The dilemma of congestive heart failure among Yemeni patients presented with acute coronary syndrome

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Abstract

Acute Coronary Syndrome and its consequences is one of the most common cardiac diseases world-wide. Yet in Yemen; Gulf registry of acute coronary events (GULF RACE I) data are the first nation-wide information that highlight the magnitude of this problem. We would like to point out the problem of congestive heart failure among Yemeni Acute Coronary Syndrome population, its prognostic importance and impact in patients outcomes. Yemen data arm and was a part from the GULF RACE phase I. Out of 1054 hospitalized with acute coronary syndrome, 181 patients (17.3%) had congestive heart failure on presenting to the hospital or during hospitalization itself. They were relatively older 63.2 ±10.7 years (P <0.001) with males predominance (72.4%). In spite of Anterior /Anteriolateral ST Elevation, Acute Myocardial Infarction was a common feature of presentation (69.6%), still Left Bundle Branch Block Myocardial Infarction were more predominant. Echocardiographic feature was more consistent with congestive heart failure group, Left Ventricular Ejection Fraction was (40% Vs 51% P <0.001). Those patients were in co-morbid condition more than the rest of the group of acute coronary syndrome. Evidently they were less treated utilizing evidence based treatments. Congestive heart failure was linked to higher in hospital mortality (30.4 % Vs 4.8% with P < 0.001). We concluded that acute coronary syndrome in Yemeni patients is complicated with congestive heart failure and had more worse prognosis regarding in-hospital morbidity and mortality.

Key words: Acute Coronary Syndrome, Congestive Heart Failure, Mortality, Yemen

Introduction

Congestive heart failure (CHF) is a complex syndrome that can result from any structural or functional cardiac disorder leading to inability of the left ventricle to fill with or eject blood. It is a common sequel of many conditions including cardiovascular diseases. Its high morbidity and mortality represent a major economic burden (16). Yemen is one of the low income country group where rheumatic heart disease is still highly prevalent (20); while in more developed the most common cause of CHF is no longer hypertension or valvular heart disease, but rather coronary artery disease (CAD) (18).

Data from phase I of gulf registry of acute coronary events (*GULF* RACE phase I), indicates that CAD including Acute Coronary Syndrome (ACS) is a main health problem that causes CHF in the gulf countries, including Yemen (2-4). A major aim of this study is to highlight the magnitude of this condition among ACS Yemeni population participated in phase I GULF RACE, as well as to describe the incidence, patient characteristics, treatment patterns and in-hospital outcomes of CHF complicating ACS in those patients.

Methods

Design and Study Population:

GULF RACE phase I is an initiative from the Gulf Heart Association; it is a prospective, multinational, multicenter survey of consecutive patient's hospitalized with the final diagnosis of ACS in six Arabian Peninsula/Gulf countries (Kuwait, Oman, United Arab Emirates, Yemen, Qatar, and Bahrain). Patients were enrolled in a pilot phase that lasted for 1 month in May 2006

and a subsequent study phase from January 2007 to June 2007. All patients were included in the present analysis (34,35). All patients with ACS were eligible with no upper age cap or other restrictions on study sample. Patients were managed according to the judgment of the treating physician. An institutional review board or equivalent at each participating hospital approved the protocol. All hospitals that care for patients with ACS in Kuwait, Bahrain, and Qatar participated, as did the majority of such hospitals (serving 85% of the population) in Yemen, United Arab Emirates, and Oman. Over this period of six month, 1054 Yemeni patients were included from 20 major hospitals all over the country with ACS pointing out cases of ST-Elevation Acute Myocardial Infarction (STEMI) or newly developed Left Bundle Branch Block (LBBB) with manifestations of CHF. The determinants of CHF in those patients and the impact of CHF on their outcome were studied. The ACS, with HF cohort, included patients with CHF at presentation (Killip class II/III), cardiogenic shock and death.

Data Collection & statistical analysis:

All patients gave informed consent to process their anonymous data. Data were collected on record forms by treating physicians. Completed data sheets were sent to the central data-processing center for uniform monitoring and registration. Patients' characteristics are presented as proportions, medians, or mean & Standard Deviation (SD) as appropriate. Whenever possible, rates were used to describe patient populations. The frequencies of categorical variables were compared using the chi-square test and by calculating odds ratios (ORs) and 95% confidence intervals (CIs). Continuous variables were compared using the 2-tailed Student's *t* test. Variables influencing in-hospital mortality were assessed using multiple logistic regression after adjustment for all confounders (i.e., age, gender, heart rate, blood pressure, and diabetes mellitus). ORs, 95% CIs, and p values are reported for significant predictors. A p-value < 0.05 was considered significant. All p values were the results of 2-tailed tests. All data analyses were carried out using SPSS version 20.

