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De Weezenlanden Ziekenhuis
Groot Weezenland 20
8011 JW Zwolle, the Netherlands

Reduced motor conduction velocity of the peroneal nerve caused by inversion damage—a prospective longitudinal study

G J Kleinrensink, P D S Dijkstra, A L Boerboom and R Stoeckart

Department of Anatomy, Erusmus University Rotterdam, the Netherlands

In an earlier publication a relationship was suggested between inversion damage and dysfunction of the deep and superficial peroneal nerves. Lack of baseline values made it impossible to demonstrate a causal connection. With a view to demonstrating such a connection, the motor conduction velocities of the deep and superficial peroneal nerves in both legs were measured in 118 enlisted Dutch soldiers at call-up.

During the military training period of 3 months, 7 inversion lesions were incurred. Treatment consisted of one week's rest and pressure bandage, followed by taping and functional after-treatment. Induction velocity was measured over one segment of the superficial peroneal nerve and three segments of the deep peroneal nerve. The measurements were repeated 1, 3 and 5 weeks after the injury in the 7 patients with inversion damage and after 3 weeks in the control group (n=25). One week after the injury, the motor conduction velocity had decreased compared with the baseline values in two segments of the deep peroneal nerve ($p<0.05$). The velocity began to increase again after 3 weeks and reached the baseline value after 5 weeks. The baseline value of the conduction velocity in enlisted men with a history of more than two inversion lesions was lower than that in enlisted men with a blank anamnesis ($p<0.05$).

The results of this study prove that a relationship exists between inversion damage and a disorder of the motor conduction velocity of the peroneal nerve.

Instability of the distal radio-ulnar joint—stabilization by means of a Goretex ligament

H R Holtslag, H Van der Hoeven and M P Carpentier-Alting

Department of Orthopedics and Reconstructive Surgery, St Antonius Hospital, Nieuwegein, the Netherlands

Symptoms of instability of the distal radio-ulnar articulation are relatively rare, but can seriously impair the function of the hand. Most patients are relatively young people in an active phase of life who develop symptoms as the consequence of an injury or hyperlaxity. Most common are ulnar pain, loss of strength and clicking. Numerous surgical methods have been described with good results, although they compromised the function of the articulation. Previously, tendon autografting was performed, but the long-term results were disappointing. In this study a description is given of the results of surgical stabilization by means of a Goretex ligament.

Patients and method: Operations in the department of Orthopedics and Reconstructive Surgery were carried out in the period 1987-1994 by a standardized method. Nine wrists in eight patients (7 women, 1 man) were stabilized; a retrospective study was made of the results. The mean follow-up amounted to 3.4 (0.7–7.9) years. Mean age was 35 (16–46) years. The dominant side was involved 6 times. The visual analog scale (VAS) and the modified Fernandez score (GFS) were used for evaluation.

Results: The symptoms in three of the nine wrists were due to laxity, the results were excellent. In the other cases, some trauma was involved: a fracture in two cases and another injury in four cases. The scores were excellent in one case, good in four and poor in one case. In one case, a slipping knot was regarded as a complication, the patient was reoperated and subsequently was satisfied.

Conclusions: The diagnosis and treatment of symptoms of instability of the distal radio-ulnar joint constitute a complicated clinical problem. Treatment by means of a Goretex ligament appears to be a good option in patients with hyperlaxity. For patients with a history of injury, this surgical strategy appears to be less appropriate, and there are sufficient alternatives with better functional results.

Proximal tibiofibular instability—a rare disorder

J M Lautenschutz, D A Vergroesen and B R H Jansen

Department of Orthopedics, Reinier de Graaf Hospital, Delft, the Netherlands

Proximal tibiofibular instability is encountered infrequently. The injury is caused by a violent impact with the foot in flexion and inversion, the knee in flexion and the entire leg in exorotation. Ogden classified anterolateral, proximal and posterior dislocation and subluxation. A complication in injuries of this nature is partial or complete loss of function of the peroneal nerve.

