MMJ

Malta Medical Journal, 2024; 36(4)
http://mmsjournals.org/index.php/mmj/42

REVIEW ARTICLE

Are our acute coronary syndrome patients achieving better glycaemic control after admission?

Elaine Camilleri, Lisa Lauren Buttigieg, Maryanne Caruana

Background

Diabetes mellitus (DM) is a cardinal cardiovascular risk factor. Tight glycaemic control is advocated as part of primary and secondary cardiovascular disease prevention. The aim of this study was to investigate the impact of acute coronary syndrome (ACS) admission on subsequent glycaemic control in known type I/II DM patients.

Methods

Patients were included if (a) known to have type I/type II DM prior to admission (b) admitted with ACS under the care of a cardiologist between January and December 2020 and (c) in possession of a haemoglobin A1c (HbA1c) result within 6 weeks of index admission (peri-admission) and a repeat result around 6 months thereafter (follow-up). Peri-admission and follow-up HbA1c levels were compared using Wilcoxon signed-rank test.

Results

One hundred and seventy patients [124 (72.9%) male; mean age 67.88 ± 10.18 years] were included. During index admission, a change in DM treatment was performed in 80 (47.1%) patients, while a diabetology review was requested for 37 (21.8%) patients. A significant reduction in HbA1c levels was demonstrated following an ACS admission with a peri-admission median level of 7.5% (IQR 2.3%) to a follow-up median of 7.1% (IQR 1.7%) (Z statistic -4.145, $p<0.001$), although at 6 months 119/170 (70%) patients still had an HbA1c above the 6.5% target.

Conclusion

Changes in DM treatment and/or advice during ACS admission appear to have an initial beneficial impact on glycaemic control in known diabetics. Aggressive long-term control is necessary to ensure more effective risk reduction.

Dr Elaine Camilleri, MD
Department of Obstetrics & Gynaecology,
Mater Dei Hospital,
Msida, Malta

Dr Lisa Lauren Buttigieg
MD, MRCP, MSc
Department of Medicine,
Mater Dei Hospital,
Msida, Malta

Dr Maryanne Caruana
MD, PhD, FESC
Department of Medicine,
Mater Dei Hospital,
Msida, Malta

The Editorial Board retains the copyright of all material published in the Malta Medical Journal. Any reprint in any form of any part will require permission from the Editorial Board. Material submitted to the Editorial Board will not be returned, unless specifically requested.

Diabetes mellitus (DM) is a cardinal risk factor for atherosclerotic cardiovascular disease (ASCVD). It has been associated with a two-fold excess risk of coronary artery disease, ischaemic stroke and vascular deaths, which is independent of other risk factors.[1] DM diagnosis is based on a haemoglobin A1c (HbA1c) of ≥6.5% (48 mmol/mol) or a fasting plasma glucose (FPG) of ≥7.0 mmol/L (126 mg/dl) on one occasion if there are classic symptoms of DM or on two occasion if asymptomatic, while an oral glucose tolerance test (OGTT) is recommended if there is doubt about diagnosis.[2-4] Adequate glycaemic control is a well-recognised key factor in primary and secondary prevention of coronary artery disease (CAD).[5,6] One could postulate that events that alert patients with DM to the presence of end-organ damage, like sustaining an acute coronary syndrome (ACS), could represent an eye-opener and act as a stimulus for better glycaemic control. The aim of this study was to investigate the impact of a hospital admission to Mater Dei Hospital for ACS management on glycaemic control in the early post-admission period among patients with known DM.

MATERIALS AND METHODS

Patients were eligible for inclusion if (a) admitted with an ACS under the care of a cardiologist at Mater Dei Hospital between 1st January and 31st December 2020 (b) known to have type I/type II DM prior to admission and (c) in possession of a HbA1c result within 6 weeks of index admission (peri-admission HbA1c) and a repeat result around 6 months thereafter (follow-up HbA1c). Patients who were first diagnosed with DM during their index ACS admission and those who died during the first 6 months after the index admission were excluded. In the case of patients with more than one ACS admission during the 12-month study period, only the first admission was taken into account and subsequent admissions were disregarded.

All data was collected retrospectively using hospital-based online software systems and was supplemented by information from paper notes when necessary. Data collected included basic demographic details, presence of other cardiovascular risk factors and details of DM treatment at the time of index cardiology admission. All data was initially collected on a dedicated Microsoft® Excel® spreadsheet and was anonymised at point of collection. Following institutional data protection clearance, the study protocol was approved by the University of Malta Research Ethics Committee. ACS was defined in line with international guidelines[7,8] and included ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI) and non-ST-segment elevation acute coronary syndrome (NSTE-ACS).

