Norwegian Orthopedic Society

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The Norwegian Orthopedic Society held its annual meeting in Oslo, October 28–29, 1988. The meeting was arranged as a section of a joint meeting for all the Norwegian Surgical Associations. This grand gathering of Norwegian surgeons occurs in Oslo each fall at the end of October.

The orthopedic papers considered experimental orthopedics, fractures of the tibia, femur and spine, hip, knee, pediatric orthopedics, and some other topics.

Experimental orthopedics

Torsion properties of femoral neck osteosynthesis: A cadaver study

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The aim of this study was to investigate torsional properties of different osteosynthesis techniques on femoral neck fractures.

Material and methods: Fifty pairs of cadaver femora were harvested (32 females, 18 males, 74 ± 12 years). Fifty femora had a cervical osteotomy, fixed with one of five techniques: two von Bahr screws (5.5 cm, one cranially, one caudally), three von Bahr screws (one cranially, two caudally), 2 von Bahr screws (one cranially, one penetrating calcar medially), and a Richards Hip Compression Screw with side plate with or without a lag screw cranially. The contralateral femur was used as a control. All the femoral heads were fixed in polyurethane blocks and tested in torsion.

Results: Test/control indices at 3°of rotation indicated that three von Bahr screws were significantly stronger than all the other techniques ($P < 0.05$). The remaining techniques varied insignificantly. Indices for maximal torsional moments indicated that three von Bahr screws were significantly stronger than the other devices ($P < 0.05$), and that the constructs of two von Bahr screws were similar, but significantly stronger than the gliding screw with or without a lag screw ($P < 0.05$).

Conclusion: Simple 5.5-mm screws give significantly better rotational stability in femoral neck osteosynthesis than hip compression screws with or without a cranial leg screw. Three instead of two 5.5-mm screws increases rotational stability significantly on cadaver specimens.

The polymorphonuclear leukocyte and its influence on fracture healing

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The role of the polymorphonuclear leukocytes (PMNLs) on fracture healing in rats was investigated.

Material and methods: A transverse fracture at the midshaft of the femur was made by an open procedure and stabilized by an intramedullary nail. Some animals were made neutropenic by infusion of a specific antiserum against rat PMNLs (antineutrophil serum, ANS), raised in sheep. Nine rats of one group were depleted of their PMNLs by intraperitoneal injections of ANS 10 h prior to the operation. All the animals in this group had less than 0.2×10^9 circulating PMNL/L at the operation. The PMNL count was kept at this level during 72 h postoperatively by injection of ANS every 12 h. Eight control rats were injected with the same amount of normal sheep serum (NSS). All the animals were treated with Cefuroxemin (50 mg/kg b.w. every 12 h). Six weeks after the operation, the animals were killed and the femurs dissected free. The callus mass was measured and the bones examined radiographically. The nails were removed, and the healing fractures were mechanically tested.

Results: In rats treated with ANS the bending moment at the fracture site was significantly higher compared with the NSS-treated animals ($P < 0.02$). There was also a tendency to increased rigidity in the ANS animals. No differences were observed in callus mass or in radiographic healing.

Conclusion: The PMNLs seem to have a negative influence on fracture healing in rats.

Revascularization and osteogenesis in syngeneic and allogeneic bone grafts

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A method for bone-blood-flow measurement using the radioactive microsphere technique has been established in a rat model. The model has been used in a quantitative study of revascularization of syngeneic and allogeneic bone grafts. Corticocancellous bone from the os ileum of the donor was transplanted into intramuscular pouches in the back of the recipient rats. The revascularization of the grafts was evaluated 2 and 3 weeks postoperatively after intraarterial injection of microspheres. The rate of mineral accretion in the grafts was evaluated with ^{85}Sr incorporation. The results showed that the method gave reproducible values for regional bone circulation in the rat, and a good correlation between blood flow and mineral accretion. The level of revascularization and mineral accretion was, on an average, three times higher in the syngeneic grafts than in the allogeneic grafts. The model represents a novel method for assessing revascularization in free corticocancellous bone grafts.

Hip

Norwegian national register for total hip replacements: Primary operations from September 15 to December 31, 1987

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During the first 3.5 months of the Norwegian National Register for Total Hip Replacements, 1,423 total hip replacements were reported. Of these, 1,251 were primary hip replacements.