Seven patients with this lesion were seen in the Reinier de Graaf Hospital. Two patients were seen after a sports injury, via the emergency room, with the head of the fibula in a dislocated position. One patient exhibited pronounced paresthesias in the territory of the peroneal nerve.

Treatment consisted of repositioning under local anesthesia and application of a pressure bandage. Four patients visited the orthopedic outpatient clinic because of pain on the lateral side of the knee, radiating to the foot. These were cases of subluxation in which after 6 months' intensive exercise therapy, no improvement of the signs and symptoms occurred. Subsequently, fixation was performed with the head of the fibula moved to the tibia by means of a spongiosa screw. The screw was removed after 6 months. Results were good in all cases. In one patient, who presented with a contralateral ankle injury, a habitual multidirectional tibiofibular instability without clinical symptoms was detected fortuitously.

Conditions to be considered for the differential diagnosis include a meniscal lesion, meniscal cysts, distorsion of the lateral collateral ligament, rupture of the biceps muscle of the thigh, etc.

The treatment in acute dislocation is repositioning. Cases of subluxation/chronic instability in which 6 months' conservative treatment fails to give a good result can be treated surgically. Methods mentioned in the literature are resection of the head of the fibula or arthrodesis. Good results can be obtained with temporary fixation, as performed in our hospital.

We should like to add three different aspects to Ogden's classification: acute/chronic subluxation and habitual luxations.

Conservative treatment of the isolated rupture of the anterior cruciate ligament—accept and adapt?

D Eygendaal, H A Josaputra and H Kuiken

Department of Orthopedics, St Clara Hospital, Rotterdam, the Netherlands

Rupture of the ACL is a frequent injury in people actively engaged in sports. Both conservative and surgical treatment in the form of reconstruction of the ACL are reported in the literature to have given satisfactory results. The present study reports the long-term follow-up of conservatively treated isolated ACL ruptures on the basis of the Lysholm score, the Tegner score, the incidence of secondary meniscal damage, subjective instability and the adaptations of an ACL-insufficient knee for the activities of daily life, (ADL).

Method: Sixty patients, 46 women, 14 men, mean age 31 (17–40), all of them active in sports, with an arthroscopically confirmed isolated ACL rupture which had been treated conservatively, were sent a questionnaire 5 years after the injury, containing questions about previous articular pathology, use of brace or crutches, adaptation of occupation, athletic activities and ADL to the knee injury, secondary knee operations and the Tegner and Lysholm scores.

Results: The mean Lysholm score was 74, the mean Tegner score was 4. 20/60 patients complained of the knee giving way during ADL, 35/60 during athletic activities, 32/60 reported pain after every major exercise, 18/60 used a brace during work or sports, 8/60 patients had been forced to change their occupation, and 48/60 had to reduce or discontinue athletic activities. 12/60 were subjected to a partial meniscectomy in a second phase.

Conclusion: An ACL rupture may have far-reaching consequences with regard to athletic activities and occupation. A Lysholm score of 74 is low in this (young) population. Furthermore, the risk of meniscal pathology within 5 years after the injury is not inconsiderable. Is a protracted expectative policy with regard to ACL ruptures justified or should the indication for surgical intervention be broadened?

Power take-off shaft injuries

M Heeg, H J ten Duis and H J Klasen

Department of Orthopedics and Traumatology, University Hospital Groningen, the Netherlands

Farmers have a dangerous occupation. Power take-off (PTO) shaft injuries account for some 11% of all hospital admissions of victims of agricultural accidents. The PTO shaft is the coupling mechanism between the tractor and farming machines; it rotates at 500–2000 rpm. It may cause very serious torsion injuries of a limb or of the whole body.

Method: Over an 8-year period, 14 patients with PTO shaft injuries were admitted to our hospital. A retrospective study was made of the causes, types of injuries and the treatment.

