SHORT REPORT

Anaemia, Iron and Vitamin Deficits in Patients with Peripheral Arterial Disease

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KEYWORDS
Anaemia; Iron deficiency; Peripheral arterial disease; Vitamin deficiency

Abstract
Introduction: Anaemia can compromise muscle and organ function. Related iron and vitamin body stores have seldom been assessed in patients with peripheral arterial disease.

Report: We retrospectively analysed basal prevalence of anaemia, iron, B12-vitamin and folic acid deficits in 420 patients with claudication and 204 patients with critical limb ischaemia (CLI). The prevalence of the evaluated parameters was 9.8%, 6.7%, 6.7% and 2.9% among patients with claudication but 49.5%, 31.9%, 15.7% and 6.4% among CLI patients, respectively (p < 0.05 for all).

Discussion: Anaemia, iron and vitamin deficits are uncommon among patients with ischemic claudication but very prevalent among patients with CLI.

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Introduction
Illness and surgical recovery imply increased metabolic demands and require physiological adjustment to preserve organ function, promote wound healing and defence against infection.1,2 Anaemia is a potentially reversible condition, common in surgical and hospitalised patients, even more so in seriously ill or elderly patients.3 It can seriously compromise muscle and organ function, increase the risk of postoperative complications and mortality and prolong hospital stay.2–5 Anaemia can be secondary to iron, B12-vitamin or folate deficiency or chronic disease, and it can be present previously to hospital admission or develop during the hospital procedure. If unaddressed, it will persist after discharge, affecting complete patient recovery and functional status.
We assessed basal prevalence of anaemia, iron, B12-vitamin and folic acid deficits in our patients suffering from ischemic claudication (IC) and critical limb ischaemia (CLI).

Methods

We performed a descriptive cross-sectional study which included all patients with peripheral arterial disease (PAD), both hospitalised and out-clinic, diagnosed or followed up in our centre between June 2007 and June 2009.

We retrospectively registered age, gender, severity of PAD (intermittent claudication vs. CLI), cardiovascular risk factors (CVRFs) (active smoking, hypertension, diabetes mellitus and dyslipaemia), coronary artery disease (CAD), cerebrovascular disease (CVD), chronic pulmonary obstructive disease (COPD) and chronic renal failure (CRF).

A peripheral blood sample was obtained from each patient after overnight fasting. We registered decreased circulating concentrations of iron (<58 mcg dl⁻¹), B12 vitamin (<179 pg ml⁻¹), folic acid (<2.4 ng ml⁻¹) and haemoglobin (<12.9 g dl⁻¹ in men and <11.9 g dl⁻¹ in women).

We used T-test, chi-square and Mann–Whitney tests for statistical analysis (SPSS 12.0, p < 0.05 as level of significance).

Results

We included 624 patients in the study; two thirds (n = 420; 67.3%) suffered from IC and 204 (32.7%) from CLI. Anaemia, iron, B12-vitamin and folic acid deficits were uncommon among patients with IC (<10% for each) but very prevalent among patients with CLI; almost 50% of the patients suffering from CLI were anaemic when first evaluated, over 30% had iron deficiency and over 15% B12-vitamin deficit (Table 1).

Anaemia was more prevalent in hypertensive patients and increased significantly with age among both IC and CLI patients, with a maximum of 62.1% in >75-year-old CLI patients. Diabetes increased the prevalence of anaemia and iron deficiency among patients with IC and was associated with B12-vitamin deficiency in CLI patients. CRF also increased anaemia and folic acid deficit in patients with IC (Table 2, Online Appendix).

Discussion

The prevalence of anaemia and iron or vitamin deficiencies in patients with IC was too low in our series to endorse a systematic assessment in these patients. We now include a haemogram as part of their initial evaluation and look into body iron and vitamin stores selectively. However, we do recommend this systematic approach in patients with CLI as part of their integral and preoperative management. The cause for anaemia should be assessed and treated prior to intervention and thus blood transfusion minimised. Iron deficiency and, to a lesser extent, B12-vitamin deficit are fairly common and should be addressed routinely. This assessment can help provide an insight into the patient’s general status, postoperative morbidity risk and future response to disease and treatment, and to select those who would benefit from supplementation.1,2,4.

Our study is limited by the lack of a matched control group, or data on the possible impact of these deficiencies on prospective patient outcome, complication rates, length of hospital stay or need for transfusion. Further research is needed to elucidate the impact of the basal assessment and

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Table 1 Prevalence of cardiovascular risk factors, comorbidity, anemia, iron and vitamin deficits according to the severity of PAD.

<table>
<thead>
<tr>
<th></th>
<th>Ischemic Claudication (n = 420) % (n)</th>
<th>Critical Limb Ischaemia (n = 204) % (n)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean ± SD)</td>
<td>66 ± 10.3</td>
<td>72 ± 11.2</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Gender (M/W)</td>
<td>89%/11% (374/46)</td>
<td>76.5%/23.5% (156/48)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Active smoking</td>
<td>33.8% (142)</td>
<td>24.5% (50)</td>
<td>0.017</td>
</tr>
<tr>
<td>Hypertension</td>
<td>63.3% (266)</td>
<td>75% (153)</td>
<td>0.004</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>30.7% (129)</td>
<td>62.7% (128)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Dyslipaemia</td>
<td>54.8% (230)</td>
<td>50.5% (103)</td>
<td>0.32</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>19.5% (82)</td>
<td>23% (47)</td>
<td>0.31</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>11.9% (50)</td>
<td>12.3% (25)</td>
<td>0.90</td>
</tr>
<tr>
<td>COPD</td>
<td>16.2% (68)</td>
<td>15.7% (32)</td>
<td>0.87</td>
</tr>
<tr>
<td>Chronic renal failure</td>
<td>7.4% (31)</td>
<td>16.7% (34)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>ABI</td>
<td>0.63 ± 0.16</td>
<td>0.49 ± 0.14</td>
<td>0.001</td>
</tr>
<tr>
<td>Hemoglobin &lt;12.9 g/dL</td>
<td>9.8% (41)</td>
<td>49.5% (101)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Iron &lt;58 mcg/dL</td>
<td>6.7% (28)</td>
<td>31.9% (65)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>B12 Vitamin &lt;179 pg/mL</td>
<td>6.7% (28)</td>
<td>15.7% (32)</td>
<td>0.002</td>
</tr>
<tr>
<td>Folic Acid &lt;2.4 ng/mL</td>
<td>2.9% (12)</td>
<td>6.4% (13)</td>
<td>0.018</td>
</tr>
</tbody>
</table>

n: number; SD: Standard Deviation; M/W: Men/Women; COPD: Chronic Obstructive Pulmonary Disease; ABI: Ankle-brachial Index.
supplementation on PAD patient recovery and prognosis, as well as health-care costs.

Conflict of Interest/Funding

None.

Appendix

Supplementary material

Supplementary data related to this article can be found online at doi:10.1016/j.ejvs.2011.01.017.

References