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Functional importance of different clinical findings in the unstable knee

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It is well known that the functional loss can vary widely in patients with knee instabilities. A positive pivot-shift is generally associated with functional impairment, especially of the patient's ability to take part in sports (Lysholm et al. 1981).

To study the relative importance from a functional point of view of different instabilities, 155 patients with old knee ligament injuries and 62 healthy controls were studied. Seventy-seven (50 per cent) had anterior cruciate tears mostly in combination with medial ligament tears, 37 had posterior cruciate tears (9/37 both cruciates), 36 had isolated medial ligament tears and the remaining five had lateral ligament injuries. A functional evaluation was done using Lysholm's functional knee scoring scale (1982). Clinical examination was done using the AAOS standard. All data were treated statistically with a multiple regression analysis. The most severe clinical finding was ab- or adduction instability in full extension. This was present in only a few patients and always associated with a poor knee function. Significant functional impairment was also associated with a positive pivot-shift or the presence of a postero-lateral drawer sign (for estimated functional score deduct from 100 for 1+ pivot-shift 11.4, for 2-3+ pivot-shift at 22.8, for 1+ postero-lateral drawer 11.9 and for 2-3+ postero-lateral drawer 23.8). Also, a straight posterior drawer sign was of significant importance (100-8.1/16.2). Abduction instability was associated with less functional impairment (100-5.2/10.4). Quadriceps atrophy was also associated with

functional loss (100-7.9). The multiple correlation coefficient between the actual functional score and the clinical findings was 0.81.

Correlation between X-ray findings and arthroscopy in the arthritic knee

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The value of arthroscopy was first recognized in the evaluation of patients with meniscus lesions and ligament injuries. Lately a few investigations have dealt with the value of arthroscopy, i.e. in the pre-operative evaluation of patients with osteo-arthritis considered for high tibial osteotomy. The present investigation was done to correlate findings of cartilage degeneration on arthroscopy to the radiographic diagnosis of osteo-arthritis using the Ahlbäck-classification (1968). Such data are important for further evaluation of the value of arthroscopy on this indication.

Sixty-three patients with a mean age of 50.7 (range 26-70) years were studied. All patients were examined preoperatively with an X-ray of both knees, weight-bearing (Ahlbäck 1968). Arthroscopy was done according to Hagberg & Gillquist (1976) and Gillquist et al. (1978). Cartilage degeneration was classified according to Outerbridge (1961). Twenty-eight (44 per cent) patients had normal cartilage or showed an Outerbridge 1 degeneration (superficial fibrillation). Twenty-five (89 per cent) had normal radiographs; the remaining three showed 1st degree osteo-arthritis. Twenty-four (38 per cent) patients showed fragmentation of the cartilage (Outerbridge 2+3). Fourteen of these (58 per cent) had

normal radiographs, nine (38 per cent) showed 1st and 2nd degree osteo-arthritis. Patients with fragmentation of the cartilage and normal X-ray had a less generalized cartilage degeneration on arthroscopy compared to those with the same grade of degeneration but pathological X-ray. Eleven (18 per cent) showed severe cartilage degeneration (Outerbridge 4); one had a normal X-ray. The rest were pathological: 1 1st, 6 2nd, and 2 3rd degree osteo-arthritis.

In conclusion, a localized cartilage degeneration although the cartilage shows fragmentation is not seen on a weight-bearing X-ray. In more generalized disease, the osteo-arthritis is diagnosed on X-ray in most patients. Whether localized cartilage degeneration diagnosed only on arthroscopy is a pre-cursor to osteo-arthritis requires further study.

Radiographic appearance after ACL-injury and meniscectomy

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From a consecutive series of knee-ligament injuries reexamined 5–35 (mean 10) years after the accident causing the injury, those with ACL-injuries (N=277) are presented. The diagnosis had been arrived at by arthrotomy. The reexamination included symptoms, function, parameters of joint instability and roentgen. According to the findings of the roentgen examination, the patients were classified into three groups.