Results: In 7 cases, the PTO shaft was appropriately protected; in the other cases, the protective cover had been removed wholly or in part. If clothing gets caught in the PTO shaft, the victim is mangled in his clothes or whirled into the air.

A total of 38 fractures (18 of them complicated) were observed, including three traumatic amputations of extremities. In addition, there were 21 lesions of soft tissues, seven visceral lesions and two nerve lesions. Four fractures were treated by conservative means, the others surgically. Apart from the three primary amputations, secondary amputations were carried out in three patients. Two patients who could be treated after 10 hours, developed a Clostridium perfringens infection which necessitated multiple re-explorations and hyperbaric oxygen treatment.

Conclusion: PTO shaft lesions constitute a very serious category of agricultural injuries. Prompted by this study a

number of recommendations were made for improvement of the protection and an educational campaign was started. The surgeon should bear responsibility for this aspect of traumatology, as well.

Dynamic hip screw with trochanter stabilization plate(the earliest experiences

M R Roethof, A J M Karthaus and A J Frima

Department of Surgery, Deventer Hospital Foundation, the Netherlands

The dynamic hip screw (DHS) is used in many cases of pertrochanteric femoral fractures types 31 A1 and 31 A2 according to Muller's classification. The DHS, however, cannot be used by itself in 31 A3 pertrochanteric femoral fractures. In these 31 A3 femoral fractures, insufficient resistance is offered to medializing and rotating forces brought about by direct weight-bearing. This tendency to medialization and rotation can be prevented using a relatively simple adjustment, the trochanter stabilization plate. We performed a retrospective study of the results in the first 16 patients treated in our hospital with a DHS with trochanter stabilization plate.

Patients and methods: Seven males and nine females with a median age of 79.5 years (28-89 years) were treated between August 1993 and June 1995 with a DHS with trochanter stabilization plate. Four patients had an 31 A2 fracture, the others an 31 A3 fracture. The median follow-up amounted to 11 months. Full weight-bearing was allowed to 10 patients from the beginning, to the other patients after 3 months.

Results: Good repositioning was achieved peroperatively in 14 patients, one patient underwent repositioning in valgus and one, repositioning in varus with a ventrally positioned femoral neck screw. In the last-mentioned patient, a head-neck prosthesis was implanted after 2.5 months. Two patients died within one month. Of the 14 remaining patients, 12 had smooth consolidation without any medialization or settling by more than 0.5 cm. Seven patients were permitted complete weight-bearing from the beginning. In one patient, there was approx. 1 cm subsidence as well as endorotation. No significant difference of leg length was seen in any of the patients.

Conclusion: Apparently, with this method most patients with an 31 A3 fracture may be mobilized with weight-bearing from the beginning. The range of possibilities of fixation of 31 A3 fractures has been extended with the trochanter stabilization plate.

Measuring the position of the acetabular component of the total hip prosthesis in standard pelvic radiographs

J L A Westerink, J Konijneburg, G Kemerink, G H I M Walenkamp

Departments of Orthopedics and Radiodiagnostics, University Hospital Maastricht, the Netherlands

With a view to assessing the influence of the position of the components of a total hip prosthesis (THP) on the risk of dislocation in 256 patients, a search was made for a reliable measuring method suitable for use with standard pelvic radiographs. The existing measuring methods are insufficiently accurate and not suitable for our purpose. We describe an accurate method to measure the position of the acetabular component, using a random anteroposterior radiographs of the pelvis.

Material and method: The investigation consisted of three parts: 1. For lack of a 'gold standard' the method was validated in the laboratory using a model pelvis. 2. The intra- and inter-observer variations were measured. 3. Out of a group of 256 patients fitted with a THP between January 1 and 31 December 1992, 11 developed an 'early' dislocation. The position of the cup was measured using the new method in these patients and in a control group.

