarticular intraosseous pressure significantly under normal conditions nor at an intraarticular pressure of 50 or 100 mm Hg. At an intraarticular pressure of 150 mm Hg, however, we found a significant increase of 5 mm Hg in the intraosseous pressure in the femoral head but not in the acetabulum.

The intraosseous partial pressure of oxygen and carbon dioxide in relation to intraosseous pressure in arthrosis
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The subchondral bone in arthrosis is characterized by elevated intraosseous pressure which has been ascribed to an increased outflow resistance in the retinacular veins. The pathological changes in arthrotic subchondral bone could thus be caused by tissue ischaemia due to the associated decrease in the regional blood flow. In this context we have investigated the intraosseous partial pressure of oxygen and carbon dioxide, and the intraosseous pressure in patients with primary arthrosis of the hip. The measurements were performed by a mass-spectrometer with a specially designed inlet system.

The measurements were performed in two series with different anaesthetic routines, one including N2O- and O2-enriched air, the other only atmospheric air. The first part of the study comprised seven patients with observations of the intraosseous PO2 and pressure from the femoral head, and the greater trochanter. The average PO2 was 64 mm Hg in the femoral head and 50 mm Hg in the greater trochanter.

The second part of the study comprised 15 patients with observations of PO2, PCO2, and intraosseous pressure in the same localities. The average PO2 and PCO2 in the femoral head were 64 mm Hg and 52 mm Hg, and in the greater trochanter 51 mm Hg and 39 mm Hg. The intraosseous pressures in the femoral head were significantly higher than those in the greater trochanter. The differences in oxygen and carbon dioxide tensions between the two localities are significant, but no correlation to the intraosseous pressure was found.

Strength pattern of cancellous bone in the ankle joint
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The strength pattern of cancellous bones was examined in 17 grossly normal ankle specimens. The distal part of the tibia and the proximal part of the talus were cut into 6 mm slices, 5 slices being cut from the tibia, and 3 from the talus. Cylinders were taken from all levels at corresponding locations. The cylin-
Mandible were tested in an Instron testing machine at a
constant deformation speed of 5 mm/min, until col-
lapse. From the load-deformation curves ultimate
strength, yield strength, and elastic modules were
calculated. The results of the study indicate the pres-
ence of a very strong anterolateral part and a
slightly weaker posteromedial part at all levels in
the tibia and the talus. At the most distal level of the
tibia there is a high strength area covering the cen-
tral part, in contrast to the proximal levels of the ti-
bial bone where the central part is very weak. In the
talus the high strength area runs along the lateral
and posterior borders. The mean ultimate strength
in the anterolateral part of the tibia was
16 MPa; in
the talus the mean ultimate strength at dislocation
was 25 MPa. The weakest parts of the tibia and ta-
lar bones had a mean ultimate strength of 5 MPa
and 10 MPa respectively. There was no difference
between the topographical variation of ultimate
strength and the distribution of the 2 other bone
strength parameters.

**Induction of fracture callus formation**

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It is assumed that fracture healing processes are in-
duced from bone particles > 0.3 mm³. Isogenic bone
from the iliac crest was therefore granulated and
percutaneously instilled into fracture haematoma in
7 severe lower leg fractures. The same procedure
was performed in 5 selected cases of pseudarthrosis
or delayed healing. No complications were seen.
The distribution of the granulate was visualized by iso-
tope scanning. X-ray attenuation measurement was
tentatively used for quantifying early calcification.
Preliminary results showed clinical healing in 1 case
of pseudarthrosis and relatively fast fracture heal-
ning. A controlled study is therefore planned.

**Arthrodesis of the knee**

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A long-term follow-up investigation of 30 patients
with arthrodesis of the knee revealed that 24 were
satisfied with the operation, while six were unsatis-
fied, 2 of whom had persistent pain. Twenty-three
patients were working at the time of operation and
18 were able to go back to work, while 3 patients
were allowed disability pensions and 2 had old age
pensions. Many of the patients experienced problems
in attending public performances and in using public
transportation. Two-thirds of the patients were to-
tally relieved of pain after fusion of the knee. Most of
the patients accepted the stiff joint, but some had
problems in social life and a few had to give up work-
ing.

