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Acute Coronary Syndrome in Oman
Results from the Gulf Registry of Acute Coronary Events

*Prashanth Panduranga,[1] Kadhim Sulaiman,[1] Ibrahim Al-Zakwani[2,3]

متلازمة الشريان التاجي الحادة في عُمان : نتائج من السجل الخليجي لأحداث الشريان التاجي الحادة

براشانت باندورانجا، كاظم سليمان، إبراهيم الزكواني

الملخص: متلازمة الشريان التاجي الحادة هي السبب الأكثر شيوعا للوفيات والمراضة الناتجة عن القلب والأوعية الدموية في البلدان الغربية. وقد وضعت المبادئ التوجيهية الدولية مع توصيات للتشخيص والعلاج بناء على التجارب السريرية العشوائية . ومع ذلك فإن بيانات من السجلات الدولية أظهرت عدم وجود رابطة بين التوصيات والممارسة السريرية الفعلية. وبالمثل، بدأت جمعية القلب الخليجية بتسجيل أحداث الشرايين التاجية الحادة في الخليج. وقد وضع هذا السجل لتحديد خصائص وعلاج متلازمة الشريان التاجي الحادة في دول الخليج بما في ذلك سلطنة عُمان. نقدم هنا تقريرا عن نتائج الدراسات المختلفة للسجل من عُمان ومقارنة نتائجنا مع البيانات الأساسية للسجل الخليجي إضافة إلى السجلات الدولية الأخرى.

مفتاح الكلمات: متلازمة الشريان التاجي الحادة ؛ عُمان.

ABSTRACT: Acute coronary syndrome (ACS) is the most common cause of cardiovascular mortality and morbidity in Western countries. International guidelines for diagnosis and treatment have been developed based on randomised clinical trials. However, data from international registries report a lack of association between guideline recommendations and actual clinical practice. Similarly, the Gulf Heart Association initiated a registry called Gulf Registry of Acute Coronary Events (Gulf RACE). This registry was developed to determine the characteristics and management of ACS in the Gulf countries including Oman. Here, we report on the results of the various Gulf RACE registry studies from Oman and compare our results with the main Gulf RACE data as well as other international registries.

Keywords: Acute coronary syndrome; Oman

Acute coronary syndrome (ACS) is a clinical syndrome characterised by unstable angina (UA), ST-segment elevation myocardial infarction (STEMI) and non–STEMI. In the majority of cases, the primary mechanism of ACS is either erosion or rupture of an atherosclerotic plaque resulting in intracoronary thrombus formation leading to either subtotal or total occlusion of a major coronary artery. ACS is the most common cause of cardiovascular mortality and morbidity in Western countries. International guidelines with recommendations for diagnosis and treatment have been developed based on randomised clinical trials.[1,2] However, data from international registries like the National Registry of Myocardial Infarction from the USA[3] and the Global Registry of Acute Coronary Events (GRACE),[4] report a lack of association between guideline recommendations and actual clinical practice. Similar to these registries, the Gulf Heart Association initiated a registry called Gulf Registry of Acute Coronary Events (Gulf RACE). This registry was developed to determine the characteristics and management of ACS in the Gulf countries including Oman.[5] Registry data is extremely important because the information is derived from unselected populations of patients reflecting "real-life" practice as well as including patients who are frequently left out of clinical trials, such as the elderly or female patients. Additionally, registries allow an assessment of the acceptance and practice of new treatments by the medical community.

Gulf RACE is the largest multinational prospective ACS registry from the Middle East with

[1]Department of Cardiology, Royal Hospital, Muscat, Oman; [2]Department of Pharmacology & Clinical Pharmacy, College of Medicine & Health Sciences, Sultan Qaboos University, Muscat, Oman, and [3]Gulf Health Research, Muscat, Oman.