Results 1. The new method proved to be reliable even in situations in which the roentgen tube was not centered on the THP. 2. The intra-observer variation showed an average standard deviation in the measuring of the anteversion of 2.6° (1.5°-3.7°). The inter-observer variation showed a mean standard deviation of 1.4° (0.8°-4.6°). 3. No significant difference was found between the anteversion of the cup in patients with an early dislocation, and the anteversion of the cup in the control group (19.6° as against 20.4°).

Conclusion: The new method makes it simple to calculate the position of the acetabular component of a THP on a standard pelvic radiographs, using a pencil, a ruler, a protractor and a calculator. In our series, no relationship was observed between the anteversion of the cup and the tendency to dislocation.

Clinical application of measurement of migration of the acetabular cup using digitalized image processing

M P Teeuwen, M Pawlicz, M C de Waal Malefijt and R Huiskes

Department of Orthopedics and Radiodiagnostics, University Hospital St Radboud, Nijmegen, the Netherlands

Aseptic loosening is the most frequent late complication of total hip arthroplasties. A method was developed to diagnose migration at an early stage by means of a computerized measuring system using digitalized conventional radiographs.

Material and methods: The pelvic radiographs of 100 patients with a primary Müller hip prosthesis implanted between 1970 and 1985 were digitalized and the migration in the cranial and medial directions as well as the angle of abduction of the cup were recorded.

Results: The measurements found were correlated with the clinical data. In this way, the specificity and sensitivity of the measuring system could be determined. These amounted

to 43% and 85%, respectively. If the measurement is carried out after first year, the specificity increases to 70% but the sensitivity decreases.

Conclusion: Automatized measurements on conventional radiographs are possible, but the spreading of the measuring data in the first few years leads to low specificity. Optimization of the baseline to which the individual measurements are related meanwhile has led to improvement of the specificity and the sensitivity.

Gentamicin-collagen membranes (Garacol) in arthroplasties—pharmacokinetics

R J Wolvius[1], W J Willems[2], I Van Haelst[3] and G H I M Walenkamp[1]

[1]Department of Orthopedics, University Hospital Maastricht, [2]Department of Orthopedics, Medical Center Alkmaar, [3]Hospital Pharmacist, Medical Center Alkmaar, the Netherlands

Reabsorbable collagen-gentamicin membranes (Garacol, Schering-Plough, Amstelveen) are registered with osteomyelitis as one of the indications. Prevention of infections of prostheses might constitute another indication, in which case adequate local gentamicin levels are necessary.

Definition of the problem: Are intra-articular gentamicin concentrations bactericidal to the most frequent infectious agents without exposing the patients to high serum levels?

Material and method: Ten patients with total hip prostheses underwent a revision of the acetabulum only in the Alkmaar Medical Center. Three membranes were left behind for prophylactic purposes. Gentamicin concentrations were measured in blood and wound fluid from the articulation.

Results: The Gentamicin levels in µg/ml.

Serum Hours	Level	Spreading
4	2.5	0.3–7.0
8	2.4	0.4–7.0
12	1.8	0.5–5.4
24	0.8	<0.2–2.2
48	0.2	0.2–0.9
Wound fluid 24 hours period	Level	Spreading
1	245	25–500
2	55	3.4–179
3	51	1.3 154
4	27	0.7–105

Conclusions: The results show considerable spreading. Local concentrations are very high, and bactericidal to even the most 'resistant' micro-organisms. Serum concentrations are not toxic. Prophylaxis with reabsorbable gentamicin-collagen membranes has a strong bactericidal effect and therefore may be useful.

Chemonucleolysis in physicians—a follow-up study

C Bouwsma[1] and R Deutman[2]

Departments of [1]Neurology and [2]Orthopedics, Martini Hospital Groningen, the Netherlands

Much has been written about chemonucleolysis, but only one publication is known about the effects of chemonucleolysis in physicians. We hereby present a second study. Methods: A search was made in the records for physicians who had undergone chemonucleolysis. They were sent a questionnaire and all then underwent neurological examination by an impartial neurologist (C.B.).