Regarding preoperative pain and walking ability, 90 percent of the patients were classified in Charnley group one, two, or three. The diagnoses were idiopathic arthrosis (71 percent), problems after fracture of the femoral neck (12 percent), dysplasia (9 percent), and rheumatoid arthritis (4 percent). The lateral approach was used in 62 percent. Only 25 percent had a trochanteric osteotomy.

The Charnley prosthesis was used in 662 as acetabular component and as a femoral component in 664 patients. Four other hip prostheses (Landos, Exeter, Müller type, and Endler) were used in more than 100 patients each. In the rest, 21 other different acetabular and 21 different femoral prostheses were used. Sixteen percent of acetabular and 10 percent of the femoral prostheses were cementless. The cementless prostheses were of 11 different types for acetabular and nine different types for femoral prostheses.

Norwegian national register for total hip replacements: Reoperations from September 15 to December 31, 1987

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During the first 3.5 months of the Norwegian National Register for Total Hip Replacements, 1,423 total hip replacements were reported. Of these, 172 (12 percent) were reoperations, i.e., revision of a total hip replacement. The females constituted 69 percent of those primarily operated on, and 63 percent of those reoperated on. Preoperative pain and walking ability were the same for both groups. The reasons for reoperations were loosening of the femoral component in 65 percent, loosening of the acetabular component in 59 percent, pain in 19 percent, luxation in 4 percent, fracture of the femur in 3 per cent, and deep infection in 2 percent. A lateral approach was used in 48 percent, posterolateral in 36 percent, and anterolateral in 15 percent of the reoperations. Osteotomy of the trochanter major was performed in 25 percent of primary as well as revision operations. The mean operation time was 137 minutes for reoperations and 104 for those who had their first total hip replacement.

The Christiansen prostheses constituted 35 percent of the removed implants. Of the new prostheses, Charnley prostheses dominated, with 50 percent of the femoral and 48 percent of the acetabular components. A total of 18 different femoral prostheses and 14 different acetabular prostheses were used for the reoperations. Cementless implants constituted 17 percent of the femoral and 21 percent of the acetabular prostheses.

Femoral bone remodeling following implantation of a cementless total hip replacement

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We have studied the radiographic bone changes caused by the femoral component of the Zweymüller prosthesis 4 months, 1, 2, and 3 years after implantation using the 3-week radiograph as a reference. Sixty of these press-fit, sandblasted prostheses were inserted in arthrotic patients in the age group 60–72 years. No revision operations were performed. Stress shielding was graded according to Engh (J Bone Joint Surg 1987; 69(B):45–55).

After 4 months, 25 and 7 percent of the hips showed stress shielding of grades 1 and 2, respectively. After 1 year, 30, 23, and 3 percent had stress shielding of grades 1, 2, and 3, respectively. The corresponding figures for the 2-year and 3-year follow-up were 30, 27, and 5, and 21, 26, and 9, respectively.

No distal cortical thickening was seen in any hip 4 months after surgery. After 1 year, 27 percent had developed cortical thickening and after 3 years, this was evident in 68 percent. In 32 percent of the hips, the cortical thickening extended up to the lesser trochanter. The overall bone balance was graded as positive in 42, negative in 17, and unchanged in 42 percent of the hips.

After 3 years, 35 percent of the hips had a radiolucent zone around the implant in the trochanteric region, but in no case was this zone seen distal to the isthmus. No migration of the implants occurred. According to the radiographic criteria for implant fixation proposed by Engh, all the prostheses in this series seemed to have achieved stable fixation by bone ingrowth. We conclude that no alarming bone remodeling was seen 3 years after implantation of this femoral component.

Dislocation after total hip replacement

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Recurrent dislocations after total hip replacement can be a serious complication. This report includes 179 total hip replacements performed at our hospital during 1985 and 1986, and mainly with the Charnley prosthesis. Fourteen (8 percent) of the 179 prostheses dislocated; eight of these within 30 days after surgery. The mean age of the patients with dislocated prostheses was 72 years, whereas the mean age of the patients without dislocation was 71 years. Among the patients without dislocations, 64 percent were operated on because of arthrosis, while 3 of the 14 patients with dislocations were operated on because of arthrosis. Nine patients with dislocated hips had been operated on with revision arthroplasty or because of complications after a hip fracture. So in this series, the incidence of dislocation after a total hip replacement was 3 percent if the patients were operated on because of coxarthrosis, 10 percent if the patients were operated on because of complications after a hip fracture, and 19 percent if the patients were operated on with revision arthroplasty. In conclusion, the main predisposing factor for a dislocation after total hip replacement was previous surgery.