1. Gonarthrosis: Narrowing of the joint space according to Ahlbäck.
2. Osteophytosis: Knee joints with osteophytes observed on the medial and/or lateral edges of the tibia or the femur with at least one osteophyte of a size of at least 2 mm.
3. Normal: All other joints.

Gonarthrosis was found in 8 per cent of the joints and almost only in joints which had also been meniscectomized. Compared to the osteophytosis and normal joints, the gonarthrosis patients were older at the time of the injury as well as at the follow-up. Osteophytosis was rare in uninjured joints. In ACL-injuries there was 15 per cent osteophytosis and in ACL-injuries with meniscectomy 40 per cent. There was no difference between the joint space in normal joints and in joints with osteophytosis. In the latter group there was a slight negative age regression which may indicate that some of the osteophytosis patients could in time fulfil the criterion of gonarthrosis.

Chondral lesions of the femoral condyles

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A study was made of 167 cartilaginous lesions in 140 knees. From their arthroscopic appearance, six different types of chondral lesions could be distinguished.

Type I-Linear crack type is a fissure in the articular cartilage.

Type II-Stellate fracture type shows a stellate pattern, often with a small piece missing in the center and with slightly undermined edges of the lesion.

Type III-Flap type is usually triangular in shape with a piece of cartilage detached at the apex of the triangle but still attached at the base.

Type IV-Crater type shows a loss of a piece of cartilage.

Type V-Fibrillation type presents as a fine fibrillation, usually within a slightly flattened, abraded or eroded area of articular cartilage.

Type VI-Degrading type features a breaking-off of major and minor pieces of cartilage.

The weight-bearing parts of the articular surfaces are the areas where chondral lesions are most commonly seen.

Analysis of causes of trauma, types of trauma and age suggests that types I–IV represent true chondral fractures and types V and VI degenerative processes.

The lesions were treated by excision of loose or undermined pieces of cartilage and the patients followed for 18.8 months. The best results were seen in types II and III, whereas types V and VI seemed to deteriorate. Pain and swelling was less, while clicking was still a fairly common complaint. It often took 6–8 months for definite improvement following the procedure.

Instability after ACL-injuries, repaired and non-repaired

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A consecutive series of 389 knee-ligament injuries in 383 patients was reexamined 5–35 (mean 10) years after the accident. The diagnosis had been arrived at by visual inspection at an arthrotomy. The reexamination included symptoms, function, clinical es-

timation and quantitative measurements of stability and roentgen.

Estimations of anterior-posterior instability arrived at by interviewing the patient or using the forward drawer test, the pivot shift or the Lachman test, were tested for internal correlation. The four variables were all closely correlated with each other and with measured instability as well.

Out of 183 ACL-injuries, isolated or combined with other ligament injuries or meniscus lesions, 86 were repaired.

Random allocation had not been used and retrospective analysis of the indications for surgery in the individual patients was difficult or impossible.

No significant difference was found in any parameter of instability between ACL-repaired and non-repaired. In spite of the shortcomings of these data, the repair procedure should have left some measurable beneficial effects. The early results of repair cannot be estimated from the data in this study.

The late results are in agreement with those presented by McDaniel & Dameron (1980) and recently by Odensten, Lysholm and Gillquist.

The most impressive finding in the present study was not that patients treated with repair were doing poorly, but rather that the untreated patients were doing so well.

Treatment of the acute torn anterior cruciate ligament. A randomized study with a short-term follow-up

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Eighty-five patients ranging in age between 13 and 49 years (mean 24.5) with an acute anterior cruciate ligament rupture underwent arthroscopy within the first week after injury. All patients had a midsubstance tear of the anterior cruciate and were randomized into two groups: surgical treatment and conservative treatment of the anterior cruciate ligament. Patients in the first group had their anterior cruciate ligament repaired with sutures and augmented with a strip from the iliotibial band. This group included 44 patients. In the other group, (41 patients) the anterior cruciate ligament was left without repair but all other damage was treated. As part of the evaluation at the follow-up 19 months postoperatively, a functional knee test including isokinetic muscle strength test (Cybex II), a standardized one-leg jump, figure-of-eight running and a

functional knee score (Lysholm & Gillquist 1982), was obtained.

