

## PROCEEDINGS OF THE SWEDISH ORTHOPAEDIC ASSOCIATION

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EDITOR: BO E. NILSSON

GUEST LECTURE:

### DECREASED ABDUCTION OF THE HIP JOINT IN INFANTS

*K. Palmén*  
Falköping

In 206 infants, in whom CDH had not been detected in the neonatal period, a later diagnosis revealed a decreased abduction in no less than 127 cases. However, this condition is not always related to CDH. Contracture of the adductors of the hip in infants is probably in many instances caused by habitual, supine - sideways position. In Sweden, infants have been traditionally kept in the supine position. It could be demonstrated that 20 per cent of children kept in this position had a decreased range of abduction motion whereas only a few children, kept in the prone position, had a decreased abduction. The range of decrease was 10-30°. Radiograms of these children could be misleading in that the child is not in a correct position on the X-ray table. Otherwise, the children's hips are radiologically normal. A good method of preventing this symptom, which may be wrongly interpreted as CDH, is lying the child in the prone position.

### MECHANICS AND SYMPTOMS FOLLOWING KNEE INJURIES

*O. Lindahl*  
Linköping

The occasionally poor relationship between objective findings and subjective symptoms in various orthopedic conditions is exemplified. The anterior cruciate ligament does not by itself stabilize the knee joint in a sagittal direction. Cruciate ligament surgery is a very doubtful procedure in that the relationship between the symptoms, the condition of the ligaments and the postoperative improvement has not been verified. Objective measurements of the mechanical properties of the knee joint before and after surgery should be recorded in order to evaluate the results

of surgery which may not necessarily agree with the opinion of the patient.

### MEASUREMENT OF SAGITTAL INSTABILITY OF THE KNEE JOINT IN A FUNCTIONAL POSITION

*L.-E. Sylvén*  
Linköping

In 10 patients with a positive drawer-sign after knee injury, the medio-posterior aspect of the joint capsule was tightened by a surgical procedure described previously. The subjective and objective results were good. Also, the sagittal stability measured in 90° flexion improved. However, after 1 year this variable did not differ greatly from the preoperative measurement. The cause of this discrepancy between a lasting clinical improvement and a temporary improvement of joint stability may be that the 90° flexion position is inadequate for measuring the drawer-sign, since in walking and running knee flexion rarely exceeds 45°. Therefore, an instrument for objective measurements of sagittal knee stability in varying degrees of flexion has been designed, and has proved valuable in preliminary studies.

### RESULTS OF SURGICAL REPAIR OF KNEE LIGAMENT INJURIES

*V. Surin & L. Ottosson*  
Borås

Thirty-three recent and 42 chronic ligamentous injuries were re-investigated 2-11 years after operation. The injuries were in many instances combined, most commonly anterior cruciate and medial collateral ligament ruptures. A variety of surgical procedures was involved. There was a significant positive correlation between measured

and subjective stability. The subjective improvement was related to the quadriceps force. After operative treatment recent injuries were significantly more often improved than chronic ones. All residual symptoms, except for the feeling of instability, were more common in those patients who had been operated on for chronic injuries. Radiological signs of arthrosis increased with the period of observation in chronic cases but not in recent cases. The various qualities of instability are related – one single measurement of stability is not relevant. Early operation and total repair of all structures is recommended.

#### LATE RESULTS OF PARTIAL PATELLAR TENDON TRANSPOSITION FOR LATE REPAIR OF ANTERIOR CRUCIATE LIGAMENT RUPTURE

*T. Dolk, S. Hallberg & U. James*  
Örebro

Twenty-five patients operated on with reconstruction of the anterior cruciate ligament, using a transplant obtained from the patellar tendon, were re-investigated after an average observation time of 33 months. Twenty-three of the patients considered themselves improved in spite of the fact that more than half still had a positive drawer-sign. There was no significant relationship between the results with regard to objective knee stability and subjective improvement. With increase in the period of time from injury the results tended to deteriorate. The time interval injury-operation also appeared to be of importance.

