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Basic science

Vasoconstrictive action of neuropeptide Y in bone

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Recently, immunohistochemical screening of bone tissue for various neuroendocrine peptides has demonstrated coexistence of immunoreactivity for neuropeptide Y (NPY) and tyrosine hydroxylase (TH) in nerve terminals located close to or within blood vessel walls in bone. TH is the enzyme responsible for conversion of tyrosine to norepinephrine in adrenergic nerve terminals. These findings suggest a role of NPY in the vasomotor regulation of bone blood flow. Such effects have never been reported before in bone tissue. We studied the vasomotor effects of NPY in an in vivo and in situ perfused porcine tibia.

Material and methods: The nutrient artery of tibia was catherized and an extracorporal blood supply was delivered to the nutrient artery through a perstaltic pump from the left carotid artery. Recordings of tibial bone perfusion pressure (BPP), mean arterial blood pressure (MAP), intraosseous pressure (IOP) in the proximal tibial diaphysis and central venous pressure (CVP) were recorded simultaneously. The peristaltic pump was set to produce a BPP equal the MAP. In 6 anesthesized pigs (60 kg) a norepinephrine (10^{-8}–10^{-4} M) dose response curve was obtained. The different concentrations of norepinephrine were infused simultaneously with a microliter-pump (Harvard) into the extracorporal blood supply for 5 minutes. The tibial BPP was recorded and had to be normalized after each infused dose of norepinephrine before a new concentration could be infused to avoid accumulation. In 11 anesthesized pigs (60 kg) the vasoactive effect of neuropeptide Y (10^{-10}–10^{-6} M) was determined in another dose response study by a similar infusion-, perfusion- and pressure recording technique.

Results: Norepinephrine produced a significant rise in bone perfusion pressure without giving any systemic effects. The peptide neuropeptide Y produced a quantitatively less but significant rise in bone perfusion pressure. The highest response in bone perfusion pressure was seen in concentrations of 10^{-7} M NPY.

Discussion and conclusions: Both mediators NPY and norepinephrine may be important in controlling bone vascular smooth muscle tone resulting in a vasoconcentration which rises the bone perfusion pressure. The importance of the mediators concentration is obvious. The dose dependant curve of neuropeptide Y gives rise to speculations about receptor blocking in concentration of 10^{-7} M NPY. An additive effect of both norepinephrine and neuropeptide Y on bone vascular smooth muscle remains to be elucidated.

CGRP, VIP and substance P induce vasorelaxation in resistance arteries isolated from cancellous bone

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Introduction: Immunohistochemical studies have revealed the existence of peptidergic nerves containing calcitonin gene related peptide (CGRP), vasoactive intestinal peptide (VIP) and substance P (SP) in bone tissue (1), some nerve endings being located adjacent to vessels. It is possible that these peptides are involved in both vasomotor regulation and control of metabolic and immunological functions in bone and bone marrow (1). The purpose of this study was to investigate the effects of CGRP, VIP and SP on resistance arteries isolated from cancellous bone.

Material and methods: The distal femur was removed from pigs (approx 80 kg) immediately after death and the condyles were sliced sagittally. In a physiological saline solution (PSS) epiphyseal arteries (approx 0.2 mm in internal diameter) were dissected under a stereomicroscope. The vessels were mounted as ring preparations on a myograph (2). The test chamber contained 37 °C oxygenated (95% O_2, 5% CO_2) PSS. The vessels were held at a stretch which allowed optimal contraction and the isometric force development was measured continuously. The vesselse were precontracted to a submaximal level

with noradrenaline (NA), and human CGRP (10^{-11}–10^{-7} M), porcine VIP (10^{-10}–10^{-7} M), or substance P (10^{-11}–10^{-6} M) was added cumulatively. Substance P was added as a single dose (10^{-6} M) to some vessels.

Results: Contraction with NA could be sustained at an almost constant level for 30 min and the force generated was reproducible for at least 10 hours. Precontracted vessels exhibited concentration dependant relaxation to CGRP and VIP. Threshold concentrations were 10^{-10} M for CGRP (p <0.01) and 10^{-9} M for VIP (p <0.01). The maximal relaxing effects were approx 70% of precontractions for CGRP (at 10^{-8} M) and 50% for VIP (at 3.3 x 10^{-8} M). Substance P induced transient vasorelaxation. A single exposure of vessels to 10^{-6} M SP elicited a greater response than when same concentration was reached in a cumulative concentration response experiment. This indicates that the relaxing effects of SP on bone vessels in subject to tachyphylaxis.

Conclusion: This study has revealed vasorelaxing effects of CGRP, VIP and substance P on resistane vessels isolated from cancellous bone.

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Miscellaneous

Bone lengthening ad modum Orthofix and Ilizarov

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With the introduction of more "physiologic" methods of bone-lengthening, the bone-healing problems have become infrequent, but problems caused by tension of soft tissues still dominate lengthening procedures. We report the results and complications in 31 bone lengthening procedures without and with correction of deformity.