Results

During the study period, 1054 patients were documented to have ACS, congestive heart failure was a result of ACS in 181 (17.3%) patients. The base line characteristics of those group of CHF patients was illustrated in Table 1. The mean age (SD) was 63.2 years (±10.7 SD). Male gender representing 131 patients (72.4%) was mostly affected than female gender, with P value < 0.001. The risk factors predisposing to Ischemic heart disease (IHD) and CHF was mainly prominent in those with hypertension & DM type II was 83 (45.9%) & 81 (44.8%) respectively and P value was significant in both <0.001, hyperlipidemia was seen in 35 (19.3%) patients with P value of 0.001. Smoking of different forms of tobacco was recorded in 71 patients (39.2%) with P value of 0.140. Khat chewing habit was very prominent, 119 patients (65.7%) was chewers with a P-valve of 0.046.

Previous history of AMI, coronary artery bypass grafting (CABG) & Stroke worsen the patient's condition and enhances CHF representing 59 patients (32.6%), 14 patients (7.7%) and 20 patients (11 %) correspondingly and P value for all was <0.001. History of angina pectoris was noted in 71 (39.2%) with P value of 0.001. History PVD 11 patients (6.1%) with P value 0.06. History of previous PCI was least to develop CHF 13 patients were post PCI (7.2%) with P value 0.820.

All patients with CHF were symptomatic at presentations and the most frequent symptoms were: IHD chest pain 120 patients (66.3%), Dyspnea 41 patients (22.7%) & atypical chest pain 6 patients (3.3%) with P value <0.001. ST elevation MI (STEMI) was a prominent subtype of ACS with P value <0.001; the patients number at presentation with those subtypes were; STEMI 126 (69.6%), non-STEMI 23 (12.7%), UA16 (8.8%) & LBBB MI 16 (8.8%). STEMI population showed ECG changes of anterior / anteriolateral in 110 patients (60.8%), while inferior / inferoposterior was in 32 patients (17.6%) giving P value of <0.001. LBBB was a prominent ECG feature of CHF group (8.8% vs. 1.7%). Echocardiographic features were mainly reduced EF% and LVEF $\leq$ 40% were noted in 63 patients (34.8%). Thrombolytic therapy utilization, either pharmacologic and mechanical, was very low among all the patients, especially those with CHF; 25 with CHF (13.8%)

193 without CHF (22.1%) P value 0.067. ACE I / ARBs were used on admission for patients with CHF 135 (74.5%) in contrast with 636 without CHF (72.9%), p-value < 0.001, while Beta Blockers were utilized in 54 CHF patients (29.8%) and in 569 without (65.2%). Diuretics were highly used in CHF 98 with CHF (54.1%), while it was used in 102 without CHF (11.7%) p-value < 0.001. Patients with CHF were discharged with similar regimen, in addition to prescribing Spironolactone and Digoxin, beside the conventional treatment of coronary artery disease, (Table 2).

Morbidity and mortality were high among CHF population p value was <0.001 ; strokes were noted in 11% of CHF patients , while cardiogenic shock was diagnosed in 40.1% and major bleeding was seen in 2 patients with CHF . Death was high among CHF (30.4% to 3.6 %) for non CHF patients, (Table 2).