Results: Twenty physicians, 4 women and 16 men, had undergone a chemonucleolysis. All returned the questionnaire. Eighteen patients were examined: one refused to cooperate in the study and another could not be reached. The person who did not want to be examined had had a laminectomy 10 years after the chemonucleolysis. Mean follow-up was 92 months (16–152). Eleven patients were free of symptoms, six classified themselves as over 85% improved and three were less satisfied. One patient had had a re-chemonucleolysis with good results. Thirteen occasionally still suffered back pain. Seven sometimes felt pain in the leg that had been painful before the chemonucleolysis. Two had given up working because of persistent symptoms. Neurological examination revealed a mild paresis in four and reflex differences in four others. In none of them was an active radicular syndrome found.

Conclusion: In this group of physicians, chemonucleolysis had a good result in 85% even after a long follow-up period.

The acetabular reinforcing ring in combination with spongiosaplasty in cup revisions—results after 9 years' follow-up

M J A van der Linde, C J M Oosterbos and A J Tonino

Department of Orthopedics, De Wever Hospital, Heerlen, the Netherlands

Aseptic loosening of cemented acetabular cups as a rule creates a major problem if considerable loss of bone is involved. Biomechanical studies have shown that in this situation it is important to restore the normal center of rotation. It has also been demonstrated that use of just cement or bulk allografts is inadequate. In order to compensate the bone loss as well as to restore the center of rotation, we have since 1980 for cup revisions always made use of crushed bone allografts and an acetabular reinforcing ring.

Patients and method: From 1980 through 1988, 44 cup revisions were performed in 42 patients because of aseptic loosening. Aseptic loosening occurred after a median period of 8.1 years. The median age of the patients at the time of revision surgery was 67 years. A Müller reinforcing ring was used in 28 cases, a Burgschneider ring in 15 cases and an

Eichler ring in one case. Spongy bone from the hospital's own bone bank was used for plastic repair of the bone defect. The patients were evaluated clinically by means of the Merle d'Aubigné score and radiologically, by means of the Harris classification for loosening.

Results: The median follow-up amounted to 9 years (3.4 to 14 years). Two patients (two hips) with Müller reinforcement rings were not available for follow-up. No early complications had occurred. Four patients required a second revision after a median period of 3.5 years: three times because of a deep infection and once, because of aseptic loosening. The other 38 hips did not need a second revision. The Merle d'Aubigné score in this group increased from a preoperative median of 9.2 to a median at follow-up14.6. Exclusive of the three deep infections which necessitated revision, the radiological failure proportion according to the Harris classification was 10% (4 out of 39) after 9 years' follow-up.

Conclusion: In aseptic loosening of the acetabular cup associated with considerable bone loss, highly acceptable long-term results can be obtained using spongiosaplasty in combination with a reinforcing ring.

The MCS prostheses—a new design

R Schaap

Department of Orthopedics, Gooi Noord Hospital, Blaricum, the Netherlands

Because of dissatisfaction with the results of prostheses for the MP and PIP joints, new prostheses were developed, elaborating on the knowledge acquired from hip and knee prosthesiology.

Choice of materials: The basic material of the prosthesis consists of titanium. Use is made of polyethylene, but the articular surfaces consist of titanium-niob ceramics (metal-metal). This material is as wear-resistant as ceramics but not as fragile. The prostheses are coated with hydroxyapatite, to profit from the rapid healing of digital and metacarpal bone.

Design: The design on the one hand was aimed at a prosthesis that was as 'anatomical' as possible. On the other hand, account had to be taken of the frequently occurring considerable destruction of bone and soft tissues in rheumatoid arthritis.

PIP prosthesis: The prosthesis is anchored by means of a stem in the medullary cavity. Distally, a tiny ridge is built into the joint to promote lateral stability.

MP prosthesis: This is also anchored by means of a small stem. The components of the prosthesis enclose each other, preventing dislocation. Nevertheless, there is a high degree of freedom of movement, to minimize the forces acting on the anchoring of the shaft.