Norwegian Orthopedic Society

Oslo, October 21–26, 1996, Tønsberg, May 29 – June 1, and Oslo, October 20–25, 1997

Editor: Lars Nordsletten
Orthopaedic Department
Ullevål University Hospital
N-0407 OSLO, Norway

Fixation of Exeter total hip prosthesis with Boneloc bone cement—a 5-years follow-up study

Per Siewers, Arno Wutzl, Elling Alvik and Pål Borgen

Martina Hansens Hospital, Bærum, Norway

The Exeter total hip prosthesis fixated with Simplex bone cement has been used at Martina Hansens Hospital since 1983. In 1991 the newly introduced Boneloc cement was used to fixate the femoral stem of 21 Exeter prosthesis whereas the acetabular component was fixated with Simplex bone cement. We discontinued the use of Boneloc after the 21 first operations due to dissatisfaction with the cement quality. The aim of this study was to report the 5 year follow-up results after alarming reports of early loosening of prosthesis fixated with Boneloc cement.

Material methods: The 21 patients had a mean age of 70 (60–83) years. Fourteen were females and 7 males. The number of operating surgeons was 5. Thirteen patients were followed-up after 5 years with a clinical and radiographical examination. Five of these had bilateral hip prosthesis with Boneloc cement in one femur and Simplex cement in the other. Three patients were dead at follow-up. Five did not show up for the follow-up examination, but 4 of them could be contacted by phone.

Result: None of the patients were reoperated after 5 years. Eight of the 13 patients who were followed up clinically and radiographically were pain free with a Harris hip pain score of 44. Three had a pain score of 40 and 2 of 30. The 4 patients contacted by phone were pain free. The mean subsidence of the femoral stem was 6 mm. By comparing subsidence in the bilateral operated group the mean subsidence on the Boneloc side was 4 mm and on the Simplex side 1 mm ($P < 0.05$). All these 5 patients were pain free. Twelve femoral stems fixated with Boneloc subsided within the cement mantle, whereas one with a cement fracture subsided 21 mm both within and with the cement mantle. This femoral stem has been revised later. Osteolysis occurred in 2 hips (Gruen zone 2–3-medially). There was no significant correlation between the degree of subsidence and pain score.

Conclusion: The collarless, polished and tapered Exeter stem seems to tolerate fixation with Boneloc cement better than several other prosthesis where alarming results of early loosening have been presented. This may be due to the fact that the Exeter stem allows some subsidence within the cement mantle without destroying it, exerting compressive forces in the mantle and less shear forces. This report agrees with other reports of the Exeter prosthesis fixated with Boneloc cement.

Ileopectineal bursa distension with fixed uncemented prosthesis

Lars Nordsletten and Stein Øvre

Orthopaedic Department, Ullevål University Hospital, Oslo, Norway

Wear of total hip replacements (THR) leading to osteolysis is well described [1], while high fluid production with communication to the ileopectineal bursa is a rarely reported complication [2]. Patients presenting with distal or local phenomena due to distension of the ileopectineal bursa with fixed uncemented prosthesis is presented.

Material: Six patients (one man) operated with uncemented THR (age 42–62 years) were referred for local swelling and pain in the affected hip (n=1) or swelling of the lower leg (n=5). Before being referred they had undergone phlebography (n=5), ultrasound/Doppler (n=5), cytology (n=6), CT (n=5) and scintigraphy (n=2).

Results: On referral all patients had fixed uncemented prosthesis (Biomet European/Jensen Cup, Taperlock femur [n=5], Harris Galante cup/stem [n=1]) with excessive wear of the liner and additional osteolysis. Time from primary operation to referral were median 6.3 (4–10) years. The cysts were aspirated for 30–50 mL fluid with symptom relief prior to revision, some patients needed repeated aspiration. The patients have been reoperated after median 6 (2.9–34) months from symptom debut. At the time of revision three were painfree in the hip. In three patients the whole prosthe-

sis was revised, in one the femoral stem and the liner were exchanged, and in two only the cup and modular head were exchanged. All symptoms connected to the distended bursa have been relieved, and ultrasound have not identified it after revision. Cytology have shown macrophages with prosthetic particles of the same type as found in the joint during revision.

Discussion: In 14% of normal hip joints there is a communication to the ileopectineal bursa [4]. Wear and particle production may lead to high fluid pressure [3] and with a one way valve mechanism the bursa will be distended and painful, and may externally compress the femoral vein. These patients should be revised promptly as repeat aspiration is necessary if they have to wait, as in all of our patients.

References

1. Nordsletten L, et al. Acta Orthop Scand 1996; 67 (Suppl 270): 3-4.
2. Goyal S, et al. Acta Orthop Scand 1997; 68, 67-9.
3. Robertson O, et al. Acta Orthop Scand 1997; 68: 231-4.
4. Chandler S B. Anat Rec 1934; 50: 235.

Good 3 year results with cemented impaction grafting in femoral revision with poor bone stock

G Flugsrud, J Benterud, S Øvre, B Grøgaard, L Nordsletten

Orthopedic Dept., Ullevål University Hospital, Oslo, Norway

Revision hip arthroplasty (cemented or cementless) whith extensive loss of bone in the proximal femur has shown poor outcome. Short term results with impaction bone grafting are encouraging [1, 2]. We report 3 year results for ten patients with Endoklinik grade III bone loss.

Patients and methods: Ten patients (5 men) were revised at median age 74 (64–81) years. Time from previous operation was 3 (1.2–19.7) years. Three patients had undergone previous revisions. Diagnosis at primary arthroplasty was osteoarthrosis (n=9) and CLP. Diagnosis at revision was loosening with Boneloc cement (n=5), loosening with good cement (n=4) and painful osteolysis (n=1). Impaction grafting was done with CPT (n=8) and Exeter (n=2) femoral stems, and median 2 (1–6) caput were used. In 6 patients cementless acetabular revision was performed (Harris Galante II), in 3 cemented impaction grafting (Ogee or Exeter). In one patient the liner of a PCA cup was replaced. All patients were reviewed by surgeons other than the operating one. Results are given as median and range.

Results: One patient died with a well functioning hip after 3 years. Follow-up was 3 (2.0–3.3) years. No patient has been reoperated. All patients had pre-revision bone loss Endoklinik grade III. Charnley category at follow-up: A: 3, B: 2, C:4. Harris' hip-score was pre-operative 53 (31–65), at follow-up 80 (68–91) ($p<0.05$). Painscore at follow-up was 44 (20–44). In all patients subsidence was estimated to 5 mm or less. Trabecular remodelling was evident in 5, cortical repair in 7 patients.