**Corresponding Author email: prashanthp_69@yahoo.co.in*

Table 1: Baseline clinical characteristics of patients with acute coronary syndrome from Oman

Characteristic	N = 1,579
	Age + SD
Age, mean ± SD, years	58 ± 13
Body mass index, mean ± SD, kg/m2	27 ± 5
	(n, %)
Male gender	971 (61)
Omani citizen	1326 (84)
Diabetes mellitus	581 (37)
Hypertension	838 (53)
Hyperlipidaemia	550 (35)
Current smoker	278 (17)
Family history of CAD	121 (7.6)
Prior Angina	757 (48)
Past MI	285 (18)
Past PCI	118 (7.5)
Past CABG	108 (6.8)
Aspirin use	751 (47)
COPD	77 (4.8)
Stroke	55 (3.4)
Dialysis	26 (1.6)
PVD	34 (2.1)
Ischemic chest pain	1154 (73)
Atypical chest pain	109 (6.9)
Dyspnoea	216 (14)
Unstable angina	795 (50)
Non-STEMI	381 (24)
STEMI	393 (25)
LBBB MI	10 (0.6)

Legend: NS = non-significant; SD = standard deviation; CAD = coronary artery disease; MI = myocardial infarction; PCI = percutaneous coronary intervention; CABG = coronary artery bypass surgery; COPD = chronic obstructive pulmonary disease; PVD = peripheral vascular disease; STEMI = ST-elevation myocardial infarction; LBBB = left bundle branch block. All values are n (%) unless specified otherwise.

more than 8,000 patients with a final diagnosis of ACS admitted in the periods 8 May to 6 June 2006 and 29 January to 29 June 2007. It provides a unique opportunity to study ACS management in this part of the world. As part of the Gulf RACE study, the data from Oman on 1,579 patients from 14 hospitals (including two hospitals with catheterisation facilities) have thrown light on the characteristics, management, and in-hospital outcomes of ACS patients in Oman. This registry determined the epidemiology of ACS including risk factors, clinical presentation, accuracy of ECG (electrocardiogram) interpretation, validation of risk models like the GRACE risk score, and in-hospital management, including utilisation of medications and invasive procedures. This registry also determined whether the evidence-based guideline recommendations are being applied, along with in-hospital outcomes and mortality in patients with ACS.

Table 1 shows the baseline characteristics of ACS patients from Oman. With a mean age of 59 years, ACS patients from Oman are younger than those in Western countries whose mean age is about 65 years.[4] The majority of patients were Omani citizens (84%) and were male (61%). In the GRACE registry, women consisted of 34% of the patients whereas in Oman they formed 39% of ACS patients.[4] Among the risk factors, hypertension was the commonest risk factor (53%) followed by diabetes (37%) and hyperlipidaemia (35%). Smoking (17%), a family history of coronary artery disease (CAD) and obesity were not found to be high in ACS patients from Oman. In the GRACE UK-Belgian study, hypertension was recorded in 46% of patients, diabetes in 16% and smoking in 30% of the patients.[6] In the main Gulf RACE registry, diabetes and smoking prevalence were high at 40% and 38%, respectively.[5] This high prevalence of diabetes among ACS patients from Oman and other Gulf countries is an alarming trend as it is well known that diabetic ACS patients have poor hospital outcomes. This was reported in a recent Gulf RACE analysis from Oman.[7] When adjusted for age and gender, diabetes status was an independent risk factor of in-hospital mortality in ACS patients (adjusted odds ratio [OR] 1.68; 95% confidence interval [CI] 1.02–2.77; P = 0.042).[7] Moreover, the burden of diabetes mellitus in Gulf countries is the highest among all world regions (13–18% versus the 6–7% global prevalence) and according to the International Diabetic Federation it will double by 2030.[8] Furthermore, in another analysis of Gulf RACE data from Oman, it was seen that non-diabetic ACS patients presenting with hyperglycaemia of >11 mmol/L were found to have a higher mortality rate when compared to euglycaemic patients (13.1% versus 1.52%; P <0.001).[9] This indicates that diabetes mellitus remains undiagnosed in many patients in Oman.