Material and method: The segment, age, amount of shortening, number of patients with deformity and the method used for lengthening are shown in the table. The mean distraction delay was 8 days. In the foot and upper extremity the indication for lengthening was deformity caused by a short bone segment.

	n	Age	Shortening	Deformity	O/I
Tibia	10	18 (3–49)	4.9 (2–13)	n=4	4/6
Femur	10	15 (4–47)	4.7 (3–8)	n=5	10/0
Upper extremity/ foot	11	16 (3–48)	2 (1–3.5)	n=8	10/1

O=Orthofix, I=Ilizarov

Results: The mean lengthening for tibia, femur and upper extremity/foot segments were 4.7 (2–10) cm, 4.0 (2–6) cm and 1.7 (1–3.5) cm respectively. The lengthening index was: tibia=1.3 month/cm, femur=1.7 month/cm and uper extremity/foot=1.6 month/cm). 9 out of 10 tibial lengthenings, 8 out of 10 femoral and 10 out of 11 upper extremity/foot segment lengthenings had a good result. 83% of all had pin-infections during distraction. All had restricted movements of the ankle/knee during distraction. Totally 36 problems/complications were registered, of which one was serious.

Conclusion: 87% obtained a good result. Lengthening procedures are associated with a high frequency of soft tissue problems during the distraction period. Joint instability is a contraindication for lengthening.

The effect of shock absorbing insoles on overuse injuries—a prospective randomised study

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Introduction: The purpose of this study was to investigate the possible effect of an insole with shock absorption with no corrigation in the amount of overuse injuries in military recruits, compared to a control group using otherwise identical equipment.

Material and method: 59 healthy military recruits were exposed to the same training program for a period of 3 months. 26 of these received shock absorbing insoles to wear at daily training, as compared to a control group of 33 by randomisation.

Results: During the period 18 (31%) sustained gait related overuse injuries. 6 (23%) in the group with the orthotic device reported 10 overuse injuries, 4 with shin splints, 3 with kneepain, 2 with plantaris fasciitis and one with low back pain. 12 (36%) in the control group reported 17 overuse injuries, 7 with shin splints, 2 with tendinitis of the Achillestendon, 3 with low back pain, one with kneepain and one with pain of the left hip. The therapeutic gain was 15%. This was however not statistically significant (p <0.416).

Conclusion: An orthotic shock absorbing insole seems to have a slight but not significant effect on the number of overuse injuries in this study.

Is osteoporosis a hereditary disease?

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The Health authorities recommend that daughters of mothers with osteoporotic fractures use hormon replacement therapy after their menopause, despite little scientific evidence. Twin

studies have shown conflicting results. The purpose of this study was to investigate whether daughters of mothers with low bone mineral density had significantly lower bone mineral density than daughters of mothers with high bone mineral density.

All women aged 55–58 years living in Hvidovre municipal area were invited to participate. Lumbar spine BMD was measured in 460 women. 200 women had a family member who would participate. These women were after the results of the lumbar spine BMD divided into 3 groups, and the high and the low BMD groups were investigated further. 60 daughters, 30 daughters to mothers in the high and low BMD group were investigated. Bone mass was measured in lumbar spine and distal radius.

Results: As compared with daughters of mothers with high BMD, the daughters of mothers with low BMD had significantly reduced bone mass in lumbar spine (1.07 g/cm^2 versus 1.2 g/cm^2, p <0.05). There was no significant difference in bone mass measured in distal radius (0.454 g/cm^2 versus 0.458 g/cm^2, ns).

We conclude that there is a hereditary factor in development of trabecular peak bone mass, and thereby in the risk of osteoporotic fractures.

Violence-conditioned injuries treated at the casualty ward at Esbjerg in 1991—follow-up of the investigation in 1981 and 1986

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Introduction: In the years of 1981 and 1986 prospective registrations of all violence-conditioned injuries were recorded during a 6 month period. In the 1986 investigation we found an increasing number of injuries but the pattern types of injuries and the circumstances for the act of violence were unchanged. The aim of the present study was to see if there had been any changes in the pattern and number of injuries caused by violence.

Method: All contacts to the casualty ward caused by violence were registered prospectively in special forms during the period 1/3–30/8 1991. Age, sex, civil status, place, time, influence of alcohol, type of lesion, need for further treatment, information about the counterpart and the weapon, if any.

Material: 509 cases were registered (1981: 236 and 1986: 379). A comparison of the following parameters showed no difference between 1986 and 1991: age, sex, civil status, place, type of lesion, need for further treatment, and influence of alcohol.

The incidence rates for the citizens of the municipality of Esbjerg for the 1991 and the 1986 investigation were calculated. The total incidence has since 1986 increased from 8 to 9 per 1000, but the increase was not significant. The incidence for men was 13.4 (max for the age-group 20–24 years: 42.8) and for women 4.7 (max for the age-group 20–24 years: 11.3, which is a significant rise compared to 1986 when it was 2.0).

In total 14% of the injured needed admission to hospital. This figure was unchanged from the earlier studies. During the 6 month period in 1991 the patients occupied 1216 hospital bed-days corresponding to 2400 days a year. Females were most often the victim at home, whereas males most often were the victim at bars and on the street. More than 50% were under the influence of alcohol. 36% of the injured knew the counterpart. There were no episodes of gunfights. Sharp objects were used in 7.7%, manual violence or kicks were used in the rest of the cases.

Conclusion: The pattern of violence did not change compared to 1986. Since 1981 the number of injured treated has increased significantly, but the rise is due to an increase in the population served, and not due to an increase in incidence rates.

Tumor

Radiology of chondrosarcomas

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With the purpose of evaluating the need for diagnostic examinations in patients with chondrosarcomas, 49 patients seen during the last 11 years were re-evaluated. Plain films of the tumor in 31 and MRI in 7 patients; skeletal survey in 45 and CT of the lungs in 13 patients.