Discussion: At revision all patients had extensive loss of bone in the proximal femur and would have faced a questionable prognosis had they undergone traditional revision arthroplasty. Our short term results are promising, most patients have insignificant pain and there are as yet no signs of implant failure.

References

1. Gie G A, et al. J Bone Joint Surg [Br] 1993;75, 14-21.
2. Nelissen R G H H, et al. J Bone Joint Surg [Am] 1995; 77A: 412-22.

Reliability of hip range of motion by goniometric measurements and visual estimates in patients with osteoarthritis.

I Holm, B Bolstad, A Ervik, M Fosdal, S Gjøs Hansen, E Korsell, Å Lier, T Lütken, M Røkkum, H Steen

National Hospital Orthopaedic Department, University of Oslo, Norway

Assessment of passive range of motion plays an important role in the examination of hip joint function. Range of motion measurements are usually performed by two physiotherapists as a part of the pre and post operative hip arthroplasty evaluation. Because these measurements are taken on the same patients several times over years and often taken by different therapists, both intratester and intertester reliability are essential if the measurements are to be meaningful and useful in the process of determining if a significant change has occurred.

Materials: 25 patients with osteoarthritis verified both clinically and radiologically participated in the study. There were 6 men and 19 women with a mean age of 68.5 (±6.8) years. The measurements were taken by four different testers on the same day and repeated one week later. The movement patterns measured were flexion/extension, abduction/ adduction, internal/external rotation.

Results: There were no significant differences for flexion, extension and adduction between the measurements recorded the first and the second day for the same tester. There were, however, significant differences for abduction, internal and external rotation. Significant differences were also found between the testers. The coefficient of variance was 5.5% for flexion (lowest) and 26.1% for extension (highest).

Conclusion: The reliability was highest for flexion. According to Bryant et al. (1993) this is the most essential movement pattern for evaluation of hip function.

Reference: Bryant M J, Kernohan W G, Nixon J R, Mollan R A B. A statistical analysis of hip scores. J Bone Joint Surg [Br] 1993; 75-B(5): 705-9.

Scoliosis in cerebral palsy treated with spinal bracing

Terje Terjesen, Johan Emil Lange and Harald Steen

Dept. of Orthopedics, The National Hospital, Oslo, Norway

The purpose of the present study was to evaluate the results of non-operative treatment in patients with quadriplegic cerebral palsy (CP) and to assess the factors that might possibly influence the progression of the curves.

Patients and methods: 95 patients with quadriplegic CP were studied. There were 60 females and 35 males with a mean age of 13.6 (2–33) years. They were treated with a custom-moulded, polypropylene thoraco-lumbar-sacral orthosis. The Cobb angles were measured on radiographs taken in the sitting position before treatment, in orthosis, and during follow-up. The pelvic obliquity (PO) was measured on the radiographs.

Results: The mean initial Cobb angle was 66° (20°–131°). Most curves were thoracolumbar or lumbar and PO above 10° was present in 54 cases. The severity of the scoliosis correlated with age and PO. The mean correction in orthosis was 24° (3°–60°). 73 patients with a follow-up period of more than 2 years had a mean scoliosis progression per year of 4° (-5.5°–21°). The progression decreased with increasing Cobb angle and increasing age. 18 patients, one fourth of the patients with >2 years of follow-up, had improvement or no deterioration of the curve. Minor skin irritation was observed in a few patients; these problems usually resolved by adjustments of the brace.

Conclusion: The initial degree of scoliosis was usually high, implying delayed diagnosis and treatment in the majority of the patients. Although the initial correction in orthosis was satisfactory, the curves usually progressed markedly despite the treatment. The main benefit of the brace was to improve sitting balance. Thus, spinal bracing is an appropriate treatment option in quadriplegic patients with severe curves when there are contraindications to operative treatment.

The effect of ultrasonographic hip joint screening in newborns—a prospective randomized study

Ketil J Holen, Agnar Tegnander, Terje Terjesen and Sturla H Eik-Nes

Dept. of Orthopedics, Trondheim University Hospital, Trondheim, Norway

The aim of the present study was to evaluate whether ultrasound screening of the hip joints in all newborns should be recommended.

Patients and methods: During the 5-year-period 1988–1992, a prospective, randomized study on hip joint screening including 15,529 newborns was carried through. The newborns were randomized to either clinical examination by experienced pediatricians (Group 1) or ultrasound examination in addition (Group 2). The effectiveness of the screening was measured as the number of late-detected cases of hip dysplasia or dislocation (HD) in the 2 groups.

Results: During a follow-up period of 4-9 years, only one case of late-detected HD has been diagnosed in Group 2 as compared with 5 cases in Group 1, representing a rate of 0.14 and 0.67 per 1000 children, respectively. The difference between the 2 groups was not statistically significant. One of the patients in Group 1 had dislocation, whereas the other patients in both groups had slight subluxation or acetabular dysplasia only.

Conclusion: When the clinical hip joint screening is of high quality, the effect of additional ultrasound screening is marginal. Therefore, general ultrasound screening is not necessary. We recommend, however, selective ultrasound screening including neonates with abnormal or suspicious clinical findings and those with risk factors for HD.

The national study of Perthes disease—preliminary results

Terje Terjesen[1], Svein Svenningsen[2] and Harald Steen[1]

Depts. of Orthopedic Surgery, [1]The National Hospital, Oslo and [2]Aust-Agder Central Hospital, Arendal, Norway

A national study on Perthes disease was started in January 1996. The aim of this report was to present some preliminary results from the first year of this study.

Patients and methods: All hospitals working with children's orthopedics in Norway take part in the study and all new cases of Perthes disease are included. Epidemiological, clinical, and radiographic data are registered. The treatment depends on the age of the patient, the Catterall group, and the radiographic femoral head coverage. There are 3 alternative methods of treatment: physical therapy, abduction orthosis, and varus femoral osteotomy. The orthopedic surgeons at each hospital have independently chosen which treatment group they will belong to.

Results: 72 patients, 56 boys and 16 girls, have been reported so far. Their mean age was 5.5 (2-13) years. The patients had had symptoms for a mean period of 4,5 (0,5-22) months before diagnosis. A limping gait was observed in 97% of the patients. The disease was on the right side in 44% and on the left in 49%, whereas 7% had bilateral affection. In patients with unilateral disease, the range of motion was most pronouncedly reduced for internal rotation and abduction. The extent of femoral head necrosis was Catterall group I/II in 19 patients and III/IV in 47. The treatment has been physical therapy in 48 cases, abduction orthosis in 9, and femoral osteotomy in 7 cases, whereas no treatment was considered necessary in 5 patients and information on treatment was unclear in 3 cases.