Statistical Analysis

In a first analysis, the Wilcoxon signed-rank test was used to analyse differences between peri-admission and follow-up HbA1c levels among all 170 subjects. In a secondary analysis, the cohort was divided into 2 subgroups (patients who had received an in-patient diabetic treatment change and those that did not) and the Wilcoxon signed-rank test was thereafter re-applied to each subgroup. Statistical analyses were performed using SPSS 26 (IBM SPSS 26, IBM Corp., Armonk NY). Statistical significance was defined as $p<0.05$.

RESULTS

There was a total of 783 admissions for ACS management in 771 patients during the study period. Of these, 170 met al eligibility criteria and were included in the study (Figure 1). One hundred and twenty-four (72.9%) study subjects were male and mean age was 67.88 ± 10.18 years. Forty-one (24.1%) subjects were hypertensive, 59 (34.7%) had hyperlipidaemia, 89 (52.4%) were active or past tobacco smokers and 76 (44.7%) had a history of ischaemic heart disease. An in-patient change in diabetic treatment was performed in 80 (47.1%) subjects as follows: 34 patients had their pre-admission anti-diabetic treatment dose altered or stopped, 21 had a new agent introduced on top of their previous diabetic treatment regime (if any), 10 had their pre-admission diabetic medication/s replaced with a new agent and 15 had a change in dose of their pre-admission treatment combined with the introduction of a new agent.

A significant improvement in glycaemic control at 6-month follow-up after an ACS admission was observed in the total study cohort with a reduction in HbA1c from a median of 7.5% (IQR 2.3%) around the time of admission to 7.1% (IQR 1.7%) at 6 months (Z statistic -4.145, $p<0.001$). Subgroup analysis revealed that the improvement in glycaemic control was only significant among those patients with a treatment alteration, whereby HbA1c levels dropped from a peri-admission median of 8.05% (IQR 2.48%) to 7.25% (IQR 1.45%) at 6 months (Z statistic -4.439, $p<0.001$). The change in HbA1c levels for the 90 subjects with no inpatient treatment change was not statistically

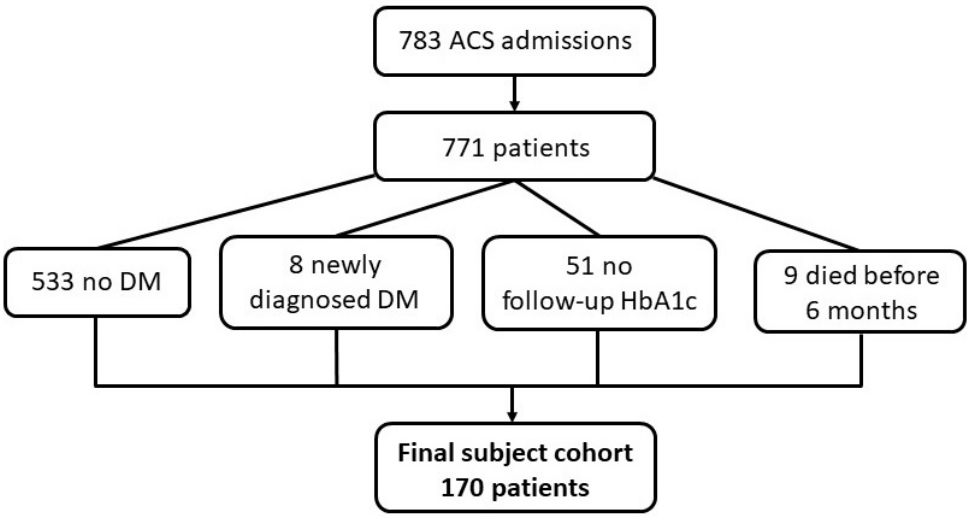

Figure 1 *Inclusion Criteria for this study*

significant (peri-admission median HbA1c = 7.1% (IQR 2.13%) vs. HbA1c at 6 months = 6.9% (IQR 1.8%); Z statistic -1.12, p=0.263).

