

age ranged from 6 to 71 years. The three most common procedures were synovectomy of the knee (13), resection of the radial head in combination with synovectomy of the elbow (12) and hip arthroplasty (12). When comparing the two decades, three differences were observed: a decreasing need for surgery—48 in the 70s and 37 operations in the 80s, increasing age of the patients—average 29 in the 70s and 44 in the 80s, and, finally, a change of procedures e.g. surgical synovectomy of the knee was frequently performed in the 70s (10) and rarely (3) in the 80s.

Due to regular factor replacement therapy the situation of patients with hemophilia has dramatically improved during the last two decades. A child with hemophilia today can expect a practically normal adolescence avoiding the bleeding complications that earlier frequently caused surgical intervention. This is most likely the explanation of the changing panorama of orthopedic surgery in patients with hemophilia today.

90. Improved radiographic survival of the Charnley prosthesis in rheumatoid arthritis and osteoarthritis—the results of new operative techniques in 402 hips

Ingemar Önsten, Jack Besjakov¹ and Åke S. Carlsson

Departments of Orthopedics and ¹Diagnostic Radiology, Malmö General Hospital, Malmö, Sweden

201 consecutive, primary, noninfected Charnley hip arthroplasties, implanted from 1968 to 1985, incl. due to rheumatoid arthritis with an adult onset, were matched in pairs with respect to year of operation, age and gender with 201 Charnley prostheses implanted due to osteoarthritis. After 10 years, 93% and 89%, respectively, were retained according to a survivorship analysis. Using definite radiographic loosening as a determinant, the 7-year survival rate for stems increased from 80% to 96% for both groups after the introduction of new cementing techniques and the relative risk for stem loosening was decreased to one fifth. The 10-year radiographic socket survival was 78% and 95% in rheumatoid arthritis and osteoarthritis, respectively. In rheumatoid arthritis the 7-year radiographic socket survival increased from 87% to 96%, an increase attributed to the introduction of flanged sockets, bone grafting in acetabular protrusion and the rejection of the original, pilot hole technique.

Knee arthrosis

91. The effects of knee osteoarthritis on the physical and psychosocial health status

Eva Mattsson and Lars-Åke Broström

Department of Physical Therapy, Karolinska Institute, Stockholm and Department of Orthopedics, University Hospital, Umeå, Sweden

In patients with osteoarthritis, interest has mainly been focused on pain and secondarily on clinical and radiographic findings. Patients experience pain very individually and consequently its influence on functional capability and health status may be different. An increasing awareness of the multidimensional impact of joint disease had led to the development of various quality-of-life measures. Health status instruments have been constructed for assessment of the impact of sickness on physical and psychosocial function. The Sickness Impact Profile (SIP) is a well-known measure of functional health status and it has been used to study patients with different diseases, but to our knowledge not to study patients with osteoarthritis of the knee. The aim of this study was to describe patients with moderate osteoarthritis of the knee, clinically and functionally, and to define physical and psychosocial effects of the disease.

Material and methods: 60 patients, 35 women and 25 men, mean age 63 years, with moderate medial osteoarthritis of the knee and no symptoms from other joints were included in the study. All patients were scheduled for reconstructive knee surgery (tibial osteotomy or unicompartmental replacement). Clinical examination, using the BOA knee function chart (max 39 points), and measurements of self-selected walking speed, pain and effort during walking were assessed using a 10-graded scale. To verify the impact of moderate osteoarthritis of the knee on health status, the Sickness Impact Profile (SIP) was used.

Results: The mean BOA score was 30 (25–34) points and self-selected walking speed averaged 63 m/min and reduced compared with healthy subjects 80 m/min. Mean values for pain and perceived exertion during walking were 3.5 (0–10) and 2.4 (0–7), respectively. The mean SIP score for the patients was 7.4 (1–29), which means that there was a 7.4% reduction of normal health status in these patients. The patients considered that their knee osteoarthritis had the greatest influence on their ambulation (A) 23%, recreation and pastimes (RP) 20%, on sleep and rest (SR) 17%, and on emotional behaviour (EB) 11%. Significant correlations ($p < 0.01$) were found; between pain during walking and the Psychosocial SIP (EB), between BOA score and the Physical SIP; between self-selected walking speed and Total SIP (A and RP).

Conclusion: SIP appears to be a measure with sufficient sensitivity to detect physical and psychosocial changes in patients with moderate gonarthrosis. In clinical assessment, determination of self-selected walking speed and pain during walking were found to reflect their general function.

92. Osteonecrosis of the knee

Ahmad Al-Rowaih¹, Anders Lindstrand²,
Karl-Göran Thorngren², Hans Wingstrand²,
Ann Björkengren³ and Torbjörn Gustafsson⁴

¹Department of Orthopedics, Al Razi Hospital, Kuwait,

²Department of Orthopedics, Lund, Sweden,

³Department of Diagnostic Radiology, Stanford, USA and

⁴Department of Diagnostic Radiology, Malmö, Sweden

Introduction: Clinically suspected primary osteonecrosis of the knee was studied in 40 patients during 1-7 years. All patients had healthy knees before usually a sudden onset of pain and all but one patient had major pain on walking during the initial half year and the walking distance was greatly reduced. Three out of four patients had also pain at rest.

