Saphenous Vein Harvesting for Coronary Artery Bypass Grafting: Retrospective Analysis of Possible Causes of Major Wound Complications in Patients with Peripheral Arterial Disease

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Objectives: To retrospectively evaluate the possible reasons for major wound complications at the saphenous vein harvesting site in patients with peripheral arterial disease (PAD).

Design: retrospective study.

Material and methods: fifteen consecutive patients admitted to the vascular department for impaired healing at the saphenous vein harvesting site after successful coronary bypass artery grafting (CABG) (Group A) were evaluated for medical, perioperative, laboratory and pathological factors and outcome. Findings were compared with those in 15 matched controls followed in the outpatient clinic after CABG (Group B).

Results: absence of pedal pulses in the affected leg was noted in 13 patients in group A and 3 patients in group B. Ankle brachial index ranged from 0.4–0.7 in group A and 1.7–1.1 in group B; corresponding ankle pressures were 40–100 mmHg (mean 60 mmHg) and 80–160 mmHg (mean 110 mmHg). All patients in group A had PAD, whereas none did in group B, and all patients in group A required intervention to save the leg. Wound healing was noted in 11 group A patients; four patients underwent below-knee amputation.

Conclusion: saphenous vein harvesting from limbs with severe PAD can lead to significant morbidity, including limb loss. In patients lacking a palpable pedal pulse, we recommend harvesting only the proximal saphenous vein.

Key Words: Saphenous harvesting; Wound complications; CABG; PAD.

Introduction

Patients treated for myocardial revascularisation have a high rate (up to 26%) of peripheral arterial disease (PAD).1 This may affect wound healing at the saphenous vein harvesting site after coronary artery bypass grafting (CABG). Though most complications are minor (local haematoma, damage to saphenous nerve, lymphatic discharge) and can be treated in the outpatient clinic,2,3 the presence of a severely inadequate blood supply can compromise the affected leg.

The aim of this study was to retrospectively analyse possible reasons for major wound complications in the saphenous vein harvesting site after CABG in patients with PAD.

Patients and Methods

Between June 1994 and June 1999, 15 patients were admitted to the Department of Vascular Surgery because of impaired healing of the saphenous vein excision site after successful CABG. Medical history, presence of PAD and arthrogenous risk factors, presence of pedal pulses, nature of the CABG procedure (elective or emergency), and duration and treatment of the harvesting site prior to admission were recorded. Perioperative data, including physical vascular examination, wound status, pathological findings, and laboratory and angiographic findings were assessed, as were type of intervention (debridement, percutaneous angioplasty, distal bypass, skin flap, amputation), length of hospitalisation, and long-term outcome. These findings were compared with those in a group of patients after successful CABG selected at random from the files of the outpatient clinic (group B).
Table 1. Clinical characteristics of patients after CABG with (group A) and without (group B) wound complications at the harvesting site.

<table>
<thead>
<tr>
<th></th>
<th>PAD group (n = 15)</th>
<th>Control group (n = 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>60–75</td>
<td>54–76</td>
</tr>
<tr>
<td>(mean)</td>
<td>(69)</td>
<td>(66)</td>
</tr>
<tr>
<td>Sex (F/M)</td>
<td>8/7</td>
<td>4/11</td>
</tr>
<tr>
<td>Type of CABG (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Elective</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Associated disease (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Hypertension</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Hyperlipidaemia</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Pedal pulses (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absent</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Present</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Ankle brachial index (mean)</td>
<td>0.4–0.7</td>
<td>0.7–1.1 (0.54)</td>
</tr>
<tr>
<td>Site of saphenous harvesting (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left leg</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Right leg</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Both</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

The post-CABG status and treatment are shown in Table 2. Thirteen patients underwent lower extremity percutaneous angiography. Treatment consisted of percutaneous angioplasty of the superficial femoral and the tibialis posterior arteries in three patients, and infrainguinal bypass in 10, including six femoropopliteal (two with the contralateral saphenous vein and four with the ipsilateral saphenous vein) and four femorotibialis anterior (all with the contralateral saphenous vein). All patients received antibiotic therapy peroperatively and underwent aggressive debridement. In two patients skin grafting was required to cover the wound.

Wound healing after treatment was noted in 11 patients. Four underwent below-knee amputation, three because of severe distal infection and gangrene in spite of a patent femoropopliteal (one patient) or femorotibialis (two patients) graft, and one because of extensive gangrene on admission. Hospitalisation ranged from 3 to 8 weeks (mean, 4 weeks).