Radical operation was possible in 42 patients, in 29 by local resection and in 13 by amputation. Local recurrence occurred in 6 of these patients after 1.4 (0.3–4) years, 5 of whom had grade II–III tumors. Lung metastases were seen at chest radiography in 12 patients after 0.9 (0.1–1.8) years, 10 of whom had grade II–III tumors.

It is proposed that the initial evaluation always includes plain films and MRI or CT of the tumor region, in patients with grade II–III tumors also CT of the lungs. That all patients are observed for 10 years with regard to local recurrence and metastases. Grade II–III tumors at intervals of 3–4 months during the first 2 years, and including CT of the lungs, then half-yearly/yearly. Grade I tumors after 3 months; then half-yearly/yearly.

Infections

Coxitis in childhood—a retrospective study

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Purpose: Wishing to distinguish between children with acute septic arthritis of the hip and children with other causes for acute hip pain by means of the physical and paraclinical findings, we retrospectively surveyed all the files of children admitted to the county hospital for acute hip pain over a period from 1981 to 1990.

Patients and results: 74 children, 11 days to 14 years of age, were admitted to the hospital. 25 were needle aspirated from the hip joint which showed pus with or without positive culture from 14 patients. 49 were not needle aspirated. None of these had septic arthritis. There was no difference between children with or without septic arthritis in the physical findings (range of motion and hip muscle spasm). Those with septic arthritis had higher erythrocyte sedimentation rate and higher white blood cell count.

16 children had isotope scan performed; 8 of these had septic arthritis. Nevertheless only 6 of the latter had positive isotope scan. None of the other 8 patients had positive isotope scan. Only a few patients were examined with ultrasound and therefore this could not contribute to our study.

Conclusion: Children with septic arthritis of the hip had higher erythrocyte sedimentation rate, higher white blood cell count and more often positive isotope scan. It is difficult to distinguish between acute septic arthritis and other causes of acute hip pain. Needle aspiration of the hip joint is often necessary to establish the diagnosis.

Soft tissue infections as complications to intravenous drug abuse

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Introduction: Soft tissue infections, demanding hosptalisation, among intravenous drug abusers are seen more and more often. They are often complicated and long-term, as well as being characterised by special microbiological matters.

Materials and methods: For the 5-year period 1985–1989 we retrospectively found 145 admissions in 89 patients because of an acute infection at the injection site located in the extremities.

Results: The clinical diagnoses were: 58 superficial abscesses, 27 deep abscesses, 57 cellulitis, one tendosynovitis and one purulent arthritis (one absces was not further classified). The commonest location was the groin 26%. Serious complications were seen in 17 of the patients: 4 lesions of femoral artery resulting in amputaion, 5 deep venous thrombosis, 4 sepsis, 3 pneumonia (one letal) and 2 compartment syndromes. Satisfactory microbiological examinations (aerobic and anaerobic) were done in only 78 cases. They showed an overweight of polybacterial infections (53% polybacterial, 38% monobacterial, 9% sterile). The commonest bacterial isolates were Streptococcus species, *Staphylococcus aureus* and anaerobes. There was a preponderance of oropharyngeal and cutaneous bacteria, and only few intestinal bacteriae.

Conclusion: We recommend: 1) surgical revision, 2) always aerobic and anaerobic culturing, 3) empiric antibacterial therapy should include an antistaphylococcal agent like dicloxacillin plus metronidazol, 4) free and easily available injection paraphernalia and desinfection swaps.

Pharmacokinetics of cefuroxime axetil (Zinnat) in serum, bone and joint fluid

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Introduction: Cefuroxime axetil (Zinnat) is an oral preparation of a 2nd generation cephalosporin highly stable to staphylococcal ß-lactamase. The parenteral preparation (Zinacef) is used to treat septic arthritis and osteomyelitis where *Staphylococcus aureus* is an essential agent.In this study the bioavailability of Zinnat was evaluated in patients undergoing alloplastic surgery.

Materials: The investigation included 10 patients undergoing alloplastic surgery, median age 76 years. 5 patients received 500 mg and 5 patients received 1000 mg Zinnat, within 24 hours. The first dose was given, fasting, at various times before surgery. 16 blood samples were taken, 14 within 8 hours. Joint fluid and bone samples were taken peroperatively. All samples were analysed for antibiotic concentrations both by microbiological assay and by high performance liquid chromatography.

Results: The serum peak concentrations were after 500 mg (range 1.5–3.0 mg/L, median 2.4 mg/L), after 1000 mg (4.4–11.0 mg/L, 7.5 mg/L). The median peak concentrations in bone and joint fluid were after 500 mg (0.4/1.0 mg/L) and after 1000 mg (1.4/2.9 mg/L). $T_{1/2}$ in serum was 3.1 h. The inhibition quotient, i e the peak concentration/MIC90 for staphylococcus aureus strains was calculated. After 500 mg Zinnat the serum/bone/joint fluid inhibition quotient was 7/1/3, and after 1000 mg Zinnat 16/6/7.

Conclusion: Cefuroxime axetil (Zinnat) in the two doses tested resulted, because of low bioavailability, in low serum concentrations and therefore too low concentrations in bone and joint fluid to be recommended as prophylaxis to fasting patients.