Table 1: CHF complicated ACS patient characteristics

Variables	CHF	NO CHF	Total	P VALUE
Number (%)	181 (17.3%)	873 (82.7%)	1054 (100%)	
Mean Age in Years (SD)	63.2±10.7	57.6±11.4	58.7±11.5	< 0.001
Male (%)	131 (72.4%)	705 (80.8%)	836 (79.3%)	< 0.001
Female (%)	50 (27.6%)	168 (19.2%)	218 (20.7%)	0.009
Khat chewing	119 (65.7%)	638 (73.1%)	757 (71.8%)	0.046
Smoking	71 (39.2%)	430 (49.3%)	501 (47.5%)	0.140
Arterial Hypertension	83 (45.9%)	270 (30.9%)	353 (33.5%)	< 0.001
Diabetes Mellitus	81 (44.8%)	201 (23.0%)	282 (26.8%)	< 0.001
Hyperlipidemia	35 (19.3%)	91 (10.4%)	126 (12%)	0.001
History of angina	71 (39.2%)	237 (22.5%)	308 (29.2%)	0.001
History of MI	59 (32.6%)	142 (16.3%)	201 (19.1%)	< 0.001
Post CABG	14 (7.7%)	22 (2.5%)	36 (3.4%)	< 0.001
Post PCI	13 (7.2%)	67 (7.7%)	80 (7.6%)	0.820
Post Stroke	20 (11 %)	26 (3%)	46 (4.4%)	< 0.001
History PVD	11 (6.1%)	20 (2.3%)	31 (2.9%)	0.06
Symptoms at presentation				< 0.001
IHD chest pain	120 (66.3%)	750 (85.9%)	870 (82.5%)	
Dyspnea	41 (22.7%)	45 (5.2%)	86 (8.2%)	
Atypical chest pain	6 (3.3%)	62 (7.1%)	68 (6.5%)	
ACS diagnosis				< 0.001
STEMI	126 (69.6%)	625 (71.6%)	751 (71.3%)	
NSTEMI	23 (12.7%)	94 (10.8%)	117 (11.1%)	
UA	16 (8.8%)	135 (15.5%)	151 (14.3%)	
LBBB MI	16 (8.8%)	15 (1.7%)	31 (2.9%)	
Site of STEMI –ECG				< 0.001
Anterior / anteriolateral	110 (60.8%)	464 (53.1%)	574 (54.5%)	
Inferior / inferoposterior	32 (17.6%)	257 (29.5%)	289 (27.4%)	
Echocardiography				
Done	127 (69.7%)	705 (80.8%)	832 (78.8%)	
LVEF%	40 (31-49)	51 (41-60)	49.5 (40-61)	< 0.001
LVEF ≤40%	63 (34.8%)	90 (10.3%)	153 (14.5%)	< 0.001

Table 2: CHF complicating ACS patients; management and in-hospital outcome

Variables	CHF	NO CHF	P VALUE
Thrombolytic therapy	25 (13.8%)	193 (22.1%)	0.067
Treatment on admission			
Aspirin	170 (93.9%)	848 (97.1%)	< 0.001
Clopidogrel	119 (65.7%)	535 (61.3%)	< 0.001
IV Heparin	162 (89.5%)	786 (90.0%)	< 0.001
LMW Heparin	15 (8.3 %)	70 (8.0 %)	0.002
Beta Blockers	54 (29.8%)	569 (65.2%)	<0.001
ACE I / ARBs	135 (74.5%)	636 (72.9%)	< 0.001
Calcium CB	1 (0.6%)	24 (2.7%)	0.080
Statins	158 (87.3%)	764 (87.4%)	< 0.001
Nitrates	133 (73.5%)	752 (86.1%)	< 0.001
Diuretics	98 (54.1%)	102 (11.7%)	< 0.001
Treatment on discharge			
Aspirin	115 (63.5%)	810 (92.8%)	0.001
Clopidogrel	85 (47.0%)	553 (63.3%)	0.05
Beta Blockers	65 (35.9%)	650 (74.5%)	0.001
ACE I / ARBs	132 (72.9%)	715 (81.4%)	< 0.001
Calcium CB	1 (0.6%)	21 (2.4%)	0.091
Statins	115 (63.5%)	774 (88.7%)	0.001
Nitrates	97 (53.6%)	664 (76.1%)	< 0.001
Diuretics	105 (58.0%)	80 (9.2%)	< 0.001
Spironolactone	55 (30.4%)	72 (8.2%)	< 0.001
Digoxin	17 (9.4 %)	7 (0.8 %)	< 0.001
Morbidity & mortality			
Stroke	20 (11.0%)	10 (1.1%)	< 0.001
Cardiogenic shock	74 (40.9%)	42 (4.8%)	< 0.001
Major bleeding	2 (1.1%)	5 (0.6%)	< 0.001
Death	55 (30.4%)	32 (3.6%)	< 0.001

Table 3: Comparison between some patents characteristics, major CAD risk factors and in-hospital outcome in different registries

Variables	Yemen CHF data(n=181)	Gulf Race phase I [18] (n=2009)	SPACE [31] (n=905)	Canadian Registry[3] (n=559)	GRACE[28] (n=2647)
Number (%)	17.3	25	20	12	19
Mean Age in Years	63	62	62	72	73
Male (%)	72.4	68	70	63	61
Arterial Hypertension(%)	45.9	62	64	58	60
Diabetes Mellitus (%)	44.8	50	71	32	29
History of MI (%)	32.6	34	48	39	29
In Hospital Mortality (%)	30.4	7.9	4.7	3.6	14