Discussion: The results could indicate that Perthes disease is more frequent in Norway than has been reported from other areas, but the data are preliminary and must be taken with caution. The method of treatment will probably be changed in some patients, due to decreasing femoral head coverage during the course of the disease.

Acute symphyseal rupture during childbirth.

Anders Mølster, Johannes Brattebø

Dpt. for Orthopaedic Surgery, Haukeland Hospital and Surgical dept., Fylkessjukehuset på Voss, Norway.

A 35-year-old woman gave birth to her first child in December 1995. During partus a crack from the symphyseal region was heard, and the patient complained afterwards of pain here and in the left ileosacral region. She needed a wheel chair until the operations. Radiography in February 1996 revealad a 3 cm diasthasis in the symphysis pubis, and a 1 cm difference in vertical position between the pubic bones with alternating weight bearing on the respective lower extremities. There was a substantial osteoporosis. Clinical examination showed pain in the left ileosacrar region by very ligh stability testing and muscle activity. She was operated in May 1995 with a symphysiodesis after resection of the upper part of the symphyseal joint and transplantation of a corticospongious bone block from the left iliac crest. The fixation was performed by a 7 hole 4.5 mm reconstruction plate, giving a satisfactory hold in the osteoporitic bone. The postoperative course was uncomplicated, but protracted. At 11 months, she walks without support, and her Trendelenburgs limp har disappeared. She has pain in the left natis for a short period morning av evening. The transplant shows radiographic healing into the pubic bones giving a bony symphysiodesis. Acute rupture of the symphysis pubis is rare, but has been described several times. They may be treated conservatively, but operative treated may be indicated if primay union is not obtained.

The piriformis syndrome

Kari Indrekvam, Einar Sudmann

Hagavik Orthopaedic Hospital, University of Bergen, Norway

The piriformis syndrome may present with a symptom complex of buttock, throchanteric, and posterior thigh pain.

Patients and methods: Nineteen patients were operated on from 1981 to 1997. There were 14 women and 5 men. The mean age at operation was 43 (24–64) years. All patients complained of deep buttock and posterior thigh pain. Fifteen patients also complained of reduced skin sensation and weakness in the leg. In 9 patients a trauma apparently initiated the pain. The preoperative disability was 6 (1–30) years. Fourteen patients were unfit for work.On clinical examination all patients had a tender buttock, worsened by passive stretching and active contraction of the piriformis muscle. Reduced skin sensation for pinprick was noticed in 10 patients and reduced muscle strength in 3. Other pathological conditions, like herniated nucleus pulposus, posterior facet syndromes and central spinal stenosis, which also can present with a symptom complex of buttock, throchanteric, and posterior thigh pain, were ruled out by additional radiological examination. All patients were operated on with tenotomy of the piriformis muscle near its insertion. Per operatively anatomical anomalies were noticed in four and adhesions in three cases.

Results: At follow up, 1 patient proved to have myelomatosis. Ten patients were relieved from pain, 8 were not. When a trauma was the initiation cause of pain 6 of 9 were relived from pain, while in patients with no previous trauma 4 of 9 were relieved from pain. Thirteen patient felt that the tenotomy was good for them. Four patients had changed occupation due to persistent pain.

Conclusion: The piriformis syndrome is a diagnosis of exclusion. Some patients had a very good and lasting effect of tenotomy of the piriformis muscle.

Transfer of tibialis posterior tendon for drop-foot

Leiv M Hove and Per T Nilsen

Department of Orthopaedics, Haukeland University Hospital, Bergen, Norway.

Transfer of the tibialis posterior tendon may be indicated for drop-foot from peroneal nerve palsy. From 1991 to 1996 we have performed 19 transmembraneous transfers, fixed by the new tendon-to-tendon technique.

Patients and methods: Through a medial incision, the tendon was divided at its insertion to the navicular. A second incision was made parallel and lateral to the lower third of the tibial crest, and a long incision was made through the interosseous membrane. A third incision was made at the dorsum of the foot, and using a tendon tunneller the tendon was passed under the extensor retinaculum. The tendon was then split longitudinally into two tails, the medial tail was inserted into the tendon of extensor hallucis longus and the lateral into the extensor longus and peroneus tertius. 16 patients (3 bilateral), 14 men, were operated, median age 22 (12–59) years. All patients had had drop-foot for more than one year. Eight had posttraumatic drop-foot, 5 had Charcot-Marie-Tooth, two had benign tumours, and one had leprosy. Two patients had <20° passive dorsal flexion and elongation of the Achilles tendon was performed at the same time. All the patients met for a follow-up 2 years (8-60 months) after the operations.

Results: All the patients had improved their walking function and could walk without the drop-foot splint. All the patients had active dorsal-flexion of the foot and the toes. Median (range) active dorsal flexion was 5° (-10° to +15°). The total active flexion/extension in the ankle joint was 35° (20° to 45°).

Conclusion: Transfer of the tibialis posterior tendon is an effective treatment for peroneal nerve palsy. Pre- and postoperative physiotherapy is important for an optimal result. The transmembraneous rout gives better cosmetic results. The tendon-to-tendon technique gives active dorsal flexion of the toes as well, and better active dorsal flexion than the earlier method with fixation of the transfer into an osseous tunnel.

Operative treatment of Morton's neuroma

Grete Sofie Hortemo, Vilhjalmur Finsen

Dept. of Orthopaedic Surgery, Trondheim University Hospital, Norway

During a period of 19 months 37 patients were operated for Morton's neuroma in our department. The interdigital nerve was resected through a dorsal incision. The aim of this study was to compare our results with those reported after decompression by division of the intermetatarsal ligament.

Patients and methods: One patient died in the observation period. All the other 36 patients with 40 operated feet answered a questionnaire. They were asked to mark their pain on a visual analogue scale (VAS: 0 = no pain; 100 = worst possible pain).