Spine

Direct repair of spondylolysis by screw fixation and/or tension wiring

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Patients and methods: Between 1980 and 1990 direct repair of the defect in spondylolysis was performed in 28 patients. The mean age was 22 (14–49). Conservative treatment for at least 6 months was tried in all patients. Criteria for the operation were absence of degenerative disc lesions on radiographs, maximum spondylolisthesis of 15%, no neurological signs and effect of brace treatment. Buck technique of screwfixation was used in 8 patients, Edinburgh technique of tension wiring in 11 patients and both in 9 patients.

Results: Mean observation time was 3 (1–9) years. The pain decreased considerably or vanished in 21 patients, 4 improved a little and 3 were unchanged (two of them had posterolateral fusion with good results). At follow-up 23 patients were working. 3 of 7 patients more than 30 years old at operation had an unsatisfactory result and got pension.

Conclusion: Direct repair of lumbal spondylolysis below the age of 30 is a good alternative to intersegmental fusion.

Hypersensitivity reaction against Cotrel-Dubousset implants after scoliosis surgery

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Contact hypersensitivity reaction against stainless steel implants is uncommon. No immunologic reactions against Cotrel-Dubousset (CD) implants have yet been reported.

Patients: 2 adolescent girls underwent correction with CD for thoracic scoliosis. At regular clinical visits during the first year no adverse reactions occurred. After one year both patients developed inflammation, multiple hygromas and drainage along the spine scars. Both patients were anaemic with elevated sedimentation rate and had weight loss. White cell counts were normal.

The CD implants were removed together with brownish pigmented granulation tissue. Multiple anaerobic/aerobic tissue cultures were negative for bacteria. Histology showed an immunologic picture of lymfocytes, plasma cells giant cells and metal debris.

Both patients soon recovered from their profound clinical manifestations, gained weight, their anaemic state disappeared and sedimentation rates normalized. No inflammation had yet reoccurred after one and half a year, respectively.

Conclusion: Probably a late cell mediated type IV hypersensitivity reaction against one of the metals in the CD alloy (nickel or chromium). Surgeons should be aware of such late reactions because the CD implant is relatively new for scoliosis surgery and the cause and frequency is yet unknown. The treatment is removal of the CD implant and all stained granulation tissue.

Stabilization by surgical treatment of vertebral column metastasis

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Purposes: Evaluation of the postoperative course in patients with malignant disease and vertebral metastasis who underwent surgery with posterior spinal reduction and fixation device. The indication of surgery was in all cases prevention of neural compressions due to local bone destruction.

Patients and methods: In the period February 1989 – June 1992, 11 patients with metastasis to the column underwent a posterior spinal reduction because of the risk of developing paraplegia. All case records and radiographs were examined in order to register primary diagnosis and treatment, localization of metastasis, per- and postoperative complications, possible secondary tumor treatment (Chemo- and/or radiation treatment) and the postoperative clinical course. 6 of the 11 patient were women, the average age at the time of surgery was 45 (30–65) years. 5 patients were dead at the time of evaluation.

Results: The primary diagnoses were breast cancer (4 pts), myelomatosis (3 pts), malignant melanoma (3 pts), malignant lymfoma (one pt) and teratoma (one pt). The metastases were localized to the lumbal region of the column (5 pts), the thoracal region (4 pts), the cervical region (one pt) and both the lumbal and thoracal region (one pt). Preoperatively the neurological deficit could be classified according to Frankel grade C (5 pts), Frankel grade D (5 pts) and Frankel grade E (one pt). Immediately postoperatively one patient complained of dysesthesia in the right leg and foot. Postoperatively 9 patients became free of pain, one patient had occasional moderate pains and one patient had constant invalidating pains. All patients except one patient who died 14 days after surgery could be discharged to their homes. Secondary treatment as chemotherapy and/or radiation treatment was given to 9 patients. Radiographs taken at follow-up showed healing of the reduction (8 pts), uncertain healing (2 pts). The average follow-up after surgery was 14 months (14 days-42 months). The mean survival time of those who died after surgery was 5 months.

Conclusion: Although the number of patients in this evaluation is small (11 pts) and the follow-up short in time we can conclude: Posterior spinal reduction can stabilize the column and prevent development of medullary compression and paraparesis. Thereby the patients' quality of life is considerably increased and the need of care diminished.

Knee

Survivorship analysis of cemented total condylar knee arthroplasty

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Aim: To evaluate the cumulative survival rates (CSR) of TKA and determine the significance of the variables pathological diagnosis, age, sex, body weight, and earlier arthroplasty.

Materials and methods: 365 consecutive TKA (Insall-Burstein) were performed on 265 patients with either a diagnosis of osteoarthrosis (OA) or rheumatoid arthritis (RA). The observation period was up to 12 years. 17 cases were revisions. The HSS knee-score was used in the clinical evaluation. Stratified survivorship analysis was performed with 2 different end-point definitions; a technical failure (TF), meaning the prosthesis no longer in situ, and a clinical failure (CF), where a prosthesis with a poor HSS-score was added to the above-mentioned definition. Concerning age, the material was split into 2 groups with 60 years as the borderline. As for the body weight, obesity was defined as BMI >27 (BMI=(weight in kilograms)/(height in meters)^2).

Significant results: The overall CSR after 12 years were 92% (TF) and 87% (CF), corresponding to annual failure rates of 0.7% and 1.1% respectively. The CSR (CF) in the OA-group was 92%, and in the RA-group 81%. The CSR (CF) of the primarily operated group was 88%, and of the revision group 76%.

