Best evidence topic - Arrhythmia

Is Sotalol more effective than standard beta-blockers for prophylaxis of atrial fibrillation during cardiac surgery?

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Summary

A best evidence topic in cardiac surgery was written according to a structured protocol. The question addressed was whether prophylactic Sotalol was more effective than conventional beta-blockers in the prevention of atrial fibrillation after cardiac surgery. Fifty-one papers were found of which eight presented the best evidence to answer the question. The author, journal, date and country of publication, patient group, relevant outcomes and weaknesses were tabulated. We conclude that prophylactic Sotalol may be more effective than beta-blockers in the prevention of post operative atrial fibrillation, and should not cause an excess of side effects.

Keywords: Review; Evidence based medicine; Thoracic surgery; Atrial fibrillation; Sotalol

1. Introduction

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

2. Clinical scenario

You are updating a protocol for the prophylaxis of atrial fibrillation after cardiac surgery for your department. For many years the protocol has been to continue the patient’s own beta-blockers during the perioperative period, restarting them the day after surgery. A new surgeon in your group suggests that Sotalol, with type III antiarrhythmic properties in addition to Beta-Blockers is superior to this protocol, but other colleagues state that changing the patient’s usual medications the day before surgery in this way will lead to a host of complications including bradycardia and hypotension. You resolve to search the literature to see whether it really is worth changing your departmental policy.

3. Three-part question

In [patients undergoing cardiac surgery] is prophylactic [Sotalol compared to conventional beta blockers] more effective in reducing the incidence of [atrial fibrillation].

4. Search strategy

Medline 1966 to Oct 2004 using the OVID interface. [exp Cardiovascular surgical procedures/OR cardiovascular surgical procedures.mp OR exp Thoracic surgery/OR Thoracic surgery.mp OR exp Coronary Artery Bypass/OR Coronary art$ bypass.mp OR cardiopulmonary bypass.mp OR CABG.mp OR coronary artery surgery.mp OR cardiac surgery.mp OR revascularization.mp OR heart surgery.mp] AND [exp atrial fibrillation/OR atrial fibrillation.mp OR AF.mp OR exp atrial flutter OR atrial flutter.mp OR supraventricular tachycardia.mp OR exp Tachycardia, Supraventricular/ OR SVT.mp] AND [exp sotalol/ OR sotalol.mp]

5. Search outcome

A total of 55 articles were identified of which 7 represented the evidence to answer the clinical question. Of note several papers were also found that compared Sotalol to placebo but these were deemed to be irrelevant to our question. A meta-analysis was also found that briefly addressed this topic. These are summarised in Table 1.

6. Comments

All of the seven papers show the reduction in the incidence of post operative atrial fibrillation was greater in those patients treated with prophylactic Sotalol than conventional beta blockade. Five of the seven papers were statistically significant. The remaining 2 papers showed a non-significant trend to a lower incidence of AF with patients treated with Sotalol.