Acetabular arthroplasty to prevent dislocation after total hip replacement

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Recurrent dislocations after total hip replacement is a serious problem. This complication has been treated by fixing an additional sector to the acetabular component in such a position as to prevent further dislocations (Olerud and Karlström 1985). During 1985 and 1986, we performed this procedure in 1 male and 2 female patients patients aged 72-80 years. The arthroplasty did not prevent further dislocations in the male patient, and in the female patients the screws broke after 3 months and 2 years, respectively.

Our experiences indicate that when an additional sector from another acetabular prosthesis is fixed to the original prosthesis to prevent dislocations, the screws are submitted to repeated strains. Due to fatigue fracture, then, they will fail. Therefore, revision arthroplasty should be considered in recurrent dislocations.

Reference

Olerud S, Karlström G. Recurrent dislocation after total hip replacement. *J Bone Joint Surg* 1985;67(B):402-405.

Fractures

Treatment of Grades I and II open tibial fractures: A comparison between locked nail and functional brace

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Patients and methods: In 1983–1987, we treated 28 Grades I and II open tibial fractures in adults with locked intramedullary nailing or with functional bracing preceded by plaster or external frame. Grade III fractures were all treated with an external frame and excluded from the study. The nailings were performed within 12 hours. In the brace group the primary treatment was reduction and a plaster cast for 16—43 days or external fixation for 16—80 days. The time in the brace varied from 3 to 16 weeks.

Results: Full weight bearing was possible after 36 (2—120) days in the nail group and after 105 (37—270) days in the brace group. In the nail group, the complications were infection (2) and instability necessitating a plaster cast (1). In the brace group, the the complications were infection (1), compartment syndrome (2), delayed or nonunion (4, and drop foot (1).

The follow-up time was 20 (12–39) months, and the result in the two groups were classified according to Ekeland et al. (1988, see table below).

	Excellent	Good	Fair	Poor
Nail group	10	6	1	0
Brace group	5	2	3	1

We concluded that Grades I and II open tibial fractures may be treated by wound care followed by functional bracing. With optimal facilities, locked nailing may give better results.

Reference
Ekeland et al. *Clin Orthop.* 1988;231:205–215.

Transpeduncular osteofixation according to Dick in the treatment of lumbar vertebral fractures

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Twelve patients, aged 16–24 years, were treated with reduction and transpeduncular osteofixation according to Dick due to fractures of the lumbar spine (L1–L5). All the fractures were considered unstable. A CAT scan preoperatively disclosed major compression of the intraspinal structures, as well as fracture of one or both peduncles. The time between injury and operation was 2–15 days. Six patients were operated on with a laminectomy, as well as reduction and fixation. In 7 patients a transpeduncular autologous bone transplantation according to Daniaux was made. Five patients underwent a posterolateral fusion of the involved segments. The anterior height of the fractured vertebrae could be corrected from preoperatively 50 percent of the estimated height to almost full height. A considerable correction of the deformed vertebrae could be achieved concerning the angle between the superior and the inferior vertebral end plate. The patients were mobilized within 5 days, 4 patients with a body jacket, the other 8 patients with a simple three-point brace. The observation time has been 3–13 months. Eleven fractures are considered healed without changes in the reduction achieved. Two patients with elevated postoperative temperature were considered to have an infection. One of these patients had a preoperativley diagnosed peripheral arthritis and the other had a pseudomembranous colitis with *Clostridium difficile*, caused by preoperative antibiotic treatment. Both patients became asymptomatic after early removal (3 and 6 months) of the implants. The implant removal did not affect the reduction. Four patients had preoperatively neurologic symptoms (1 cauda equina syndrome and 3 radicular symptoms). Three patients are now without neurologic symptoms, whereas 1 patient has a paresis of the peroneal muscles. This is in regression 4 months after the operation.

Knee

Proximal tibial osteotomy for medial gonarthrosis: A 10-13-year follow-up study

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The results in 41 knees that had been treated by proximal tibial closing wedge osteotomy for varus deformity and arthrosis of the medial compartment were evaluated. The average age of the patients was 65 (45–77) years.

At follow-up, 19 knees were rated as good or excellent, and 22 knees were rated as fair or poor. One patient with a total knee joint arthroplasty at follow-up was rated as poor.

Preoperative varus deformity of more than 10° was not correlated with a poor rating. All the patients rated as fair or poor had a temporary pain-reducing effect of the operation. There was a tendency for a correlation between an improved result and a valgus axis between 5° and 12° at follow-up.