Methods: Clinical examination and repeated measurement with both plain radiography and three-phase ^{99m}Tc MDP scintimetry.

Results: 33 patients had typical scintimetric and radiographic signs of osteonecrosis of either one of the femoral condyles while the remaining 7 patients had only typical scintimetric findings but never developed an osteonecrosis on plain radiography. A persistent high flow-phase and static-uptake ratio 6-12 months after the onset of symptoms correlated positively with a poor clinical and radiographic outcome. 30 knees had an unfavourable outcome: 29 because of the development of arthrosis - 8 of these were operated by a knee arthroplasty and 4 by an osteotomy.

Discussion: The Lotke method was simple and reliable for measuring osteonecrosis on plain radiographs and a value of 40 or more was usually related to failure. The scintimetries were prognostic during the second half year after onset. A strong correlation was found between pool-phase ratios and the static ratios. As the scintimetric finding was identical in all 40 knees and there is no other well-known localised disease in this region of the femur condyle we believe that 7 patients with normal radiographs probably had an abortive form of osteonecrosis.

93. The Gliding Meniscal knee prosthesis

Apostolos J. Polyzoides¹, Athanassios Tsakonas²
and Jonathan B Kersley¹

¹Birmingham U.K. and ²Thessaloniki Greece

From 1982 to the present, the Gliding Meniscal knee prosthesis, which allows gliding and rotation while retaining the cruciates, has been used in 603 knees. We describe the results of this operation in the first 223 patients (262 knees, 73 RA and 189 OA) from 1982 to 1987, who were available for review. The mean follow-up period was six years.

Pain relief and satisfaction was 96%: flexion was increased in 85%. Six patients (2.6%) required revision.

94. Long-term results of the cemented total condylar knee arthroplasty—a 9–11-year follow-up

Adel Nafei, Ole Kristensen, Ivan Hvid,
Per Kjaersgaard-Andersen and Jørn Jensen

Orthopedic Surgical Department, Aarhus University
Hospital, Aarhus, Denmark

Aim: To report long-term results of the Insall-Burstein total condylar knee prosthesis (TKA) in the treatment of osteoarthritis (OA) and rheumatoid arthritis (RA).

Materials and methods: Two hundred and eight consecutive patients were operated in the period Oct 1979 to May 1982 (277 TKA). Sixty-three patients (80 TKA) died in the observation period and 27 (33 TKA) were lost to follow-up. Available for 10-year follow-up were 118 patients (164 TKA). In the OA group there were 14 men (16 TKA) and 58 women (76 TKA). In the RA group there were 9 men (14 TKA) and 37 women (57 TKA). The average age in both groups was 68 years. The average observation time was 10 (9-11) years. All patients were clinically and radiologically examined preoperatively, 2-3 months postoperatively, and after 1, 5, and 10 years. All radiograms were analyzed for tibio-femoral alignment, tilt of the tibial components and radiolucency zones at the bone/cement interface. The HSS knee-rating scale was used for the evaluation, and the radiolucency score (RS) approved by the Knee Society was used for the evaluation of the radiolucency zones.

Results: In the OA group 86% scored "excellent" or "good", 8% were "fair" and 6% were "poor". The corresponding figures for the RA group were 76%, 11% and 13%. In the OA group the average total HSS score was 57 points preoperatively and 84 points postoperatively. The corresponding figures for the RA group were 48 and 84 points. The difference in the score gain in the two groups was not statistically significant. The correlation between the total score and RS was statistically significant in both groups. None or mild residual functional pain was found in 88% in the OA group and in 95% in the RA group. Range of motion above 95 degrees was found in 71% in the OA group and in 54% in the RA group. Seventy-five percent of the patients had a longer walking distance than preoperatively in both groups. Significant RS was found in 13 TKA (14% of prostheses in situ) in the OA group and in 3 TKA (5%) in the RA group, without functional pain. A positive statistically significant correlation was found between the RS and varus positioning of the tibial component (only in the OA group). There was a significant positive correlation between the body mass index and the RS, but not between obesity (>120% normal weight) and the occurrence of significant RS. Complications of clinical significance were registered in 8% in the OA group and 11% in the RA group, but none were fatal. The frequency of late deep infection was 2% in the OA group and 7% in the RA group. The difference in the frequency of the complications in the two groups was not statistically significant.

Conclusion: The long-term results of TKA are satisfactory. The prosthesis provides a high percentage of pain

relief, improved range of motion and walking distance. The crude survival rate of the prosthesis was 94.5%. Correct positioning of the tibial component is of importance in the survival of the prosthesis.

95. The Rotaglide total knee replacement: Evolution, biomechanical rationale and results of the first 170 cases

George Dendrinos¹, Apostolos J. Polyzoides²
and Athanassios Tsakonas³

¹Athens Greece, ²Birmingham, U.K. and ³Thessaloniki Greece

A mobile polyethylene platform, metal-backed knee replacement system has been designed to combine low constraint forces with low contact stresses (Rotaglide), allowing nearly normal joint articulation and loading as well as long-term wear resistance of the implants. The system is versatile, including a large number of component options, and it may be used in both primary and revision arthroplasties. The overall results in the first 170 cemented cases (161 patients) with 2–5 year follow-up (average 3.1 years) were excellent or good in 95.3%. Poor results were seen predominantly in revision cases. There have been no mechanical implant failures and no platform bearing dislocations in this series. Pain relief and restoration of function have been gratifying with this arthroplasty design.