In the first group with a sutured anterior cruciate ligament, 88 per cent of the patients were stable at follow-up. In this group the mean score was 86.9 ± 12.2 points. In the other group there were only 8 per cent stable patients at follow-up, a significant difference. The mean score in this group of patients was 84.2 ± 11.4 points (non-significant). We could not find any significant differences between the groups in the running test, jumping test or thigh muscle strength tests.

Entrapment of the nervus peroneus superficialis as a cause of pain

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In five patients with long-standing pain on the lateral side of the lower leg and on the dorsal side of the foot, increasing during physical activity, the nervus peroneus superficialis branches, cutaneus dorsalis intermedius and medialis were explored, in one patient bilaterally, on the suspicion of entrapment of the nerve as the cause of the pain.

In three cases a muscle hernia, 2 cm in diameter, was found with the nerve (both branches) riding on the bulging peroneus muscles. In the remaining three cases, the nerves (cutaneus medialis) penetrated the fascia through a small hole with very dense edges, in one case with obvious signs of chronic compression, like oedema and neuroma, and in the other two with a normal appearance. A fasciotomy was made subcutaneously with a Smillie knife in a proximal and distal direction, altogether about 15 cm. In all cases the pain disappeared immediately after the operation.

The possibility of a compression of the nervus peroneus superficialis should be kept in mind in cases with inexplicable pain of the lateral side of the lower leg and dorsal side of the foot.

Treatment of femoral fractures with the "locking" nail technique

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Intra-medullary nailing of femoral fractures according to Küntscher's method does not solve all prob-

lems. The ideal indication for a Küntscher nail is the mid-shaft fracture. In fractures in other locations or in comminuted fractures, there are two problems: rotation of the fragments and telescoping at the fracture site. By locking the nail into the bone by means of self-tapping screws driven through holes located at both ends of the nail, rotation and shortening can be avoided. Two sighting devices have been designed for screw setting. The proximal screws are positioned through a firmly attached nail target device. The distal screw positioning is done through a target device which is inserted and locked on the generator housing of an X-ray unit.

We used dynamic-locking nailing in 30 femoral fractures: in fresh fractures of all types, in non-unions as well as in pathological fractures.

We find that this technique is a definite step forward in the treatment of femoral shaft fractures.

Five-year experience of an operative program for total hip arthroplasty

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In 1978, an operative program for THR was introduced at the East hospital in Gothenburg. Three different prostheses have been used: the cemented Charnley prosthesis, the cemented ICLH double-cup arthroplasty and the cementless Lord-Madrepourique system.

The program was formulated by taking into account age, related level of activity and the diagnosis with the grade of pathological changes defined from radiographs. Osteoarthritis was defined as being supero-lateral or medial, and graded I-IV.

The Charnley procedure has been used on a regular basis for elderly patients, over 60, with all kinds of different diagnoses. The reason for choosing this procedure was that good, long-lasting results have been obtained in Gothenburg since 1972 and can be anticipated according to the literature. The procedure has been continuously developed and is extremely standardized and thereby well suited to educational purposes.

The ICLH double-cup arthroplasty has mainly been used on middle-aged patients (40-60 years) with OA grade I and II. Sixty-four patients have been operated since 1978 and 56 followed for 1-6 (mean 2.5) years postoperatively in a prospective and longitudinal study. The clinical results were equal to those obtained by conventional stem hip arthroplasties. Complications were recorded in nine hips with femoral neck fracture in two, loosening of both

components in two and loosening of the acetabular component in five. Our results have shown that the selection of patients is very important and the quality of bone must be good. Surface replacements can be used on a small but well-defined group of patients, but further clinical studies must be performed.

The cementless Lord-Madrepourique system has been used on young and middle-aged patients (25-55 years) with destructive hip changes (grade IV) of various kinds. This study is also prospective and longitudinal and 70 patients have now been operated. In our latest follow-up, 38 patients were seen with a mean age of 45 years. The follow-up time is short (0.5-3 years). The clinical results are good and complications few. The operative method involves certain specific pit-falls but no reoperations or any clinical failures have yet been seen.