Results: 40 feet were operated, 33 were female. The mean age was 45 years at the time of operation. The average observation time was 16 months. 28 lesions were located in the third intermetatarsal space, 14 in the second, and 2 in the fourth. Two intermetatarsal spaces were affected in 4 cases. 25 nerves were histologically verified as Morton's neuroma and one as a traumatic neuroma. In four no pathology was found. 10 nerves were not histologically examined. The average pain before operation was VAS 82 (range 35–100), and the average VAS score for pain at review was 9 (0–65). 29 (73%) said that the pain had disappeared (VAS 0). 10 had reduced pain. 5 of these had a pain-free period early postoperatively and may have developed a postoperative neuroma. One patient had unchanged pain. Histological examination of the resected tissue did not show nerve. All except this patient would have consented to operation if they had known the outcome in advance.

Conclusion: In our study 73% had no pain at review. This is comparable to the reported results after decompression.

Mitchell's osteotomy for hallux valgus

Christian Øye, Vilhjalmur Finsen

Departement of Orthopedic Surgery, Trondheim University Hospital, Norway

Patients and methods: Of 50 patients operated for hallux valgus 45 were operated with Mitchell's osteotomy. These patients were included in a prospective study for evaluation of the results of the operation.

The level of pain was visiualized preoperatively by use of Visual Analog Scale (VAS), 0 indicated the best result, 100 indicated the worst. The localization of the pain was marked on a drawing of the foot.

Results: Preoperatively 43 patients complained of pain, of whom all but one had pain localized over the medial prominence. Infection of the wound was found postoperatively in one patient. This was sucessfully treated by antibiotics. One patient was admitted to hospital 3 weeks later with a pulmonary embolus. At the one year follow-up 44 patients were reviewed. Of these, 32 reported a painfree foot. The mean VAS-score had decreased from 35 to 8. Pain over the medial prominence was still a complaint in 10 patients. Four patients had developed metatarsalgia after surgery. Although not reported as a problem, reduced sensibility dorsomedially of the hallux were found in 19 patients. The radiograps showed a mean improvement in the hallux valgus angle of 8 degrees. The first intermetatarsal angle was unchanged. The mean shortening of the first metatarsal was 6 (1 - 12) mm. This shortening showed no correlation with pain. Signs of osteoarthrotic changes in the MTP joint were found in on patient. These were not present preoperatively. Early signs of osteonecrosis of the first metatarsal head occurred in two feet. There were no non-unions.

41 patients stated that they would have undertaken the operation if they had known the result in advance.

Conclusion: We conclude that this method gives a good result and can be recommended when pain over the medial prominence is the main indication. Sensory reduction over the dorsum of the great toe and metatarsalgia are often found. More serious complicatons such as pulmonary emboli and osteonecrosis do also occur.

Tourniquets in forefoot surgery—less pain when placed at the ankle

Vilhjalmur Finsen and Ann-Mari Kasseth

Dept. of Orthopaedic Surgery, Trondheim University Hospital, Norway.

We compared perioperative pain and postoperative neurological sequele after hallux valgus surgery with the pneumatic tourniquet placed on the middle of the leg or just above the ankle.

Patients and methods: 50 consecutive patients scheduled for surgery in ankle block were randomized prospectively to one of the two tourniquets placements. One patient was withdrawn after randomisation. Patients marked areas of pain, paraesthesia and numbness on a drawing of the foot preoperatively and 6 and 10 weeks after operation. The cuffs were inflated to 100 mmHg above systolic blood-pressure.

Results: Both placements of the tourniquet gave an excellent bloodless field. Mean patient discomfort with proximal placement was significantly higher ($p<0.01$) at 10, 20 and 30 minutes of the operation. There was no increase in new areas of numbness and paraesthesia at 6 and 10 weeks after distal cuff placement.

Conclusion: Placement of the tourniquet cuff at the ankle gives less patient discomfort an no increased incidence of nerve injury.

Subtalar/triple arthrodesis after fracture of the calcaneus

Jarand Hindenes and Anders Mølster

University of Bergen, Department of Orthopaedics, Haukeland Hospital, Bergen, Norway.

Even with modern treatment, the end results after fractures of calcaneus are not always satisfactory. In the litterature, one often finds that some patients 'had to have arthrodesis', without further comments. This study was undertaken to assess the results after artrodesis performed after primary unsuccessful treatment of fractures of the calcaneus.

Material and methods: In 1978–1991, 19 patients were operated. 8 men and 3 women aged 22–65 (median 43) years, appeared for follow up. Time from primary injury to fusion was median 18 months (7 months to 11 years), and from fusion to follow up median 7.5 (4–15) years. 6 patients received reduction and internal fixation of the primary fracture, 2 had reducion and fixation with pins and plaster a.m. Essex Lopresti, 1 had plaster cast for 6 weeks, 1 had primary mobilization and 1 was treated nonoperatively without any further information. 5 had subtalar and 6 had triple arthrodesis. The review consised of radiographic examination, clinical assessment and evaluation of a funcional score based on pain, mobility, use of support and ability to work.

Results: All patients had bony fusion. For the group as a whole, we found a significant improvement in the funcional ability ($p< 0.02$). 8 patients had pain improvement, while 3 had increased pain. 5 of the 6 patients treated with triple arthrodesis had impaired sensibility below the incision. Besides that our small material did not reveal any statistically significant difference between the two groups.

Conclusion: Fusion in patients with pain and impaired function after fracture of the calcaneus gives satisfactory results in about two thirds of the cases. Our material is small, but gives no indication that the somewhat more extensive triple arthrodesis is necessary in cases without arthrosis in Choparts joint.

AO tension-band osteosynthesis of dislocated fractures of the olecranon.

Vilhjalmur Finsen, Per Snorre Lingaas, Sturla Storrø

Dept. of Orthopaedic Surgery, Trondheim University Hospital, Norway

31 patients operated with AO tension band osteosynthesis of isolated displaced olecranon fractures were reviewed after a median of 76 months. 13 fractures were comminuted. The postoperative immobilisation was short and the median hospital stay was 3 days. In two cases the stainless steel wire broke and had to be replaced and in 13 patients the osteosynthesis material had to be removed after healing because of pain at the tip of the elbow. This did not influence the final result. The median time away from work was 12 weeks. There was no significant loss of elbow power at review, and satisfactory mobility, function, and absence of pain. There were 29 good clinical results and 2 fair results. Anatomical reduction was achieved in 24 elbows. Possible arthrosis was detected at follow up in 5 elbows, but all of these patients had a good clinical result. We conclude that this method leads to few serious complications and good clinical medium term results.

Presentation of a new dynamic external fixator for distal radius fractures

Per Helland, Leiv M Hove, Anders Mølster

Department of Orthopaedics, Haukeland University Hospital, Bergen, Norway

We have developed a new, dynamic, external fixator for distal radius fractures. The fixator and the results from the first study will be presented.