96. Micromotion of the femoral component in Miller-Galante knee arthroplasty

Kjell-Gunnar Nilsson and Johan Kärrholm

Department of Orthopedics, University Hospital, Umeå, Sweden

Failure of total knee replacements has often been attributed to poor fixation of the tibial component. In some designs the use of cement improves the stability of the tibial tray by reducing micromotions (Ryd 1986, Nilsson et al. 1991a). However, the in vivo efficiency of cemented and cementless fixation of commercially available femoral components has not been studied in detail. The purpose of this study was to measure micromovements of Ti-Al-V femoral components using roentgen stereophotogrammetric analysis.

Patients and methods: 28 consecutive patients (33 knees) with gonarthrosis Grade 3–4 according to Ahlbäck, planned for tricompartmental knee arthroplasty, were randomized to cemented (n=17) or cementless (n=16) fixation of the femoral component. The mean age at the operation was 72 (59–84) years. Before the operation 6 tantalum markers had been inserted into the femoral component (Miller-Galante,

original design). Further markers were inserted in the distal femur during the operation. Stereoradiographic examinations were performed within 10 days postoperatively, and at 3, 6, 12, and 24 months after the operation.

Results: The femoral components rotated 0.3°–0.6° (mean values) in relation to femur during the 2 first postoperative years. Internal-external rotations were the most obvious rotations followed by forward-backward tilting. The direction of the rotations were equally distributed. Proximal migration (0.3–0.4 mm) of one part of the prosthesis was usually combined with distal migration (0.3 mm) of the opposite side due to prosthetic tilting. The maximum migration of the most unstable part of the implant (MTPM) was 0.4–0.6 mm after 6 weeks and increased to 0.8–0.9 mm after 2 years. The size and pattern of the micromotions did not differ between the cemented and cementless components. The knee score and pain score (Hospital for Special Surgery), range of motion, prosthetic positioning and knee alignment did not differ between the two methods of fixation.

Discussion: The migration of the femoral components in this study was of about the same magnitude as cementless Miller-Galante tibial components (Nilsson et al. 1991a). Presence of prosthetic tilting in the absence of migration of its center is compatible with bony ingrowth close to the axis of rotation and fibrous fixation more peripherally. It has previously been indicated that migration of the tibial component is partly related to the design of the joint area (Nilsson et al. 1990, 1991b). The divergent pattern of the femoral component migration suggests that the fixation of the femoral components is less sensitive to forces induced during flexion-extension by the design of the joint area.

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97. Multiple revision total knee arthroplasty

G. K. Dendrinos and G. K. Polyzoides

Orthopedic Department, Solihull Hospital, Solihull, West Midlands, U.K.

The results of 36 consecutive multiple revision total knee arthroplasties were reviewed. Included were 26 knees that underwent two revisions and 10 knees that underwent three or more revisions. A large variety of implants with varying degree of constraint were used. Bone grafting including two stage grafting was used in 19 patients. The mean interval from primary arthroplasty to the first revision was 4 years, from the first to the second revision 3.9 years and from the

second to the third revision 2.6 years. The mean follow-up from the primary total knee arthroplasty was 10.3 years and from the last revision 3.2 years.

Satisfactory results were obtained in 60% second revisions and in 40% third revisions. The most common reason of failure of the second revisions was instability and of the third revisions infection. The most favourable variables for prolonged survival (no revision) were second revision, soft tissue balance and stability, use of condylar designs for primary and first revision arthroplasty, restoration of bone stock deficit with staged grafting and management of infection with staged reimplantation.

98. Arthroscopy of total knee replacements

Anders Herrlin

Department of Orthopedics, Karolinska Institute, Huddinge University Hospital, Huddinge, Sweden

Introduction: Arthroscopy can be used to evaluate symptomatic prosthetic knees. This is a summary of the author's experience with the procedure performed under local or general anesthesia.

Materials and methods: Thirty procedures were performed between 1989–1991. The mean age of the patients was 69.5 (45–80) years. The TKR had been done 56 (1–103) months before the arthroscopy. Prophylactic antibiotics were used (Cefadroxil 1gx2 p.o. for five days). The instrumentation was a standard equipment (5 mm arthroscope, pump, video, leg holder, parapatellar portals). All incisions were sutured. In 17 cases, the arthroscopy was done as an outpatient procedure under local anesthesia. In 13 cases a spinal/epidural or general anesthesia was used and the patient was hospitalized.

Result: There were no complications. In two cases; one with local and one with a spinal anesthesia, the arthroscopy had to be abandoned due to difficulties to obtain an acceptable free view. The findings in the remaining cases were wear of the polyethylene in 16 cases, suspect loosening of tibial or patellar component in 3 cases, and unspecific synovitis in 19 cases. In 2 cases, no explanation was found for the patients' symptoms. Proliferative synovitis was removed as part of the procedure in 7 knees.

