Possible/rejected IE but
Rejected IE
Possible IE

Clinical suspicion of IE
Modified Duke Criteria (4)

DEFINITION

Definite IE
Possible IE
Rejected IE

1. PROVEN value
2. Endocarditis TTE/TOE + microbiology
3. PROVEN clinical criteria
4. Isolated embolic events

ESC 2015 modified Duke criteria

Definite IE
Possible IE
Rejected IE

Proven IE but low suspicion
Possible IE
Rejected IE

Native valve
Prosthetic valve
Native valve
Prosthetic valve

In summary, echocardiography, BC, and clinical features remain the cornerstone of diagnosis of IE. When BC are negative, further microbiological studies are needed. The sensitivity of Duke Criteria can be improved by new imaging modalities (MRI, cardiac CT, cardiac PET). Imaging is frequently difficult and is an important scope of the ‘Heart Team’. In some cases, surgery needs to be performed on an urgent basis (within 24 h), urgent basis (within a few days, <7 days), irrespective of the duration of antibiotic treatment. In other cases, surgery can be postponed to allow 1 or 2 weeks of antibiotic treatment under careful clinical and echocardiographic observation before an elective surgical procedure is performed. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.

Neurological complications

Symptomatic neurological events develop in 15–30% of patients with IE and additional silent events are frequent. Stroke (thromboembolic and haemorrhagic) is associated with excess mortality. Rapid diagnosis and initiation of appropriate antibiotics are of major importance to prevent a first or recurrent neurological complication. After a first neurological event, if cerebral haemorrhage has been excluded by cranial CT and neurological damage is not severe (i.e. coma), surgery indicated. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.

Surgical treatment is used in approximately half of patients with IE because of severe complications. Early consultation with a cardiac surgeon is recommended in order to determine the best therapeutic approach. Identification of patients requiring early surgery is frequently difficult and is an important scope of the ‘Heart Team’. In some cases, surgery needs to be performed on an urgent basis (within 24 h), urgent basis (within a few days, <7 days), irrespective of the duration of antibiotic treatment. In other cases, surgery can be postponed to allow 1 or 2 weeks of antibiotic treatment under careful clinical and echocardiographic observation before an elective surgical procedure is performed. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.

In summary, echocardiography, BC, and clinical features remain the cornerstone of diagnosis of IE. When BC are negative, further microbiological studies are needed. The sensitivity of Duke Criteria can be improved by new imaging modalities (MRI, cardiac CT, cardiac PET). Imaging is frequently difficult and is an important scope of the ‘Heart Team’. In some cases, surgery needs to be performed on an urgent basis (within 24 h), urgent basis (within a few days, <7 days), irrespective of the duration of antibiotic treatment. In other cases, surgery can be postponed to allow 1 or 2 weeks of antibiotic treatment under careful clinical and echocardiographic observation before an elective surgical procedure is performed. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.

Neurological complications

Symptomatic neurological events develop in 15–30% of patients with IE and additional silent events are frequent. Stroke (thromboembolic and haemorrhagic) is associated with excess mortality. Rapid diagnosis and initiation of appropriate antibiotics are of major importance to prevent a first or recurrent neurological complication. After a first neurological event, if cerebral haemorrhage has been excluded by cranial CT and neurological damage is not severe (i.e. coma), surgery indicated. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.

Surgical treatment is used in approximately half of patients with IE because of severe complications. Early consultation with a cardiac surgeon is recommended in order to determine the best therapeutic approach. Identification of patients requiring early surgery is frequently difficult and is an important scope of the ‘Heart Team’. In some cases, surgery needs to be performed on an urgent basis (within 24 h), urgent basis (within a few days, <7 days), irrespective of the duration of antibiotic treatment. In other cases, surgery can be postponed to allow 1 or 2 weeks of antibiotic treatment under careful clinical and echocardiographic observation before an elective surgical procedure is performed. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.

Neurological complications

Symptomatic neurological events develop in 15–30% of patients with IE and additional silent events are frequent. Stroke (thromboembolic and haemorrhagic) is associated with excess mortality. Rapid diagnosis and initiation of appropriate antibiotics are of major importance to prevent a first or recurrent neurological complication. After a first neurological event, if cerebral haemorrhage has been excluded by cranial CT and neurological damage is not severe (i.e. coma), surgery indicated. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.

Surgical treatment is used in approximately half of patients with IE because of severe complications. Early consultation with a cardiac surgeon is recommended in order to determine the best therapeutic approach. Identification of patients requiring early surgery is frequently difficult and is an important scope of the ‘Heart Team’. In some cases, surgery needs to be performed on an urgent basis (within 24 h), urgent basis (within a few days, <7 days), irrespective of the duration of antibiotic treatment. In other cases, surgery can be postponed to allow 1 or 2 weeks of antibiotic treatment under careful clinical and echocardiographic observation before an elective surgical procedure is performed. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.

Neurological complications

Symptomatic neurological events develop in 15–30% of patients with IE and additional silent events are frequent. Stroke (thromboembolic and haemorrhagic) is associated with excess mortality. Rapid diagnosis and initiation of appropriate antibiotics are of major importance to prevent a first or recurrent neurological complication. After a first neurological event, if cerebral haemorrhage has been excluded by cranial CT and neurological damage is not severe (i.e. coma), surgery indicated. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.

