1.8 Preoperative Evaluation of a Vascular Patient

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1.8.1 Introduction

The purpose of preoperative evaluation is to identify and, if necessary, implement measures to prepare higher risk patients for surgery. Preoperative evaluation can decrease the length of hospital stay as well as minimize postponed or cancelled surgeries [4]. With the high likelihood of underlying coronary artery disease and the high degree of haemodynamic cardiac stress with profound alteration in heart rate, blood pressure, vascular volume, bleeding and clotting tendencies, vascular surgery represents an intermediate (1–5%) to high (>5%) mortality risk.

Surgical morbidity and mortality generally falls into one of three categories: cardiac, respiratory and infectious complications. A good history and physical examination, focusing on risk factors for cardiac, pulmonary and infectious complications, and determination of a patient's functional capacity are essential in the general evaluation process.

With respect to the type of surgery, urgent and emergency procedures constitute higher risk situations than elective, nonurgent surgery and present a limited opportunity for preoperative evaluation and treatment.

1.8.2 Systemic Evaluation

A thorough systemic evaluation is appropriate in all patients undergoing vascular surgery. Specific areas of importance are discussed here.

1.8.2.1 Cardiovascular System

Cardiac complications are the leading cause of morbidity and death in patients undergoing vascular surgery [1]. Many of the risk factors contributing to peripheral vascular disease (diabetes mellitus, smoking, dyslipidaemia) are also risk factors for coronary artery disease (CAD). The incidence of CAD in patients with peripheral vascular disease is around 60%. The usual symptomatic presentation in this group of patients may be obscured by exercise limitations due to advanced age or intermittent claudication.

Risk Stratification

The goal of risk stratification is to reduce overall morbidity and mortality associated with the surgical procedure. The information gathered from the history and examination will help to stratify the patient as at high, intermediate, or low risk for peri-operative cardiac complications. Consideration of further testing is based on the risk category at which the patient is placed. An example of risk stratification is shown in Table 1.8.1.

For patients who have undergone coronary artery bypass grafting within the last 5 years, and whose clinical status has remained stable without recurrent symptoms or sign of ischaemia, further cardiac testing is not necessary. If a patient has had adequate coronary evaluation in the last 2 years and the findings were favourable, it is not usually necessary to repeat the tests unless there are new symptoms.

Diagnostic Procedures

Recommended European Standard

Low Risk
- Electrocardiography (ECG)
- Plain chest radiograph.

Intermediate Risk and High Risk
- Exercise electrocardiography – in most ambulatory patients the test of choice is exercise electrocardiography, which provides an estimate of functional capacity and can detect myocardial ischaemia.
Preoperative Evaluation of a Vascular Patient

Useful Additional Therapeutic Strategies
For the small percentage of patients who are at high risk and have symptoms of unstable angina or residual angina after recent MI it may be appropriate to proceed directly to coronary angiography rather than noninvasive studies.

PTCA or CABG should only be performed in patients who meet the criteria for the respective procedures independent of the proposed vascular surgery. The benefit of prophylactic coronary revascularization has never been proven in a randomized controlled trial (RCT); however, several retrospective studies have shown that patients who have undergone CABG have the same morbidity and mortality from cardiac complications as those with no clinical signs of coronary artery disease [3].

Figure 1.8.1 shows an algorithm for cardiac evaluation and management of vascular surgical patients.

1.8.2.2 Respiratory System
The major pulmonary complications in the peri-operative period are atelectasis, pneumonia and bronchitis. Predisposing risk factors include cough, dyspnoea, smoking, a history of lung disease and obesity. Vascular surgery of the abdomen or chest has a far higher rate of pulmonary complications compared to vascular surgery in places other than the abdomen.

### Table 1.8.1 A guide to risk stratification

<table>
<thead>
<tr>
<th>Low Risk</th>
<th>Intermediate Risk</th>
<th>High Risk</th>
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<tbody>
<tr>
<td>Advanced age</td>
<td>Prior myocardial infarction</td>
<td>Recent myocardial infarction</td>
</tr>
<tr>
<td>Abnormal electrocardiogram</td>
<td>Diabetes mellitus</td>
<td>Unstable or severe angina</td>
</tr>
<tr>
<td>Rhythm other than sinus</td>
<td>Compensated or prior congestive heart failure</td>
<td>Decompensated congestive heart failure</td>
</tr>
<tr>
<td>Low functional capacity</td>
<td>Mild angina pectoris</td>
<td>Severe valvular disease</td>
</tr>
<tr>
<td>History of stroke</td>
<td></td>
<td>Significant arrhythmias in the presence of underlying heart disease</td>
</tr>
<tr>
<td>Uncontrolled hypertension</td>
<td></td>
<td>Supraventricular arrhythmias with uncontrolled ventricular rate</td>
</tr>
</tbody>
</table>

- Stress echocardiography – useful in patients with a major abnormality or uninterpretable ECG, or patients who cannot meet the physical requirements of the exercise portion of an exercise ECG. Patients with positive results have an 8–38% risk of cardiac death or myocardial infarction (MI) within 30 days after surgery.

**Treatment**

**Recommended European Standard**

**Low Risk**
- β-Blockade – the ability of β-blockers to reduce the peri-operative risk of cardiac complications has been extensively documented [2]. Atenolol is often administered intravenously or orally beginning 2 days pre-operatively and continuing for 7 days postoperatively; this intervention reduced the incidence of peri- and postoperative myocardial ischaemia by 30–50% in randomized controlled trials [7]. In the absence of contraindications all patients undergoing major vascular surgery should benefit from β-blockade.

**Intermediate and High Risk**
Therapy in these groups should be based upon the results of noninvasive testing:
- If negative – β-blockade only.
- If positive – consider cardiac catheterization, the results of which may lead to either percutaneous coronary angioplasty (PTCA) or coronary artery by-pass grafting (CABG).