Conclusion: Arthroscopy is useful for the diagnosis of complications after TKA. It is possible to detect and quantify polyethylene wear and the degree of synovitis. Loosening of the components can sometimes be demonstrated. Symptomatic synovial scar tissue formation with interference can be treated. Most arthroscopies can be done under local anesthesia as outpatient procedures. Great care must be taken to avoid complications such as infection or damage to the implant.

99. Arthrography for evaluation of wear in total knee arthroplasty

Anders Herrlin, Cecilia Enderlein and Urban Lindgren

Departments of Orthopedics and Radiology, Karolinska Institute, Huddinge University Hospital, Huddinge, Sweden

Introduction: A simple method is needed to evaluate polyethylene wear early, in order to avoid metal to metal contact necessitating total revision.

Materials and methods: Fifteen patients with symptoms from their total knee replacements, mean age 72.5 (48–80), mean weight 76.2 kg (55–96), and 58 (29–103) months after surgery were investigated. The original implant thickness of the metal-backed tibial components were stated to 7 mm in eight cases, 9 mm in six cases and 11 mm in one case. Double contrast arthrography was performed under fluoroscopic control. The findings at arthrography were compared with the findings at arthroscopy and with plain standing radiographs.

Results: There were no complications. We found two knees with less than 2 mm of polyethylene remaining on the tibial component. The first case had a local breakthrough which was not detected on plain radiographs but was visible on arthrography and arthroscopy. The second case had an evenly worn surface with a residual thickness of 1.5 mm at the thinnest part as seen on arthrography. Ten knees had moderate wear seen both on arthrography and arthroscopy. Plain radiographs were not conclusive in these cases. Three knees were classified as normal on arthrography, but arthroscopy revealed minor wear in two of these.

Conclusion: Arthrography is useful for evaluation of wear of the tibial polyethylene component and it is in some cases more useful than arthroscopy in determining the thickness of the remaining polyethylene.

100. Blood salvage in total knee arthroplasty with Solcotrans postoperative drainage

Tore Dalén, Søren Skak and Kim Thorsen

Department of Orthopedics, Örnköldsvik Hospital, Örnköldsvik, Sweden

The risks of transmitting infections and of adverse immunological reactions from bank blood transfusions have focused interest in autologous transfusion and blood salvage procedures.

The purpose of this study was to investigate if use of Solcotrans drainage system for blood salvage postoperatively could reduce the need for homologous blood transfusion after tricompartmental knee replacement surgery.

Material and methods: In 1989 and 1990 the Solcotrans drainage system was used in a consecutive series of 58 patients, 42 women and 16 men, mean age 70 years, after a

tricompartmental (Tricon M) knee replacement. The diagnosis was osteoarthritis in 45 and rheumatoid arthritis in 13 patients.

The control group consisted of all 59 patients also operated with Tricon M prosthesis in the years 1987 and 1988. Mean age was 68 years, 38 were women and the diagnosis was osteoarthritis in 31 and rheumatoid arthritis in 28 patients. Both groups received the same treatment pre- and postoperatively. The operations were mainly performed by two surgeons and a tourniquet was used. Postoperative blood transfusion was indicated either when the Hb level was less than 90 g/L or when hypovolemia was evident. Means and standard deviation are given.

Results: Preoperatively mean Hb level was 137 ± 15 in the Solcotrans group and 134 ± 14 in the control group. The mean total blood loss was 1317 ± 639 ml in the Solcotrans group and 1450 ± 680 ml in the controls. The mean volume in the Solcotrans drainage was 853 ± 519 ml and 809 ± 557 ml was retransfused. In 10 patients, all blood could not be retransfused, due to coagulation in three, too small volume (<200 ml) in four, misunderstandings in two and technical problems in one patient.

Two patients had a shivering and fever reaction during the autologous retransfusion. These reactions did not prevent the retransfusion. Homologous transfusion was given to 45 patients (76%), with an average of 2.5 units in the control group compared to 19 patients (33%), average 2.1 units, in the Solcotrans groups. On discharge from hospital mean Hb level was 117 ± 11 g/L in both groups.

Conclusion: After two years' use of the Solcotrans post-operative drainage system we conclude that retransfusion of autologous blood is a safe procedure, and that the need for bank blood in total knee replacement surgery can be reduced.

101. Comparative study of systemic intravenous and regional intravenous administration of prophylactic antibiotic in elective lower extremity orthopedic surgery

Labros Kalivas, Fofo Papakalou, Stefanos Tsourvakas, Stefanos Provelegios, Chara Paloumpi and Eleftherios Dounis

Athens Greece

The efficacy of a regional route for antibiotic prophylaxis in lower extremity orthopedic surgery was investigated in 10 patients and compared with the standard systemic iv method in 20 patients, using a second generation cephalosporine. Ceforanide (2g) was given intravenously as the standard systemic prophylaxis. The same dose of ceforanide was injected intravenously into the ipsilateral root after the inflation of a tourniquet. Samples of fat, muscle and dermal were collected from the area of the lateral femoral condyle and bone. Tissue levels of ceforanide were determined using a microbiological method.

Peak tissue levels of the systemic antibiotic were observed 20 minutes after injection. When the ceforanide was given intravenously with the standard systemic method the mean peak bone level was 18.00 ± 2.93 mg/g. The peak bone level for the regional antibiotic was 174.4 ± 19.19 mg/g, i.e. some nine times higher than in standard systemic prophylaxis. For all tissue samples the ceforanide levels were significantly higher when the antibiotic was given regionally ($p < 0.001$, paired *t*-test).