#### RESULTS FOLLOWING CRUCIATE LIGAMENT RECONSTRUCTION WITH THE PATELLAR TENDON

*O. Ahlgren & S. Friberg*  
Umeå

Ten cases operated on using a patellar tendon transplant without bone attached and 12 with attached bone were re-investigated. The follow-up included arthroscopy. The drawer-sign and rotational motion of the knee were recorded. The stability and the subjective results were better in patients with a bone-tendon transplant. The accumulated percentage of residual symptoms was 86. A relationship existed between the drawer-sign and the patient's feeling of instability. Arthroscopy revealed that 11 of the 12 bone-tendon transplants remained in a good position whereas six out of ten without bone, although in a correct position, seemed to have loosened somewhat.

#### RECONSTRUCTION OF THE ANTERIOR CRUCIATE LIGAMENT

*E. Eriksson*  
Stockholm

Four modifications of Jones' procedure were compared. Eighty per cent of the knee joints were stable at the 1-year follow-up, using a modification that included a new drill guide. A detailed description of the operative technique is published in: *Injuries of the Ligaments and their Repair*, ed. by G. Chapchal, pp. 130–142, G. Thieme, Stuttgart, 1977.

#### RECONSTRUCTION OF INVETERATE POSTERIOR CRUCIATE LIGAMENT INJURIES

*A. Stenström*  
Lund

Five patients, all with a posterior drawer-sign, were operated on. The semi-tendinous tendon with bony attachment was used for reconstructing the posterior cruciate ligament in its original position. Four of the patients had improved with regard to instability, subjectively and objectively; three could participate in soccer, and one (a woman) did not improve.

#### ACUTE ARTHROSCOPY

*E. Eriksson*  
Stockholm

Fifty consecutive acute knee injuries were examined arthroscopically. The injuries, 35 total or partial anterior cruciate ligament injuries, five bucket handle and four other meniscal lesions, two radiolucent chondral loose bodies and two cases of pigmented villo-nodular synovitis, could be easily diagnosed and treated while under the same anesthesia. Acute arthroscopy is the quickest and most reliable method with which to obtain an accurate diagnosis.

#### KNEE INJURIES IN SOCCER PLAYERS

*A. Roaas & G. Andersson*  
Göteborg

One hundred previously active or still active soccer players, aged 30–40, were compared with 108 age-matched controls, selected to represent the male population of the city of Göteborg. A history of knee injury was found in 56 per cent of the football players, and in 17 per cent of the controls. Knee symptoms were present in 65 and 34 per cent, respectively. The most common injury in both series was rupture of a semilunar

cartilage – 29 per cent in the football players, 6 per cent in the controls. Sixteen per cent of the football players had ligamentous injuries as compared with 4 per cent in the control series. Instability was found in 18 knees among the football players and in 16 knees in the control series. Reduced joint space was found medially in four subjects, all soccer players.

#### COMPARATIVE STUDIES OF QUADRICEPS TRAINING MODELS AFTER KNEE SURGERY

*L. Peterson, G. Grimby, E. Gustavsson & P. Renström*  
Göteborg

The effect of quadriceps exercise was tested in three groups of patients after knee injury and operation: one group used an isokinetic training device, one group a quadriceps exercise table and one a standard home program. The exercise program was carried for a period of 6 weeks, three times a week. In all groups the quadriceps force was improved by the exercise programs. The improvement in quadriceps force was greatest, both dynamically and statically, after isokinetic exercise.

#### THE SWEDISH NATIONAL KNEE ARTHROPLASTY PROJECT – A PROGRESS REPORT

*M. Grubor, G. Bauer & A. Lindstrand*  
Lund

Since 1975, 824 cases have been reported so far to the central register. Nine per cent were post-traumatic, osteonecrosis etc., whereas the remainder were evenly divided between osteoarthritis and rheumatoid arthritis patients. The compartment sliding type of prosthesis has been the most frequently used, with the Marmor prosthesis being the most popular. Complications have been recorded in 10 per cent of the cases. Deep infection, as a late complication, has so far been recorded in only six cases, of which four occurred after implantation of a hinge prosthesis. The early mortality was 0.25 per cent.