Conclusion: The diagnosis of RA has a significantly negative effect on the cumulative survival rate. Primary cases did significantly better than revision cases. Age, sex, and BMI do not significantly affect the survival rate.

Early, full weight bearing or weight relievement in cementless total knee arthroplasty

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Introduction: Achieving rigid initial fixation is the most important factor in promoting bone ingrowth into porous coated tibial components after cementless total knee arthroplasty. Biomechanical studies have shown that short pegs are ineffective in controlling sinking and lift off in the PCA Modular tibial tray and weight relievement is recommended (1, 2). The purpose of the present study was to evaluate the significance of weight relievement on migration and fixation of the PCA tibial tray using radiographic stereophotogrammetric analysis (RSA) (3).

Patients and methods: 34 consecutive patients (34 knees) with arthrosis who had cementless total knee arthroplasty (PCA Modular) were randomized to 6 weeks weight relievement (3 weeks full relievement and 3 weeks toe touch weight bearing) or early, full weightbearing. The knees were prepared for radiographic stereophotogrammetric analysis which was performed 6 days, 6 weeks and one year postoperatively.

Results: No revisions had been performed in the first postoperative year and knee score did not differ between the 2 groups. 6 weeks after operation the MTPM (=maximum migration of the most unstable part of the implant) was median 0.6 (0–2.0) mm in the weight relievement group and 0.6 (0–1.4) mm in the weight-bearing group (p >0.05). In the weight-relievement group the subsidence was significantly greater than in the weight-bearing group but one year postoperatively there was no difference in migration or inducible displacement (fixation).

Discussion: Although the PCA Modular tibial component has no central stem or screws the 6 weeks of weight relievement did not reduce the migration or enhance fixation in comparison with early, full weight bearing. Nearly all designs of cementless tibial components have a central stem and/or screw fixation giving better initial stability and also in these cases weight relievement is not worth the trouble.

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Hip

10 years follow-up examination of straight stem Müller total hip replacement

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The results of total hip replacement in a prospective series of 211 patients operated on 259 hips in the period April 1979 to December 1981 with straight stem Müller prosthesis are presented.

157 patients with 194 hips were available for follow-up examination. 54 patients with 65 hips were either dead (43/52) or did not want to participate (11/13).

Altogether 29 hips in 25 patients needed revision due to aseptic loosening during the follow-up period. Late deep infection occurred in 3 hips and superficial infection occurred

in one hip. Of these 2 stems and 3 cups were revised. In one of the patients reoperation was carried out altogether 4 times without revision of any prosthetic component. The femoral stem was revised in 29 hips and the acetabular cup in 14 hips. 4 hips dislocated, one of them twice.

At follow-up 6 hips were definitely loose, they have been revised between 10 and 11 years postoperatively, 3 hips were probably loose and 42 hips were possibly loose. All patients but one have at present a functioning hip prosthesis. The median score on the D'Aubigne & Postel 6 point scale was 14.6 at follow-up (8.1 preoperatively). Use of analgesics on a 1–3 use of analgesics scale was 1.2 (2.8 preoperatively).

Improved longevity of first cemented revision total hip arthroplasties

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The purpose of the study was to analyse whether the risk of further revision after the first cemented revision total hip arthroplasty had changed in the period 1977 to 1992, and to examine the background for any such changes.

Material and methods: 434 consecutive, cemented first revisions performed from 1977 through 1992 were analysed. Risk of further revision was estimated using Kaplan-Meier techniques, and different groups of patients were compared using the Logrank test.

Results: The risk of further revision was significantly reduced for revisions performed in 1982 and later compared to revisions performed before 1982, primarily because of a reduced risk of late aseptic loosening of the femoral component, which can be related to use of sufficiently long revision stems and improved cementation. No significant differences in the risk of aseptic loosening of the acetabular component or in the risk of re-revision for other causes of failure than loosening were encountered, comparing the early and the late period. Risk of re-revision for other reasons than loosening is related to the incidence of intra- and postoperative complications which, consistently, was not reduced in the late period.

Recurrent aseptic loosening of the femoral component after cemented revision

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The purpose of the study was to identify risk factors for recurrent aseptic loosening of the femoral component after the first cemented revision.

Material and methods: 160 consecutive cemented first revisions of aseptic loose primarily cemented femoral components, performed from 1977 through 1988, were analysed using Cox's regression model. The influence on risk of recurrent loosening was analysed for the following variables: relative length of revision stem, quality of cementation, cortical excavation, position of stem, calcar/collar relation, use of plug, age, sex and year of revision.

Results: Relative length of revision stem and quality of cementation were highly significant risk factors, with reduction of risk of loosening when the revision stem overbridged the tip of the primary stem with one width of the femoral shaft or more, and when cementation was sufficient in 4 or 5 of 5 zones. Age and position of stem were significant risk factors with lesser impact, with increased risk associated with young age and neutral position of the stem.

A significant improvement in fixation of the cemented revision femoral component in revisions performed in 1982 or later could be related to the use of femoral components with sufficiently long stems and improved cementation.

Cementless total hip replacement with the LINK Ribbed System

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Material: A total of 206 primary hip arthroplasties in 178 patients were evaluated. They were all operated on with Cementless LINK Ribbed System (without coating). There were 84 women and 94 men. The age of the patients at the time of surgery was 53 (15–67) years. The indication for operation was primary arthrosis in 129 hips, rheumatoid arthritis in 22, sequels of fracture in 17, sequels from pediatric hip disease in 19, idiopatic necrosis of the head of the femur in 10 and other diagnoses in 9 hips. Charnley Classes of Function were A in 96 hips, B in 89, and C in 21 hips. The mean follow-up time was 3 (2–5) years.