We concluded that the regional administration of ceforanide achieves significantly higher tissue levels than when the same drug is given systemically. Regional administration could thus be a useful route for prophylaxis during lower extremity orthopedic surgery when it is carried out under tourniquet control.

102. A comparison of bioglass and hydroxylapatite in reconstruction of osteochondral defects

J. T. Heikkilä, A. J. Aho, A. Yli-Urpo¹ and Ö. Andersson²

Department of Surgery, Turku University Hospital,

¹Institute of Dentistry, Turku University and

²Department of Chemistry, Åbo Academy, Finland

As one part of our bioglass project two types from the entity of bone substitutes were tested in a rabbit knee model. In this model three conical holes were drilled (Friolit 4-0 drill) on the patello- and both tibiofemoral joint surfaces. The model aims at testing composite materials. In this study incorporation of bioglass (BG, 56.5% SiO₂, 27.0% Na₂O and 12.0% CaO) and dense hydroxylapatite (HA) as a control substance in the subchondral bone was evaluated. Conical HA and BG implants were manufactured and implanted in the holes with standard orthopedic sterility. Implants were harvested with surrounding bone after 3, 6 and 12 weeks. The tissue was fixed in formalin and embedded in light-hardening plastic (Technovit). Evaluation was done macroscopically and microscopically and the elements of bone implant surface were examined with energy dispersing roentgen analysis (EDXA). The specimens were examined with light microscopy and scanning electron microscopy (SEM). The percentage relationship of connective, chondroid and bone tissues on the surface of the implants were measured with partly computerized planimetric methods and the results of light microscopy and SEM compared. The biochemical fixation of the implants was confirmed with EDXA. Our model worked well and the results are comparable to those of other research groups in this field. There was a clear tendency of bone formation in both groups as a function of time and in the end of test period 70–80% of the implant surfaces were attached to bone according to perimetric measurements. Models of this kind have earlier not been proven to work.

103. Regional fibrinolytic response to ischemia in knee prosthesis surgery

Bengt I. Eriksson, Sven Martinell, Elsa Eriksson and Bo Risberg

Departments of Orthopedics, Anesthesiology and Surgery, Östra Hospital, University of Göteborg, Göteborg, Sweden

The high frequency of deep vein thrombosis (DVT) in the operated leg after total knee replacement suggests that local factors are of importance for the development of thrombosis. Investigation of the local fibrinolytic response to surgery might give valuable information on possible thrombogenic mechanisms. The purpose of this study was to test the hypothesis that regional fibrinolytic response to surgery is dissociated from systemic response.

A mid-thigh tourniquet was used with a duration of ischemia of 1.5–2 hours. Catheters were inserted in the proximal part of the femoral veins on both sides and blood was sampled simultaneously from these catheters before and after the ischemia. The following fibrinolytic variables were analysed in plasma: tissue plasminogen activator (t-PA) activity, t-PA antigen, plasminogen activator inhibitor (PAI-1) activity and PAI-1 antigen.

When the tourniquet was released t-PA antigen, PAI-1 activity and PAI-1 antigen increased significantly in samples from the operated limb ($p < 0.01$). Within 2 minutes the t-PA antigen level was significantly increased in both limbs, as compared to preoperative values. The differences between the limbs in t-PA and PAI-1 antigen levels were sustained for 15 minutes and 2 minutes, respectively. One day postoperatively PAI-1 activity and antigen increased in both limbs, which was interpreted as an acute phase reaction, due to an increased synthesis and release of PAI-1 into the systemic circulation.

This study was in support of the hypothesis that local changes may be dissociated from systemic response. Analysis of t-PA and PAI-1 in plasma from the operated limb, after restoration of blood circulation, demonstrated changes in the fibrinolytic system which could not be found in the nonoperated limb. Regional activation or inhibition of the fibrinolytic system might play an important role in the pathogenesis of DVT after knee surgery.

104. An improved interface using an internally cooled sawblade

Søren Toksvig-Larsen, Leif Ryd and Anders Lindstrand

Department of Orthopedics, University Hospital, Lund, Sweden

The effect on tibial component fixation by the use of a cooled sawblade for the bone cuts was studied in a randomized prospective study using roentgen stereophotogrammetric analysis (RSA). Micromotion of the tibial component, both as migration over time and as inducible

displacement in response to external physiological forces was studied. 33 cases of gonarthrosis were operated on with the PCA modular (bossed version) prosthesis. The tibia components were inserted without cement, but with 3 screws each 32 mm long for initial fixation. All cases were clinically successful after one year. There were no differences between the two groups regarding migration over time at the one-year follow-up, mean MTPM 1.5 mm and subsidence 0.4 mm. Inducible displacement was, however, smaller with the cooled sawblade (MTPM = 0.4 mm, $p < 0.05$). A 2-mm coarse sawblade (prototype cooled sawblade) results in inferior cut-surfaces with regard to roughness and flatness. Our findings do probably not indicate substantial bony ingrowth, but the use of an internally cooled sawblade resulted in a stiffer interface.