Material and methods: The rationale for the design of the device was to construct a flexible distractor through which dynamic traction is applied to the fracture. The dynamic traction is maintained during flexion and extension as well as radial and ulnar deviation. This was achieved by a combination of distraction and compression forces where a distraction spring near the bone acts as a fulcrum. In order to develop the design, a preliminary flexible fixator was constructed and applied to anatomical specimens. Based on these experiences a first device was constructed and operations on 18 volunteers with unstable fractures were performed. Several modifications of the prototype were made during this preliminary series. The modified prototype of the new device was now used for a first study: 30 fractures in 30 patients were included in this prospective series. The median (range) age of these patients were 60 (33–78) years, 23 patients were female, 9 fractures were classified (AO/ASIF) as type A3, 1 type C1, 15 type C2, and 5 type C3. The device was left open to allow full range of motion of the wrist from the first day. The device was removed after median 6 (3–9) weeks.

Results: At final follow-up the median radial shortening was 0 (0–5) mm, the volar angulation 7o, and the radial inclination 24° (16°–30°). 24 patients had no radial shortening during the flexible fixation period, 4 had <3 mm, 20 patients had unchanged and 8 had improved the radial tilt. At removal of the fixator the flexion/extension was 54°, at 12 weeks 88°, and at 6 months 104°. Supination/pronation at 6 weeks was 113°, at 12 weeks 166°, and at 6 months 176°. Four patients had complications: 2 had temporary dystrophy, 1 man (150kg) lost 5 mm radial length, probably because of too week distraction forces, and one lost 4 mm because too early (3 weeks) removal of the fixator.

Conclusion: This new dynamic fixator shows promising results. An ongoing randomised study must be fulfilled before the fixator is ready for general use.

MRI as preoperative investigation of lumbar herniated nucleus

Øyvin Hasting, Tor Erik Gudmundsen, Tom Pedersen, Harald Østensen

Dept. of Orthopedics and dept. of Radiology, Buskerud Central Hospital, Drammen, Norway

MRI has in our hospital mostly replaced CT and myelography as routine imaging for suspected lumbar herniated disc. The aim of this study was to see if this is acceptable.

Materials and methods: The findings at operation for herniated disc at BCH in the years 1994 and 1995 were matched with the preoperative radiological findings on MRI, CT and myelography in 120 patients.

Results: 102 patients had done MRI. We found one false negative MRI. CT was done in 12 patients, with one false negative. Myelography was done in 42 patients with 7 false negative. 20 patients with 22 discs were shown to have herniations on MRI but turned out to be negative at operation. MRI had in these shown 5 large herniations, 10 medium or unspecified herniations and 7 correctly diagnosed as small, probable herniations.

	Sensitivity	Specificity
MRI	99%	84.5%
CT	91%	100%
Myelography	83%	88%

The clinical results at 6 weeks postoperatively were good in 75% of the patients. In the patients with negative findings at operation still 60% had a good clinical result. Four in the negative operation-group had the MRI done more than 12 weeks prior to operation.

Conclusion: MRI is extremely sensitive and might show the truth more than the operative findings. It gives the surgeon problems in distinguishing between clinically relevant findings and not. It is important that the surgeon correlate closely to the clinical findings when deciding to operate. There is important that the radiologist gets feedback from the operative findings to enable him to improve his accuracy. MRI is sufficient as a single investigation prior to lumbar herniation surgery. It is a less invasive alternative to CT and Myelography.

Arthroscopical wrist arthrodesis for rheumatoid arthritis

Ø Hagen and P Aaser

Martina Hansens Hospital, Bærum, Norway

Wrist arthrodesis is as well recognized method for pain reduction and stability for patients with severe rheumatoid wrist arthritis. The standard open operative procedure is however encumbered with complications like infection and wound healing problems. Arthroscopical technique is increasingly used for joint operations, and techniques and results after arthroscopically performed ankle arthrodesis have been reported. The aim of this study was to develope a technique for arthroscopically performed wrist arthrodesis.

Material methods: Five female patients with severe rheumatoid wrist arthritis, mean age 60 (44–85) years, have been operated with an arthroscopical modification of Mannerfelts techique for wrist arthrodesis. The hand was suspended in Chinese finger traps and the arthroscope and instruments were introduced through the portals 3-4, 6R, MCR and MCU. After a synovectomy of the wrist joint including the midcarpal joint remaining cartilage was shaved away. Through a small skin incision over the third MCP joint a Rush pin was introduced through the third metacarpal bone, the carpus and into the radius. Correct introduction into the radius was controlled arthroscopically. Thereafter the arthrodesis was compressed manually and stabilized against rotation with a Kirschner pin from the distal radius to the carpus.

Results: The arthrodesis was clinically and radiographically healed in the 5 patients after mean 4 months. One patient developed transient reduced sensibility of the pulp of the 4th finger. No other complications were recorded and all patients are satisfied with the operation.

Conclusion: Wrist arthrodesis may be performed with arthroscopical technique in patients with rheumatoid arthritis with good results. This method has not been described previously in the literature and seems to have several advantages compared to the open procedure.

Resection of the clavicle—a case study

Anne Ervik, Inger Holm, Per Ludvigsen, Olav Reikerås

University of Oslo, National Hospital, Orthophaedic Centre

Resection of the clavicle has been described for primary and metastatic tumors of the clavicle, for neurovascular compression in the thoracic outlet, and for cervicothoracic arterial injuries. Resection of the clavicle is well tolerated, there is small limitations in shoulder movement, and the function in the upper extremity is essentially normal.

Material and methods: We present a 52-year-old man, who in 1991 had a fracture in the clavicle, treated with a open reposition and osteosynthesis. Half a year later he got an infection, developing to osteomyelitis. He was treated with antibiotics for a long period. The clavicle was resected May,1995. Postoperatively he used a collarncuff'and performed exercises beneath pain level. He was on sick leave for 8 weeks, and from then he has worked full time as an electrician.

Result: 1 year postoperatively, the patient had no problems with ADL and work below shoulder level. He had problems with work above shoulder level, and had work-related pain. The range of motion (ROM) of the shoulder girdle was approximately normal. Muscle performance, tested on a Cybex 6000, was reduced for external rotation, flexion and extension.

Conclusions: ROM was appoximately normal. There was normal function below shoulder level. Work above shoulder level was difficult. Muscle performance especially in flexion and rotation was reduced. He had work-related pain.