**Meniscectomy in children**

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An analysis of 76 patients under the age of 17 under-
going 78 meniscectomies is presented, and correlated
with the preoperative history, subjective symptoms,
objective findings and the lesions found. There was
an equal number of operations on both sexes and 1/3
of the operations were performed on the lateral meniscus. The most common pathological findings were bucket-handle lesions and peripheral detachments. Eight per cent of the menisci removed were normal. The most important subjective and objective symptoms were intermittent locking, a feeling of the knee giving away, a lack of full extension, and a positive McMurray’ test.

Seventy-five patients (77 knees) have been reviewed from 10 to 370 (mean 180) months after surgery in order to determine the late results of meniscectomy. Delay of operation gave inferior results. The younger the patient, the worse was the result. The benefit of operation was less in girls than in boys. Removing a meniscus is not a benign procedure; 42 per cent in whom a pathological meniscus and 17 per cent in whom a normal meniscus had been removed were without symptoms. These results stress the need for making an accurate diagnosis by careful examination and arthroscopy before embarking on meniscectomy in children.

**Arthroscopy of the knee joint in children with special emphasis on meniscal lesions**

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During a 2-year period, 76 arthroscopies were done in children below 16 years of age (mean age 14½): 19 were done as out-patients, 17 of these in local anesthesia. The referring doctors suspected a meniscal lesion in 25 cases, but the diagnosis was confirmed in only 6 of these. The hospital staff’s diagnosis was verified in 9 out of 31 cases. An unsuspected lesion of both menisci was found in a case of acute ligamentous injury. Thus only 10 patients had a meniscal injury. The most frequent lesion was rupture of the anterior cruciate ligament.

Because of the arthroscopy, 3 minor meniscal lesions could be observed without treatment. No meniscus was totally removed. In two cases an operation would have been made on the wrong side of the knee if arthroscopy had not been done. Fifteen arthroscopic operations were performed, but only three because of meniscal lesions.

**Isometric quadriceps exercises in chondromalacia of the patellae**

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The efficacy of isometric exercises of the quadriceps with a straight leg was evaluated in 20 patients (26 knees) who had chondromalacia of the patellae. Fourteen knees had subluxation of the patellae, and in 12 knees the chondromalacia was idiopathic. EMG was obtained from the vastus lateralis (VL) and the vastus medialis obliquus (VMO) during isometric contractions at 60, 45, 30, 15 and 0 degrees of flexion prior to and after 3 months of daily isometric quadriceps exercises.

After 3 months the EMG revealed a significant increase of the electrical activity of both VL and VMO at 45 degrees and of VMO at 15 degrees in patients with patellar subluxation. However, there was no difference between VL and VMO. The increase in activity in the idiopathic group was not significant. In total, 7 patients were improved after 3 months.

The muscular balance of the patella remained unchanged after isometric quadriceps exercises on a straight leg, and the effect of the treatment may as well be attributed to a reduction in painful activities. A more selective training of the VMO is recommended.

**Intraosseous volume-stress test in patellofemoral disorders**

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In 48 patients with patellofemoral pain, intraosseous pressure measurements were carried out in 65 painful patellae and 31 normal patellae. The volume-stress test, i.e. pressure response to 5 ml saline injected intraosseously in the patella, was significantly elevated in the painful patellae in flexion (44 mm Hg vs. 21 mm Hg) and during joint tamponade (35 mm Hg vs. 22 mm Hg), (p < 0.01). Identical intramedullary pressure (18 mm Hg) and increase in pressure (4.6 mm Hg) were found in the patellae in extension.

