Prosthetics and Orthotics International, 1980, 4, 87–89

Major amputations of the lower extremity for vascular disease

A. H. BOONTJE

University Hospital, Groningen

Introduction

Despite continuing progress in vascular surgery, some 90% of all amputations of the lower limb are still being performed for vascular occlusive disease. Gangrene too can be extensive. A patient can be inoperable for vascular surgery and arterial reconstruction or lumbar sympathectomy does not always give the desired effect.

Amputations of the lower limb will therefore continue to be part of the armamentarium of the vascular surgeon. An amputation is a semi-elective operation. The degree and progression or regression of the ischemia are often difficult to judge and predict. It is generally advisable to observe an ischemic leg for at least a few days and to take conservative measures, both local and by means of 10% Dextran by intravenous drip. Then there is time for further evaluation of the general condition of the patient and for angiography. Physiotherapy is required as well. Moreover, the level of amputation, below-knee or above-knee, can be determined more reliably.

Below-knee amputation is done with the formation of a long posterior musculocutaneous flap with myoplasty, and an above-knee amputation is performed by means of a fishmouth incision and myoplasty. Only a soft dressing, without plaster of Paris or bandage, is used on the stump.

Patient series

A series of 151 patients with 171 primary amputations, performed over a period of six years (1972–1977), is reviewed. Re-amputations are not included in this number. More than one-third of the patients were in the seventh decade of life (Fig. 1); 89 of the 151 patients were male and 62 female. A record of previous surgery to achieve improvement of the circulation of the leg was not uncommon as Table 1 shows. Nearly one-third of the patients had undergone lumbar sympathectomy, sometimes several years ago.

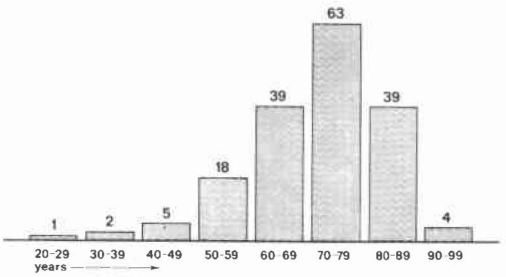

Fig. 1. Age distribution in 171 amputations.

Table 1. Previous surgical treatment
171 Amputations

Arterial reconstruction	
—in 20 patients	26 (15%)
Lumbar sympathectomy	55 (32%)
Local intervention	15 (9%)

Most patients, suffering from generalized atherosclerosis, had a number of concomitant diseases, usually two or three (Table 2).

Table 2. Concomitant diseases
in 171 Amputations

Cardiac	79%
Diabetes mellitus	61%
Hypertension	33%
Pulmonary	30%
Renal	25%
Cerebrovascular	19%

Amputation level

The indication for amputation was gangrene with or without rest pains in 92% of cases. In only 13 cases were intractable rest pains the sole indication. As Table 3 demonstrates, the ratio of below-knee versus above-knee amputations was about 2:1. A below-knee amputation was always the primary choice, unless there was severe cyanosis and oedema or tissue necrosis and

All correspondence to be addressed to Dr. A. H. Boontje, Department of Vascular Surgery, University Hospital, Groningen, The Netherlands.

infection of the lower leg. Series functional disorders of the knee existed in a few cases and made an above-knee amputation desirable. Two patients even showed tissue necrosis of the upper leg, which made a hip disarticulation necessary.

Table 3. Level of amputation

Below-knee	109	(64%)
Above-knee	60	(35%)
Hip disarticulation	2	(1%)
	171	

Wound healing

Wound healing of the stump is of paramount importance. Primary healing occurred in two-thirds of the 109 below-knee and in over two-thirds of the 60 above-knee amputations as Table 4 shows. The risk of failure in healing after above-knee amputation is not all that much smaller than after below-knee amputation!

Table 4. Wound healing of 171 amputations

	Below-knee		Above-knee	
Primary healing	71	(65%)	43	(72%)
Death before primary healing	9	(8%)	6	(10%)
Failure	29	(27%)	11	(18%)
	109		60	

(Death before primary healing 2 hip disarticulation)

Failures of wound healing are presented in Table 5. Secondary wound healing usually took one or two months. Reamputation above the knee was necessary in 9 of the 109 below-knee amputations (8%); usually after a few weeks.

Table 5. Failures of wound healing

	Below-knee	Above-knee
Secondary healing	14	3
Death before secondary healing	5	4
Operative stump revision	1	4
Reamputation	9	0
	29	11

Operative mortality

Another important aspect is the operative mortality within 30 days of the operation. The total operative mortality in this group of atherosclerotic patients was fairly high—19%—and that after above-knee amputation proved to be higher than that after below-knee amputation, as Table 6 demonstrates. In some 50% of cases the cause of death was cardiac and in some 30% sepsis (urosepsis or sepsis from decubitus). More than 50% of the patients died before primary wound healing could occur.

Table 6. Operative mortality in 171 amputations

			Causes	
Below-knee	16	(15%)	Cardiac	15
Above-knee	14	(23%)	Sepsis	9
Hip disarticulation	2	(100%)	Pulmonary	3
	32	(19%)	CVA	3
			Other	2
				32

Postoperative complications

Table 7 lists the non-fatal postoperative complications, except failures of wound healing. They occurred in some 20% of below-knee amputations and in an equal percentage of above-knee amputations. In nearly 50% of these cases the complications were pulmonary or cardiac disorders. Gas gangrene developed in two of the earlier cases; this complication no longer occurred after introduction of a policy in which the skin of the leg was painted with an aqueous solution of Betadine 10%, a couple of hours before operation.

Table 7. Non-fatal postoperative complications in 171 amputations

			Pulmonary	10
			Cardiac	8
Below-knee	21/109	(19%)	Pressure sores	6
Above-knee	12/60	(20%)	Cerebral	4
Hip disarticulation	1/2	(50%)	Urinary tract	4
	34/171	(20%)	Sepsis	3
			Gas gangrene	2
			Other	5
	42 complications			42

Contralateral amputations

There are many factors which prevent rehabilitation, such as cardiopulmonary or cerebrovascular insufficiency, dementia or blindness. But the further destiny and possibility

of rehabilitation of the amputee is also largely influenced by circulatory disorders in the other leg. Table 8 shows that six patients had previously undergone amputation of the other leg. Forty seven patients had ischemia of the other leg (intermittent claudication, rest pains or tissue necrosis) at the time of the primary amputation. In 20 patients, the other leg had to be amputated as well during the period

Table 8. Ischemia of the other limb
151 patients—1972–1977

Previous amputation	6 (4%)
Ischemia	47 (31%)
Amputation other limb	20 (13%)

considered; from 1972 to 1977. Bilateral amputations are therefore not uncommon. In this series the ultimate percentage was 17. Table 9 gives the distribution of the levels of amputation. In 20 of the 26 patients, amputation

Table 9. Bilateral amputations
26 of 151 patients (17%)

Bilateral below-knee	11
Below-knee and above-knee	13
Bilateral above-knee	1
Above-knee and hip disarticulation	1

of the second leg was performed within two years of the first amputation.

Conclusions

Of the 151 amputees, 120 remained (after deducting the operative deaths) for whom rehabilitation could in principle be considered.

The results of rehabilitation will be presented in this Journal in the future.

It can be stated in the meantime, that in spite of a considerable mortality and a fair percentage of failures in wound healing, a significant number of amputees can be rehabilitated with a prosthesis and enabled to have a reasonable life for years.