Organization of out-patient surgery

A Ekeland, T Eide and E Spjøtvold

Martina Hansens Hospital and Bærum Hospital, Bærum, Norway

Long waiting time for surgery is an increasing problem at Norwegian Hospitals. Many of the patients can be operated upon on an out-patient basis requiring less hospital resources. The purpose of this study was to evaluate how this could be most effectively organized as a project.

Material methods: 10 patients were scheduled for out-patiens surgery each Saturday during the fall 1996 and the winter 1997, altogether 168 patients operated on 17 Saturdays. The patient suffered meniscal ruptures, hallux valgus, the carpal tunnel-syndrome and similar less demanding conditions. About half the patients had a preoperative evaluation at our open ward clinic whereas the others were called directly in for operation based on accurate remittances from primary care physicians.

Result: A total of 161 (96%) of the remitted patients were operated upon, whereas 8 (5%) did not show up or was not operated due to a week indication for surgery. Of the 86 patients having been examined by primary care physicians alone before surgery 5 (6%) were not operated whereas 3 (4%) of the 82 patients who had been preoperatively evaluated at our out-patien clinic in addition were not operated. This difference was not significant and the patients who were called directly in for operations saved 4-5 months in waiting time. The surgeries undertaken were knee arthroscopies with meniscal resections (39%), arthroscopies of other joints (3%), operations for carpal tunnel syndrome (14%), other hand and elbow operations (15%), hallux valgus (10%), other operations of the foot (16%) and other minor operations (3%). 40% of the surgeries were undertaken in spinal/epidural anesthesi, 21% in ankle block and 20% in local anesthesia. Only 3% of the patients required narcosis. The mean operation time was 20 minutes, and the time between each operation was also 20 minutes.

Conclusion: About half the patients or more remitted for out-patient surgery may be taken directly in for surgery based on accurate evaluation by primary care physicians. This shortens the waiting time for surgery by several months.

Intramedullary locked nailing with 2 mm diastasis in rat femura

Roel Bierling, Kari Indrekvam, Oliver Grundnes, Anders Mølster

Department of Orthopedics, Institute for surgical research, Haukeland University Hospital, Bergen Norway

The aim of this study was to create an experimental model for a diaphyseal pseudarthrosis, if possible both a hypertrophic and an atrophic version.

Material and methods: 24 male Wistar rats weighing 340 g (330–360) underwent an osteotomy in the left femur.Two mm bone was removed, and the medullary canal was reamed to 1,8mm. A 30-mm nail with a 1.8-mm diameter was introduced and locked proximally and distally. A spacer in the osteotomy site was used temporarily to maintain 2 mm diastasis. The rats were randomised into 2 groups , one received steel nails, the other polyacetal nails. Radiograps in lateral and a-p-projections were taken postoperatively and after 4 and 8 weeks. At 8 weeks postoperatively, blod flow and metabolism in the two femora were measured, and the animal was sacrificed. Histologic preparations were made from the pseudartrotic area. Bloodflow was measured with Ce 141 labeled microsheres (diameter 15um) wich were injected in the left carotid, and metabolism was measured with Sr 85 injected 48 hours before the animal was sacrificed.

Results:

	Atrofic pseud.	Hypertrofic pseudarthr.	Union	Technical failure	Sum
Steel	6	2	1	3	12
Polyacetal	1	3	4	4	12
Sum	7	5	5	7	24

Technical failure was due to loosening of the proximal interlocking screw or a fracture of the femoral neck, resulting in collaps of the diastasis or rotational instability. Blood flow was significantly higher in hypertrophic callus, compared with the atrofic callus, ($p< 0.005$), and in the operated femur compared with the unoperated contralateral femur. Metabolism was slightly elevated in femora with hypertrofic callus compared with atrofic, but the difference was not statistically significant.

Conclusion: The model provide possibilities for studies of atrophic and hypertrophic pseudartrosis. However, the proximal interlocking technic needs to be improved.

The effect of hyperbaric oxygen on atrophic pseudarthrosis in rats

Roel Bierling, Anders Mølster, Kari Indrekvam, Oliver Grundnes

Orthopaedic Department, Haukeland sykehus, University of Bergen, Norway

Hyperbaric oxygen (HBO) treatment of fractures in rats has been found to augment fracture healing (Coulson et al. 1966, Persson et al. 1967). Adjuvant HBO to surgical treatment of human pseudarthrosis has been reported to be promising

(Grundnes et al. 1995). This study was designed to test the hypothesis that HBO can prevent or treat atrophic pseudarthrosis in a rat model.

Material and methods: 36 male Wistar rats weighing 280–300 g were operated with an osteotomy on the left femur. 2 mm of bone was removed, and the diasthasis maintained after fixation. The medullary cavity was reamed to 1.8 mm, and the femur was stabilised with a locked intramedullary steel nail. The rats were randomized into 3 groups of 12 animals: Group 1 Control (no HBO). Group 2 HBO from the fourth post.op. day. Group 3 HBO from the eight post.op week. Hyperbaric oxygen was given under a pressure of 2.4 ATA (absolute atmospheric) , 90 minutes dayly over a 4 weeks period. Radiographs were taken every fourth week and the animals were killed after 16 weeks. Histologic preparations were made.

Results: Group 1 : Atrophic pseudarthosis in 7 rats; 1 animal died ,1 osthesynthesis was infected, 3 fractures healed due to mechanical failure with collaps of the diasthasis. Group 2: Atrophic pseudarthrosis in 11 rats; 1 mechanical failure.

Group 3: Atrophic pseudarthrosis in 8 rats;1 hypertrophic pseudarthrosis,1 animal died; 2 fractures healed due to mechanical failure.

Conclusion: Monotherapy with hyperbaric oxygen does not prevent or cure atrophic pseudarthrosis in rats.

Controlled mobilization after flexor tendon repair in zones I–III—a prospective comparative study of one-finger and four-finger

M Brandt, T Lütken, A Reigstad and J R Haugstvedt

The National Hospital University of Oslo. Orthopaedic Centre, Norway

Rehabilitation following flexor tendon repair, especially in zone II, still remains a difficult and controversial problem. Various versions of the Kleinert technique have been described. May et al. (1) have presented data indicating better results with a programme involving active extension of all four fingers and passive flexion of all four fingers produced by rubber band traction, plus additional passive flexion and nightly IP joint extension. The aim of the present study was to compare a method of traditional modified Kleinert programme with a group receiving the 4-finger Kleinert programme.