In the painful patellae the drainage time was prolonged during all test conditions, and patellae phlebograms demonstrated impaired drainage which was well correlated to a positive volume-stress test. An increased vulnerability of the blood flow in a
Development of mechanical strength in osteochondral fractures fixed with either fibrin sealant or Kirschner wire

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Osteosynthesis of small osteochondral fractures is often difficult using conventional fixation techniques, and therefore fibrin sealant has been suggested as a fixation agent. Standardized osteochondral fractures in the left femoral condyle in 19 adult mongrel dogs were fixed with either Kirschner wire or fibrin sealant. The leg was immobilized in a brace with the knee in full extension. Adaptation and development of mechanical strength after 4, 7 or 8 and 14 days was measured and compared with an in vitro study of the initial strength of the fibrin sealant in osteochondral fractures. The maximum tensile strength in fibrin-sealed fragments was initially 0.73 newton/cm² and the failure energy 0.037 newton/cm. After 4 days of healing, an increased maximum tensile strength in the fibrin-sealed group was recorded, whereas no difference in energy absorption at failure was found. Although the initial strength of the fibrin sealant bond was low, the tendency to displacement was less in this group. The present results suggest that fibrin sealant can be used for fixation of small osteochondral fragments provided that immobilization is sufficient.

Lesions of the volar plate in the proximal interphalangeal joint of the fingers

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A prospective study comprising 126 consecutive patients was performed from 1 November 1982 to 1 November 1983. The aim was to evaluate immobilizing treatment versus nonimmobilizing treatment of traumatic lesions of the volar plate of the proximal interphalangeal joint. The patients were randomly allocated to 2 groups, 61 patients having their finger immobilized for 3 weeks on a 20-cm-long volar foam-rubber-covered aluminium splint and 65 patients treated purely with analgetics without immobilization.

At follow-up 6 months later, all patients were examined by the same person: 46 patients treated with immobilization and 44 patients treated without immobilization participated. No difference was found between the two groups with respect to subjective complaints, objective signs, or length of sick-leave. It is concluded that the two treatments are equally beneficial to the patient, but treatment without immobilization is favoured because of its cheapness and greater patient compliance.

Isotope bone scanning and zonography in the evaluation of fractures of the carpal scaphoid bone

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In order to shorten the period of immobilization in patients with a suspicion of fracture of the scaphoid bone, but without primary radiographic evidence of fracture, a prospective study was carried out in 60 patients. Seven days after the injury, a Tc-diphosphonate bone scan and a zonography (a tomography with narrow angle tube motion) was performed. Seventeen patients had increased focal tracer uptake radially in the wrist, but only 11 of the patients had a fractured scaphoid. None of the patients with a scaphoid fracture had a negative scan. All fractures of the scaphoid bone were found at zonography. One scaphoid bone cyst was misinterpreted as a fracture. Isotope bone scanning as well as zonography seems suitable for the exclusion of fractures of the carpal scaphoid bone a soon as 7 days after the injury.

Colle’s fracture: the early radiographical result

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In a retrospective series of 269 patients with fractures of the distal radius, the radiographical results were evaluated initially, after reduction, and at union. The patients had been treated by manual reduction when necessary, followed by immobilization in dorsal and volar plaster splints. The fractures were classified according to Older. Undisplaced fractures of type 1 were stable and showed no secondary displacement. In fractures of type 2, 3 and 4 the dorsal angulation could be satisfactorily reduced, but all patients showed secondary displacement averaging 10 degrees of dorsal angulation at the time of union. The shortening in type 2 fractures was satisfactorily reduced in most cases whereas type 3 and 4 fractures had barely been completely reduced. At union the most severely displaced fractures (Types 3 and 4) demonstrated a shortening of 8 mm on average.

Forty-seven patients had been followed radiographically at short intervals during the period of immobilization. It was demonstrated that the secondary displacement occurred during the first 2 weeks of immobilization, whereas only 8 per cent of the patients redislocated during the second to the sixth week. Consequently the appropriate time for radiographic control is 2 weeks after injury.

It is concluded that fractures of the distal radius should be classified according to the system described by Older. In 30 per cent of the cases (fracture types 3 and 4) the radiographical result was unacceptable after manual reduction and immobilization in plaster and alternative methods of treatment of these compressed and comminuted fractures should be considered.