Auer et al. [2] looked at 253 patients randomised into 4 groups. The group treated with sotalol alone showed a statistically significant reduction in the incidence of AF compared with placebo, the group treated with beta blocker only showed a non-significant trend to a lower incidence of post op AF. They also showed that patients in both the sotalol and beta-blocker groups had a higher incidence of
<table>
<thead>
<tr>
<th>Author</th>
<th>Patient group</th>
<th>Study type</th>
<th>Outcome</th>
<th>Key results</th>
<th>Study weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auer et al. (2004), Am Heart J, Austria [2]</td>
<td>N = 253 patients undergoing either CABG or valve surgery, randomised into 4 groups</td>
<td>PRCT double blind (level 1b)</td>
<td>Atrial fibrillation &gt;5 min duration or for any length of time requiring intervention</td>
<td>Amiodarone and Metoprolol 19/63 (30.2%) gp ( P &lt; 0.008 )</td>
<td>No continuous ECG monitoring</td>
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<tr>
<td></td>
<td>63 received Amiodarone and Metoprolol (50 mg bd)</td>
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<td></td>
<td>Metoprolol only 25/62 (40.3%) ( P &lt; 0.16 )</td>
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<td></td>
<td>62 received Metoprolol (50 mg bd)</td>
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<td></td>
<td>Sotalol 20/63 (31.7%) ( P &lt; 0.013 )</td>
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<td></td>
<td>63 received sotalol (80 mg tds)</td>
<td></td>
<td></td>
<td>Placebo group 35/65 (53.8%)</td>
<td></td>
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<tr>
<td></td>
<td>65 received placebo</td>
<td></td>
<td>Complications</td>
<td>Dose reduction or withdrawal occurred in:– 3.1% Placebo 3.2% Amiod and Metoprolol 12.7% Sotalol 16.1% Metoprolol 16.1% Metoprolol</td>
<td></td>
</tr>
<tr>
<td>Sanjuan et al., 2004, Ann Thorac Surg, Spain [3]</td>
<td>N = 253 cardiac patients receiving either CABG or valve surgery.</td>
<td>Unblinded PRCT (level 1b)</td>
<td>AF &gt; 10 min at any point during in patient stay</td>
<td>Atenolol group 34/153 (22%) Sotalol group 10/100 (10%) ( P = 0.013 )</td>
<td>Lack of continuous ECG monitoring</td>
</tr>
<tr>
<td></td>
<td>153 received Atenolol 50 mg od</td>
<td></td>
<td></td>
<td>Withdrawal of drug in 12 Atenolol group of 8 patients in sotalol group Dose reduction in 2 of Sotalol group Long length of time for atenolol to act</td>
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<tr>
<td></td>
<td>100 received 80 mg bd Sotalol Starting in both 24 h pre op.</td>
<td></td>
<td>Complications</td>
<td>Dose reduction in 2 of Sotalol group</td>
<td></td>
</tr>
<tr>
<td>Abdulrahman et al., 1999, Eur Heart J, USA [4]</td>
<td>N = 191</td>
<td>PRCT Double blind (level 1b)</td>
<td>Incidence of SVT</td>
<td>Sotalol group 9/93 (10%) Metoprolol group 22/98 (22%) ( P = 0.028 )</td>
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<td></td>
<td>93 Sotalol 40 mg, bd for one day then 80 mg bd</td>
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<td></td>
<td>Non sustained VT seen in 2 in each group Withdrawal seen in 3 (3.2%) in Sotalol group and 7 (7.1%) in Metoprolol group</td>
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<tr>
<td></td>
<td>98 Metoprolol 25 mg bd for 1 day then 50 mg bd</td>
<td></td>
<td>Complications</td>
<td>Dose reduction or withdrawal in 11 Sotalol group and 5 Metoprolol group</td>
<td></td>
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<tr>
<td>Parikka et al., 1998, J Cardiovasc Pharmacol, Finland [5]</td>
<td>N = 191</td>
<td>Unblinded PRCT (level 1b)</td>
<td>AF &gt; 15 min or other sustained arrhythmias (at any point during in patient stay)</td>
<td>Metoprolol group 30/93 (32%) Sotalol group 16/98 (16%) ( P &lt; 0.01 )</td>
<td>Lack of continuous ECG monitoring</td>
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<td></td>
<td>93 received Metoprolol 25 mg tds increased to 50 mg tds as tolerated</td>
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<td></td>
<td>Withdrawal of drug in one pt. per group 6 (7%) of metoprolol group and 2 (2%) of Sotalol group needed reduction of dosage</td>
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<td></td>
<td>98 received Sotalol 40 mg tds increased to 80 mg tds (Starting on first post op morning)</td>
<td></td>
<td>Complications</td>
<td>Withdrawal of drug in one pt. per group 6 (7%) of metoprolol group and 2 (2%) of Sotalol group needed reduction of dosage</td>
<td></td>
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<tr>
<td>Nystrom et al., 1993, Thorac Cardiovasc Surg, Sweden [6]</td>
<td>N = 101</td>
<td>Unblinded PRCT (Level 1b)</td>
<td>AF of any duration up to the end of the 6th post op. day</td>
<td>Sotalol group 5/50 (10%) Control group 15/51 (29%) ( P = 0.028 )</td>
<td>Lack of continuous ECG monitoring No standardised dose or type of ( \beta ) Blocker</td>
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<td>50 sotalol 160 mg on pre op morning then 160 mg per day</td>
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<td></td>
<td>(4/11 (36%) of those on no treatment, 11/40 (27.5%) of those on ( \beta ) blocker.)</td>
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</tbody>
</table>
| | 51 control (1/2 dose \( \beta \) Blocker post op if on treatment pre op or nothing if not on treatment) 40 \( \beta \) Blocker 11 not on any treatment | | Complications | Dose reduction or withdrawal in 11 sotalol group and 5 control group | (Continued on next page)
bradycardia necessitating a dose reduction or withdrawal of the drug but with no difference between them. Patients on active treatments showed a trend towards a shorter hospital stay but no difference was noted between the active groups.

