

## PROCEEDINGS OF THE DANISH ORTHOPAEDIC SOCIETY

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### THE REGIONAL VASCULAR VOLUMES AND DYNAMIC HAEMATOCRITS COMPARED TO THE REGIONAL PERFUSION IN CANINE ANCELLOUS AND CORTICAL BONE

E. TØNDEVOLD

Hillerød Hospital

The plasma and erythrocyte volumes were measured with radioactively labelled fibrinogen and erythrocytes. The dynamic haematocrit in the small vessels was found to be 50 per cent of the arterial value in cancellous bone and 75 per cent of that in cortical bone. The perfusion rates in the same regions were determined with microspheres demonstrating a linear relation between perfusion rate and blood volume.

A thorough testing of the plasma volume indicators showed that the distribution volume for albumin and transferrin was twice the value determined with fibrinogen. This difference seems to be correlated with molecular weight.

### FRACTURES OF THE HUMERUS TREATED WITH FUNCTIONAL CAST BRACING

O. VANG

Hvidovre Hospital

Thirty-two patients with fractures of the humerus were treated with functional cast bracing. Six patients had pathological fractures. The treatment consisted of a hanging cast or a U-shaped plaster slab for 1 week followed by functional cast bracing for about 6 weeks. The average time until clinical union was 7.8 weeks. Twenty-three patients were re-examined. Seven patients had minor malpositioning as judged by the X-ray films. One patient had a 20° varus angulation, two patients complained of slight shoulder pain and eight patients had slight reduction of abduction or external rotation.

There were no cases of non-union or nerve damage. The patients all expressed their satisfaction with the cast which permits active mobilization of both shoulder and elbow.

### COLLES FRACTURE: FUNCTIONAL BRACING IN SUPINATION VERSUS DORSAL CAST IN PRONATION

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The position of supination of the forearm during the treatment of Colles' fracture has been reported to reduce the collapse of the fragments in comminuted intraarticular fractures of the distal end of the radius.

A prospective randomized study was performed in 81 patients with 71 comminuted, intraarticular fractures. The anatomical results including the evaluation of radial length, radial deviation and dorsal angulation were found to be significantly better in the group of 37 patients treated with functional bracing in supination ( $P < 0.02$ ). The functional results including the evaluation of residual deformity, complications, objective, and subjective results were equal in the two groups after 7 weeks, 3 months, and 6 months.

### SCREENING OF SCHOOL CHILDREN FOR SCOLIOSIS

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Odense University Hospital

Four hundred and fifty school children in their 12th year of life were screened for scoliosis, employing the forward bending test as well as moiré topography. A total of 112 children presented an asymmetrical back pattern on the moiré screen. The overall ratio of girls to boys was 1.7:1.

Of the 112, 52 showed a positive forward bending test, 24 had back complaints, and 16 (11 girls and 5 boys) displayed a moiré pattern indicating a scoliosis curve of approximately 20 degrees.

Moiré topography is recommended in the screening of school children for scoliosis.

### THE MONK "HARD TOP" PROSTHESIS IN MEDIAL FRACTURES OF THE FEMORAL NECK

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Holbæk Hospital

The Monk "Hard Top" prosthesis was inserted in 116 patients; 104 (90 per cent) had fresh fractures and 12 (10 per cent) fracture sequelae. The average age was 78.5 years with a range from 47–99 years.

Seventy-three patients could be re-examined. The mean period of follow-up was approximately 2 years. The postoperative complications compared well with those after conventional hemiarthroplasties. X-ray examinations showed no wear of the acetabular cartilage or protrusion of the prosthesis. Eighteen cases showed radiolucency along the femoral stem. The results according to Love's classification were: excellent 34 cases (48 per cent), good 21 (30 per cent), fair 12 (17 per cent) and poor 4 cases (5 per cent).

### MECHANICAL TESTING OF TRABECULAR BONE DURING KNEE REPLACEMENT: THE DEVELOPMENT OF AN OSTEOPENETROMETER

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In order to measure the strength of the juxta-articular trabecular bone during knee replacement an osteopenetrometer was developed. In principle the instrument consists of a needle which penetrates the bony tissue while the pressure and the displacement of the needle are registered simultaneously.

Good agreement was found between osteopenetrator measurements and compression tests made on the same bony structure. Measurements on corresponding bones proved to reflect the morphology of the skeletal structure. The osteopenetrometer appears to be suitable for objectively assessing the strength of trabecular bone during operation.

