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COMPARISON OF ORAL IVABRADINE AND METOPROLOL FOR CONTROL OF HEART RATE IN PATIENTS UNDERGOING CT CORONARY ANGIOGRAPHY

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Objectives Optimisation of heart rate (HR) to limit motion artefacts is mandatory in all patients undergoing CT coronary angiography (CTCA). Despite use of β -blockers ($\beta\beta$), patients often have HR>target range of 65 bpm. Though calcium channel blockers have also been used as alternatives to β -blockers, administration of both of these classes of rate lowering drugs may be hazardous in some patients (eg, those with baseline Bp<100–110 mm Hg, severe

left ventricular dysfunction, peripheral vascular disease, severe obstructive airway disease). Ivabradine is a selective blocker of I_f current and sinus node pacemaker activity and unlike $\beta\beta$ has neutral effects on systolic and diastolic blood pressure (SBP, DBP) and cardiac contractility.

Methods Amongst 200 patients undergoing CTCA, oral Ivabradine (5 mg BD) started 48 h, was compared to oral Metoprolol (50 mg BD). Patients with atrial fibrillation, known arrhythmias, impaired renal function (Serum creatinine >1.5 mg/dl), known allergy to iodinated contrast media, pregnancy, baseline heart rate <60 bpm, left ventricular ejection fraction $<30\%$, blood pressure $<100/70$ mm Hg, and other known contra-indications to β -blockers were excluded.

Additional doses (5 mg or 50 mg respectively) of the drugs were given on arrival in the CT room, if the HR was ≥ 65 bpm. If at 3 h after the additional first dose, the heart rate was still >65 bpm, another dose of 5 mg Ivabradine or 50 mg Metoprolol was administered. Baseline HR, systolic and diastolic BP (HR1, SBP1, DBP1) and final parameters prior to CTCA (HR2, SBP2, DBP2) were recorded. Patients whose heart rate could not be lowered below 65 bpm despite this protocol had their CTCA procedures rescheduled. (We did not allocate patients to receive IV β -blockers, to avoid skewed comparisons between the groups, since IV Ivabradine was not available with us).

Results Of those receiving Ivabradine 52% had HR <65 bpm on arrival in the CT room as compared to only 13% in the $\beta\beta$ group. The final HR in Ivabradine group was significantly lower, as compared to Metoprolol (57.6 ± 3.1 vs 62.1 ± 2.9 , $p < 0.001$). Mean % reduction in HR was significantly greater with Ivabradine (32.1% vs 28.1%, $p < 0.001$). Ivabradine had no significant effect on Systolic or diastolic BP (SBP1, SBP2 135.1 ± 10.2 , 134.3 ± 9.1 mm Hg; DBP1, DBP2: 85.1 ± 7 , 84.2 ± 6.7 mm Hg, $p = \text{ns}$). Metoprolol demonstrated significant reduction in both SBP and DBP (SBP1, SBP2: 134.3 ± 12.2 , 117.1 ± 7.1 ; DBP1, DBP2: 87.1 ± 6.4 , 83.1 ± 3.9 , $p < 0.001$ for both).

The need for additional doses of the drug was significantly higher in the $\beta\beta$ group (87% vs 48%, $p < 0.01$). In the Ivabradine group, 34/100 (34%) required one additional dose and 14/100 patients (14%) required two additional doses to achieve the target HR of ≤ 65 bpm. In the $\beta\beta$ group, 40/100 patients (40%) required one additional dose while 47/100 patients (47%) required two additional doses of Metoprolol to achieve the target heart rate.

Both drugs were well tolerated and no adverse effects to any of them were reported.

Conclusions Ivabradine was found to be safe and effective as a HR reducing agent in patients undergoing CTCA. It produced greater degree of reduction in HR as compared to Metoprolol, without any significant change in the systolic or diastolic blood pressure. The number of patients requiring additional doses of the drugs prior to achieving target HR was also significantly reduced with Ivabradine. Given its pharmacological properties, the use of Ivabradine as a HR lowering agent promises to be an attractive therapeutic option in patients undergoing CTCA.