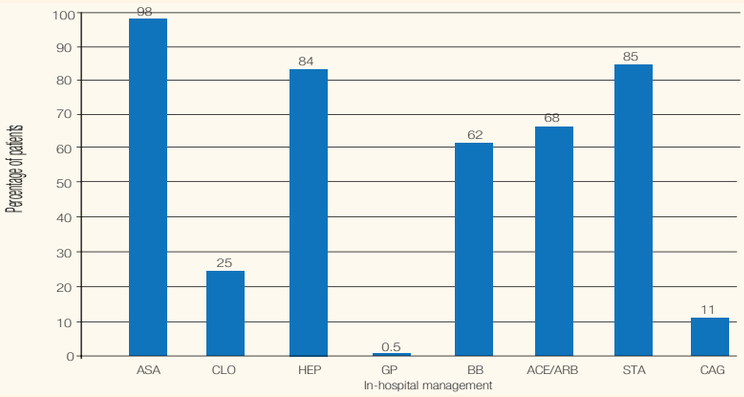

Figure 1: In-hospital management of patients with acute coronary syndrome from Oman.
Legend: ASA = aspirin; CLO = clopidogrel; HEP = heparin (includes low molecular weight heparin); GP = glycoprotein IIb/IIIa inhibitors; BB = beta-blockers; ACE = angiotensin-converting enzyme inhibitors; ARB = angiotensin II receptor blockers; STA = statins; CAG = coronary angiography.

Hence, measures to prevent and control diabetes as well as diagnose it early are very important in Oman. Even though hyperlipidaemia was found in 34% of ACS patients in a recent analysis of Gulf RACE patients from Oman, metabolic syndrome was found to be present in 66% of patients who had higher rates of heart failure (odds ratio (OR): 1.37; 95% confidence interval (CI): 1.03–1.81; P = 0 .028) and mortality (OR: 4.42; 95% CI: 1.25–15.5; P = 0.020) when compared to non-metabolic syndrome patients.[10]

Among ACS patients from Oman, prior angina was seen in 48% of patients, with prior myocardial infarction (MI) in 18%, prior percutaneous coronary intervention (PCI), or coronary artery bypass graft surgery (CABG) in 7.5% and 6.8%, respectively, and prior stroke in 3.4% of patients. The prevalence of prior angina is similar to the GRACE UK-Belgian study where it was found in 47% of the patients, but prior MI, prior PCI, prior CABG, and previous stroke were higher in Oman than in the GRACE population at 28%, 17%, 11% and 8% respectively.[6] Of the 1,579 ACS patients from Oman, 50% had a final diagnosis of UA, 25% had STEMI, and 24% had non-STEMI. Among the types of ACS, investigators of the GRACE registry reported that UA was the most frequent cause of hospital admission (38%), followed by 30% STEMI, and 25% non-STEMI patients.[4] The occurrence of UA is higher in patients in Oman, which indicates that picking up these patients for an early invasive strategy will prevent future cardiac events.

Figures 1 and 2 show the in-hospital management of ACS patients in Oman. The frequent use of in-hospital evidence-based pharmacologic therapies, such as aspirin (98%), anticoagulation (84%), statins

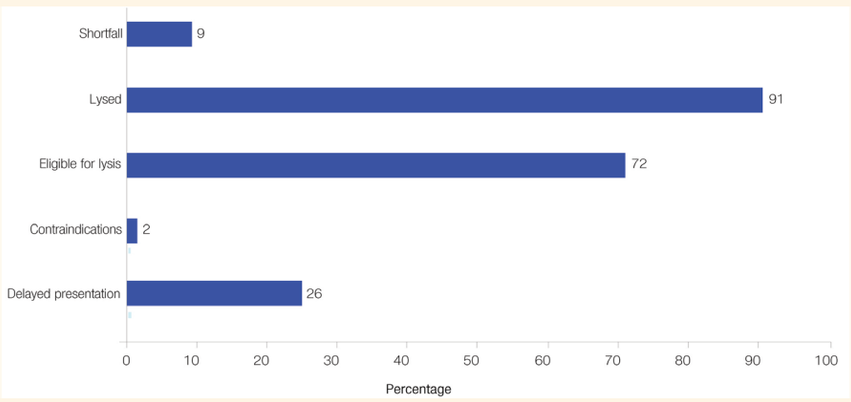

Figure 2: Missed opportunities for thrombolysis in patients with acute coronary syndrome from Oman.