A clinical study of gentamicin excretion kinetics after total hip joint replacement with gentamicin cement

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The incidence of deep infection after total hip joint replacement can be reduced with the use of PMMA bone cement containing gentamicin. It has been particularly useful for revision of infected prostheses. Its efficacy in the prevention of early infection is uncontroversial, while its long-term effect against late hematogenous infection has not been established clinically or in animal experiments.

Ten patients (44-72 years) undergoing total hip joint replacement with PMMA bone cement containing 0.89 per cent active gentamicin sulphate were investigated. They received 55-122 g Palacos® and thus 0.5-1.1 g gentamicin (corresponding to 5.6-16.7 mg/kg). Four, 12 and 24 h portions of urine were collected for up to 2 years postoperatively. Gentamicin concentrations in urine were initially 8-25 mg/l, and during the first 4 days the daily excretion ranged from 0.7-25 mg/day. On the 30th day the drug levels in urine were 0.5-1 mg/l and the daily excretion 0.5-1 mg/day. The excretion time curve consisted of an initial rapid phase, terminated 4-6 days postoperatively, with a half-life of 0.65 (range 0.5-1.6) days, and a slow phase with a half-life of 16 (range 7.5-73) days. Calculations based on the area under the individual excretion time curves 0-2 months postoperatively and their extrapolation in time accounted for 13 (range 5-18) per cent of the

gentamicin given. Although some gentamicin was "lost" in wound secretions, a major part was still not accounted for. Data obtained 2 years after the operations suggested that the true terminal half-life was much longer (≥ 240 days) than the average 16 days calculated from data 5–60 days postoperatively. It was calculated that the surface area of the cement would be in excess of 150 cm² and that the volume of a 1 mm thick interface tissue layer would be approximately 15 cm³. Thus, at 3 weeks, when the daily excretion was approximately 1 mg/24 h, 67 $\mu\text{g}/\text{cm}^3$ /day of gentamicin would be available for antimicrobial action at a 1 mm thick tissue/cement interface.

Seventy-four Attenborough knee replacements. A clinical and radiographic study

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Seventy-four Attenborough total knee replacements in patients with severe classical rheumatoid arthritis were followed for 2–5 years. The preoperative radiograms were evaluated according to two different scoring systems. At follow-up, radiographic whole leg examination was performed. Mean malalignment was 7°. The overall results were not encouraging, with definite failure in eight knees and probable failure in another 21 knees. Failure was significantly correlated with postoperative malalignment.

Stability of external fixators used for knee arthrodesis after failed knee arthroplasty

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Arthrodesis as treatment for failed knee arthroplasty is being used increasingly but it has a high failure rate. The usual method is external fixation, generally with the Hoffmann-Vidal fixator which has a low anterior-posterior bending stiffness compared to the lateral bending stiffness. A ventral frame with sagittal pins was designed for the Hoffmann-Vidal fixator in order to improve the sagittal stability. In this study the load-deformation curves were plotted for external fixators with and without sagittal pins

and ventral frames. The modified Hoffmann-Vidal fixator and the similar titanium Ace Fischer fixator were found to have a sagittal stability superior to that of the standard Hoffmann-Vidal device.

Tolerance of Diclocil vs. Ekvacillin/Heracillin in perioperative prophylaxis

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Despite extensive use of isoxazolyl penicillins (isoxapc's) in perioperative prophylaxis of arthroplastic surgery, there is a lack of controlled studies comparing isoxapc's in this setting. There have been many assumptions, but few facts. We have studied the local and systemic tolerance of different isoxapc's.

Material and methods. Consecutive hip replacements were randomized to receive I-Diclocil (Diclo) i.v. 1 g \times 3 and orally 1 g \times 3 or II - Ekvacillin (Ekva) 2 g \times 4 i.v. and Heracillin (Hera) 1 g \times 3 orally. These may be considered as equivalent regimens. Prophylaxis was given for 5 days (i.v. on the day of operation). Local and systemic tolerance were recorded by an investigator who was unaware which isoxapc had been administered.