In group B only three patients out of 15 had delayed wound healing at the saphenous harvesting site. None of these needed surgery, and all the wounds healed in 2–4 weeks with local dressings and oral antibiotics.

Discussion

The present study shows that saphenous vein harvesting from limbs with severe PAD can lead to significant morbidity.2,3 The prevalence of PAD in patients undergoing CABG is 14–26.5%. Since only 7.9% have a history of claudication, PAD is masked in the majority by the limitation in walking imposed by angina.1 Other risk factors for infection at the saphenous vein excision site are diabetes mellitus and obesity.4,5 However, in these cases, when pedal pulses are palpable, the leg is usually not jeopardised. When the ankle pressure is less than 40–50 mmHg in non-diabetic patients, or less than 80 mmHg in diabetic patients, it is unlikely that wound infection will be remedied solely by local treatment.6 Gandhi and colleagues7 reported on five patients with PAD who required infrainguinal revascularisation for wound necrosis after saphenous vein harvesting for CABG. Pedal pulses were not palpable in any of the affected extremities.

In the present study we compared 15 patients who were admitted because of wound complications of CABG to 15 patients after CABG followed in the outpatient clinic. Differences were found between the groups for absence of pedal pulse, presence of diabetes mellitus, mean ankle brachial index, and mean ankle pressure. All patients in group A had severe PAD whereas none did in group B, and all needed intervention to save the limb; four required below-knee amputation.

Results

The clinical characteristics of the two groups are summarised in Table 1. The patients in group A were readmitted 2–6 weeks after CABG (mean, 4 weeks). Associated diseases were insulin- and non-insulin-dependent diabetes mellitus (11 patients), hypertension (10 patients) and hyperlipidaemia (seven patients). Absence of pedal pulses in the affected leg was noted in 13 patients; ankle brachial index ranged from 0.4 to 0.7 in group A and 1.7–1.1 in group B; corresponding ankle pressures were 40–100 mmHg (mean 60 mmHg) and 80–160 mmHg (mean 110 mmHg). The saphenous vein was harvested from the left leg in 11 patients, the right leg in one, and both legs in three. In three of the 11 patients in whom the left saphenous vein was harvested, the right leg had palpable femoral and popliteal pulses whereas the left leg had a femoral pulse only.

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Note:

1. When both legs are ischaemic, the saphenous vein should be harvested from the less affected leg (defined by laboratory work-up).

2. In all patients with impaired healing at the saphenous vein excision site, careful examination is essential, and the possibility of ischaemia should be taken into account.

Fig. 1. Decision-making flow chart for saphenous vein harvesting.

The measures generally used to reduce the risk of complications of CABG are minimally invasive harvesting involving small (3–4 cm) cutaneous incisions, or the less traumatic endoscopic harvesting. Nevertheless, in patients with inadequate vascularisation combined with ischaemic heart disease, even minor trauma to the underlying tissue will cause necrosis and infection. In the present sample, all the revascularisation procedures performed were undertaken because of complications of saphenous graft wound healing, and all amputations were the direct results of the occurrence of severe irreversible infection.
at the graft site – despite a well-functioning bypass – that could not be controlled by debridement and antibiotics.

The decision-making process for saphenous vein harvesting is shown in Figure 1. Patients at risk of ischaemic incisional complications may be identified before CABG by review of their medical history for PAD risk factors and careful physical examination. When pedal pulses are impalpable, harvesting options other than the saphenous vein should be considered (e.g. radial artery cephalic vein). In these cases, ankle brachial index and pulse volume recording should be performed, and the saphenous vein harvested from the leg with the less severe PAD. In emergency CABG, when no distal pulses are palpable, we recommend harvesting the proximal saphenous vein from a point not below the knee, as there is usually no problem of wound healing in this site even when no distal pulses exist.

We found that referral for vascular consultation was delayed in all 15 patients for 2–6 weeks after CABG. Two patients had already had skin graft failures, and one patient presented with an unsalvageable limb infection and had to undergo primary below-knee amputation. Therefore, we suggest that in all cases in which delayed healing at the harvesting site is observed, a vascular laboratory work-up should be performed as soon as possible, followed by vascular consultation and angiography to assess the need for revascularisation.

In conclusion, PAD in patients undergoing CABG should be recognised as a major risk factor for severe complications at the saphenous vein harvesting site, and it can even lead to limb loss. Careful preoperative evaluation and correct choice of surgical procedure will minimise the chances of major vascular complications at the harvesting site.

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References


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