#### ROENTGENOGRAPHY OF KNEE ENDOPROSTHESES

*S. O. Ahlbäck & J. Rydberg*  
Stockholm

The radiograms of the patients involved in the national project are being reviewed centrally with classification of the preoperative roentgen

diagnosis. The basic concept is that an early engagement of both the lateral and medial compartments of the joint should be classified as arthritis rather than arthrosis. It is recommended that gonarthrosis be classified according to the localization of cartilage destruction and not to the distribution of osteophytes. Also, a survey of the roentgenographical appearance of the various types of knee prostheses is being prepared. This will, in the future, serve as a guide for radiologists.

#### TWENTY-FIVE YEARS EXPERIENCE OF ARTHROPLASTIES

*B. Walldius*  
Stockholm

A personal experience of arthroplasties since 1951 was presented. Based on experience with the use of cement since 1953, it is suggested that all endoprostheses should be designed to stay in place and to function without cement. Any type of foreign body will be surrounded by a layer of fibrous tissue. An endoprosthesis must be mechanically arranged in order to permit some degree of elastic deformation in this fibrous tissue without running the risk of loosening. Various types of knee prostheses and the reasons for subsequent modifications were described. The latest type has a built-in capacity for rotation.

#### RECONSTRUCTION OF THE MEDIAL TRANSVERSAL PATELLAR RETINACULUM IN CASES OF LATERALLY TILTING PATELLA

*F. Tideström*  
Linköping

The medial third of the patellar tendon, together with a part of the tibial tubercle, is dissected from below up to a 45° downwards-medially inclined line on the middle of the patella. It is then turned medially, drawn below the lower end of the adductor magnus tendon and sutured to itself, pulling the patella medially. This procedure was applied in cases of laterally tilting patella in order to prevent sideways movement. In 8 out of 11 patients, aged 15 to 52, this procedure was followed by improvement of the condition.

#### SYNOVIA – A CRYSTAL BALL FOR ORTHOPEDIC SURGEONS

*P. H. Widmark*  
Malmö

Syn (like) – ovia (egg) – analysis in the polarizing microscope is now in fashion. However, the

synovia glucose content is also of interest. A value exceeding the "normal" serum value will frequently unmask a latent or manifest diabetes mellitus! In postoperative hemarthrosis in hemophilic, gouty or rheumatoid joints there often exists a high intra-articular pressure, low  $pO_2$  level, high  $pCO_2$  level and a decreased pH, all of which changes are unfavorable for the metabolism of joint tissues. Such joints, therefore, should be punctured and frequently aspirated.

#### THE DIAGNOSIS OF DEEP INFECTION AFTER TOTAL HIP REPLACEMENT

*Å. Carlsson, G. Josefsson & L. Lindberg*  
Malmö, Gävle and Lund

The diagnosis of early infection following total hip replacement is usually simple but difficulties may be encountered in cases with symptoms occurring months or years postoperatively. In most cases, signs and symptoms, simple laboratory methods and radiographic examinations suffice for the diagnosis. The most prominent features are pain on walking, located in the groin or thigh, rotational pain, elevated ESR and radiographic bone resorption. In doubtful cases, scintimetry and, rarely, arthrography may be of use. For the definitive diagnosis, aerobic and anaerobic cultures of deep biopsies are required. It is important to withdraw antibiotics several weeks prior to biopsy.

#### HEMATOGENOUS INFECTION AFTER TOTAL JOINT REPLACEMENT

*Å. Ahlberg, Å. Carlsson & L. Lindberg*  
Malmö and Lund

The incidence of hematogenous infection in total hip arthroplasties has been calculated to be 0.2–0.3 per cent. The onset of infection is rapid with signs and symptoms similar to other forms of septic arthritis. In 16 cases described in the literature and five cases of our own, infection started 3–66 months (mean 26) after operation. The causative microbes were *staphylococcus aureus*, *E. coli*, *proteus mirabilis*, *beta streptococcus* and *pneumococcus*. In almost all cases, removal of the prosthesis became necessary and four patients died. At present, a thorough débridement, followed by irrigation drain and antibiotics, appears to be the treatment of choice.