Surgical treatment is used in approximately half of patients with IE because of severe complications. Early consultation with a cardiac surgeon is recommended in order to determine the best therapeutic approach. Identification of patients requiring early surgery is frequently difficult and is an important scope of the ‘Heart Team’. In some cases, surgery needs to be performed on an urgent basis (within 24 h), urgent basis (within a few days, <7 days), irrespective of the duration of antibiotic treatment. In other cases, surgery can be postponed to allow 1 or 2 weeks of antibiotic treatment under careful clinical and echocardiographic observation before an elective surgical procedure is performed. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.

Neurological complications

Symptomatic neurological events develop in 15–30% of patients with IE and additional silent events are frequent. Stroke (thromboembolic and haemorrhagic) is associated with excess mortality. Rapid diagnosis and initiation of appropriate antibiotics are of major importance to prevent a first or recurrent neurological complication. After a first neurological event, if cerebral haemorrhage has been excluded by cranial CT and neurological damage is not severe (i.e. coma), surgery indicated. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.

Surgical treatment is used in approximately half of patients with IE because of severe complications. Early consultation with a cardiac surgeon is recommended in order to determine the best therapeutic approach. Identification of patients requiring early surgery is frequently difficult and is an important scope of the ‘Heart Team’. In some cases, surgery needs to be performed on an urgent basis (within 24 h), urgent basis (within a few days, <7 days), irrespective of the duration of antibiotic treatment. In other cases, surgery can be postponed to allow 1 or 2 weeks of antibiotic treatment under careful clinical and echocardiographic observation before an elective surgical procedure is performed. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.

Neurological complications

Symptomatic neurological events develop in 15–30% of patients with IE and additional silent events are frequent. Stroke (thromboembolic and haemorrhagic) is associated with excess mortality. Rapid diagnosis and initiation of appropriate antibiotics are of major importance to prevent a first or recurrent neurological complication. After a first neurological event, if cerebral haemorrhage has been excluded by cranial CT and neurological damage is not severe (i.e. coma), surgery indicated. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.

Surgical treatment is used in approximately half of patients with IE because of severe complications. Early consultation with a cardiac surgeon is recommended in order to determine the best therapeutic approach. Identification of patients requiring early surgery is frequently difficult and is an important scope of the ‘Heart Team’. In some cases, surgery needs to be performed on an urgent basis (within 24 h), urgent basis (within a few days, <7 days), irrespective of the duration of antibiotic treatment. In other cases, surgery can be postponed to allow 1 or 2 weeks of antibiotic treatment under careful clinical and echocardiographic observation before an elective surgical procedure is performed. The three main indications for early surgery in IE are its 3 main complications, i.e. HF, uncontrolled infection, and prevention of embolic events.
In summary, antibiotic prophylaxis should be limited to patients at high-risk of IE undergoing the highest risk dental procedures. Hygiene measures, in particular oral and cutaneous hygiene, are of utmost importance. Epidemiological changes are marked by an increase in IE due to staphylococci and of healthcare-associated IE, thereby highlighting the importance of non-specific asymptomatic prophylaxis. This should not concern only high-risk patients, but should also be part of routine care in all patients since IE occurring in patients without previously known heart disease now accounts for a substantial and increasing incidence. This means that, although prophylaxis should be restricted to high-risk patients, preventive measures should be maintained or extended to all patients with cardiac disease.

The ‘Endocarditis Team’

The presence of an ‘Endocarditis Team’ is crucial in IE. This multidisciplinary approach has shown to significantly reduce the 1-year mortality in infective endocarditis. The management of patients with IE with reference centres by a specialized team (‘Endocarditis Team’) is strongly recommended.

Antibiotic prophylaxis at dental procedures

<table>
<thead>
<tr>
<th>Situation</th>
<th>Antibiotic</th>
<th>Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allergy to penicillin or ampicillin</td>
<td>Amoxicillin 500 mg orally or i.v.</td>
<td>2 g orally or i.v.</td>
<td>10 mg/kg orally or i.v.</td>
</tr>
<tr>
<td>Allergy to penicillin or ampicillin</td>
<td>Clindamycin</td>
<td>600 mg orally or i.v.</td>
<td>20 mg/kg orally or i.v.</td>
</tr>
</tbody>
</table>

The ‘Endocarditis Team’ should have meetings on a regular basis in order to discuss cases, take surgical decisions, and define the type of follow-up.

Role of the ‘Endocarditis Team’

The ‘Endocarditis Team’ should have meetings on a regular basis in order to discuss cases, take surgical decisions, and define the type of follow-up.

1. Blood cultures positive for IE
2. Topical microorganisms consistent with IE from 2 separate blood cultures: *Viridans streptococci*, *Streptococcus pyogenes* (streptococcus bovis), HACEK group, *Staphylococcus aureus* or *Staphylococcus epidermidis*
3. Community-acquired endocarditis: in the absence of a primary focus or *Streptococcus* species from 1 intermittently positive blood culture
4. Presence of multiple blood cultures of blood sample drawn ≥12 h apart, or ≥4 of ≥3 a variety of ≥2 repeat positive blood cultures of blood samples drawn ≥12 h apart or ≥4 positive blood cultures for C. burnetii or phase I/2 anti-EB assay ≥1:80