

Success rate of prosthetic fitting after major amputations of the lower limb

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Abstract

Rehabilitation after amputation at through-knee level is described and analysed in relation to amputations at above-knee and below-knee levels.

Introduction

In dealing with amputation surgery for gangrene of the lower limb the most important result for the patient and the family is to get the amputee back home. For the orthopaedic surgeon and the prosthetist the professional demands also include considerations of regaining some walking ability. In modern industrialized countries we often find a wheelchair bound amputee as a result of a failure of surgery.

The purpose of this paper is to describe the number of patients being successfully fitted in relation to the three major levels of lower limb amputations.

Patients and methods

The total series included 320 lower limb amputations in patients with a mean age of 70 years (range 40-94) following gangrene due to diabetic or arteriosclerotic complications.

At discharge from hospital 265 limbs were available for prosthetic fitting. A total of 178 patients were discharged to their own homes, possibly after a period in a rehabilitation institution, whereas a further 87 patients were discharged to an institution for long-term nursing care, including 45 patients originally living in their own home.

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In all patients with a walking capacity prior to amputation prosthetic fitting was attempted. When walking was achieved between parallel bars with a preliminary prosthesis the patients were discharged for further ambulatory training. The results analysed in this paper are those obtained at discharge from the out patient clinic or in acknowledgement of definite failure of attempted fitting at discharge from the hospital.

Results

Among the 87 patients discharged for long-term nursing care in an institution amputation was performed at TK level in 19 cases, AK in 45 and BK in 23 cases. Prosthetic fitting was generally achieved in 14 per cent (12/87) of cases, whereas the remainder were either wheelchair bound or bedridden. Patients amputated at the shank or through the knee did better than those amputated at the thigh (Table 1).

Discharge to a nursing institution was necessary for 45 patients who had been living in their own surroundings preoperatively, and 80 per cent (36/45) of these patients were wheelchair bound or bedridden. Among those obtaining a walking capacity 9 out of 12 had preoperatively lived in their own home. Only half of the patients discharged to a nursing institution with a prosthesis were able to use the prosthesis outdoors.

Table 1 Results of prosthetic fitting in patients discharged to institutions for long-term nursing care.

Level	Prosthetic gait	Wheelchair	Total
TK	4 (21%)	15	19
AK	4 (9%)	41	45
BK	4 (17%)	19	23
Total	12 (14%)	75	87

Table 2 Result of prosthetic fitting in patients discharged to own home or a temporary rehabilitation institution.

Level	Prosthetic gait		Wheelchair	Total
	Outdoors	Indoors		
TK	20 (69%)	8 (28%)	1 (3%)	29
AK	29 (41%)	14 (20%)	28 (39%)	71
BK	56 (72%)	9 (11%)	13 (17%)	78
Total	105 (59%)	31 (17%)	42 (24%)	178

Among 178 patients discharged to their own home or a temporary rehabilitation institution every fourth patient was finally bound to a wheelchair (Table 2). Hardly any of the TK amputees were wheelchair bound and 69 per cent achieved an outdoor walking capacity. Nearly three quarters of the BK amputees obtained an outdoor walking capacity, but as many as 17 per cent were wheelchair bound. The poorest results were encountered after AK amputations, as more than every third patient was wheelchair bound and less than half of the patients were able to walk outdoors.

Discussion

Gangrene of the lower limb with major amputation is often followed by a high primary mortality (Jensen, 1982) due to the generalized toxic physiological effect and many amputations are consequently undertaken as life saving procedures. This is especially the case among patients who are already in need of long-term nursing care. The loss of a limb in elderly patients often leads to dependence on other people and often to discharge to an institution for long-term nursing. This was experienced in nearly every fifth patient of those previously living independently at home. The majority of these patients were wheelchair bound or bedridden irrespective of the level of amputation. Discharge to long-term nursing care without a walking capacity is definitely to be considered as a poor result, although life is saved.

Among patients returning to their own home the goal of the amputation surgery should be to make the patient ambulatory with a prosthesis. This was achieved in 76 per cent of patients in this series. A striking feature of these results show, however, that the statement of preserving the knee joint at any price (Pedersen, 1968)

seems to be no longer valid, as patients with TK amputations generally did better than BK amputees and the majority of AK amputees failed to achieve prosthetic gait.

The results of AK amputations are fairly consistent with previous reports (Chapman et al, 1959; Burgess et al, 1971; Christensen, 1976), but better than a number of others (Warren and Kihn 1968; Hierton and James, 1973; Robinson, 1976). The success rate of BK amputations with prosthetic fitting in 83 per cent of cases also correlates with previous reports (Smith, 1956; Burgess et al, 1971; Chilvers et, 1971), although Hierton and James (1973) claimed prosthetic walking in 66 per cent and Holstein et al (1979) in half of the cases only.

The high success rate following TK amputations has been pointed out before (Early, 1968; Howard et al, 1969, Chilvers et al, 1971; Newcombe and Marcuson 1972), but the general opinion is still to select the BK amputation level whenever possible. This might be explained by the high technical development of BK prosthetics and numerous theoretical and biomechanical advantages of the BK level as well as the cosmetic problems experienced with the TK prosthesis. It is, however, hoped that problems related to the manufacture of TK prostheses and the inborn traditional aversion might be overcome with this issue of Prosthetics and Orthotics International.

The explanation for the high success rate of TK prosthetics is probably due to the undisturbed strength of the hip and thigh muscles, the end-bearing capacity of the stump and a feeling of stability and tightness of the socket. Another explanation might be that the prosthesis can easily be supplied with a knee lock in case the patient demonstrates instability or incapacity in walking with a mobile knee joint. This is in contrast to BK prosthetics, where a preliminary PTB or comparable prosthesis has to be exchanged with a conventional prosthesis with a knee lock in a similar situation. In such circumstances the physiotherapist and the prosthetist might often press the patient to continue with the prosthesis and elderly patients are not likely to disappoint their therapists.

Unfortunately these statements are purely founded on qualified guessing, as this retrospective series does not give sufficient information about these problems. It has, however, previously been pointed out (Jensen et

al, 1982) that a BK amputation cannot be converted to a TK amputation in cases of extensive skin necrosis or infection.

Based on these considerations it is suggested that the TK level of amputation should be selected in all possible instances as an alternative to an AK amputation, as the prosthetic fitting is highly superior. It is also suggested that the TK level should be considered as an alternative to any BK amputation in all old and probably feeble patients if the postoperative fitting might be problematic, as such patients are more likely to be able to walk on an artificial, although stiff, limb after TK amputation. In all circumstances, where the perfusion of the amputation area is doubtful evaluation of the possibilities of breakdown of the BK stump should always be taken into consideration in favour of a TK amputation. Eventually the TK amputation should be considered also in patients demanding a wheelchair existence, especially in risk of contralateral amputation, as stability in the wheelchair is absolutely superior as compared to an AK amputation because of the long and strong stump.

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