Material and method: 72 patients with 90 injured digits were included in the study during the period Jan. 1992 – Sept. 1995. The first 36 patients with 45 injuried digits were treated with the traditional modified Kleinert system (group 1), and the next 36 patients with 45 injuried digits, with the 4-finger Kleinert system (group 2). In both groups a dorsal splint (plaster cast), immobilizing the wrist in approximately 30–40° and the MCP joints in approx. 60–70°, was used for 4 weeks. Tendon injuries in zones I, II and III were included in the study. The results were evaluated by the Buck-Gramcko and Strickland score at 4 weeks, 8 weeks, 4 months and 1 year.

Results: There was a nonsignificant tendency to lower scores for the 4-finger Kleinert group. One ruptures was seen in each group. The results for the three zones differed less than reported previously. The Buck-Gramco score was significant higher than the Strickland score.

Conclusion: In view of the fact that the modified Kleinert procedure is the simpler programme we conclude that it is not necessary with the 4-finger Kleinert programme.

References

1. May E.J et al. Controlled mobilization after flexor tendon repair in zone II. A prospective comparison of three methods. J Hand Surg 1992; 17B: 942-52.
2. Brandt, M. et al. Controlled mobilization after tendon repair in zone I-III: A prospective comparative study of two methodes. Proc. 6th. Congress of IFSSH, 547, Helsinki 1995.

A prospective randomized study on the effect of knee bracing after ACL reconstruction—preliminary results with 1-year follow up

MA Risberg[1], I Holm[2], J Eriksson[3], O Tjomsland[1], A Ekeland[4]

[1]Surgical Clinic, Ullevål hospital, University of Oslo, [2]National Hospital, Orthopaedic Center, [3]National Hospital, Dept. of X-ray, University of Oslo, [4]Martina Hansens Hospital. Norway

The purpose of this study was to assess the clinical effect of knee bracing after anterior cruciate ligament reconstruction.

Materials and methods: 60 patients were prospectively randomized into two groups, one with and one without a knee brace. Data were recorded preoperatively, postoperatively after 6 weeks, 3, 6, 12 and 24 months. The following evaluation methods were used: KT-1000 knee arthrometer (instability), computer tomography (thigh atrophy), Cybex 6000 (muscle strength), Lysholm and Cincinnati scoring systems, IKDC form, visual analogue scale for pain, and three functional knee tests.

Results: Three months after surgery the brace group revealed a significant higher functional outcome recorded by Lysholm and Cincinnati scores, a significant lower pain at rest, and a significant higher thigh atrophy compared to the group without brace. There were no significant differences between the two groups with regard to instability, muscle strength or the functional knee tests.

Conclusion: The brace group disclosed a better functional outcome and lower pain, but a higher thigh atrophy compared to the nonbraced group 3 months after surgery. There were no significant differences between the two groups 6 or 12 months after surgery.

Complications by use of forced diasthasis of the ankle joint for arthroscopy

Anders Mølster and Asbjørn Bøe

Dept. for Orthopaedic Surgery, Haukeland Hospital and Kysthospitalet i Hagavik, Bergen, Norway

In Haukeland Hospital we have used calcaneus traction via extension table in a similar set up as in tibial intramedullary nailing for arthroscopy of the ankle joint. We have had three complications, all were neurological damage after extraordinarily vigorous extension. Two patients had arthrofibrosis after previous (sub)luxation, one patients had osteochondritis in the posterior aspect of the tibial joint surface, all needing extra extension force to allow visualization. In spite of padding the popliteal post with rubber + a silicon cushion and 90 degrees flexion in the knee joint, all cases of neural damage was considered caused by pressure against the popliteal nerve. Two patients had drop foot, one had paralysis of the posterior calf muscles as well. All pareses were transient, but lasted up to 8 weeks. In Kysthospitalet i Hagavik we have used a distraction device with screw attachment in calcaneus and distal tibia. We have had three complications with fracture through the screw hole in tibia. Careful use of traction force may diminish, but not eliminate the danger of nerve compression injury with the present equipment without possibility to monitor the force of traction. A too proximal placement of the tibial screw for the distractor may increase the weakening of the bone and give increase the fracture risk compared with a more distal screw hole. Other methods for ankle joint extension exists, with probably less risks for complications.

Activity related knee pain and injuries in athletic adolescents

K A Bergstrøm, K Brandseth, S Fretheim, K Tvilde, A Ekeland

5700 Voss and Martina Hansens Hospital, 1355 Bærum, Norway

An increasing number of overuse injuries are reported in adolescents engaged in organized sport. The pupils at a Norwegian ski gymnasium were examined for such injuries in 1993.

Materials and methods: Knee data from 45 pupils aged 15–19 years were thoroughly collected and a follow-up study performed one year later. Radiographs were taken when indicated. KT-1000 manual maximum difference (MMD) was recorded for all knees. The anterior tibial laxity was considered pathologic when MMD>3mm. The pupils were divided into competitive and non-competitive. Those who had positive Lachman and pivot shift tests were considered to be at increased risk for a skiing knee injury. Pupils with KT-MMD>3mm were given physiotherapy. Restoration of quadriceps and hamstring strength and flexibility with exercises specific for these muscles was an essential part of management.

Results: A total of 73% of the pupils reported activitiy related pain/injuries to the knee by the time of the first examination, wheras only 33% reported knee pain/injuries before they entered the school. Sixty-one percent had overuse injuries, 27% small disabilities and 12% had indistinct knee pain. The knee was significantly more exposed to pain/injuries in these adolescents than any other body region ($p<0.01$). Females suffered more knee pain/injuries (88%) than males (57%). "Jumpers knee" was found in all competitive pupils with MMD > 3mm and a hard endpoint, whereas this knee laxity was less common among the other competitive pupils ($p<0.05$). In the follow up study one year later a significant reduction in knee pain/injuries to 35% were recorded. Indistinct pain and overuse injuries to the knee were significantly reduced but a similar reduction in small disabilitis were not recorded. Any new knee injury was not recorded in the stage of following-up.

Conclusion: The musculature seems to have an important protective role in the function and stabilization of the knee. Pupils with MMD > 3mm seems to be at increased risk for "jumpers knee". By identifying those at increased risk, preseason recommendations can be made and ski injuries may be prevented.

