Outcome in 282 lower extremity amputations

Knee salvage and survival

Niels Ellitsgaard[1], Anders P. Andersson[1], Jesper Fabrin[1] and Per Holstein[2]

Lower-extremity amputation for arterial insufficiency was performed in 282 cases ineligible for vascular surgery. In 203 cases (Group I), amputation was elective without previous vascular surgery. In 14 cases (Group II), amputation followed recent vascular reconstruction, and in 12 cases (Group III) amputation was performed after failed thromboembolectomy. In 53 cases (Group IV), amputation was done acutely, i.e., as a life-saving procedure because of septicemia. The results as regards both knee salvage and survival were much better in Groups I and II than in Groups III and IV. We conclude that knee salvage is poor and mortality high after acute amputations and after failed thrombembolectomy. These factors should be taken into account when comparing series from different centers.

The number of lower-extremity amputations is still rising (Liedberg and Persson 1983) despite an increase in vascular reconstructions. The total number of major amputations in Denmark due to arteriosclerosis was roughly 1,100 in 1978, 1,300 in 1982, and 1,400 in 1988 (personal communication from Ebskov). We assessed knee salvage and survival after acute and elective amputations.

Patients and methods

A total of 282 lower-extremity amputations for vascular disease were performed from January 1980 through December 1981 and studied retrospectively. The analysis comprised 255 patients (107 females and 148 males) with a median age of 72 (30–94) years. All the patients had been evaluated for vascular reconstruction prior to amputation. The amputations were divided into four groups: *Group I.* Elective amputation in patients unsuitable for vascular surgery (203 cases). *Group II.* Amputation following failed vascular reconstruction performed less than 1 month before amputation (14 cases). *Group III.* Amputation following failed thromboembolectomy performed less than 1 month before amputation (12 cases). *Group IV.* Acute amputation in patients with septicemia due to gangrene (53 cases). The age was roughly the same in the four groups, and the incidence of diabetes was 40 percent in Group I and somewhat lower in the other groups. In all four groups, there were patients who had had vascular reconstruction at least 1 month previously, usually more than a year before. The level of amputation was determined by clinical examination. In case of doubtful viability, the skin perfusion pressure was measured (Holstein 1985).

The chi-square test was used for calculating differences, with $P < 0.05$ considered significant.

University of Copenhagen, Departments of Orthopedics M[1] and Thoracic and Vascular Surgery L[2], Bispebjerg Hospital, Bispebjerg Bakke 23, DK-2400 Copenhagen NV, Denmark

Correspondence: Dr. Niels Ellitsgaard, Kastelsvej 8, I th. DK-2100 Copenhagen Ø, Denmark

Results

The final level of amputation and the mortality were more favorable in Groups I and II (Table I), with half of the knees saved and a survival rate of 91 per-

Table 1. The final amputation level, the incidence of reamputation, and the mortality

Group	n	Final level			Reamputation	Mortality[a]
		B	T	A		
I	203	109	5	89	12	19
II	14	7	0	7	2	0
III	12	1	0	11	0	5
IV	53	5	2	46	3	13

B below-the-knee; T through-the-knee; A above-the-knee.
[a]Death before discharge from hospital.

cent in these groups versus 6 and 47 percent, respectively, in the 65 cases of Groups III and IV. Roughly one third of the amputations were performed in diabetics with a median age not different from that of nondiabetics. In Group I, there was a higher number of below-the-knee amputations among diabetics than among nondiabetics, i.e., 60/82 as compared with 49/121. Determination of amputation level by skin perfusion pressure was used in 154 out of 217 elective cases, but in only 24 out of 65 among the acute cases. The high number of primary thigh amputations after failed thromboembolectomy was mostly due to extensive ischemia, with demarcation lines close to the knee, whereas in the acute cases the amputations were performed to treat a life-threatening condition.

Discussion

In a recent paper, Larsson and Risberg (1988) reviewed amputations considering separately cases after failed thromboembolectomy. They found a knee-salvage rate of only one fifth as compared with more than half in the rest of their series. Moreover, one third were reamputated in this group. Our study confirms these results, with only one salvaged knee out of 12 after failed thromboembolectomy and 5/12 dead. Thus, failed thromboembolectomy entails a very small chance of saving the knee and a high risk of death.

Our data also demonstrate that a high number of acute amputees without recent vascular surgery have a very small chance of retaining the knee and a high risk of death. We have not been able to find specific data in the literature concerning acute amputations as compared with elective amputations.

The small group of patients undergoing amputation after failed vascular reconstruction is comparable as regards knee salvage and mortality to the group of elective amputations.

There is an ongoing debate on the risk of losing the knee joint in the event of failed vascular surgery. Some authors report an increased rate of thigh amputations, i.e., about 70 percent (Ramsburg et al. 1977, Kazmers 1980, Dardik et al. 1982), whereas other authors find knee salvage equal with or without vascular reconstruction (Murdoch 1967, Burgess and Marsden 1974). Our results are similar to the latter.

A high percentage of retained knees, about 80 percent, has been reported by Sarmiento (1970), Burgess (1971), Persson (1974), and Robinson (1976). However, in larger series the knee retention is about 50 percent or below (Glattly 1964, Hansson 1964, Christensen 1976, Ebskov 1983, Netz 1983). The various series are not quite comparable. Thus, diabetics seem to have a better chance to retain the knee (Silbert and Haimovici 1950). Also, as regards below-the-knee amputations, in young patients healing is better than in old patients (Holstein and Hansen 1988).

Our series demonstrates that the fraction of acute cases has a decisive influence on the results of amputation. The outcome after failed thromboembolectomy is poor.

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