Methods: The clinical evaluation was done according to Harris Hip Score (HHS) system. The radiographic assessment was made on unilateral antero-posterior and lateral radiographs and was graded in one of 3 groups: stable, probably loose or definitely loose.

Results: At the follow-up 37 hips had been revised. In 20 hips both the cup and stem were revised. 15 hips were revised on the femoral side only and 2 on the acetabular side only. The frequency of revision of the femur stem was 17% and the frequency of revision of the acetabular cup was 11%. At the radiographic evaluation of the 171 unrevised femur stems 27 were graded definitely loose (16%) and 20 of 184 unrevised cups were graded radiographically definitely loose (11%). The average HHS of the 169 unrevised hips were 73 (range 21–100). The result was good or excellent (HHS 80-100) in 77 hips (46%).

Conclusion: Due to the high revision rate and the relatively poor clinical and radiographic outcome results were worse than anticipated and we have stopped using this type of cementless total hip prosthesis.

Uncemented total Bi-Metric hip arthroplasty

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Introduction: Orthopedic Department, Horsens Hospital was one of the first departments in Denmark which used the Bi-Metric system for total hip arthroplasty. We have made a two-year follow-up.

Patients and methods: The follow-up includes 46 patients of whom 4 are excluded because of death and one because of lack of interest in the follow-up. 4 of the patients were operated bilaterally so we examined 45 hips. Primarily all received a collared standard total Bi-Metric hip prosthesis with a porous coating to the proximal portion of the stem. The medium follow-up time is 3 years. At the follow-up we used Harris Hip Scores and standard radiographs.

Results: 2 patients have been reoperated, one because of infection and one because of a loosening of the stem. 4 patients had tenderness or pain in the hip region. All the rest had none or slight complaints and nearly maximum Harris Hip Scores.

Conclusion: Very few patients had postoperative pain. The rest of the patients all had high Harris Scores.

Early high loosening frequency of threaded acetabular cup in THR

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Aim: To evaluate the outcome of an operation with a hybrid cementless total hip prosthesis.

Material: A total of 70 primary hip arthroplasties in 65 patients were evaluated. They were all operated on with a cemented femur stem and a cementless spheric threaded acetabular ring. There were 31 women and 34 men. The mean age of the patients at the time of surgery was 70 (38–83) years. The indication for operation were primary arthrosis in 61 hips, rheumatoid arthritis in 4, sequels of fracture in 2, sequels from pediatric hip decease in 2, idiopatic necrosis of the head of the femur in one and other diagnoses in 9 hips. Charnley Classes of Function were A in 35 hips, B in 31, and C in 4 hips. The mean follow-up time was 2.5 (1–5) years.

Methods: The evaluation was performed according to Harris Hip Score (HHS) system. The radiographic assessment was made on unilateral antero-posterior and lateral radiographs taken shortly after the operation and at the latest control. The radiographs were evaluated in conjuction with the radiographic department and were graded in one of 3 groups: stable, probably loose or definitely loose.

Results: At the follow-up 2 hips had been revised. No femur stems were revised. At the radiographic evaluation one femur stem was graded definitely loose and 14 of 68 unrevised cups were graded radiographically definitely loose. The average HHS of the 68 unrevised hips were 76 (range 30–100). The result was good or excellent (HHS 80–100) in 37 of 68 hips. As a consequence of the evaluation 15 hips were scheduled for revision.

Conclusion: Due to the relatively poor clinical result and high rate of definite radiographic loosening we have now stopped using this type of uncemented acetabular cup.

Experiences with Haemonetics Haemolite® 2 cellsaver and total hip arthroplasty (THA)

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Introduction: The risk of transferring infectious diseases by blood transfusions has increased the patients interest in avoiding transfusions. Previously most patients having a THA needed transfusions. Recently several systems for autotransfusion have been developed. We have tested a cellsaversystem which collects, washes, concentrates and filtrates the red blood cells before autotransfusion.

Material and methods: Totally 35 consecutive THA, 18 using the cellsaver and 17 not using it, entered the study. The following parameters were registered: age, type of operation, type of anestetic, blood loss and administration of auto- and homologous blood during and after the operation. Hemoglobin, hematocrit and creatinin were registered at the admission, the first, third and tenth day. There was no difference in the two groups regarding age, hemoglobin and type of operation. Except for the need of an extra anestetic nurse to run the cellsaver, there was no change in the ortopedic or anestetic routines. We only collected blood during the operation.

Results: There was no significant difference in the peroperative bleeding, or in the total blood loss. In both groups a few patients lost a large amount of blood. The median blood loss was 1950 (925–6337) mL in the cellsaver group and 2350 (1260–4440) mL in the control group. The need for homologue transfusion was significantly higher in the control group, median 400 mL vs 800 mL. This difference is at the same magnitude as the amount of autotransfused blood, median 398 mL. In the cellsaver group 9 patients did not need any homologous transfusion at all, whereas in the control group only one did not need any transfusion.

Conclusion: In half of the patients in the group where cellsaver was used, homologous transfusion was avoided. This result was achieved without any previous routine in the technique and without blood collection after surgery. The processing kit can be used for 6 hours without risk of contamination. The method has its costs: a kit DKK 1,100 and an autotransfusion bag DKK 130. A bag of homologous blood costs DKK 350. In the beginning there will be needed an extra anestetic nurse in the theatre.