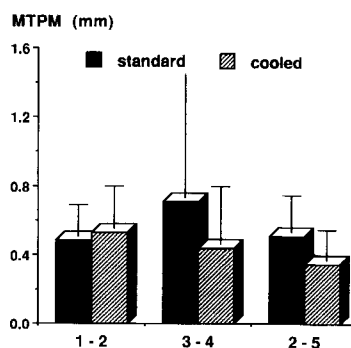


Figure 1. Inducible displacement. Position 1; supine, 2; standing, 3; outward rotation, 4; inward rotation, 5; squatting.

105. The Swedish national register for knee arthroplasty

Stefan Lewold, Leif Ryd, Kaj Knutson and Lars Lidgren

Department of Orthopedics, University Hospital, Lund, Sweden

The Swedish Knee Arthroplasty Project, initiated in 1975 by the Swedish Orthopedic Society, is a multicenter data base on all artificial knee joint replacements performed in Sweden. The entry forms contain demographic data, information on the condition of the knee, type of replacement and any complication during the hospital stay. The project was intended for registration purposes only and has no authority over the participants, who used their own indications for arthroplasty, choice of prostheses and indication for revision. Each patient was followed at 3, 6 and 10 years after operation. Complications or revisions were reported annually. As of September 1, 1991, 22,157 primary knee arthroplasties had been reported to the data base.

The demographic data concerns diagnosis, choice of prosthesis and prosthetic annual incidence. The diagnosis

varies with age where rheumatoid arthritis (n=6,134) is predominant in younger patients and primary osteoarthritis (n= 14,986) in the older age groups. There has been an increase in the annual number of joint procedures with some minor variations for reasons such as hospital strikes and political encouragement. The number of knees now performed annually is about one fifth of total hip procedures or about 2,500 in a population of about 8.5 million. As to the choice of prosthesis it is interesting to note that in rheumatoid arthritis unicompartmental or stabilized prostheses have almost been abandoned but about 50% of all replacements for osteoarthritis are unicompartmental.

The register is a handy tool to identify general complications such as healing problems, infections, dislocations, vascular and nerve injuries. The over-all annual incidence of infection is now well under 1%. There were, however, wound healing problems in about 5% of all bi- or tri-compartmental replacements of which about 25% eventually developed a deep infection.

The over-all 10-year cumulative revision rate for OA knees is about 10%. Probably the most important use of the register is to look at the failure rate of various implants and to see if there are new failure patterns. During the period December 1983 to July 1990, 772 unicompartmental PCA prostheses, 1,564 Marmor and 1,441 St George prostheses were implanted. There was a significant difference in the cumulative revision rates already at 2 years increasing to 15% for the PCA prosthesis compared with 5% for the other two types. Similar comparisons can be made between total knee designs. Retrospectively, there was information on wear in 29 of 65 revised PCA tibial components. In 4 cases the polyethylene was intact, in 7 cases there was minor wear whereas 18 components showed major polyethylene wear. Since the beginning of 1992, a retrieval program has been linked to the project and all revised components will be analysed centrally for wear and correlated to corresponding interface studies.

The numbers collected through the national multicenter project permit analyses also of sequential subsets and the conclusions drawn reflect the attitudes and skills of an entire professional body rather than those of particularly interested and skilled individuals. Multicenter implant studies should be carried out irrespective of in vitro test and randomized clinical studies.

106. Outcome of revision for failed unicompartmental knee arthroplasty for arthrosis

Kaj Knutson, Stefan Lewold and Lars Lidgren

Department of Orthopedics, University Hospital, Lund, Sweden

The Swedish National Register for knee implants with 23,000 primary knee arthroplasties was used to study the outcome of revision for failed unicompartmental knee

arthroplasty in gonarthrosis. Today 50% of the primary arthroplasties for arthrosis are done with a unicompartmental prostheses. The revision rate has gradually improved over the years of the study. Initially it was 12% at 6 years for the Marmor uni knee. During the 1980's that rate was only 5%. The same improved revision rate has been recorded for the St. Georg schlitten prosthesis. Some of the modern unicompartmental knees (PCA, Oxford) and the obsolete Gunston-Hult have a 6-year revision rate between 10% and 15%.

Based on 535 revised uni knees we tried to analyse the outcome of revision. 437 revised uni knees were treated with either a new uni or a total knee. Ten-year revision rate for revision with uni knee was 25% and for revision with a total knee 15%. The improved results with the total knees are more pronounced when only modern designs are compared. The re-revision rate at 5-year when inserting additional components for contralateral arthrosis is 25%.

Unicondylar knee replacement is a safe primary procedure when performed with well-designed components and modern surgical technique. It gives good patient satisfaction, range of motion, pain relief and few serious complications. However, once failed the knee should be revised using a total knee replacement. This applies to most modes of failure and not even degeneration of the other compartment can be safely treated by adding unicompartmental components.

107. Results of Kinemax knee arthroplasty —1–2-year follow-up

Adel Nafei, Strange Nielsen, Ole Kristensen and Ivan Hvid

Orthopedic Surgical Department, Aarhus University Hospital, Aarhus, Denmark

Introduction: The Kinemax prosthesis was introduced in our department in 1988 to evaluate the press-fit concept. Due to the high frequency of aseptic loosening (21%) and residual pain (41%) when the prostheses were noncemented, we find it important to publish the preliminary results.