Table 4: In-Hospital major outcomes in some close neighborhood registers

OUTCOMES	YEMEN DATA	Gulf Race I	SPACE
Stroke	**11.0%**	**1.3%**	**0.9%**
Cardiogenic shock	**40.9%**	**11.6%**	**3.5%**
Major bleeding	**1.1%**	**1.5%**	**0.7%**
Death	**30.4%**	**7.9%**	**4.4%**

Discussions

A prominent finding of this study is that Acute Coronary Syndrome is a major underlying cause for congestive heart failure. As a first study of its kind in Yemen, it indicates that, in between every 5-6 patients, one will develop CHF. Patients present late for any thrombolytic modalities. Older males are more prone to CHF. The morbidity in form of strokes, major bleedings and cardiogenic shock were strikingly high, while mortality was the fate of every third patient with CHF. Not only the Framingham Heart Study suggests that the most common cause of HF is no longer hypertension or valvular heart disease, as it was in previous decades, but rather CAD (19). Still the prevalence of CAD as underlying cause of CHF in multi-center HF trails (1986-2005) was published in New England Journal of Medicine (1,4-15,17,21-25,27,29-33) indicating that CAD is a major underlying cause for CHF. The presence of CAD in those patients has been shown to be independently associated with a worsened long-term outcome in these several studies as shown in Table 5.

Table 5: Prevalence of CAD in Multicenter HF Trials Published in the ***New England Journal of Medicine*** From 1986- 2005

Trial	Year	All Patients	CAD Patients
V-HeFT I	1986	642	282
CONSENSUS	1987	253	146
Milrinone	1989	230	115
PROMISE	1991	1088	590
SOLVD-T	1991	2569	1828
V-HeFT II	1991	804	427
SOLVD-P	1992	4228	3518
RADIANCE	1993	178	107
Vesnarinone	1993	477	249
CHF-STAT	1995	674	481
Carvedilol	1996	1094	521
PRAISE	1996	1153	732
DIG	1997	6800	4793
VEST	1998	3833	2230
RALES	1999	1663	907
DIAMOND	1999	1518	1017
COPERNICUS	2001	2289	1534
BEST	2001	2708	1587
Val-HeFT	2001	5010	2866
MIRACLE	2002	453	244
COMPANION	2004	1520	842
A-HeFT	2004	1050	242
SCD-HeFT	2005	2521	1310
CARE-HF	2005	813	309
Total	**19 years**	**43 568**	**26 877 (62%)**

V-HeFT indicates Vasodilator–Heart Failure Trial; Consensus, Cooperative North Scandinavian Enalapril Survival Study; Milrinone, Milrinone Trial; PROMISE, Prospective Randomized Milrinone Survival Evaluation; RADIANCE, Randomized Assessment of the effect of Digoxin on Inhibitors of the Angiotensin-Converting Enzyme; Vesnarinone, Vesnarinone Trial; CHF-STAT, Congestive Heart Failure Survival Trial of Antiarrhythmic Therapy; Carvedilol, Carvedilol Trial; DIG, Digitalis Investigation Group trial; VEST, Vesnarinone Trial; RALES, Randomized Aldactone (spironolactone) Evaluation Study for Congestive Heart Failure; DIAMOND, Distensibility Improvement With ALT-711 Remodeling in Diastolic Heart Failure; COPERNICUS, Carvedilol (Coreg) Prospective Randomized Cumulative Survival; BEST, Beta-Blocker Evaluation of Survival Trial; Val-HeFT, Valsartan Heart Failure Trial; MIRACLE, Multicenter InSync Randomized Clinical Evaluation (North America); COMPANION, Comparison of Medical Therapy, Pacing and Defibrillation in Chronic Heart Failure; A-HeFT, African-American Heart Failure Trial; and CARE-HF, Cardiac Resynchronization–Heart Failure study.

The patient characteristics in the whole group of the Phase I GULF RACE (2) showed more high prevalence (25 % Vs 17.3%) for the Yemeni CHF patients. Older males are also affected, but still our study shows more older male patients. The SPACE (3) registry (The Saudi Project for Assessment of Coronary Events) & GRACE (28) (Global Registry of Acute Coronary Events Investigators) showed slightly higher prevalence than Yemen data (20% & 19% Vs 17.3%) with older male predominance. Meanwhile, the Canadian Registry (26) for ACS indicated low prevalence (12 % Vs 17.3%) still older male patients are more affected (Table 3).