We conclude that the closing wedge osteotomy provided long-lasting pain relief in almost half of our patients.

Primary suture of the anterior cruciate ligament at a county hospital

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Many orthopedic surgeons agree that acute ruptures of the anterior cruciate ligament (ACL) should have a primary suture because the results are better after immediate operation than after a delayed reconstruction. Reports from a number of orthopedic hospitals have shown optimistic results of primary ACL suture after a short-time follow-up, but poor results after longer periods of observation. We wanted to evaluate the treatment with primary suture in a county hospital.

Methods: Twenty-seven patients with acute ruptures of the ACL were treated with primary suture ad modum Palmer or Marshall in the 5-year period 1982–86. Twenty-five of the patients were followed up after 36 (14–76) months. Functionally, the patients were evaluated with Tegner's activity score and Lysholm's functional score. The stability was evaluated with the Lachman and pivot shift tests, and instrumentally with a KT-1000 arthrometer. AP projections in a standing position were used to evaluate the knees for arthrosis.

Results: Totally, 20 of 25 had reduced their activity according to Tegner's activity score. In the Lysholm functional test, 19 of 25 had "good" or "excellent" results, whereas 6 of 25 had "fair" or "poor" results. Six of 25 were unstable with the Lachman test. Seven of 25 had a positive pivot shift. When using the KT-1000 arthrometer, which measures ante-

rior-posterior instability, 10 of 24 had side-to-side differences of more than 3 mm, which is regarded as abnormal. No patients had developed gonarthrosis according to Ahlbäck's classification, but 10 of 25 had early signs of arthrosis.

Conclusions: In this follow-up study of 36 months, every fourth patient had reduced their functional level. Every fourth knee was unstable and most of the patients had reduced their activity level. According to the literature, the results are expected to improve when using augmentation techniques for ACL injuries in young active people. We feel that also county hospitals with orthopedic activity should be able to manage these kinds of operations.

Knee prosthesis in Trondheim

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Apart from a few Guepar prostheses in 1980, the only prosthesis used in our department has been the Townley Anatomic Knee. Patellar prostheses have never been used.

Material and methods: Of 117 knees implanted between February 1980 and February 1988, 102 were reviewed (92 women and 25 men). Thirteen patients had bilateral replacement. Indications were idiopathic and posttraumatic arthrosis (52) and rheumatoid arthritis (50). The mean age was 66 (31–83) years. Follow-up time was 45 (6–96) months. The patients were evaluated using the Hungerford and Krackow rating system.

Results: Pain: Thirty-three percent had disabling pain and 63 percent had significant pain preoperatively. Ninety-five percent were free of pain at follow-up. Stability: Only 48 percent of the knees were stable before operation. Thirty-four percent had instability exceeding 10°, and 20 percent had more than 20° instability. At follow-up, 83 percent were stable, and none had instability exceeding 7°. Alignment: Forty-eight percent had a mean varus deformity of 15° (1–45°), and the rest had a mean valgus deformity of 17° (1–35°). At follow-up, none were in varus and the mean valgus angle was 6°(3–13°). Flexion contracture decreased from 13°to 2°. The ROM increased from 81°to 93°.

Overall results: There were 92 percent excellent and good, 5 percent fair, and 3 percent poor.

Complications: Two patients died of pulmonary embolism and kidney failure. Four had superficial and 2 had deep infections; one prosthesis is salvaged and the other has a solid arthrodesis. Loosening: One tibial part is radiographically loose. One spontaneous patellar fracture was treated conservatively.

Conclusion: The Townley Anatomic Knee has given very good results without patellar resurfacing.

Pediatric orthopedics

Evaluation of the hip joints by ultrasound in children older than 2 years of age

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The aim of the present study was to find out whether ultrasound was appropriate in the evaluation of congenital hip dysplasia and dislocation (CDH) in children above 2 years of age.

Patients and methods: The hip joints of 101 patients, aged 2–18 years, were examined. Forty-one patients underwent control for previous CDH, while 60 patients were admitted because of clinical suspicion of CDH, or because of intoeing or pain in the hip and thigh regions. Longitudinal ultrasound scanning from the lateral aspect was employed, as well as anterior scanning in the direction of the femoral neck. The lateral and anterior covering of the femoral head by the bony acetabulum were measured, and the measurements were compared with those of conventional radiography.