The results of the Bristow and Bristow-Latarjet procedure for recurrent dislocation of the shoulder

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Twenty-five cases of recurrent dislocation of the shoulder were reexamined 1–7 years after either the Bristow or Bristow-Latarjet procedure. No peroperative complications were recorded. Four out of seven shoulders had redislocations after the Bristow procedure, but none of the 17 shoulders treated with the Bristow-Latarjet procedure redislocated. The decrease in range of movement after the two procedures was the same: outward rotation was decreased by 19 degrees on average.

Patients in both groups complained about not having reached their previous level of sporting activity. Five of the seven patients treated with the Bristow procedure and 16 of the 18 patients who had the Bristow-Latarjet procedure were satisfied with the result.

Objectively, the results were considered excellent or good in 5 and poor in 2 cases with the Bristow procedure, whereas 14 of the patients treated with Bristow-Latarjet procedure were evaluated as excellent or good, 2 had a fair and one a poor result.

Displaced fractures of the proximal humerus

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The final results after treatment of 71 displaced fractures of the proximal humerus were reviewed. In 30 two-fragment fractures no difference was found between closed and open treatment. In 29 three-fragment fractures the results following successful closed reduction were superior to open treatment. Open reduction and osteosynthesis in four-fragment fractures gave better results than closed reduction alone. Necrosis of the humeral head was the major cause of unsatisfactory results.

It is recommended that the treatment of choice in two- and three-fragment fractures should be closed reduction, whereas four-fragment fractures should be treated with internal fixation. Prosthetic replacement should be reserved for cases developing aseptic necrosis.

Fractures of the proximal humerus. The relation of the Neer classification to the course of healing

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A retrospective investigation including 326 fractures of the proximal humerus was carried out: 76 patients were under 15 years of age and the remaining 250 cases comprised 178 females and 72 males. The annual incidence rate increased from 1.3 per 10 000 for the age group 16–30 years to 26.8 per 10 000 for the age group above 65 years. The age pattern for males and females differed somewhat, the females generally being older. The classification of the fractures for
patients above the age of 15 revealed 106 undislocated fractures (42 per cent) and 76 (30 per cent) dislocated two-fragment fractures. The remaining cases were distributed among the other fracture types with a preponderance of dislocated three-fragment fractures. Only three patients had four-fragment fractures, whereas 10 patients had fracture dislocations which were all anterior.

All patients but 4 were treated conservatively with early mobilisation. The course of healing related to the type of fracture and was significantly longer in dislocated two- and three-fragment fractures compared to all other types. Thus a careful classification of fractures may be used to predict the course of healing.

**Preliminary experiences with the Judet non-cemented total hip prosthesis**

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A series of 36 total hip replacements, including 6 revision arthroplasties, was performed in 32 patients aged 19-73 and followed for 8-37 months. Peroperative fractures of the femoral shaft needing cerclage nylon straps were found in 7 cases and in a further 2 cases fractures were observed up to 2 months postoperatively, probably not identified during the operation.

A steep inclination of the acetabular cup in 7 cases resulted in 2 dislocations that could be treated conservatively, but 2 component dislocations and 2 cases of persisting pain and reduced range of motion led to revision arthroplasties.

The Judet prosthesis is not found suitable because of a difficult surgical technique and many fracture complications or improper placement of the components due to the design of the instruments.

**School accidents in Aarhus municipality – a prospective and interdisciplinary analysis**

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In 21 public schools, with 13035 pupils comprising 38 per cent of Aarhus municipality, all accidents requiring professional treatment were analysed, taking into consideration the classical epidemiological variables: host, agent, and environment as well as the pre-event and postevent phases of the injuries. The accidents were described by the school medical officer, health visitor, or a specially instructed teacher, and the lesions and treatments by the therapist, who might be the doctor in the hospital, the school medical officer, a general practitioner or a dentist.

