Best evidence topic - Aortic and aneurysmal

In patients with acute aortic intramural haematoma is open surgical repair superior to conservative management?

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Summary

A best evidence topic in cardiac surgery was written according to a structured protocol. The question addressed was: In patients with acute aortic intramural haematoma (IMH) is open surgical repair superior to conservative management. IMH is defined as a clinical condition related to but pathologically distinct from aortic dissection. In this potentially lethal entity, there is haemorrhage into the aortic media in the absence of an intimal tear. Altogether more than 204 papers were found using the reported search terms, from which six systematic reviews represented the best evidence to answer the clinical question. The authors, journal, date and country of publication, patient group studied, study type, relevant outcomes and results of these papers are tabulated. IMH represents 17% of all dissections, whereas in postmortem studies this condition is found in 4–13%. The 30-day mortality of IMH is 24% (36% with type A and 12% with type B IMH; \( P < 0.05 \)). With surgical repair, 30-day mortality of type A IMH was 14% for patients treated surgically and 36% for patients treated medically with a \( P \)-value of 0.02. Survival at 1, 2, 3, 5 and 10 years was respectively: 81 ± 21%, 87 ± 8%, 83 ± 6%, 65 ± 22% and 44 ± 14%. In contrast, with 8% mortality associated with medical treatment, prognosis of type B IMH is more favourable without surgical intervention, the latter associated with a 30-day mortality of 33% (\( P < 0.05 \)). Symptomatic patients and those with rapid progression or overt dissection during follow-up need emergent surgery. Ascending aortic diameter of > 50 mm or subadventitial haematoma thickness of > 12 mm should be considered as the candidates for early surgery. Although IMH seems to have an improved prognosis over aortic dissection, survivors of IMH are at significant risk for progressive aortic abnormalities, including aortic rupture, aneurysm, and ulceration. We conclude that surgical treatment of aortic IMH involving the ascending aorta with open distal replacement of ascending aorta results in lower mortality and longer survival compared to conservative management. IMH affecting the descending aorta can be managed with medical or endovascular interventional approach. In this latter group, serial imaging of the aorta is recommended, as aneurysm formation is not uncommon.

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1. Introduction

A best evidence topic was constructed according to a structured protocol. This is fully described in the ICVTS [1].

2. Three-part question

In patients with [aortic intramural haematoma (IMH)] is [open surgical repair] superior to [conservative management] for optimising [long-term survival].

3. Clinical scenario

You are referred a 74-year-old patient who presented 2 h ago with intrascapular pain. A CT-scan shows an IMH of the ascending aorta extending across the arch. You can see no intimal tear and he is hemodynamically stable. You take him to theatre. On excision of the native aorta, you are struck by how normal the intima is despite an adventitial haematoma and you wonder whether you could have treated him conservatively.

4. Search strategy

AND [haematoma.mp OR haematoma.mp]

5. Search outcome

Two hundred and four papers were found using the reported search. From these, five systematic reviews were identified that provided the best evidence to answer the question. They are presented in Table 1.

Studies overlapping patient groups from the same institution were excluded. Case reports and small series of < 10 patients were not enrolled. Studies that did not declare the clinical outcome were also excluded. Primary outcomes of interest were the initial treatment strategy and the early (< 30-day or in-hospital) and overall mortality rates.

6. Results

Aortic IMH is defined as a clinical condition related to but pathologically distinct from aortic dissection. In this poten-
### Table 1: Best evidence papers