Injury populations in two different alpine areas in Norway

K A Bergstrøm[1], A Ekeland[2]

[1]5700 Voss and [2]Martina Hansens Hospital, 1355 Bærum, Norway

Different elements of risks to sustain a skiing injury have been examined previously. New information about the condition of the slopes has been achieved revealing injury concentration to relatively few areas of the slopes.

Materials and methods: Systematical registration of all injuries on an alpine area map started in Hafjell alpine area, Lillehammer in 1990/91, and in an other alpine area, Voss, Norway in 1993/94. In Hafjell they also recorded grooming hours by snow-mobile. The ski patrol did the injury registration, with the guidance of doctors connected to both alpine areas.The injury rate and the Injury Severity Score ISS were calculated.

Results: A total of 183 injuries with an injury rate of 1.8 injuries per 1000 skier-days, and a mean ISS of 3.6 per/injury was recorded in the 1991 and 1992 seasons in Hafjell. In Voss 214 injuries with an injury rate of 2.4 injuries per 1000 skier-days, and a mean ISS of 3.0 per injury was recorded in the 1994 and 1995 seasons. An accumulation of injuries or populations on three different sites of the slopes were recorded in Hafjell. This represented 73 injuries or 40% of all injuries in the alpine area, $p<0.05$. Seven accumulations of injuries were recorded on the map of the slopes in Voss. This represented 48 injuries or 22% of the total. Grooming of the slopes was bad for 50% of the injuries occuring on accumulated injury sites and for 36% of all iinjuries in Hafjell, $p<0.05$. The corre-

sponding values in Voss were 50% and 40%. Six winter seasons of continuous registration of grooming hours with snowmobile in Hafjell appears to be inversely proportional to number of injuries, r = –0.9995 (p<0.02).

Conclusion: By finding the sites where injuries occur on alpine slopes, a wrong construction of the slope can be changed. This together with a proper grooming of the snow in that particular area, may induce a significant reduction of the injuries.

Problems in orthopedic multicenter studies—screw fixation of displaced femoral neck fracture

Antti Alho[1], Svein Austdal[3], Jan G Benterud[1], Georg Blikra[2], Per Lerud[2], T Steinar Raugstad[3]

[1]Ullevål Hospital, Oslo, [2]Akershus Central Hospital, Nordbyhagen, and [3]Rogaland Central Hospital, Stavanger, Norway

Patients and methods: Displaced femoral neck fractures were fixed in a prospective, randomized multicenter study comparing 3 screw systems: 3 Ullevaal Hip Screws (new design), 2 Olmed screws, and 2 Tronzo screws. Salvage with bipolar or total prosthesis was defined as the end point after failed fixation. Screw removal was planned for minor local pain problems. The study was approved by an ethics committee. After exclusions, 482 women and 125 men, median age 80 (54–97) years, remained in the study. The follow-up examinations were scheduled to 3, 12 and 24 months.

Results: The total percentages of salvage operation were: Ullevaal screws 11, Olmed screws 17, and Tronzo screws 17 (P=0.04). The rates of implant removal were 10, 6, and 11, resp. (NS). Despite common criteria, the rates of salvage operation (prosthesis replacement) and removal of implant differed significantly between the hospitals independent from the implant group (P<0.001).

Table. Patients with reoperation[a]

	RCH		ACH		UH	
	US	OS	US	TS	US	OS
N	102	89	119	130	81	86
Salvage operation	7	5	16	22	10	25
Removal of screws	18	17	15	8	2	2
Other	2	1	2	0	1	0

[a] RCH = Rogaland Central Hospital, ACH = Akershus Central Hospital, UH = Ullevål Hospital, US = Ullevaal screws, OS = Olmed screws, TS = Tronzo screws.

Each patient was registered once. Removal of screws preceeding replacement with bipolar (n=2) or total hip prosthesis (N=4) are not listed.

Discussion: The inter-institution differences, which affected the total result of the study, depend on differences in treatment policy and allocation of resources. We conclude that any multicenter study may be biased by local factors affecting the outcome measures, even a "hard" end point. Controversial results of apparently similar one-institution studies in terms of revision operations may be explained by such factors and may bias any inter-institution comparison of outcomes of orthopedic procedures.

The relative risk of obtaining a hip fracture is higher for inhabitants of Oslo East than inhabitants of Oslo West

Trine S Kaastad[1], Haakon E Meyer[2], Jan A Falch[3]

Depts. of Orthopedics, [1]Ullevål Hospital, [2]National Health Screening Service, and [3]Dept. of Medicine, Aker Hospital, University of Oslo, Norway

Oslo has the highest incidence of hip fractures ever reported, and the county Sogn og Fjordane (S&F) only has 2/3 of this incidence (1). There are great differences in mortality rates between city regions of Oslo, and S&F has the lowest mortality in Norway. Our aim was to investigate if differences between Oslo city regions also could be found in the incidence of hip fractures.

Material and methods: In 1989 all new hip fractures were registered in Oslo-inhabitants, and the address was registered for all of age 50 or more. Those living in nursing-institutions were registered by their address prior to admittance. All were localized to one of six city regions (Inner West (IW), Inner East (IE), Outer South (OS), Outer East (OE), Outer North (ON), Outer West (OW)). Age- and sex-specific incidence in 5-year groups were calculated for the total population of Oslo These were projected on corresponding 5-year populations in the six regions, and the sums were the expected number of fractures in each region if the incidence had been as in Oslo. The ratio between observed and expected number of fractures for women and men was calculated for each region. The same was done for S&F.

Results: There were 1028 new fractures in Oslo women and 284 in Oslo men. Relative risks (RR) of hip fracture were calculated for Oslo's city regions and S&F compared to Oslo IW and showed significantly higher RR in IE for women (RR 1.24 [95% confidence interval 1.03–1.49]) and in IE and OE for men (RR 1.66 [1.13–2.43] and RR 1.49 [1.02–2.16]). RR in S&F was significantly lower for women (RR 0.75 [0.60–0.93]), but not for men (RR 0.82 [0.56–1.21]).

Conclusions: There were differences in incidence of hip fractures within Oslo with increased risk of fracture in the city regions where the population had the highest mortality rates. Women in S&F had lower risk of hip fracture than women in Oslo Inner West, but not men. However, the risk for men in S&F in sustaining a hip fracture was only half of the risk for men in Inner East. The differences between Oslo and S&F have been known, but the differences within Oslo have not previously been shown. They have given us a good background for further studies of factors that contribute to the high incidence of hip fractures in the Oslo-population and to evaluate measures that seek to reduce this incidence.

Reference: 1. Falch et al. Bone 1993; 14: 643-5.