Acta orthop. scand. 53, 309–311, 1982

PROCEEDINGS OF THE DANISH ORTHOPAEDIC SOCIETY

Copenhagen, February 27 1981

Editor: NIELS J. HOLM

THE PATHOMECHANICS OF THE DIABETIC NEUROTROPHIC ULCER AND ITS CONSERVATIVE TREATMENT

PAUL W. BRAND

Louisiana

Insensitive feet suffer ulceration of the skin from three different levels of force involving different pathology and methods of prevention.

1. Low pressure applied constantly causes ischemic necrosis. Cause: tight shoes. Prevention: change shoes at least twice a day.
2. High pressure such as from sharp stones or broken glass causes mechanical penetration. Prevention: protective footwear.
3. Moderate pressure, 2 to 5 kg/cm^2, if repeated thousands of times day after day, results in inflammation and ulceration. Prevention: spread the pressure by using molded shoes or clogs that rock on a central pivot. Minimize the number of steps per day. Thermography may show patches of warmth which indicate impending ulcers. Open ulcers may be treated with bed rest or in a plaster cast.

SCINTIGRAPHY OF THE FEET IN PATIENTS WITH GANGRENOUS TOES

J. GREIFF, J. CHRISTENSEN & A. UHRENHOLDT

Hvidovre Hospital

Based on ^{99m}Tc-pyrophosphate scintigrams of the feet of patients suffering from gangrenous toes a working hypothesis has been formed.

Frostbite injuries: The skin necrosis extends further proximally than does the bone necrosis.

Arteriosclerosis: The bone necrosis extends further proximally than the skin necrosis.

Diabetes mellitus: Skin necrosis or bone necrosis may be present one without the other or they may occur simultaneously.

Scintigraphy appears to be a valuable tool in the determination of the level of amputation, especially when atypical amputations in patients with diabetes mellitus are planned.

THE NEUROPATHIC FOOT. TREATMENT AND PROPHYLAXIS

K. LARSEN (Chiropodist)

Niels Steensens Hospital

The diabetic patient with polyneuropathy needs frequent check-ups of the feet, and must be educated in foot care and protection of areas of high pressure in the feet. The check-ups must include the walking pattern, the footwear, deformities, callosities, the circulation and a neurological examination.

The aim of the education programme is to teach the patient daily foot inspection, skin care and hygiene. Also the patient should learn to appreciate the importance of spacious shoes and stockings. Pressure areas under the feet may be protected by wearing insoles made from a functional imprint in a smooth Plastazote® sole. The patient walks with these soles in his shoes for some days and the final insole is then moulded according to the imprint. Such insoles may be used in the treatment of manifest neuropathic foot ulcers. Toe prostheses made from silicone rubber may prevent deformities due to toe amputations.

AMPUTATIONS OF THE LOWER EXTREMITIES IN DIABETIC PATIENTS

K. LUND

Orthopaedic Department O, Odense University

During the period from 1972 to 1978, 105 amputations were performed in diabetic patients. Forty-eight of the patients were receiving Insulin. The patients receiving Insulin were younger and more frequently had below-

0001-6470/82/020309-03 $02.50/0

knee amputations than patients who were not receiving Insulin. Forty per cent were bilateral amputations, mostly in diabetics who had not received Insulin. The interval between the time when the diagnosis is made and the amputation is longer in the Insulin treated group. Both below-knee and above-knee amputations heal better in patients receiving Insulin and more knees could be saved in the Insulin treated group.

THE RESULTS OF ARTERIAL RECONSTRUCTION IN DIABETICS WITH SEVERE LOWER LIMB ISCHAEMIA

L. I. ANDERSEN, J. KROGH CHRISTOFFERSEN & H. J. BUCHARDT HANSEN

Department D, Copenhagen University Hospital

The results of arterial reconstruction in 21 patients with gangrene or pain at rest are presented. The predominant location of the arteriosclerotic lesion was the iliac or femoral arteries. All types of operations are represented. The more distal the reconstruction, the more often the reconstruction failed.

During the observation period (mean 14.7 months) there was a limb-salvage rate of 73 per cent and a patency of the reconstruction of about 80 per cent with a operative mortality of 5 per cent.

It is concluded that there is no significant discrepancy between the results of vascular reconstruction in diabetics and that in patients without diabetes mellitus.

RESULTS OF RECONSTRUCTIVE VASCULAR SURGERY ON THREATENED LOWER LIMBS OF DIABETICS

B. SKOV JENSEN & V. HØJKJÆR LARSEN

Department of Thoracic and Vascular Surgery, Odense University Hospital

During the period from 1962–1980, 53 diabetic patients threatened by amputation underwent reconstructive vascular surgery. After 1 year 30 patients had preserved the threatened limb whereas 14 (25 per cent) had been amputated (above-knee 3 per cent, below-knee 15 per cent, and foot 7 per cent). Nine patients had died.