<table>
<thead>
<tr>
<th>Author, date and country, study type (level of evidence)</th>
<th>Patient group</th>
<th>Outcomes</th>
<th>Key results</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kan et al., (2008), Eur J Cardiothorac Surg, China [2]</td>
<td>328 patients from 12 trials were included in the review</td>
<td>Primary outcomes of interest were the initial treatment strategy and the early (&lt;30-day or in-hospital) and overall mortality rates</td>
<td>Initial surgery and medical treatment were performed for 168 (51.2%) and 160 (48.8%) patients, respectively.</td>
<td>There was higher mortality in patients with initial medical treatment. Symptomatic patients and those with rapid progression or overt dissection during follow-up need emergent surgery.</td>
</tr>
<tr>
<td>Systematic review (level 1a)</td>
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<tr>
<td>Maraj et al., (2000), Am J Cardiol, USA [3]</td>
<td>143 patients in 19 studies were evaluated</td>
<td>Early and late mortality in type A and B IMH</td>
<td>Patients with Stanford type A IMH who underwent surgery, compared with those who underwent medical management, had a significantly better prognosis (14% vs. 36% mortality, respectively, P &lt; 0.02).</td>
<td>The optimal management of patients with ascending aortic IMH has been emergency surgical repair. Type B IMH may be managed using medical treatment.</td>
</tr>
<tr>
<td>Systematic review (level 1a)</td>
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<tr>
<td>Tsai et al., (2005), Circ, Germany [4]</td>
<td>173 patients in 4 studies including 58 patients from The International Registry of Acute Aortic Dissection (IRAD) were included</td>
<td>Rate if IMH in symptomatic patients with aortic dissection; Risk of progression to dissection and rupture; Early and late mortality in type A and B IMH</td>
<td>Symptomatic patients consistent with aortic dissection had IMH accounting for 5–20% cases; Risk of progression to classic dissection in 28–47% with rupture in 20–45%; IRAD: 5.7% prevalence of IMH in acute aortic syndromes. Patients with IMH vs. AD tended to be older (68.7 vs. 61.7 years; P &lt; 0.001) with distal aortic involvement (60.3% vs. 35.3%; P &lt; 0.0001)</td>
<td>IMH of ascending aorta has a prognosis similar to type A dissection. IMH of descending aorta has prognosis similar to type B dissection. Acute type A dissection mortality is 1–2% per hour after symptomatic onset. Without surgery 50% at 30 days. Uncomplicated type B descending dissections have a 30-day mortality of 10% and may be managed medical or with stent grafting.</td>
</tr>
<tr>
<td>Sundt (2007), Curr Opinion Cardiol, USA [5]</td>
<td>177 patients in 5 studies with Type A IMH and 274 patients in 6 studies with type B IMH were included</td>
<td>Early and late mortality in patients with IMH</td>
<td>In a meta-analysis of 143 cases of type A and B IMH, the mortality rate was 21%.</td>
<td>This systematic review of multi-centre trials and meta-analyses showed:</td>
</tr>
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</table>
Table 1 (Continued)

<table>
<thead>
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<th>Author, date and country, study type (level of evidence)</th>
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</thead>
<tbody>
<tr>
<td>Systematic review (level 1a)</td>
<td>3 other trials looking at endovascular management of type B dissections including 38 patients were reviewed</td>
<td></td>
<td>Predictors of progression include presence of penetrating aortic ulcer, while younger age, diameter &lt; 4.0–4.5 cm, and haematoma thickness &lt; 1 cm confer prognostic benefit</td>
<td>Type A IMH: with careful follow-up, as many as half of IMH patients may avoid surgery. However, given a low operative risk for intervention on the ascending aorta in the acute setting and end-organ malperfusion, which is distinctly common among patients with IMH, one should operate at time of presentation and obviate prolonged hospital stay</td>
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<tr>
<td>von Kodolitsch and Nienaber (1998), Z Cardiol, Germany [6]</td>
<td>209 Patients from several studies</td>
<td>Incidence of IMH among all acute aortic syndromes 30 days mortality: untreated vs. medical vs. surgical treatment</td>
<td>IMH reflecting 17% of all dissections, whereas in postmortem studies this condition is found in 4–13%</td>
<td>IMH is a potential precursor of dissection and should be managed like dissection with undelayed surgical intervention in patients with type A IMH and with medical treatment in type B IMH</td>
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Finally, IMH is a potentially lethal entity, there is haemorrhage into the aortic media in the absence of an intimal tear.

Kan et al. [2] analysed data over a 20-year period from 328 cases in 12 studies. Initial surgery and medical treatment were performed for 168 (51.2%) and 160 (48.8%) patients. 9/12 studies (75%) came from Asia. The early mortality rate was 10.1% (17/168) and 14.4% (23/160) in patients who received initial surgery and medical treat-
ment, respectively ($P=0.37$). They conclude initial medical and timed surgical intervention in type IMH is associated with a higher mortality rate.