DISCUSSION

Glycemic control is key in cardiovascular disease prevention. A ~1% reduction in HbA1c is associated with a 15% relative risk reduction in non-fatal MIs. Patients with short duration of DM, who have no ASCVD and a lower HbA1c, an intensive glucose control is more beneficial. An HbA1c target of <7% reduces microvascular complications, while evidence for an HbA1c target to reduce macrovascular risk is less compelling. However several studies have shown that long follow-up (≤20 years) is necessary to demonstrate a beneficial effect on macrovascular complications, and that early glucose control is associated with long-term cardiovascular benefits. However HbA1c targets should be individualized, with more-stringent goals (6.0–6.5%) in younger patients, if achieved without significant hypoglycemia. Less stringent HbA1c goals may be more appropriate for elderly patients with multiple comorbidities, including hypoglycemic episodes and with long-standing DM and limited life expectancy.[5,6] Patients with ASCVD and DM have an estimated 10-year risk of CVD-related death in excess of 10%.[6] Hence in this patient cohort, an improvement in glycaemic control is paramount to long-term prognosis. This should be coupled with aggressive management of any concomitant cardiovascular risk factors through more physical activity, weight loss in case of high body mass index, better blood pressure control and smoking cessation. Furthermore glucagon-like peptide 1 receptor agonists (GLP-1RAs) and sodium-glucose co-transporter 2 (SGLT2) inhibitors are now recommended to improve cardiovascular outcomes in patients with type II DM.[6]

Our results suggest that an admission with an ACS leads to a more favourable glycaemic control at 6-month follow-up. The explanation for this observation is likely to be multifactorial. Firstly an admission to hospital for specialist care of ASCVD is accompanied by a baseline risk factor assessment, meaning that patients who might have slackened in their glycaemic control assessment in the community are picked up early on. Improvement in DM medications is ensured during the hospital stay when necessary, and, as our subgroup analysis suggests, this is the main intervention to impact subsequent glycaemic control. Such improvement is further sustained by outpatient diabetologist input among those not already under active follow-up. The importance of risk factor modification is reiterated during the cardiac rehabilitation programme that the majority of patients follow after discharge. It is also likely that sustaining an acute coronary event acts as a "reality check" for many patients making them more aware of the importance of taking charge of their health to avoid further complications in the future.

Limitations

The retrospective nature of our data collection meant that an important number of subjects did not have a follow-up HbA1C at 6 months and had to be excluded from the study cohort. The number of admissions is also likely to be lower than usual given that the study period incorporated the initial months of the COVID-19 pandemic in Malta during which avoidance of the hospital environment has been well-documented.[9]

One could also measure weight at admission with ACS and 6 months after to assess the impact of weight loss and diet on HbA1c but was not possible in this study as such measurements were not taken.

ACKNOWLEDGEMENTS

We would like to thank all the people who in some way or another helped us to collect the data for this study.

CONCLUSIONS

A combination of factors related to the period around and early after an admission with ACS, particularly in the form of introduction or revision of DM medications, appear to have an initial beneficial impact on glycaemic control in our patient population. Studies to assess whether this observation is sustained in the longer term are warranted to ensure the most effective risk reduction for our ASCVD patients.

REFERENCES

1. Collaboration ERF, Sarwar N, Gao P et al Diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies. Lancet 2010; 375(9733): 2215-222.
2. Association AD Diagnosis and Classification of Diabetes Mellitus. Diabetes Care 2013; 37(Supplement_1): S81-S90.
3. World Health Organization & International Diabetes Federation. Definition and diagnosis of diabetes mellitus and intermediate hyperglycaemia : report of a WHO/IDF consultation: World Health Organization; 2006 (updated 2006). Available from: https://apps.who.int/iris/handle/10665/43588.
4. Cosentino F, Grant PJ, Aboyans V et al. 2019 ESC Guidelines on diabetes, pre-diabetes, and cardiovascular diseases developed in collaboration with the EASD Eur Heart J 2020; 41:(2) 255-323.
5. Ray KK, Seshasai SR, Wijesuriya S et al. Effect of intensive control of glucose on cardiovascular outcomes and death in patients with diabetes mellitus: a meta-analysis of randomised controlled trials. Lancet 2009; 373(9677): 1765-72.
6. Visseren FLJ, Mach F, Smulders YM et al. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice: Developed by the Task Force for cardiovascular disease prevention in clinical practice with representatives of the European Society of Cardiology and 12 medical societies With the special contribution of the European Association of Preventive Cardiology (EAPC). Eur Heart J 2021; 42:(34) 3227-337.
7. Collet J-P, Thiele H, Barbato E et al. 2020 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation: The Task Force for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation of the European Society of Cardiology (ESC). Eur Heart J 2020; 42:(14) 1289-367.
8. Thygesen K, Alpert JS, Jaffe AS, et al. Fourth universal definition of myocardial infarction. Eur Heart J 2018; 40:(3) 237-69.
9. Grech N, Xuereb R, England K, Xuereb RG, Caruana M. When the patients stayed home: the impact of the COVID-19 pandemic on acute cardiac admissions and cardiac mortality in Malta. Z Gesundh Wiss 2021: 1-7.