No correlation between the results and the duration of the diabetes or the degree of technical difficulty was found.

It is recommended that diabetic patients with occlusive arterial disease be evaluated for vascular surgery because among the threatened limbs suitable for reconstruction more than half can be preserved.

THE HEALING OF INFECTED ULCERS OF THE FEET IN DIABETES MELLITUS

P. HOLSTEIN

Niels Steensens Hospital

In 66 cases with subchronic ulcers of the feet and occlusive arterial disease severe infection was found in 19 out of 35 cases with diabetes mellitus and in 4 out of 31 cases without diabetes mellitus. The frequency of healing was significantly correlated with the arterial supply, but not with the occurrence of infection. The treatment was conservative including adequate antibiotics and surgical drainage in the presence of pus. The investigation demonstrates that the infection may only be treated successfully if the arterial supply is sufficient.

THE CLASSIFICATION OF DIABETIC FOOT LESIONS

P. HOLSTEIN

Surgical Department M, Bispebjerg Hospital

The diagnosis "Gangraena Diabetica" (WHO list of diagnoses) is not adequate because different pathogenetic mechanisms are involved. The lesions may be caused by peripheral neuropathy, by infection, or by occlusive arterial disease, or by a combination of these conditions. The distinction between the causes is important because each of the conditions requires specific therapy.

The neuropathy must be compensated for by adequate shoes with soft molded insoles, and the infection must be treated at an early stage with adequate antibiotics or with radical surgical drainage. In the case of ischaemia arterial reconstruction should be considered.

THE HEALING OF NEUROPATHIC ULCERS OF THE FEET

P. HOLSTEIN

Surgical Department M, Bispebjerg Hospital

The frequency of healing of neuropathic subchronic ulcers on 66 feet in 62 patients with occlusive arterial disease was compared to the arterial condition as evaluated by systolic blood pressure measurements at the ankle and on the big toe.

Thirty-two diabetic feet out of 35 had neuropathy while only 8 out of 31 feet without diabetes showed this complication. Conservative treatment including relief from mechanical stresses by adequate shoes showed healing in 42 cases after 5 to 6 months.

In 24 cases major amputations became necessary after about 4 months. The healing was significantly correlated with the distal blood pressure but not with the presence of neuropathy.

THE TREATMENT OF INFECTIONS OF THE FOOT

S. Å. HEDSTRÖM

University Hospital, Lund, Sweden

The principles of the treatment of infected feet in diabetics are discussed.

Posttraumatic neuropathic wounds were treated with local incision, drainage, and antibiotics. In cases of interdigital infection of the forefoot the best therapy seems to be transmetatarsal amputation. Staphylococcus aureus was the most common pathogen followed by B-streptococci, gram-negative rods and anaerobes. The surgical treatment was supplemented by appropriate antibiotics.

THE HEALING OF AMPUTATIONS IN DIABETES MELLITUS

P. HOLSTEIN & N. A. LASSEN

Surgical Department M and Department of Clinical Physiology, Bispebjerg Hospital

The skin perfusion pressures were measured preoperatively in 307 below-knee amputations. Diabetes mellitus was present in 124 cases. No significant differences were found between the healing rates in relation to skin perfusion pressures in patients with and without diabetes mellitus.

Thus the perfusion pressure is the important factor, not the presence of diabetes.

METABOLIC REGULATION AND INFECTION IN DIABETES MELLITUS

T. DECKERT

Niels Steensens Hospital

The prevalence of infection is higher in diabetics compared with non-diabetics. Diabetics are more often carriers of staphylococci than non-diabetics (35 per cent and 10 per cent, respectively) and post-operative wound infections are seen in 11 per cent of diabetics as compared with 2 per cent in non-diabetics. If infection is present it usually takes a more severe course in the diabetic patient. The cause of the more frequent and more severe infections is not quite clear, but a decreased immunologic response to infections has been demonstrated in diabetics. However, the general condition and the many metabolic abnormalities must also be considered.

RESULTS OF VASCULAR RECONSTRUCTION IN THE LOWER LIMBS IN DIABETIC PATIENTS

A. ELBIRK, P. KRISTENSEN, P. SAGER & K. H. TØNNESEN

Surgical Department M, Bispebjerg Hospital

The results of arterial reconstruction in 40 diabetic patients with severe ischaemia of the foot are presented. Ischaemic ulcers were present in 85 per cent. Patency after 2 years was 49 per cent as estimated by distal blood pressure measurement. The group was compared with a non-diabetic group of 120 patients.

With regard to frequency of amputation, run-off, and patency rate no difference was found.

Seventy-six per cent of the diabetic patients retained their limbs after arterial reconstruction.

If arterial reconstruction is possible in the diabetic patient the results achieved are just as good as in non-diabetic cases.