Maraj et al. [3] conducted a meta-analysis including 143 patients. IMH had a mortality of 21% affecting mostly men (61%) with a median age of 68 years. There was no difference in the overall mortality rates in Stanford type A vs. type B patients. Patients with Stanford type A IMH who underwent surgery, compared with those who underwent medical management, had a significantly better prognosis (14% vs. 36% mortality, respectively, $P<0.02$). Patients in Stanford group A who received medical treatment had a higher mortality rate than those in group B who received medical treatment (36% vs. 14% mortality, respectively, $P<0.02$). In type B patients, medical and surgical outcomes were similar.

Tsai et al. [4] consider IMH a precursor of dissection and as such similar in natural history. However, IMH may extend, progress, regress or reabsorb (10%).

In the International Register of Acute Aortic Disease (IRAD), which registered 1010 patients with acute aortic dissection, 58 (5.7%) had IMH. This cohort tended to be older (68.7 vs. 61.7 years; $P<0.001$) and more likely to have distal aortic involvement (60.3% vs. 35.3%; $P<0.0001$). The investigators demonstrated an association between increasing hospital mortality and the proximity of IMH to the aortic valve, regardless of medical or surgical treatment (9/12 deaths occurred in the ascending aorta).

Sundt [5] analysed data on 451 patients. They demonstrate that studies from US and Europe have shown higher mortality in IMH [6, 7]. Data from the Far East by Kaji et al. [8] demonstrate a benign progression of disease and lower proportion of patients needing surgery. Twenty-two consecutive type A IMH patients treated expectantly. With only patients demonstrating progression or dissection going to surgery, 12/22 demonstrated a decrease in wall thickness over the first month while nine progressively enlarged and only one fatally ruptured. Diameter under 5 cm was the predictor of outcome by multivariate analysis. Song et al. [9] had 186 patients with acute aortic syndromes affecting ascending aorta, 51 had IMH, with overall mortality among IMH only 9%. The mortality rate among surgical patients was high at 20%, although this may have reflected the grave condition of the patients selected for operation. The Japanese and Korea studies demonstrate that 'you can get away' with initial non-operative treatment if one commits to a long hospital stay. Fifty-seven percent of IMH patients were discharged home without surgery with an in-hospital mortality rate of 7% (IMH patients) vs. 34% (aortic dissection patients) $P=0.004$. Late follow-up at 56 ± 37 months (IMH group) and 60 ± 42 months (aortic dissection group) demonstrated an actuarial survival for IMH of 90% at 1, 2 and 5 years compared with 67, 66 and 62% for aortic dissection. Of equal interest, however, was the decrease in wall thickness among IMH patients from 9 ± 3 mm to 1 ± 3 mm ($P<0.0006$), and a decrease in wall diameter from 48 ± 5 mm to 45 ± 6 mm ($P<0.0006$) among the 17 (57%) IMH patients at mean 30 months after onset. Complete resolution was observed in 40% of the patients.

von Kodolitsch and Nienaber [6] revealed 209 cases in the literature of in vivo diagnosed IMH reflecting 17% of all dissections, whereas in postmortem studies this condition is found in 4–13%. In 18%, IMH progresses to dissection and in another 15% to rupture. In 25% and 28%, respectively, dissection and rupture occur in the ascending aorta and in 12% and 9%, respectively, in the descending thoracic aorta. The 30-day mortality of IMH is 24% (36% with type A and 12% with type B IMH; $P<0.05$). With surgical repair, mortality of type A IMH is lowered to 18% compared to 60% with medical treatment ($P<0.01$). In contrast, with 8% mortality associated with medical treatment, prognosis of type B IMH is more favourable without surgical intervention, the latter associated with a 30-day mortality of 33% ($P<0.05$). Thus, IMH is a potential precursor of dissection and should be managed like dissection with undelayed surgical intervention in patients with type A IMH and with medical treatment in type B IMH.

In this study, a variant of IMH associated with perforating aortic ulcer (PAU) has been deliberately left out to avoid confusion in the reader and to generalise conclusions generated by systematic review of the chosen papers.

7. Clinical bottom line

We conclude that immediate surgical treatment of acute IMH involving the ascending aorta (type A) with open distal replacement results in lower mortality and longer survival. IMH affecting the descending aorta can be managed with medical and endovascular interventional approach when there is a high risk of rupture or danger of end-organ malperfusion.

References