Results. Local erythema or phlebitis was noted after Diclo i.v. in 19/50 (38 per cent) and after Ekva i.v. in 21/60 (35 per cent). Oral therapy was discontinued following side-effects in 9/55 (16 per cent) of Diclo patients and 9/60 (15 per cent) of Hera patients.

Conclusion. In this study no significant difference was found between Diclocil and Ekvacillin/Heracillin regarding local and systemic tolerance.

Fixation of slipped capital femoral epiphysis with AO-screws

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During the period 1970–1982, 22 patients with slipped capital femoral epiphyses were treated by fixation with AO cancellous screws. Most of the operations were done without or with a very small gentle reduction. Two screws with a short tap were used and about 1 cm of the screw protruded through

the cortex laterally. The fixation was good and no further displacement occurred. Weight-bearing was reduced postoperatively for about 2 months and after about 2 years the screws were extracted, usually without problem. Fifteen cases had advanced slipping up to 2.5 cm or 46° according to Billing; the rest showed only minor slipping. Five patients were operated on both hips. Only one patient, with advanced slipping, now has some discomfort; in the rest there is no problem. We have not been able to find any significant disadvantage in the femoral remodeling capacity or growth with this atraumatic osteosynthesis.

Postoperative care and rehabilitation in hospital in elderly patients with hip fracture

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During a 1-year period (April 1981 to March 1982), 251 patients with hip fracture were studied with special reference to the need for nursing care and functional rehabilitation in the hospital immediately after operation. One hundred and thirty-nine patients with cervical hip fracture were operated with nails (a single Rydell nail or two Hansson hook-pins) and 112 patients with trochanteric fractures were operated with Ender nails (13) or Richards sliding nail (96). The two patient groups were compared. The hospital stay for cervical fractures (mean age 79 years) was mean 16 days (median value 14 days) compared to mean 30 days (median value 22 days) for trochanteric fractures (mean age 80 years).

On average, patients with cervical fractures managed their ADL 2–5 days postoperatively, whereas the trochanteric fractures needed help with ADL for up to 13 days postoperatively. Thus, considerably greater demands are put upon the nursing staff by patients with trochanteric fractures.

Severe pain on walking, severe pain at rest with disturbed sleep at night, as well as moderate pain on walking and at rest, were persistent for a considerably longer time period and in 3 to 5 times as many patients in the trochanteric group. Three weeks after operation, 90 per cent of the patients with cervical fracture had returned home compared to 67 per cent of the patients with trochanteric fractures.

One week after operation, the trochanteric group had a hemoglobin value 70 per cent (mean) of that in the cervical group, probably due to peroperative blood loss of 715 ml (mean) compared to 128 ml (mean) in the cervical group.

A somewhat higher incidence of other diseases, more pain because of the greater fracture and lower hemoglobin value, may be some factors explaining the greater demands on nursing care and difficulties in managing ADL postoperatively in the trochanteric group.

A prospective study of knee function after arthroscopic meniscectomy

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The arthroscopic meniscectomy technique is developing fast thanks to improved instruments, the use of a mechanical leg-holder, and the development of endoscopic television. Most studies of arthroscopic meniscectomy have presented a final result without comparison to preoperative knee function. It is important, however, to relate the results of operation to the preoperative status. This study is concerned with the short-term functional recovery after arthroscopic meniscectomy used as a routine method of treatment. In a prospective study, operation under arthroscopy was done in 100 consecutive patients, 11 women and 89 men with a lesion of one meniscus. Meniscectomy was done in 86 patients with medial meniscus tears and in 14 lateral tears; 67 per cent were treated as out-patients and 28 per cent remained in the hospital for only 1 day. No complications occurred during the follow-up period after 10 (6–17) months.