During the 1-year study the incidence was 79 per thousand pupils, corresponding to about 60 000 school accidents annually in Denmark. Most accidents occurred during intermissions (59 per cent), physical education (24 per cent) and on the way to school (6 per cent). Common lesions were contusions (33 per cent), distortions (25 per cent), wounds (17 per cent) and fractures (14 per cent). The type of school accidents corresponded well to other accidents during the same period in the same population and age-group treated in the casualty departments as regards the pattern of injury and severity, but the frequency was about 40 per cent higher during the time at school.

High risk factor combinations could be demonstrated. The interdisciplinary method used in the study was found useful and is probably convenient in other types of accident analysis.

**Preliminary experience with uncemented total hip replacement**

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Since the 1960’s, the use of cemented total arthroplasty has expanded substantially. However, long-term results (more than 10 years) have shown an increased frequency of prosthetic loosening, especially in younger patients. Since April 1983 the Judet porous metallic total hip prosthesis without cement has been used in selected cases. This is a metal-to-plastic device, the femoral and acetabular components being made of a cobalt-chromium cast alloy, the latter with a polyethylene lining. Up to January 1985, 29 hips in 26 patients were operated, eight females and 18 males. The mean follow-up time was 11 months (3-24 months). Sixteen patients with a follow-up period of more than 1 year improved their range of movement from 117 degrees preoperatively to 170 degrees postoperatively. Thirteen patients returned to work.

**Complications:** There were two cases of technical failure in the positioning of the cup. There was one
case of femoral fracture, one case of deep infection with a loose cup had a successful revision. There were 6 cases of deep venous thrombosis and six cases of ectopic ossification. The primary results seem encouraging.

Indomethacin as prophylactic treatment against the recurrence of para-articular ossifications

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Eight patients were treated for severe para-articular ossifications following total hip arthroplasty 5–54 (mean 24) months after the operation. All patients suffered from pain and/or stiffness of the hip. After total excision of the ossifications all patients were treated with Indomethacin 25 mg three times daily for 6 weeks. The medication was discontinued in two patients after 6 and 7 days respectively because of side-effects.

At follow-up 6–18 months postoperatively, three patients were free from ossifications, three had a mild degree of recurrence and two had recurrence of a moderate degree. The two patients in whom medication had been discontinued had mild and moderate ossifications. No patients complained of stiffness of the joint and only one had pain around the hip when sitting. All patients had a markedly improved hip mobility with a mean improvement of 124 degrees.

Indomethacin seems to be a valuable prophylactic treatment in the prevention of recurrence of para-articular ossifications.

Arterial embolectomy with the fogarty balloon catheter

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To study factors of importance for the diagnosis and the prognosis in patients with suspected peripheral arterial embolism, a series of 48 consecutive embolectomies in 44 patients was reviewed. Embolism was significantly more frequent in patients with a sudden onset of pain than in patients with less typical symptoms from the extremity with signs of acute ischemia. The mortality rate was 14%. The limb salvage rate was 65%. Among the survivors the limb salvage rate was 82%. The embolectomies performed less than 24 h after the onset of pain carried a good prognosis. The amputation rate increased to 100% if the operation was delayed for more than 24 h after the occlusion had occurred.

A peroperative angiography is recommended in patients without a sudden onset of pain and in patients where the distal pulses are not restored during operation.

Results of operative treatment of lumbar disc herniation

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Over a period of 2 years (1981–1982) 125 patients were operated on for herniated lumbar discs. At follow-up, after an average observation period of 3 years (22–47 months), 18 patients had been re-operated and 91 patients were re-examined. According to the pain level the results were classified as excellent, good, fair or poor, which equally divided the patients into 4 subgroups 26%, 24%, 25%, 25%). The patients' status at follow-up did not correlate to the operative findings but did correlate to preoperative neurologic findings as well as to the preoperative myelogram; 53% had resumed their previous occupation, 17% were working at a level described as lighter and 30% were unemployed. Six patients had a better working capability after operation. The working capability corresponds well to the pain level.

