Amputation for occlusive arterial disease

A prospective multicentre study of 177 amputees

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Summary. All major amputations of the lower limb due to occlusive arterial disease were studied prospectively and consecutively during one year in the 5 hospitals in Malmöhus county, Sweden. The patients were followed for 6 months after the primary amputation of which 136 were through the tibia, 6 through the knee and 35 through the femur. One hundred and seventy-seven patients (92 men and 85 women) were included; 49% were 80 years or older and 40% were diabetic. At 6 months, 85 of the surviving 109 patients had healed stumps, 10 were not healed and 14 had been revised or reamputated. Half the survivors used a prosthesis daily. There was no significant difference in healing related to sex, age, diabetes or the level of amputation, but diabetics were more often bilateral amputees. The mortality at 6 months was 38% and at 4 years 72%.

Résumé. Toutes les amputations majeures des membres inférieurs, motivées par des maladies vasculaires, ont été étudiées de façon prospective dans la région de Malmö (Suède). Les cinq hôpitaux de la région ont été inclus dans l'étude pendant un an. Après l'amputation, les malades ont été suivis pendant 6 mois. La mortalité a été enregistrée jusqu'à la 4ème année post-opératoire. 177 patients ont subi des amputations majeures (92 hommes et 85 femmes), à savoir 136 amputations de jambe, 6 désarticulations du genou et 35 amputations de cuisse. Durant cette même période 302 opérations de chirurgie vasculaire des membres inférieurs ont été réalisées dans la région. L'incidence des amputations a été de 34 pour 100 000 habitants, par an. 49% des malades avaient 80 ans et plus, 40% étaient diabétiques. L'amputation transfibulaire a été faite initialement chez 77% des patients, après 6 mois 74% avaient conservé le même niveau d'amputation. Au contrôle du 6ème mois, parmi les 109 survivants, 85 (78%) étaient cicatrisés, chez 10 patients (9%) l'amputation n'était pas guérie et 14 (13%) avaient été réamputés. Il n'y avait pas de différence significative, quant à la guérison, selon l'âge, le sexe, l'existence d'un diabète ou le niveau de l'amputation. Les sujets diabétiques étaient plus souvent amputés bilatéralement (p = 0.015). La mortalité était de 38% après 6 mois et de 72% après 4 ans. L'utilisation quotidienne d'une prothèse n'a été notée que chez la moitié des malades survivants au 6ème mois.

Introduction

The incidence of lower limb amputations has increased since the 1950s [10, 19, 29]. Amputation for occlusive arterial disease has become a growing health problem. The problem will remain as there is an increasing number of older people in society and arising incidence of diabetes mellitus. The more widespread knowledge of the hazards of smoking, better management of diabetes and advances in vascular surgery may help to halt the increased rate of amputation.

The present prospective study was carried out to investigate the incidence and management of lower limb amputations, to assess how sex, age, diabetes and the primary level of amputation affect healing of the stump and mortality, and to find out whether the results differed in the 5 hospitals in the area. The study was initiated by the Swedish medical research council to identify parameters of efficacy in the care
and treatment of this growing and cost-consuming category of patients.

Patients and methods

There are 5 hospitals, including the University of Lund, one county and 3 community hospitals, in Malmöhus county which had a population of 526,805 at the end of 1987. In 3 hospitals the amputations from January 1987 to the end of December 1987 were recorded on amputation registry forms, and in the other 2 from April 1987 to the end of March 1988.

One hundred and seventy-seven patients underwent major amputations of the lower limb for occlusive arterial disease. The nomenclature for levels is in accordance with ISO 1989. The 17 patients with major bilateral amputations during the study period were considered only with regard to the first leg.

The indications for amputation were progressive gangrene, with or without septicaemia, or intractable pain, which had not responded to conservative treatment or vascular surgery. The level was chosen by the attending orthopaedic surgeons who carried out 98% of the amputations. We adopted an aggressive approach to preserving the knee joint and transtibial amputation was carried out in every case where a major amputation was considered necessary. The decision was made mainly on the basis of clinical symptoms and signs, and in 64% was supported by Doppler ultrasound pressures; no other noninvasive tests were used.

In transtibial amputations, the sagittal technique was used in 87%, anterior and posterior flaps in 7%, skew flaps in 1%, and in the remaining 5% unusual techniques were employed. A complete circular plaster on web-roll was used in 93% of all transtibial amputations, a posterior plaster splint in 5% and soft dressing in 2%. 84% were treated with peri- and postoperative intravenous antibiotics for an average of 15 days after operation (range 2 to 94, median 10 days).

Patients receiving oral anti-diabetic drugs or insulin were recorded as diabetics. Smoking habits were also recorded, but will be discussed among risk factors in another paper.

The Student t-test was used for continuous variables. For comparison of categories, the chi square test and Fisher’s exact test were used. For the simultaneous analysis of mortality, Multivariate Polychotomous Logistic Regression analysis [16] was used by means of the 1990 revision of the BMDP computer software package [2].

Results

Incidence

The incidence of amputation was 34 per 100,000 inhabitants per year, and increased with increasing age (Table 1). The incidence among amputees in Malmöhus county who were younger than 80 years was 17.8 compared with 20.3 in 1979, and among amputees 80 years or older was 417 compared with 379 in 1979 [20]. This increase was not significant. During the same period, 302 arterial operations were carried out in the legs.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Number of inhabitants</th>
<th>Number of amputations</th>
<th>Incidence per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–39</td>
<td>280,263</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40–59</td>
<td>132,089</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>60–69</td>
<td>52,634</td>
<td>27</td>
<td>51</td>
</tr>
<tr>
<td>70–79</td>
<td>40,973</td>
<td>51</td>
<td>124</td>
</tr>
<tr>
<td>80–</td>
<td>20,846</td>
<td>87</td>
<td>417</td>
</tr>
<tr>
<td>Total</td>
<td>526,805</td>
<td>177</td>
<td>34</td>
</tr>
</tbody>
</table>

Sex, age, and level

Out of the 177 patients, 92 men and 85 women underwent major amputations. The mean age at amputation was 77 (43–95) years, 75 years in men and 80 years in women, and 49% of amputees were aged 80 years or older. The mean age among diabetics and non-diabetics was 75 and 78 years respectively. Of the 177 primary amputations, 136 were transtibial, 6 were disarticulations through the knee and 35 transfemoral. During the study no Syme amputation was carried out and 1 hip disarticulation was performed for a vascular problem. The primary knee preservation ratio was 3.3:1. There were no significant differences in below and above knee levels between male and female or diabetics and non-diabetics.

Diabetes mellitus

Seventy out of 177 amputees were diabetic (40%). The male percentage in diabetics and non-diabetics was 49% and 54% respectively. The mean duration of diabetes before amputation was 16 (1–60) years. This was significantly longer (p = 0.009) among amputees with a contralateral amputated leg (23 years) than with a normal leg (13 years).

Thirty per cent of the amputees who were 80 years and older were diabetics, while 49% of those younger were diabetics; 83% of diabetics and 73% of non-diabetics were amputated at a transtibial level, and of these 15% and 18% respectively had to be revised within 6 months. These differences were not significant.

Contralateral leg

The other leg was pregangrenous in 25 patients and already amputated in 24 patients. Thirty-nine patients were or became bilateral amputees during the study, and 19% (21/109) of the survivors at 6 months were bilateral major amputees; 30% (14/47) of the diabetics and 11% (7/62) of the non-