After operation there was a highly significant improvement of knee function as measured by a system score in all patients. However, in the presence of quadriceps muscle weakness and degenerative joint changes, the final score was significantly lower compared to patients not having these changes. Among patients with bucket-handle tears, 79 per cent were operated on within 1 month. Of patients with other tears more than 75 per cent had a history of 3 months or more. After 2 weeks, 85 per cent of the patients were back at work. In elderly patients knee function was generally within the good-excellent group at follow-up and comparable to that in younger patients.

This study supports our opinion that the arthroscopic operating technique facilitates treatment of all meniscus lesions and should, whenever possible, become the standard method of meniscectomy.

A scoring system for evaluation of subjective symptoms after ankle fracture

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A scoring system for evaluating the symptoms after ankle fractures is described. The system is tested against a linear analogue scale, the range of motion in loaded dorsal extension, the presence or absence of osteoarthritis and the presence or absence of dislocation. The scoring system correlates well with these four parameters.

The conclusion is that the scoring system is a good tool for evaluating the subjective symptoms after ankle fractures. It seems to give a much more detailed picture of the symptoms than the traditional system with four groups.

The scoring system is recommended for scientific purposes. It can also be of great importance for medico-legal purposes.

Intramuscular pressure and blood flow in unilateral chronic compartment syndrome

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Chronic compartment syndrome (CCS) is reported to affect both legs in 90–100 per cent of cases. Among our patients with CCS, we have found three cases with unilateral CCS in the anterior tibial muscle. The aim of this report is to emphasize the value of the muscle relaxation pressure (MRP) during exercise in diagnosing CCS and to correlate the MRP to muscle blood flow.

Method. With the patient lying on his back and the feet on loaded pedals, a specially prepared polyethylene catheter was introduced into the muscle compartment of the anterior tibial muscle bilaterally. The catheter was connected to a pressure recording system with microcapillary infusion. The MRP and muscle blood flow were measured during exercise. Six normal subjects were investigated in the same way.

Results. In the normal subject the MRP rose continuously to 20–25 mmHg during 15–30 min of work until the muscle became tired. The muscle pressure at rest normalized within 6 min. In patients with CCS, the MRP rose to 15–22 mmHg in the symptom-free leg and to 35–45 mmHg on the painful side. When the MRP rose to 35–45 mmHg, the blood flow decreased rapidly and the patients developed severe

pain and impaired muscle function in the anterior tibial muscle. When the resting pressure after exercise fell below 30 mmHg, there was a reactive hyperaemia with very high muscle blood flow values.

Conclusion. Muscle relaxation pressure is a valuable parameter in diagnosing CCS. The blood flow decreased significantly when the MRP value rose above 35 mmHg. The muscle blood flow, the amount of work and the MRP value were well correlated.

Chronic compartment syndrome in the erector spinae muscles

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Chronic compartment syndrome (CCS) is characterized by increased intramuscular pressure during and after exercise. The condition is known in the lower leg and in the dorsal interosseous muscles of the hand. CCS in the erector spinae muscles has not been described. These muscles are enclosed in a relatively unyielding osteofascial space.

Method. The intramuscular pressure at rest was measured in the erector spinae muscle bilaterally at the level of L1–L2 in ten healthy persons with the injection technique described by Whitesides et al. One patient with unilateral back pain initiated by exercise was examined clinically. The intramuscular pressure at rest in the erector spinae muscles was measured bilaterally. The patient was operated on with fasciotomy of these muscles on the left, painful side.

Results. The intramuscular pressure was 6 mmHg (range 4–9 mmHg) in the control group. In the patient with back pain initiated by exercise, the muscle pressure was 24 mmHg on the painful side and 5 mmHg on the other. After fasciotomy the patient became symptom-free and the intramuscular pressure was 6 mmHg bilaterally. The pressure remained unchanged when recorded 14 days later. The muscle was edematous and microscopic examination showed inflammatory cells and a slight degree of muscular atrophy.

Conclusion. One patient with a CCS in the erector spinae muscles is presented. The intramuscular pressure exceeded significantly that of the control patients. The histopathological and clinical examination corresponded well with the pressure measurement. Fasciotomy resulted in relief of pain and normalization of the intramuscular pressure.