Spondylodesis in neuromuscular collapsing scoliosis

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Children with neuromuscular paralysis develop a collapsing type of scoliosis, often uncontrollable by external support. Their respiratory capacity will suffer additionally and the pelvic obliquity causes poor sitting tolerance and comfort. Since 1983, six of these patients have been operated, 3 with the Harrington-Cotrell technique and 3 with segmental wiring according to the Luque technique. The diagnosis was Duchenne muscular dystrophy (3), late infantile spi-
nal muscular atrophy (2) and traumatic tetraplegia (1). The average age was 17 years, mean curve correction 54% (from 107 to 49 degrees). Pelvic obliquity was diminished from 35 degrees to 11 degrees and sitting height was increased by 24%. No pulmonary or medullary complications were seen.

Even though the pelvic obliquity was more difficult to correct with the Luque technique, this method is preferred because rapid mobilization is possible without the need for a brace, and better pelvic fixation and more functional sagittal curves are obtained postoperatively. In future, consideration should be given to operating these patients at an earlier stage of the disease, when the scoliosis reaches 40–50 degrees. The spine is more flexible, so corrections, balance, and pulmonary function are more easily improved.

The applicability of the abbreviated injury scale (AIS) in the analysis of injuries in children

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AIS is a uniform scale rating the severity of car crash injuries. The system has been applied to other fields of investigation, for example studies of child injuries. The aim of the present study was to assess the applicability of AIS in such cases.

All accidents among 13,035 pupils in 21 schools were consecutively registered during 1 year. A total of 1024 injuries was found. The severity of each lesion was assessed according to AIS and a specially designed scale rating concussion, head injuries, and fractures as potentially serious child injuries. By inference, analysis of multidimensional contingency tables, using weighted poisson models, dependence or independence was demonstrated between the injury factors, sex, age, injury mechanism, and severity.

Using AIS, significant dependence existed only between age and mechanism and between mechanism and severity. Rating severity by potentially serious lesions, further dependence existed between sex and mechanism, sex and severity and finally age and severity.

In investigations registering all injuries in a population, the AIS-rating is not applicable. The dependence between various injury factors is not revealed due to the relatively large number of minor injuries occurring in this type of study.

Fractures of the femoral neck treated with Russin-screws

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A material comprising 105 patients with fractures of the femoral neck treated with multiple pinning a.m. Russin have been examined retrospectively. Forty-four of these patients have been re-examined with an observation time of at least 2 years. The average age was 79 years. Union was found in 31 (70 per cent), non-union in 5 (11 per cent) and necrosis of the femoral head in 8 (18 per cent). The functional results were judged according to d'Aubigné. In 75 per cent the function was good, in 20 per cent acceptable and in 5 per cent poor.

The method can be recommended as being quick, safe and gentle.

Overweight and related postoperative complications in Charnley hip arthroplasty

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As many publications have reported a significant correlation between overweight and loosening as well as fracture of hip prostheses, obese patients have to reduce their weight before undergoing total hip replacement a.m. Charnley at the Odense University Hospital, Denmark. A 5-year follow-up of body weight and postoperative complications in 365 patients is reported. Primarily non-obese patients maintained a constant weight, while patients who had undergone weight reduction almost regained their former weight within 5 years. No significant relation was found between overweight and infection, aseptic loosening, fracture of the prosthesis, mecanical wear, or trochanteric displacement. The material, however, was too selected to permit any valid conclusion concerning the complications in relation to obesity. Conclusively, insertion of heavy-calibre femoral prostheses should be considered in former obese patients, since they may be expected to regain their usual weight. Furthermore, greater efforts should be made to avoid increase in weight postoperatively.
Dislocation following total hip arthroplasty

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The rate of postoperative dislocation after Stanmore total hip arthroplasty in 427 cases was 4.9 per cent, 1.4 per cent were classified as recurrent cases. Retroversion of the acetabular component and postoperative joint laxity were the only factors that were found to predispose to dislocation. The importance of preserving the effective femoral neck length during total hip arthroplasty is emphasized.

Risk factors in loosening of total hip arthroplasty

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