Material and methods: 79 Kinemax knee arthroplasties were performed in a period of 14 months. Twenty-six tibia components were cemented and 53 were noncemented. Three patients died during the observation period due to other reasons. One patient was lost to follow-up. The average age was 68 (41–81) years in the cemented group and 70 (41–81) years in the noncemented group. The average observation time was 14 (3–28) months for both groups. All the patients were examined clinically and radiologically preoperatively, postoperatively and at 3 months intervals. All radiograms were analyzed for accuracy of prosthesis implantation and radiolucency zones around the tibial component. The HSS knee-rating scale was used for the evaluation, and the radiolucency score approved by the Knee Society was used in measuring the radiolucency zones.

Results: At the latest examination in the noncemented group 55% scored "excellent", 23% were "good", 2% were "fair" and 21% were "poor" (10 revisions). The corresponding figures for the cemented group were 54%, 42%, 0%, and 4%. The frequency of the residual pain in the noncemented group was significantly higher than in the cemented group ($p=0.02$). The revised tibial components were primarily correctly placed (average tilt of 1.5° medially and 11° posteriorly). All the other prostheses were also placed correctly. Radiolucency around the tibial components in situ: 90% had a significant radiolucency score (5–20 points, average = 8 points). A radiolucency score equal to 9 exclusively around the stem of the component was registered in 18% of the cases. No significant radiolucency score was registered in the cemented group. A positive correlation was found between the radiolucency score and the residual pain (Spearman's test: correlation coefficient = 0.27, $p=0.04$).

Conclusion: The frequency of symptomatic mechanical loosening and residual pain in the noncemented group was unacceptably high. Thus the press-fit concept proved unsuccessful and the prosthesis is not recommended for noncemented use.

108. The natural course of arthrosis of the knee

Arne Sahlström, Olof Johnell and Inga Redlund-Johnell¹

Departments of Orthopedics and ¹Diagnostic Radiology, Malmö General Hospital, Malmö, Sweden

The aim of the present study was to examine the course of untreated (or conservatively treated) knee pain with radiographic osteoarthritis in a 20-year perspective.

Materials and methods: All radiographs have been saved from 1970, when the practice of standing, weight-bearing knee radiographs was started for the diagnosis of arthrosis of the knee. The radiographs from 1970 to 1974 were evaluated. In 1990 to 1991 the patients who still lived in Malmö were invited to a follow-up examination ($n=265$). nonresponders were either deceased (38) or in 171 cases without radiographically classified arthrosis in the 70s but in 56 cases the patients did have classified arthrosis. A total of 132 responded and participated in this examination. A questionnaire using the HSS score (i.e. scoring both social and clinical functions), clinical examination and new radiographs taken in standing, weight-bearing position were performed—in the same manner as 20 years earlier. Questions were also asked about the duration of the knee pain and operations performed before 1970. The degree of arthrosis was classified according to Ahlbäck (1968). The mean age in 1970 was 57 (36–73) and at follow-up 76 (54–93). The mean follow-up time was 19 (18–20) years. The mean duration of pain before the first radiograph in the 1970s was 2 (0–18) years. 92 were not treated, 5 had had an

arthroscopy, 9 a meniscectomy, 13 an osteotomy, 10 a total knee replacement (in the latter two groups the operated knee was not included in the calculations) and 3 had sustained a fracture. In the 1970s all patients had had knee pain as their presenting symptom. 27 had mainly patellofemoral symptoms, 4 had sustained a previous fracture with pain as sequelae. The rest, i.e. 101, had mainly femurotibial osteoarthritic pain.

In the 1990s, 27% were painfree, 42% had pain in the same knee and 31% in both knees. The HSS score in the various Ahlbäck classification groups in the 1970s were as follows for the nonoperated (97): Ahlbäck 0 had mean score of 89 ± 9 for the affected side and for the nonaffected side mean 90 ± 8 ; Ahlbäck 1 77 ± 13 and 86 ± 11 respectively; Ahlbäck 2 mean 70 ± 15 and 72 ± 15 ; Ahlbäck 3 61 ± 4 and 62 ± 10 . However, the HSS score contains social function as well, which may be somewhat misleading for the unaffected side. In the patients with Ahlbäck 0, (i.e. no arthrosis) in the 1970s, 57% remained the same after 19 years, whereas the others had developed radiographic evidence of arthrosis, 41% were painfree ($n=61$). In the Ahlbäck 1 group ($n=25$) 40% still had the same class, none had an improved score, 28% were painfree. In the Ahlbäck 2 classification 33% still had the same class, whereas the rest with Ahlbäck 3 or more had deteriorated although 22% ($n=9$) had no pain.

Discussion: It should be possible to compare our data, based on a pain score and radiographic findings in the 1970s, with the outcome of operative treatment, i.e. arthroplasty, in a 20-year perspective regarding quality of life. As an example we have compared 20 patients who, on the average 15 years ago, had a Geomedic knee arthroplasty performed. Their HSS scores at follow-up were according to the Ahlbäck classification as follows: Ahlbäck 1: 86 HSS; Ahlbäck 2: 80 HSS; Ahlbäck 3: 62 HSS; Ahlbäck 4: 60 HSS.