### VARIATIONS IN TRABECULAR BONE STRENGTH IN THE PROXIMAL PART OF THE TIBIA

P. CHRISTENSEN, P. S. VANG & O. SNEPPEN

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Osteopenetrator measurements at 45 points distributed all over a horizontal resection surface below the joint surface of the proximal tibia showed that the mean penetration force varied according to a definite pattern, being greatest in the medial condyle, somewhat less in

the lateral condyle, and considerably less centrally in the area beneath the intercondylar eminence. Additionally it was found that the penetration force decreased distally, especially in the medial condyle.

The osteopenetrometer is capable of recording major variations in bone strength within very small areas.

### THE REVERSIBILITY OF GLYCOSAMINOGLYCAN DEPLETION IN ARTICULAR CARTILAGE

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Histological sections from the patellae of 42 rabbits were investigated at different times after surgery. Estimates of the degree of surface depletion were made by visual measurement with light microscopy as well as by measurements of the optical density in sections stained with Toluidine Blue at pH 3. Additionally the glycosaminoglycan level in the areas below the depleted zones was estimated. Both methods demonstrated a distinct depletion after 1 week with a maximum after 4 weeks. After this the surface depletion decreased significantly until 26 weeks postoperatively. In step with the surface depletion, histological signs of synovitis were observed.

### HISTIOMORPHOMETRIC ANALYSIS OF TRABECULAR BONE OF THE PROXIMAL TIBIA IN OSTEOARTHRITIC KNEES WITH VARUS OR VALGUS DEFORMITY

P. CHRISTENSEN, F. MELSEN & J. KJER

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Peroperative bone biopsies were taken from the proximal end of the tibia in ten patients with osteoarthritis with varus or valgus deformity of the knee. Iliac crest biopsies were taken at the same time. The microscopic evaluation demonstrated an excess of trabecular bone in the stressed condyle and a decreased amount of trabecular bone in the unstressed condyle.

The findings concerning resorptive and formative surfaces were discussed and attention was drawn to the amount of woven bone in the stressed condyle.

### EPIPHYSEAL GROWTH AND INTRAOSSEOUS PRESSURE IN EXPERIMENTAL ARTHRITIS OF THE KNEE

*An experimental study in dogs*

C. BÜNGER, S. S. SØRENSEN, U. LUCHT, E. H. BÜNGER & O. MYHRE JENSEN

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The aim of the present study was the development of an animal model suitable for the investigation of epiphyseal growth disturbances in juvenile arthritis. Unilateral arthritis was induced by weekly instillations of 2 ml 1 per cent Carrageenin solution into the knee joint in four puppies for 8 weeks. X-ray examinations thereafter revealed epiphyseal overgrowth of the distal femoral epiphysis compared to the control knee in all dogs. The intraosseous pressure in the distal femoral epiphysis as well as the intraarticular pressure was significantly elevated in the arthritic knees in all dogs. During simulated intraarticular effusion a significant pressure increase was observed in the distal femoral epiphysis of the control knees, whereas a minimal response was observed in the arthritic knees. Microscopic examination of synovial membranes showed unilateral villous hypertrophic synovitis with chronic inflammation and fibrosis.

The present results suggest that epiphyseal hyper-tension and stasis play a role in the pathophysiology of growth disturbances in juvenile degenerative arthritis.

#### THE EFFECT OF ANTERIOR DISPLACEMENT OF THE TIBIAL TUBEROSITY IN IDIOPATHIC CHONDROMALACIA OF THE PATELLA

*A prospective randomized study*

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The effect of anterior displacement of the tibial tuberosity was evaluated in a prospective and randomized study in 42 patients with idiopathic chondromalacia of the patella. A modified Bandi procedure was used which gave a marked therapeutic advantage with a true difference in the cure rate between the two groups being in the interval from 10 to 76 per cent.

The lack of unambiguously good results may be due to the fact that though an anterior displacement reduces the retropatellar pressure it can not by itself compensate for an abnormal dynamic tracking pattern of the patella.

#### BILATERAL SIMULTANEOUS TOTAL KNEE REPLACEMENT

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Between January 1980 and February 1981, 172 total knee replacements were performed in 135 patients. Thirty-seven patients were operated bilaterally, 17 in staged procedures and 20 patients had both knees operated on simultaneously.

