Diabetes mellitus is a major risk factor for atherosclerotic peripheral arterial disease. Previous studies have shown that the pattern of atherosclerotic disease is more diffuse in diabetes, with more severe involvement of the distal segments. These studies considered the occlusive pattern but did not report the incidence and severity of plaques, stenoses and other types of arteriographic changes. In an effort to compare the relative frequency of various angiographic presentations of atherosclerosis (occlusion, stenosis, tortuosity, mural irregularity and calcification of arterial walls) between subjects with and without diabetes, we performed the present survey.

Methods

We studied 104 lower limb angiograms that were obtained from 26 patients with and 26 patients without diabetes. Patients were matched for age and gender, and they underwent arteriography of both lower extremities for ischaemic symptoms (such as claudication, rest pain, ulcer or gangrene). Conventional angiography was performed using either the right or left transfemoral approach (Seldinger’s technique). We compared, by means of the chi-squared test, the observed frequencies of the five types of arteriographic findings in different arterial segments of the lower extremity between patients who had diabetes and those who did not. A cut-off value of \( p<0.05 \) was considered statistically significant.

Results

Table 1 presents the statistically significant differences observed in morphology of arteriographic findings in various segments of the leg arteries in patients, according to their diabetes status. As shown, arterial occlusion was more commonly encountered among patients without diabetes, whereas non-occlusive types of atherosclerotic arterial involvement, namely stenosis, tortuosity, mural irregularity and calcification of arterial walls, were more frequent in subjects who did have diabetes.

Discussion

To our knowledge, few studies have compared the frequency of different morphological types of arteriographic findings other than occlusions and stenoses in subjects with and without diabetes. In an attempt at determining the correlations between the arteriographic findings and the patient’s age, sex, and atherosclerosis risk factors such as diabetes, Hyvarinen demonstrated that vascular tortuosity increased with age but not with the presence of diabetes. Neubauer and colleagues showed that in large vessels of the muscular type, progressive and uniform narrowing, increased intima roughness or rugosity, and linear media calcification were related to type 1 diabetes.

The clinical significance of these arteriographic findings is still under investigation. Although it was initially considered a benign finding, calcification of the media is now recognised as a strong predictor of cardiovascular morbidity and mortality in patients with diabetes. Furthermore, a strong association with diabetic polyneuropathy and familial aggregation have also been documented. Calcification of the coronary artery is important in that the presence of calcification around a target lesion for coronary intervention can predict coronary artery dissection in response to balloon angioplasty. The same may also be true of peripheral arterial involvement, further emphasising the clinical significance of paying attention to morphological lesions of atherosclerosis other than occlusion or stenosis.

<table>
<thead>
<tr>
<th>Morphology of lesion</th>
<th>Involved arteries</th>
<th>With diabetes (%)</th>
<th>Without diabetes (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occlusion</td>
<td>Deep femoral</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Anterior tibial</td>
<td>29</td>
<td>51</td>
</tr>
<tr>
<td>Haemodynamically significant stenosis†</td>
<td>Posterior tibial</td>
<td>29</td>
<td>7</td>
</tr>
<tr>
<td>Tortuosity‡</td>
<td>Deep femoral</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Arterial wall irregularity§</td>
<td>Deep femoral</td>
<td>45</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Superficial femoral</td>
<td>58</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Popliteal</td>
<td>42</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Peroneal</td>
<td>26</td>
<td>8</td>
</tr>
<tr>
<td>Arterial wall calcification¥</td>
<td>Superficial femoral</td>
<td>26</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Popliteal</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Anterior tibial</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Posterior tibial</td>
<td>9</td>
<td>0</td>
</tr>
</tbody>
</table>

* All differences were statistically significant (\( p<0.05 \))
† Arterial diameter reduction of more than 50% (and less than 99%)
‡ More than two acute angulations in the course of the artery
§ Lack of luminal smoothness resulting in a beaded appearance
¥ Presence of linear or punctate mural calcified foci with an entire length of more than 20% of the arterial length
In conclusion, we found that patients with diabetes had arterial occlusions less frequently but that non-occlusive lesions were more common in these patients. These findings help us reach a clearer picture of diabetic atherosclerotic arterial disease. Non-occlusive lesions, particularly the calcifications of the arterial wall which were found to be more common among patients with diabetes in our series and had not been studied in much detail previously, could be of clinical significance, especially in determining the prognosis and response to therapeutic measures like balloon angioplasty. However, further investigation into the clinical implications of these findings is required.

Conflict of interest
None declared.

References

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