#### COBALT ALLERGY – A CAUSE OF ENDOPROTHESIS LOOSENING

*A. Heijer, U. James, H. Kogler & K. Undeland*  
Uddevalla and Örebro

Seven cases are presented in whom cobalt allergy is suspected as a factor contributing to poor results of knee endoprosthesis. In four of the cases, the prosthesis had to be removed. There were negative cultures, at least two, anaerobic and aerobic, in all cases, and four had a skin rash in the knee region. Four cases had cutaneous tests, positive for cobalt allergy. All seven cases were metal to metal endoprostheses (Walldius and Guepar). It is suggested that metal to metal articulations be avoided, and that epicutaneous tests for metal allergy be included in the pre-operative procedure.

#### BRACHYMESOPHALANGIA AND OSTEOCHONDRITIS DISSECANANS

*B. Lindén*  
Malmö

This is a condition which combines hypoplasia or even aplasia of the middle phalanges of the hands and/or the toes with osteochondritis dissecans in the carpo-metacarpal joints. The syndrome was discovered in one patient, who presented with locking in a metacarpo-phalangeal joint. The family of this proband consisted of 27 individuals, 17 of whom were investigated. Ten of these had the syndrome, and out of the remaining 10, another 4 possibly had similar changes. The heredity is autosomally dominant. Those affected had no other malformations or clinical signs and the syndrome had rarely caused clinical symptoms.

#### THE EFFECT ON ARTICULAR CARTILAGE OF INTRA-ARTICULAR INJECTION OF OSMIUM TETRAOXIDE AND RADIO-GOLD IN EXPERIMENTAL ARTHRITIS

*Å. Ahlberg, A. Henricson, H. Telhag & F. Wollheim*  
Malmö

Antigen-induced arthritis was produced in 30 adult rabbits, using ovalbumin. After 4 weeks, 10 rabbits received 0.3 ml 1 per cent Osmium tetraoxide, 10 rabbits 100  $\mu$ Ci  $^{198}$ Au intra-articularly and 10 served as controls. In addition, 10 rabbits without arthritis were treated with osmium and 10 with  $^{198}$ Au. Light microscopy showed severe destruction of articular cartilage in the osmium-treated animals, worse than in the controls. On the other hand, the degree of destruc-

tion in the  $^{198}\text{Au}$ -treated animals was less than in the controls and the osmium animals. In all the non-arthritis animals light microscopy was normal regardless of treatment. Autoradiograms ( $^3\text{H}$ -thymidine) showed injury to the cartilage in all groups.

#### TENODESIS IN RECIDIVOUS ANKLE SPRAINS USING THE SHORT PERONEAL TENDON

*L. Ottosson*  
Borås

Lateral ankle instability was treated with peroneal tendon tenodesis. Forty-two patients, operated in this manner, were followed up, on average, 5 years after surgery. Most of these patients had a distinct trauma in their history with instability, repeated sprains and, periodically, pain at rest. The procedure caused no complications and was followed by improvement in all but three of the patients. The most common persistent symptom was lateral swelling in 14 cases. Four patients were unable to do physical exercise after surgery. It was demonstrated that tenodesis, using the tendon in its normal position, has a good stabilizing effect on the ankle joint.

#### EXTIRPATION OF TUMORS LOCATED NEAR THE THORACIC CAGE

*B. Stener & G. Markhede*  
Göteborg

A method is described by which the external thoracic fascia, the external intercostal muscles and the periosteum of the external surface of the ribs can be included in the specimen as a continuous wall of healthy tissue on the deep side of the tumor. This technique has been used in 11 patients, nine of whom had undergone one or more inadequate operations earlier. Eight patients had malignant tumors, three an extra-abdominal desmoid. In one of the latter patients, in whom a recurrent tumor was adherent to the rib periosteum, the method was unsuitable. In the other patients, the method appears to have been adequate for local control of the tumor.