Janssen et al. [8] looked at 130 patients undergoing coronary artery surgery. 2.4% of patients treated with sotalol developed post operative AF compared to 15.3% of those treated with metoprolol. The difference was statistically significant. There were no major reported side effects in either group.

Parika et al. [5] looked at a total of 191 patients undergoing coronary artery surgery. He showed a significant reduction in the incidence of AF in the group treated with sotalol (16% vs 32%). He showed doses needed to be increased in 18% of the β-blocker and 10% of the Sotalol group, the final doses being 54±14 mg Metoprolol group and 40±0 mg in the sotalol group. Medications were stopped in 1 patient per group.

Surtorp et al. [7] compared high and low dose treatment regimes in both Sotalol and Propranolol groups. Four hundred and twenty-nine patients were studied. The incidence of AF was 13.9% and 18.8% in the low dose Sotalol and Propranolol groups, respectively, and 10.9% and 13.7% in the high dose Sotalol and Propranolol groups. Although these results show a trend to a lower incidence of AF in both the Sotalol treatment groups they are statistically non-significant. Adverse effects resulting in stopping drug were seen in 2 patients in both low dose treatment regimes (2/74 Sotalol and 2/66 Propranolol) and in 14/133 (high dose Sotalol) and 17/156 (high dose Propranolol) patients. Therefore doubling the dose causes no substantial increase in the preventative effects but produces an increase in the unwanted side effects.

Sanjuan et al. [3] looked at 253 patients undergoing Cardiac surgery. AF was seen in 44 patients. The incidence was 10/100 (10%) in the Sotalol group and in 34/153 (22%) in the Atenolol group \( P=0.013 \). They also showed that AF resulted in statistically significant longer stays in the CCU and longer hospital stays overall. Adverse effects resulting in withdrawal of treatment was seen in 12 of the Atenolol group and in 16 of the Sotalol group and in 2 of the Sotalol group the drug was reduced.

Nystrom et al. [6] looked at 101 patients randomised to Sotalol or control (half dose pre op B blockade or no treatment if not on pre op. β blockade). AF was seen in 5/50 (10%) of the Sotalol group and in 11/40 (27.5%) of patients on half their pre op β blocker dose and in 4/11 (36%) patients on no treatment. Eleven patients in the Sotalol group needed dose withdrawal and of these, 5 required withdrawal of the drug, all adverse symptoms resolved following this.

Abdulrahman et al. [4] looked at 191 patients undergoing cardiac surgery and were given low dose Sotalol or Metoprolol. AF was seen in 9/93 (10%) of the Sotalol group and in 22/98 (22%) of the Metoprolol group. Drug withdrawal was necessary in 3/93 (3.2%) of the Sotalol group and in 7/98 (7.1%) of the Metoprolol group.

Crystal et al. [10] showed a lower incidence of AF in the Sotalol group v B Blocker group when both agents were directly compared (12% vs 22%, OR, 0.50;95% CI 0.34 to 0.74), giving a number needed to treat of 10 to prevent an additional case of AF using Sotalol versus standard β-Blockers.
With regard to which regime is optimal. Several of these studies seem to use either 40 mg tds or 80 mg bd starting pre-operatively, and doses higher than this caused an excess of side effects. Thus either of these regimes may be considered optimal.

7. Clinical bottom line

Prophylactic Sotalol may be more effective than β blockers in the prevention of post operative atrial fibrillation in elective patients. Sotalol should not cause an excess of side effects.

References