Hemiarthroplasty as primary treatment of subcapital fractures in Denmark

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Aim: To identify the indications for the use of hemiarthroplasty as primary treatment of subcapital femoral fractures in Denmark.

Material and method: A questionnaire was sent out in January 1992 to all orthopaedic and surgical departments in Denmark. 30 out of 31 orthopaedic departments and 30 out of 34 surgical departments answered.

7 orthopedic and 11 surgical departments never use hemiarthroplasty. Of the remaining 23 orthopedic and 19 surgical departments hemiarthroplasty is used only in displaced fractures except in one surgical department, which also uses hemiarthroplasty in non-displaced fractures. 12/23 orthopedic and 14/19 surgical departments consider walking ability to be of no importance for the indication to use hemiarthroplasty. 4/23 orthopedic and 3/19 surgical departments use age beyond 80 years as criterium. Poor general condition of health as criterium to use hemiarthroplasty is used in 11/23 orthopedic and 6/19 surgical departments.

Uncemented Moore prosthesis is used in 10/23 orthopedic and 15/19 surgical departments. Christiansen prosthesis is not used in orthopedic departments but it is used in 4 surgical departments. Total hip replacement is used as primary treatment in one orthopaedic and one surgical department.

Conclusion: Hemiarthroplasty is rather widely used as primary treatment of subcapital femoral fractures in Denmark.

Displaced femoral neck fractures in patients with rheumatoid arthritis should be treated with total hip arthroplasty

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24 patients with rheumatoid arthritis (RA) and femoral neck fracture (FNF) were investigated for complications in fracture healing.

13 fractures were internally fixed with muliple pin-osteosynthesis (3 AO/ASIF screws) 2 fractures had gliding-screw osteosynthesis (DHS). 4 displaced fractures had hemiarthroplasties a m Moore and 2 displaced fractures had primary total hip arthroplasty a m Müller. One patient had the femoral head removed and stayed in Girdlestone-status, one patient denied operation. One patient with a non-displaced fracture was mobilized without complications.

Results: 4/6 displaced and 4/7 non-displaced fractures had complications with redislocation or necrosis of the femoral head after multiple pin-osteosynthesis. 6 fractures got complications within the first 6 months. In 3/4 hemiarthroplasties the prosthesis failed, all of them were loose within the first 2 postoperative years. No complications were recorded for the total hip arthroplasties.

Conclusion: This retrospective study showed a high rate of failure after pinning FNF in RA-patients, and much higher than seen in patients without RA. Previous studies have shown good results after total hip arthroplasty in these patients, so we recommend that RA patients with displaced FNF should be treated with primary total hip arthroplasty, and it should also be considered in elderly patients with non-displaced fractures.

Conservative vs surgical treatment of impacted, subcapital fractures of the femoral neck

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Introduction: The subject of this study was to examine whether the non-operative treatment of impacted, subcapital femoral neck fractures is still justified.

Materials and methods: Through a controlled, prospective and randomized trial, the conservative treatment was compared to osteosynthesis with a Dynamic Hip Screw. Impacted fractures were radiologically defined according to the Garden type I valgus-fracture, with an angle between 160°–180°, as seen in the AP-projection, and a maximal retroversion of 20°, as seen in the lateral view. Only patients with an injury less than 72 hours old, able to lift the leg straight, operable, and mobilized early on 2 crutches with full weight bearing, were included.

Results: During the period May 1987 to September 1990, 23 patients (3 men, 20 women) presented the characteristics above. In 7 fractures osteosynthesized, 6 healed without complications, one patient developed avascular head necrosis 22 months postoperatively, and had a secondary hemiarthroplasty. In 16 fractures treated conservatively, secondary dislocation occurred in 10 cases, necessitating hemiarthroplasty in 8 cases, while one patient had a secondary osteosynthesis. One patients was not operated on due to deteriorating general health condition. One patient later had the prosthesis removed due to infection. 8 out of 10 cases of secondary dislocation occurred within 2–9 days after the injury, one after 31 and one after 35 days.

The 6 conservatively treated patients presenting radiologically verified, healed fractures, were younger, with a median age of 69 (59–80) years, than patients demonstrating secondary dislocation, median 82 (78–94) years. There were no significant radiological differences between the healed and the dislocated fractures treated non-operatively.

Conclusion: It is concluded that the advantages of primary osteosynthesis predominate in the treatment of this type of fracture.

Shoulder and arm

The role of diagnostic arthroscopy in recurrent instability of the shoulder

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Aim: To define the value of diagnostic arthroscopy in patients with recurrent instability of the shoulder.

Materials and methods: 66 consecutive patients, 21 women and 45 men, median age 26 (16–55) years, with a history of shoulder instability were evaluated clinically with respect to etiology, direction and degree. All patients had conventional radiographs of the joint and 45 degrees cranio-caudal view to expose the glenoid. Finally all had an arthroscopy in the lateral position under general anesthesia.

Results: In 41 patients clinical and radiological evaluation classified the instability as traumatic, recurrent and anterior. Arthroscopy confirmed the diagnosis in all cases and arthroscopy did not change the planned operation. 18 patients had a clinical diagnosis of instability and all had normal radiographs. Arthroscopy divided this group into 12 patients with traumatic, recurrent anterior instability, including 3 cases of SLAP lesions. 4 had recurrent nontraumatic multidirectional instabilities, and 2 were unstable with cuff tears. 7 patients with clinical and radiographic signs of multidirectional or posterior instability could be verified by arthroscopy.