#### WHEN SHOULD OS CALCIS FRACTURES BE OPERATED ON?

*O. Thorén*  
Vänersborg

In the past, it has been demonstrated that cases with severe displacement and with a Böhler angle of  $0^\circ$  or less are more successfully treated sur-

gically than conservatively. Using these criteria, 32 suitable cases were operated on within the first 2 days after the injury. The os calcis was exposed by a lateral incision, the posterior aspect of the joint being elevated and a bone transplant inserted for support. The previous concept about indications for surgery was supported by the results of this series.

#### WORKING CAPACITY FOLLOWING McMURRAY OSTEOTOMY

*M. Yllö*  
Skövde

Thirty-seven patients, 27 men and 10 women, with coxarthrosis, in many instances secondary, were operated on with a displacement osteotomy, according to McMurray. The follow-up period was at least 2 years. The age range for women was 24–58, and for men 36–64. It was demonstrated that 25 patients were capable of heavy work whereas 12 were doing lighter jobs. Twenty-seven went back to work after the operation. Seventeen were able to do the same type of work after operation as before, whereas ten had had to change to a lighter job. Ten patients could not go back to work.

#### BONE MINERAL IN BALLET DANCERS

*S. Andersson*  
Malmö

In professional ballet dancers, the bone mineral content was measured in the cancellous bone of the proximal end of the tibia. The values were significantly increased as compared with a non-ballet control population, the mineral content being, in many instances, so great that it was above the range of normative data. An example was also given of a severe post-traumatic osteopenia, following a minor foot injury to a ballerina.

#### LOSS OF BONE MINERAL AFTER TIBIA SHAFT FRACTURE

*S. Andersson*  
Malmö

After a tibia shaft fracture, the bone mineral content of the distal end of the tibia rapidly decreased. The average loss was about 40 per cent. Within the first year, there was a slow recovery of bone mineral but the original content was never attained. There was no difference in this regard between 13 patients treated with a long leg plaster cast and crutches as compared with 14 treated with a functional plaster and early

weight-bearing with a free knee joint and no support.

#### LOSS OF BONE MINERAL AFTER LIGAMENOUS KNEE INJURIES

*S. Andersson*  
Malmö

The bone mineral content in the proximal end of the tibia was measured in patients with clinical signs of ligamentous knee injuries from the day of the injury and over a period of 1 year. There was a rapid loss of bone mineral: 7 per cent in those patients who were treated with an ace-bandage only and mobilized as soon as possible, and 14 per cent in patients operated on with repair of the ligaments and postoperative plaster cast for 6 weeks. No signs of restoration of the lost bone mineral were noticed in any of the groups.

#### ORTHOPEDIC HEALTH SURVEY OF 69-YEAR-OLDS IN STOCKHOLM

*E. Spangfort*  
Huddinge

About 5,000 69-year-old men and women, residents of the city of Stockholm, who had not been admitted to institutions, were surveyed with regard to orthopedic conditions. Sixty per cent of the women and 50 per cent of the men had subjective symptoms from spine or joints, of which one fifth were classified as severe. However, only 2–3 per cent had an obvious orthopedic condition requiring referral for orthopedic treatment whereas 6–7 per cent had symptoms which probably could be managed in a general practice. The survey did not support the concept of a large "silent" need for orthopedic services in this fraction of the population, nor that routine health surveys of the elderly by orthopedic specialists could be justified.