Results: The outlines of the bony structures like the ossification center of the femoral head and the bony acetabular rim, and soft tissue structures like the joint capsule and the labrum were easily identified in most patients. A good agreement between ultrasound and radiography when measuring the lateral projection of the femoral head in relation to the bony acetabular rim was found. A lateral projection of more than 8 mm on the sonograms in children below 10 years of age indicated subluxation, and more than 15 mm in those 2–4 years of age indicated dislocation.

Conclusions: 1) Ultrasound is an adequate method for evaluating the hip joints of children older than 2 years, as well as in adolescents. 2) Because exposure to radiation is avoided, ultrasound is recommended as the primary imaging technique in clinical practice.

Late diagnosed congenital hip dislocation before and after neonatal screening by ultrasound

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Introduction: Previous studies show a relatively high incidence (2–3 promiles) of late diagnosed congenital dislocation of the hip (late CDH) in Sør-Trøndelag County. The aim of the present study was to evaluate the effect of neonatal hip screening by ultrasound on the incidence of late CDH.

Patients and methods: During the 9-year period 1977–85, 24,590 children were born at Trondheim University Hospital (Group A). During the 11-year period 1977–87, 7,746 children were born in local hospitals outside Trondheim (Group

B). Neonatal clinical examination including the Ortolani test was performed by a pediatrician in Group A and by a doctor (not an orthopedist or pediatrician) in Group B. During the 2-year period 1986–87, 5,409 children were born at Trondheim University Hospital (Group C). These children were clinically examined by a pediatrician, and hip ultrasonography was performed by an orthopedist. All the children with late CDH in these groups were registered. The radiographs were assessed and classified as dysplasia, subluxation, or dislocation based on measurements of the acetabular index and lateral and/or proximal displacement of the proximal femur.

Results: The incidence of late CDH in Group A was 2.64 (65 children: 25 dysplasia, 30 subluxation, 10 dislocation). In Group B the incidence was 3.49 (27 children: 9 dysplasia, 10 subluxation, 8 dislocation). In Group C the incidence was 0.74 (4 children: 3 dysplasia, 1 subluxation).

Conclusions: 1) The incidence of late CDH was considerably reduced by neonatal hip screening by ultrasound. 2) No cases of late hip dislocation in children neonatally examined by ultrasound have been detected so far.

Femoral rotation osteotomy in patients with increased anteversion of the femoral neck

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Introduction: Increased femoral anteversion that gives symptoms in children can be corrected by derotational osteotomy. The purpose of this study was to evaluate the accuracy and precision of the peroperative correction of subtrochanteric derotational osteotomy.

Materials and methods: The study includes 7 girls and 4 boys, aged 3–7 years (mean 5 years) who were operated on bilaterally. Measurements of the femoral neck anteversion were performed preoperatively and postoperatively by the Dunlap/Rippstein method. The radiographic measurements were then compared with the planned peroperative correction, which was indicated in the journal.

Results: Preoperatively, the anteversion (AV) angles of the femoral neck measured 45.9 ± 9.1° and postoperatively 9.7 ± 8.6°. The mean correction, as evaluated by the radiologic measurements, then, was 36.2 ± 11.5°. In relation to this the correction planned peroperatively by the surgeon was 38.5 ± 6.5°. From these results, we found an inadequate peroperative correction of 2.4 ± 10.4° (variation + 11° to —18°),

Conclusion: From this study, we can conclude that subtrochanteric derotational osteotomy in children seems to be done with good accuracy, but with inadequate precision.

Miscellaneous

Evaluation of allotransplantation in bone tumors in a 17-year perspective

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Patients and methods: Twenty-one aggressive or malignant bone tumors in 14 men and 7 women aged 17–59 years were treated with wide excision. The replacement transplants were 9 bicondylar and 3 unicondylar femoral, 2 bicondylar tibial, and 7 intercalary humeral, femoral, or tibial deep-frozen cadaver grafts. The median follow-up was 9 (1–17) years.

Results: A gradual creeping substitution or accretion of new bone on necrotic trabeculae was observed. Major resorption occurred in 3 cases. A gradual joint degeneration became evident at 5 years without immediate functional consequences. Four grafts or junctions fractured. One failed intercalary tibial graft resulted in amputation. There were three tumor recurrences, one resulting in amputation. One knee arthrodesis was performed. There was no primary infection, but one secondary infection. Forty operative procedures were performed in the series. The results before 3 years were (Mankin et al. 1982) excellent (9), good (9), fair (2), and poor. The results at 3–17 years were excellent (4), good (4), fair (6), and poor (4).