Conclusion: Diagnostic arthroscopy of the unstable shoulder with clinical and radiographic signs of anterior instability seems unnecessary, and can be omitted. However, patients with clinical signs of instability and normal radiographic findings can be further classified by arthroscopy and the diagnostic specificity improved.

The shoulder impingement syndrome The result of open decompression

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Introduction: The purpose of this study was to retrospectively estimate the effect of subacromial decompression by anterior acromioplasty.

Materials and methods: 40 patients (41 shoulders) with subacromial impingement resistant to conservative treatment were included and evaluated according to UCLA score. Patients with suture demanding rotator cuff tears were not included. 24 women and 16 men (17 shoulders) participated. Median age: 54 (25–69) years. Symptoms preoperatively: 0.5–15 years. Median follow-up postoperatively: 40 (6-142) months.

Results: Excellent or good in 68% of the cases, fair in 12% and poor in 20%. 80% were satisfied with the overall result, 20% were not. 93% reached an excellent or good result if the symptoms had lasted > 3 years, 56% with symptoms < 3 years, p =0.03. Poorer result for women, and for the oldest age group (60–69). The difference was not significant. No difference in the total result in relation to the length of the follow-up period.

Conclusion: The clinical results after open decompression are satisfactory, both by means of functional results, and the patients' own opinion. Few complications were seen. The importance of a careful selection of the patient material must be stressed.

Diagnostic findings in posttraumatic chronic painful shoulder

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The study was done in order to evaluate patients with chronic posttraumatic shoulder pain after a nondislocated (NL) shoulder-trauma. We examined 22 consecutive patients with chronic shoulder pain for more than 6 months after a single NL shoulder-trauma (distorsion 12 and contusion 10). Suspected degenerative shoulder lesion implied exclusion. Mean age was 33 (17–55) years, 20 males and 2 females. Pain, the feeling of unstable shoulder during over-the-head activities and symptoms of dead arm syndrome were also present. The shoulders were tested for instability, signs of impingement, ROM and apprehension. Evaluation was performed by standard and special radiographs, ultrasonography, 3d MRI and arthroscopy, the latter was standard of reference for comparison.

Clinically all had decreased ROM, 16 had a positive apprehension test and 4 had unidirectional unstable shoulders. 5 had signs of impingement. All standard radiographs were normal. Special radiographs identified 3 osseous Bankart (OB) and one tuberculum major (TM) lesion. Ultrasonography showed 3 partial (PRC) and 2 total rotator cuff (TC) lesions. 3d MRI revealed 13 labral tears (11 non-osseous (NOB) and 2 OB lesions), 3 PRC and 2 TRC lesions and one TM lesion. Arthroscopic findings consisted of 16 labral tears (3 OB and 13 NOB lesions) 4 PRC and 2 TRC lesions.

The results indicate a high incidence of intraarticular lesions in patients suffering from chronic pain after an NL-trauma and further evaluation of this group of patients seems recommendable.

Total shoulder arthroplasty in rheumatoid arthritis

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Purpose: To evaluate long-term results in patients with severe RA who received total shoulder replacements.

Material: 83 shoulder replacements in 64 patients. 45 unilateral and 19 bilateral. Mean age 57 (31–78) years. Follow-up mean 5 years.

Results: 84% had no/slight pain at follow-up. Significant improvement in range of motion was achieved. Function increased from 12 pre-op to 27 post-op (max 40 points). No improvement in strength was observed. 4 glenoid prostheses were found loose, 2 revised. Significant radiolucency was found in 13 of the humerus prostheses and in 20 of the glenoid. None of the prostheses was found to be loose. In 38% proximal migration of the humerus was observed.

Conclusion: Total shoulder replacements in patients with rheumatoid arthritis gives significant pain relief, increased motion, improved function and a low revision rate.

Immobilisation of Colles' fractures Older type 1 and 2

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Introduction: In order to reduce the time of immobilisation, patients with Colles' fractures Older type 1 and type 2 with no need for reduction, i e dorsal angulation less than 10°, were treated for either 3 or 5 weeks with a dorsal plaster cast. The anatomic results were evaluated after 3 months.

Material and method: Patients beyond the age of 18, presenting at the casualty ward, with a Colles' fracture, Older type 1 and type 2, were allocated to either 3 or 5 weeks in a dorsal plaster cast. From radiographs taken on day 1, 10 and 90 the change in axial radial length, radial and dorsal angulation was obtained.

Results:

Table. Change in axial radial length (ΔARL), radial angle (ΔRA) and dorsal angle (ΔDA) after 3 months.

Time in cast	3 weeks	5 weeks
Cases	19	13
Age (years)	59 (29–78)	62 (40–79)
Female:male	16:3	11:2
Older type 1	13	11
Older type 2	6	2
ΔARL (mm)	1.5 (0–7)	1.1 (0–5)
ΔRA	1.9° (0–8)	2.2° (0–10)
ΔDA	2.9° (0–15)	4.0° (0–11)

Conclusion: There is no significant difference (*t*-test) between the 2 groups concerning age, sex ratio or the end anatomic results, so we recommend maximum 3 weeks in a dorsal plaster cast for Colles' fractures Older type 1 and non-reduced Older type 2.