These results are better than the natural course. One drawback might also be that we in the 1970s did not use scoring according to the HSS and even if only 10 patients had a knee arthroplasty there could have been a selection bias which to some extent might hamper our conclusions. The natural course of arthrosis of the knee should be the golden standard for evaluation of long-term follow-up studies of knee arthroplasties. In our study, in those patients with >50% joint space reduction, 40% had not over 20 years deteriorated radiographically and one fourth was painfree in the 1990s. In a comparison with Danielsson's study from 1964 of the natural course of osteoarthritis of the hip, those >50% joint space reduction (Ahlbäck 1) 20 years later in 37% still had the same class and 35% were painfree. Those with total joint space reduction (Ahlbäck 2) had in 45% still the same class and 16% were painfree—11% had improved radiographically.

109. Follow-up study for high tibial osteotomy using minimal osteosynthetic material as proposed by A. Renieris

George Skouteris, Stefanos Kalos, John Pegos, Nicholas Papadourakis, Demetrius Zachariou, George Georgopoulos and Aristides Renieris

Athens Greece

With the goal of early mobilisation and rehabilitation of the patient and bony union without loss of correction, many methods of internal and external fixation have been used.

Since 1985, we have been using proximal tibial wedge osteotomy with minimal osteosynthetic material for the correction of varus deformity in osteoarthritic knees. This has successfully provided stability of correction in 65 knees (53 patients). The postoperative complications were minimal and in all our cases bone healing at the osteotomy site was achieved in the corrected position.

The method involves first, osteotomy of the fibular head, followed by a wedge osteotomy of the upper tibia above the tibial tuberosity and compression of the osteotomy by an anchored wire passing through two cannulated screws supported by specially made staples. The first screw is situated proximally, parallel to and 1 cm below the tibial articular surface and the other distally, 1–2 cm from the lower saw cut of the osteotomy and parallel to it. The site of the screws is prelocated using guide pins and confirmed by AP radiographs.

The tightened wire is effective in maintaining the correction of the deformity, leading to rapid union of the osteotomy. At the same time it permits early mobilisation and weight bearing, reducing the hospitalisation and rehabilitation period, as has been evident from the follow-up study.

110. Complications of the patella after total knee replacement

D. A. Dartée, J. A. N. Verhaar and A. J. van der Linden

Orthopedic Department, Academic Hospital, Maastricht, The Netherlands

Over a period of 9 years more than 250 primary total knee arthroplasties have been implanted in the Orthopedic department of the Academic Hospital of Maastricht. Recently all patients with a total knee arthroplasty have been contacted. A physical examination was performed and radiographs made.

The complication rate was in accordance with data in the literature. Problems involving the patella were the most frequent (10%). The resurfaced patella presented problems including patella fractures, patella subluxation and patella loosening. Most of these complications can be explained by features of the chosen prosthesis or to the technique of implantation.

111. Load-bearing cartilage of the knee after proximal tibial valgus osteotomy

Hans Bergenudd¹, Olof Johnell¹, Inga Redlund-Johnell² and Stefan Lohmander³

Departments of ¹Orthopedics, ²Diagnostic Radiology, Malmö General Hospital, Malmö and ³Department of Orthopedics, University Hospital, Lund, Sweden

In 19 consecutive patients with medial gonarthrosis, an arthroscopic examination with cartilage biopsy of the load-bearing cartilage in the medial femoral condyle was undertaken at the same time as a proximal tibial valgus osteotomy. A follow-up biopsy was performed at an average of 26 months after the valgus tibial osteotomy—again with a transarthroscopic procedure. In 9/19 knees there was an improvement of the cartilage quality, 8/19 knees were unchanged whereas 2/19 knees deteriorated. Radiographs of the knees were taken before and 2 years after the osteotomy. Six knees had improved, 11 were unchanged and 2 had deteriorated. Our results suggest that the proximal valgus osteotomy has a beneficial effect on the load-bearing cartilage in the medial femoral condyle.

Knee injuries

112. Osteochondral lesions and acute ACL injuries

L. Engebretsen, E. Arendt and H. Fritts¹

Department of Orthopedic Surgery, University of Minnesota, ¹Center for Diagnostic Imaging, St. Louis Park, Minnesota, USA

Introduction: Injuries to the anterior cruciate ligament (ACL) are often accompanied by lesions in joint capsule, ligaments, menisci and cartilage. Recent studies using magnetic resonans imaging technique (MRI) have shown a high frequency of subcortical and osteochondral lesions although radiographs are normal. The purpose of this study was to examine the frequency of bony lesions judged by MRI and correlate the findings with the arthroscopic diagnosis in patients with acute ACL injuries.

Patients and methods: During the period from August 1990 to May 1991, 49 patients were treated surgically due to an acute rupture of the ACL. In 18 patients MRIs were obtained in order to rule out a repairable meniscal injury prior to surgery. The MRIs were read by one radiologist. The arthroscopic diagnosis were carried out by two surgeons.

Results: Apart from one tibial avulsion fracture, all the radiographs were normal. All 16 total ruptures of the ACL seen on the MRI were confirmed through the scope. In addition, the arthroscopic exam showed two partial ruptures