Conclusions: Allografting still presents unsolved problems. The cartilage preservation is unsatisfactory. The grafts resorb and fatigue fractures occur. However, the alternatives (tumor prostheses and resection arthrodeses) also involve a considerable morbidity.

Reference

Mankin et al. *Cancer* 1982; 50:613–630.

Shortening and lengthening osteotomies fixed with interlocking nail

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Introduction: In 1985, we started a prospective study on patients with femora being shortened or moderately lengthened (< 10 percent of bone length). Clinical data, motility in the hip and knee joints, and peak torque measured with a Cybex isokinetic dynamometer were recorded preoperatively, and 3, 6, and 12 months postoperatively.

Patients: Fifteen femora in 12 patients were shortened a mean of 44 (23–65) mm. Five femora in 5 patients were lengthened a mean of 30 (29–40) mm. All the lengthenings and six shortenings were performed as midshaft step-cut osteotomies, and nine shortenings as transverse osteotomies. All of them were fixed statically with the Grosse-Kempf in-

terlocking nail. Indications: Three had a high stature; the rest had inequality of leg length of different etiologies.

Results: The operating time was 188 min for the shortenings and 149 min for the lengthenings. Peroperative bleeding was 1840 mL for the lengthenings, 1400 mL for the shortenings. One patient sustained a stretch injury of the ischiadic nerve, with partial late recovery. One patient contracted an infected hematoma, which healed with antibiotic therapy. A stress fracture of the nail was seen in 2 patients; in both the nail was exchanged. All the patients were tested on a visual analogous scale: 0 representing a normal extremity, and 100 representing a useless extremity. The mean score was 33, 20, and 16 after 3, 6, and 12 months. At 12 months, 11/14 had a normal gait, 12/14 had normal ability to climb stairs, and 9/14 had normal running ability. No significant change in the motility of knee and hip joint was observed at 12 months.

The mean peak torque over the knee joint at 12 months as a percentage of the preoperative value were as follows (see table below).

	Lengthening		Shortening	
Ang. velocity	Extension	Flexion	Extension	Flexion
180/s	83	77	81	96
90/s	73	74	67	74
30/s	83	71	71	84

Conclusion: Shortening and lengthening osteotomies reduce the muscle power 10–30 percent of preoperative values. The complication rate is significant. The interlocking nail is a good device for fixation, but the problem of stress fracture of the nail is significant.

Reconstruction of hand function in tetraplegia: A case report

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A 29-year-old man sustained a fracture of the cervical spine in an automobile accident in May 1986. The only hand function was weak dorsal flexion of both wrists, and there was no extension in the elbows. He was characterized as a weak C6 tetraplegic.

After reconstruction of the lateral pinch a.m. Zancolli, the hand function has improved remarkably bilaterally. After transposition of the dorsal part of the deltoid muscle to the triceps using extensor tendons from one foot, he has obtained strong extension of the elbow.

It is concluded that upper limb reconstruction considerably improves the function of these patients.

Arthroscopy of the elbow

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From November 1985, we have performed 22 arthroscopies of the elbow in 19 patients. The median age of the patients was 22 (13–58) years.

Locking of the joint was the most disabling symptoms in 10 patients, whereas 5 patients had reduced extension and 6 stated pain as the main symptom.

Preoperative radiographs were negative in 8 patients, whereas in 7 patients, one or more corpora libera were found, and 3 patients proved to have osteochondritis.

Access to the anterior compartment was gained through a small incision proximal to the annular ligament and anterior to the radial epicondyle, taking care to avoid the radial nerve. Entrance to the posterior compartment was between the olecranon and the radial epicondyle, using a standard 4-mm scope.

Results: In 5 patients no pathology was found. We found 7 corpora libera and one osteochondritis. Cartilaginous lesions were found in 3 patients, 4 had arthrosis, and 1 had synovial chondromatosis. Percutaneous extraction of free bodies was done in 4 patients, whereas three arthrotomies were well guided by the previous arthroscopy. Resection of cartilage and synovia was performed in 2 patients. Three patients had their diagnosis changed by the arthroscopy; a suspected free body was ruled out in 2 patients, and in 1 patient with osteochondritis, we found a free body.

Conclusion: Arthrotomy of the elbow joint is useful in reaching a diagnosis when symptoms are vague and preoperative investigations inconclusive. Arthrotomy may be avoided in some cases, as surgical procedures can be completed percutaneously.