No difference in the number of complications between the two groups was found. The duration of the

operation was significantly shorter (202 versus 240 minutes), the need for blood transfusions greater (4.2 versus 3.2 units) and the postoperative length of stay in hospital significantly shorter (28 versus 42 days) for the patients operated on simultaneously.

#### ARTHROSCOPY IN THE DIAGNOSIS OF MENISCAL DISORDERS

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In a consecutive series of 588 knee arthroscopies, the arthroscopic diagnosis resulted in subsequent arthrotomy in 428 knees. The accuracy of the clinical and the arthroscopic diagnosis "meniscal injury" was evaluated by means of the diagnostic specificity (the predictive value of a positive test) and the diagnostic sensitivity (the predictive value of a negative test).

Arthroscopy added substantially to the diagnostic accuracy and proved especially valuable in the planning of the operation. If arthroscopy is available explorative arthrotomy is no longer needed.

#### GAS GANGRENE AFTER LOWER-LIMB AMPUTATIONS FOR ISCHAEMIA

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Over a period of 9 years eleven patients were treated for gas gangrene after amputations for ischaemia. Seven of the patients had diabetes mellitus. The treatment consisted of surgical revision, antibiotics, and hyperbaric oxygen. Gas gangrene developed on an average 3½ days after the primary amputation and the infection lasted for an average of 5 days. None of the patients died on account of the infection but three patients died during the subsequent course. Diabetes mellitus was not found to influence the course of the infection.

If gas gangrene is suspected the patients should be transferred to a hospital where the surgical treatment may be combined with hyperbaric oxygen.

#### THE RECONSTRUCTION OF SOFT TISSUE DEFECTS OF THE LOWER LEG BY MEANS OF THE DORSALIS PEDIS ISLAND FLAP

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Soft tissue defects in the distal third of the lower leg and the heel may offer reconstructive problems. With the dorsalis pedis island flap defects of up to 12×10 cm may be covered. Thirteen patients were treated with

this procedure. In 12 cases the treatment was successful with a stable soft tissue coverage. One flap became necrotic because of arterial thrombosis.

Donor site morbidity was minimal. All patients used ordinary footwear, but clogs provoked ulcerations in the split-skin transplanted area. The procedure is recommended for reconstructions of soft tissue defects in the distal part of the lower leg.

#### THE SIGNIFICANCE OF THE POSTERIOR TALO-FIBULAR LIGAMENT IN ANKLE STABILITY

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The lateral collateral ligaments of 30 osteo-ligamentous ankle preparations were cut successively to elucidate the function of the posterior talo-fibular ligament. Motion was provoked by a defined torque and registered graphically as mobility patterns. The posterior talo-fibular ligament consists of two components, a short anterior and a long posterior component. The ligament does not play an independent role in ankle stability if the ligamentous apparatus is otherwise intact, but after sectioning of the two anterior collateral ligaments, the short fibres limit inward and outward rotation of the talus, the talar tilt, and dorsiflexion, whereas the long fibres do not inhibit inward rotation.

#### HALLUX RIGIDUS TREATED BY DORSAL WEDGE OSTEOTOMY

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Nine young patients with hallux rigidus were followed up clinically and radiologically 2–7 years after a dorsal wedge osteotomy of the proximal phalanx of the first toe had been performed. In seven patients the results were evaluated as excellent. The operation is recommended for young patients without osteoarthritic changes in the preoperative radiographs.

#### FUSION OF THE ANKLE: A LONG-TERM FOLLOW-UP

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Twenty-eight out of 31 patients with fusion of the ankle were examined 2–17 years after the operation. Twenty-six were post-traumatic cases with osteoarthritis. Bony fusion was achieved in 25 patients, 21 patients had slight pain or no pain at all, but pain was a problem in seven patients, in three of whom it was partially disabling. The movement between the talus and the calcaneus was reduced to less than 50 per cent in 21 patients while passive mobility of the first metatarsal bone increased in one-third of the patients. The gait was normal in 15 patients, eight had a slight limp and five were disabled. Seventeen patients had a practically normal walking distance. Radiological osteoarthritis of the subtalar joints was found in 17 patients, but this had been present preoperatively in nine patients. Twenty patients had returned to their normal activity and three had found easier jobs. The operation still offers a good solution for patients with osteoarthritis of the ankle.