The risk factors for developing CAD were investigated thoroughly in Yemen data ; arterial hypertension then diabetes mellitus were the most common risk factors; while, in SPACE, diabetes mellitus was very prevalent (71% in SPACE, 44.8% in Yemen data while GRACE 29%). Yemen data showed also Khat (*Catha edulis Forsk*) chewing habit is considered a potential risk factor which is limited to our study. The site of coronary event in STEMI was more in anterior/anterolateral MI in Yemen data and also in Gulf Race I. LBBB in ECG carries higher risk for developing CHF among ACS patients in both Yemen data and SPACE registry and both reported high prevalence of low LVEF by Echocardiographic examination. In-hospital medication in Yemeni patients, shown in Table 2, pointed out inadequate CHF management.

The in-hospital course and its outcomes, regarding the morbidity and the mortality among CHF group, pointed out a gloomy outcome of the Yemeni patients and was a big dilemma as Strokes in 11%, cardiogenic shock 40.9% major bleeding 1.1% and death 30.4%, in contrast to other registries, especially Gulf Race I and SPACE (Table 4). The table reflect the quality of care in Yemeni tertiary hospital, late presentation of the patient to health facilities, adequacy of the emergency referral system and the performance of medical teams handling those patients.

Limitations of the study

The absence of data about prior history of pre-hospitalization with HF represents a major limitation of the study and that surely affects the outcomes post-hospital discharge. Lack of biomarkers for CHF, e.g. natriuretic peptides which are useful biomarkers in the diagnosis of CHF and in the management of those patients with established CHF. The loss of contact with the patients after discharge represents another limitation to know the long run outcome in those groups.

Conclusion and recommendations

Acute coronary syndrome in Yemeni patients is a major cause for congestive heart failure and had worse prognosis regarding in-hospital morbidity and mortality**.** In this observational study, ACS patients with CHF were older, more likely to have hypertension, diabetes, lower LVEF, and hemodynamically unstable status than those without CHF unstable than those without CHF. These findings potentially explain the higher incidence of in- hospital adverse outcomes in ACS patients with CHF. More aggressive treatment of these patients may be warranted to improve prognosis. Improving health systems is mandatory to overcome limitations in handling those patients. More studies on Khat as a potential risk factors are needed.

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معضلة قصور القلب الاحتقاني بين المرضى اليمنيين الذين كانت لديهم متلازمة الشريان التاجي الحادة

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الملخص

قصور الشرايين التاجية الحاد ونتائجه هي واحدة من أمراض القلب الأكثر شيوعاً في جميع أنحاء العالم. وحتى الان في اليمن فإنَّ بيانات السجل الخليجي لإصابات الشريان التاجي المرحلة الأولى هي المعلومات الواسعة التي تسلط الضوء على حجم هذه المشكلة. ونود أن نشير إلى مشكلة قصور القلب الاحتقاني بين السكان اليمنيين المصابين بقصور الشرايين التاجية الحاد، أهمية تطورها وتأثيرها في نتائج المرضى. وبيانات اليمن هي جزء من بيانات السجل الخليجي لإصابات الشريان التاجي المرحلة الأولى. من بين 1054 أدخلوا إلى المستشفى يعانون من متلازمة الشريان التاجي الحادة، كان 181 مريضاً (17.3%) يعانون من قصور القلب الاحتقاني أصيبوا بها أثناء قدومهم إلى المستشفى أو أثناء رقودهم في المستشفى. كانوا من كبار السن نسبياً 63.2 ± 10.7 (SD) سنه ، (P <0.001) مع هيمنة الذكور (72.4%). على الرغم من الأمامي/الأمامي الجانبي كان ارتفاع ال ST لاتشاء عضلة القلب الحاد السمة الأكثر (69.6%)، ولا يزال فرع الحزمة اليسارية لاحتشاء عضلة القلب أكثر شيوعاَ. وكانت صور تخطيط صدى القلب أكثر اتساقاً مع مجموعة قصور القلب الاحتقاني، وكان دفع البطين الأيسر 40% مقابل 51% (P <0.001). وكان هؤلاء المرضى في حالة هوس أكثر من بقية المجموعة من متلازمة الشريان التاجي الحادة. من الواضح كانت المعالجة أقل باستخدام العلاجات التي تستند إلى الأدلة. ارتبط قصور القلب الاحتقاني إلى معدل عالي لوفيات المستشفى 30.4% مقابل 4.8% مع (P <0.001). نستنتج أنَّ متلازمة الشريان التاجي الحادة للمرضى اليمنيين معقدة مع فشل القلب الاحتقاني ويكون أكثر خطورة بشأن معدلات الاعتلال والوفيات في المستشفى.

الكلمات المفتاحية: قصور الشرايين التاجية الحاد، قصور القلب الاحتقاني، وفيات، اليمن.