Table 2: In-hospital outcome in patients (n,[%]) presenting with acute coronary syndrome from Oman

Characteristic	N = 1,579
Recurrent ischaemia	150 (9.4)
Re-infarction	38 (2.4)
Congestive heart failure	403 (25)
Ventilation	82 (5)
Cardiogenic shock	89 (5.6)
Major bleed	16 (1)
Stroke	16 (1)
Mortality	69(4.3)

(85%), and thrombolytic therapy (91%) is similar to the GRACE and CRUSADE (Can Rapid Risk Stratification of Unstable Angina Patients Suppress Adverse Outcomes With Early Implementation of the ACC/AHA Guidelines) registries.[4,11,12] The use of beta-blockers (62%) is low in Oman compared to nearly 80% use in these registries as well as in the main Gulf RACE registry, but angiotensin-converting enzyme inhibitors (ACEI)/angiotensin II receptor blockers (ARB) (68%) use is similar to these registry reports. This variation in the use of guideline-recommended medications may be related to patient or physician characteristics, as well as hospital type and national variations.[11,12] In one of the GRACE analyses, which may be true for Oman as well, high-risk features (e.g. heart failure, older age) were related to failure to use beta-blockers, but being at a teaching hospital and care by a cardiologist were associated with better use of these drugs.[13] Some drugs with proven benefits were used less often, such as clopidogrel (25%) and glycoprotein IIb/IIIa receptor inhibitors (0.25%), probably due to the non-availability of these medications in most of the hospitals in Oman. Among STEMI patients, 26% had delayed presentation of >12 hours which is similar to the GRACE study;[11] however, 91% of the eligible patients were thrombolysed which is consistent with guideline recommendations.

Coronary angiography was utilised in only 11% of the patients which is mostly due to the existence of only two invasive catheterisation facility hospitals in Oman. However, in a recent Gulf RACE analysis[14] overall utilisation of catheterisation in ACS patients from all Gulf countries was very low (20%) when compared to 66% usage rate in the GRACE registry.[11] Other than the unavailability of catheterisation facilities, a second important reason for the low rate was the avoidance of catheterisation in high risk ACS patients among Gulf cardiologists. Low risk ACS patients were more often catheterised than intermediate or high risk patients.[11] This "treatment-risk paradox" has been proposed as one of the reasons why less or no mortality benefit was seen in some ACS registries when compared with randomised trials.

Table 2 shows the in-hospital outcomes of ACS patients from Oman. Most of the outcomes were comparable to the GRACE registry except for the high prevalence of heart failure (25%) among Omani ACS patients which is nearly twice that of the GRACE registry. The reason could be the high prevalence of diabetic ACS patients in Oman. In-hospital mortality of 4.3% is low compared to 10.8% in the GRACE registry. In another analysis of ACS patients from Oman, women experienced more recurrent ischaemia and heart failure, but had similar in-hospital mortality (4.6% versus 4.3%) even after adjusting for age ($P = 0.500$).[15]

In conclusion, ACS patients in Oman, compared to other countries, are younger with higher rates of diabetes and heart failure, but lower overall in-hospital mortality. There is evidence of good adherence to most of the evidence-based medications, except for the use of catheterisation. There is a need to explore ways to increase the overall rate of in-hospital cardiac catheterisation as well as to provide other evidence-based medications in Oman and prescribe them to patients who would benefit most. In addition, there is a need to diagnose and control diabetes effectively. Awareness of these findings from Oman may help the medical community adhere more strictly to the national and international guidelines.

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