Acta orthop. scand. *50*, 571–572, 1979

DISTAL BLOOD PRESSURE MEASUREMENT IN LOWER-LIMB AMPUTEES

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Reamputation above the knee after failure of primary below-knee amputation was related to the distal blood pressure. With pressures of 20, 30 and 40 mmHg, two-thirds, one-third and one-seventh, respectively, of the below-knee amputations required reamputation above the knee.

Key words: amputation level; below-knee amputation; distal blood pressure

Accepted 7.ii.79

In lower-extremity amputation it is very important to save the knee, and thus improve the possibility of walking with a prosthesis. In recent years the relative number of above-knee (A-K) amputations has been declining (Hansson 1964, Burgess et al. 1971, Hierton & James 1973, Harris et al. 1974, Kolind-Sørensen 1974, Couch et al. 1977, Hutton & Rothnie 1977). Amputation on the crus, however, involves an increased risk of non-healing of the stump and secondary amputation above the knee, which is of course a severe strain on the patient. Therefore objective methods to determine the probability of satisfactory healing of a below-knee (B-K) amputation are of great value and we have, for this purpose, used preoperative determination of the distal blood pressure of the skin (Holstein & Lassen 1973, Lassen & Holstein 1974).

PATIENTS

During the period 1974–1977, a total of 77 lower-extremity amputations were carried out. In nine of these cases bilateral amputation was performed, so that the number of patients was 68. The reason for the amputation was arteriosclerosis, co-existing in 17 cases with diabetes mellitus. The indication was severe pain or gangrene of the foot. The level of the amputation was decided by clinical estimation (Kelly & Janes 1957). Only in cases where the skin of the middle of the lower leg was markedly cold, white or cyanotic, was femur amputation chosen.

METHODS

With a hypodermic needle, 5 μCi ^{131}J and 0.01 mg histamine chloride was injected into the skin 10 cm below the patella. Above the point of injection a water-bag fixed by an ordinary blood pressure cuff was placed.

The radioactivity was measured continuously with a scintillation detector, and every 2 minutes the pressure in the cuff was increased in steps of 10 mmHg, until a constant counting speed was registered. The result was given as the lowest pressure, which was capable of stopping the washing out of the injected radioactivity.

Crus amputation was performed by sagittal incision (Persson 1974), emphasizing an atraumatic surgical technique, especially concerning the skin.

RESULTS

Fifty-six primary B-K amputations were carried out and the number of reamputations

0001–6470/79/050571–02$02.50/0

Table 1. The amputation level related to the distal blood pressure

Amputation level		Number	Blood pressure		
			⩾40	30	⩽20
Primary	B-K	56	30	9	17
Reamputation to	A-K	17	4	3	10
Remaining	B-K	39			
Primary	A-K	21	7	3	11
Total	A-K	38			

above the knee were related to the distal blood pressure of the skin (Table 1). When the distal blood pressure was ⩽ 20, 30 and ⩾ 40 mmHg, two-thirds, one-third and one-seventh, respectively, of the B-K amputations required reamputation above the knee.

DISCUSSION

In selecting the level of amputation the aim is to save the patient's knee in as many cases as possible, at the same time avoiding secondary amputation.

In gangrenous areas, or where the skin is markedly cold, white or cyanotic, healing is not possible according to common clinical experience, but in all other cases there is a possibility of healing but a risk of reamputation. The risk, if great, is perhaps not worth taking in old and frail patients whose prospects of being able to walk again are meagre.

A more accurate means of determining the risk is therefore very important. Assessment of the distal blood pressure of the skin offers a numerical estimation of the risk of reamputation if a primary B-K amputation is performed.

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