#### TECHNICAL FAILURES WITH THE ENDER NAILING PROCEDURE

*L. Hult & M. Nilsson*  
Stockholm

Technical difficulties were encountered in 62 out of 920 cases. The nails slipped in 31 cases: in 16, owing to compression of the fracture causing the nails to slip and interfere with the knee function; and, in 15, because of poor fixation with dislocation of the fracture. All 31 cases were re-operated on: in 6, the nails were removed after the fracture was healed whereas slipping in conjunction with fracture dislocation could not be

successfully re-operated using Ender nails. Perforation of nails into the acetabulum occurred in 19 cases but caused little discomfort to the patients. In nine cases, nails were displaced outside the femoral neck and head. All fractures, including those with technical failures, healed satisfactorily.

#### FRACTURE ORTHOSES

*D. Moxer*  
Borås

A fracture orthosis should fulfil the criteria of being available to supply a fracture at short notice and without time-consuming shop work. Thermoplast can be moulded on the leg. The orthosis is cut longitudinally leaving a gap of 1 cm and then attached to the limb under pressure. Also, fixtures are attached with thermoplast. These orthoses are best suited for thigh and below-knee fixation. The main advantages are low weight, easy handling, radio-translucency, immediate weight-bearing and control of compression. In a series of 30 patients, the opinion of the patients regarding this bandaging technique was very positive.

#### THE TULIP PROSTHESIS

*O. Henriksen, G. Marsch & B. Persson*  
Karlskrona and Lund

In the tulip prosthesis a cushion filled with tiny plastic balls is moulded onto the stump. The air is evacuated by a pump from this "air splint", which then serves as a semi-rigid provisional stump support which may be inserted into a standard adjustable early walking aid and secured with four "petals" (hence the tulip!). In a series of 13 below-knee amputees aged 37–88, this method greatly improved the results of early postoperative walking exercise. Also, the physiotherapists were able to handle this phase of rehabilitation independently without involving the brace shop in the individual cases.

#### ASPECTS OF SENSORY FEEDBACK FROM MOTORIZED PROSTHESES

*P. Herberts, L. Körner & A. Anani*  
Göteborg

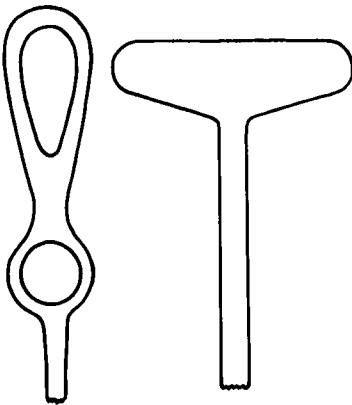
Afferent electrical nerve stimulation was carried out, using a percutaneous method for intraneural stimulation of nerves in the amputation stump of below-elbow amputees and by sensory nerve stimulation in non-amputees. It was found that frequency or amplitude modulated stimulation

after a limited training could convey information on about five to six discrete levels with a rate of correct recognition of greater than 80 per cent and with an amount of transmitted information of 1.80–2.05 bits per symbol. These results have encouraged further work in order to develop a motorized prosthesis with this kind of feedback system.

#### ERGONOMICALLY IMPROVED RETRACTOR HANDLES

*H. Ekström & O. Lindahl*  
Linköping

On the basis of ergonomic considerations, the traditional retractor handle designed about 1890 has been replaced by a new handle (Figure). It could be demonstrated by experiments and practical tests that the new handle offers a considerable improvement by distributing the pressure of the tool more evenly and reducing the muscle force needed to maintain a constant traction at a level which is more comfortable for the surgical assistant.



#### THE SCAPULO-COSTAL SYNDROME

*L. Blomberg*  
Borås

Tenderness of the superior angulus of the scapula, radiating pain to the neck and sometimes to the arm, and dysfunction of the levator scapula muscle and to some extent the rhomboids, are characteristics of the scapulo-costal syndrome. Four patients were described. The etiology seemed in all cases to be a sprain of the arm and shoulder. In one case, with very severe pain after injury, there were gait abnormalities, probably due to sensory spinal inhibition caused by the severe pain. Local injection of steroid and local anesthetics were effective in all four cases.

#### SYMPOSIUM – OCCUPATIONAL ORTHOPEDICS

##### INTRODUCTION I

*A. Nachemson*  
Göteborg

The locomotor system is the most common site of occupational disability with preponderance for disorders of the back. Our knowledge of the relationship between working conditions and pain in the back is incomplete. It is therefore justified to devote much more work to and take a greater interest in occupational orthopedics.

##### INTRODUCTION II

*G. Danielsson*

The National Board of Occupational Safety and Health, Stockholm

With the reform of July 1, 1977, in Sweden, the definition of occupational injury will be expanded to include conditions not necessarily caused by accident. The problems involved in preventing orthopedic conditions will therefore be more important in the future. Today, departments of occupational medicine are being established all over the country and most of the health regions are being covered. It is desirable to further decentralize these activities. An important objective of occupational medicine is to bring health care in general into closer contact with working conditions. Orthopedics will, in this respect, be one of the most important branches of medicine.

#### EXAMPLES OF INJURIES TO THE BACK

*A. Nachemson*  
Göteborg

Between blue collar and white collar workers there is no difference in the incidence of pain in the back. The importance of psycho-social factors for low back incapacity is well documented. Working conditions, particularly jobs requiring lifting strength, stooping positions or demands on maximal physical effort, are of major importance in this context. With electromyography and disc pressure measurements it is possible to find the optimum sitting working position in patients with severe back pain. Patients with sciatica are predominantly affected by bending, twisting and rotating movements. However, in other aspects many patients with back pain still retain a locomotor capacity comparable with normal.

It has been demonstrated that the central part of the nucleus pulposus is poorly supplied and has

a low content of oxygen and glucose. In the border line, between the nucleus and the annulus, shearing ruptures may occur at an early stage of the degenerative process. These changes may be more pronounced if the disc is subjected to static forces of a long duration.

#### METHODS EMPLOYING ELECTROMYOGRAPHY FOR BIOMECHANICAL STUDIES

*R. Kadefors*

AB Götaverken, Göteborg

Physical load presents the most common complaint among Swedish workers, as far as work environment problems are concerned. Quantitative methods for studying physical work are needed, and EMG methods are of major potential interest in this regard. Static work is accompanied by changes in the spectral composition of the EMG, indicative of decrease in muscle fiber conduction velocity. The quantitative interpretation of the EMG changes is greatly facilitated by using intramuscular single wire electrodes for signal pick-ups. This method is also applicable in field studies on the shop floor.

#### METHODS OF BACK LOAD MEASUREMENTS

*R. Örtengren*

Göteborg

Few objective methods for measuring forces inside the body are currently available. Examples are recordings of intra-discal pressure and of intra-abdominal pressure. Monitoring of myoelectric back muscle activity using surface or percutaneous electrodes is also useful. Quantitative electromyography has been applied

in studies of working postures in the laboratory as well as on the shop floor. The myoelectric signal amplitude is a predictor of muscle force, and the changes in the signal power spectrum parallel localized muscle fatigue. It has been demonstrated that the myoelectric activity and the intradiscal pressure of the lower back increase linearly with the load on the spine. The method of weight-lifting – back-lifting or leg-lifting – seems to be less important whereas the distance between the weight and the body is more important for the load on the back.

#### SHOULDER PAIN IN ARDUOUS INDUSTRIAL WORK

*P. Herberts*

Göteborg

Static work was studied by means of quantitative electromyography from muscles of the shoulder of welders in a ship-yard. The myoelectric spectral development indicated that localized muscle fatigue was common in prolonged overhead work, especially in the supraspinatus muscle. By means of clinical examination, soft tissue radiography and quantitative electromyography, the effect of this type of industrial work was evaluated in welders with typical shoulder pain. The study revealed that the older workers have a chronic tendinitis of the rotator cuff. The supraspinatus muscle was shown to be consistently fatigued during overhead welding. It is believed that this is an important factor in the etiology of the shoulder pain common in older welders. Thus, overhead welding presents an undesirable working situation involving heavy static loading on the supraspinatus muscle. Experience and training for this type of job does not entail immunity.