

Therapeutic Hypothermia for Comatose Patients: VF Versus Other Initial Rhythm – does it Matter?

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Background: Unconscious adults after out-of-hospital cardiac arrest (OHCA) should be treated with mild induced hypothermia (MIH) when the initial rhythm was ventricular fibrillation (VF) (ILCOR 2003). No data and no recommendations exist regarding other rhythms. We conducted a current practice survey in order to assess efficacy of MIH in patients after OHCA due to non-VF rhythm.

Methods: Eighty six consecutive OHCA patients (68 VF, 18 non-VF) were cooled by MTRE Criti Cool™ external cooling system. Patients were analyzed according to their initial rhythm and according to their neurological outcome on discharge, defined by their cerebral performance category (CPC).

Results: Out of sixty-eight patients with VF 42 patients (62%) had favorable outcome (CPC 1-2) and 32% died. Among the non-VF group 4 patients (22%) had favorable outcome ($p < 0.001$ versus VF) and 67% died ($p = 0.008$ versus VF). Differences in baseline characteristics between the favorable and unfavorable non-VF groups were in age and severe co morbidities. Outcome was worse when time from collapse to return of spontaneous circulation (ROSC) was more than 25 minutes or (a trend to worse outcome) when the patient was presented to the emergency room with convulsions or hemodynamic instability.

Conclusions: In our experience, MIH is less efficient in non-VF compared to VF patients. Factors that seem to influence their outcome are: age, co morbidities, time duration from collapse to ROSC, convulsions and hemodynamic instability at presentation.

The Value of Troponin-I Curve after Primary PCI for ST Elevation Myocardial Infarction

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Background: After thrombolysis in ST elevation myocardial infarction (STEMI), cardiac troponin-I (CTnI) curve demonstrated two peaks. The ratio between the early to late peak has been shown to carry important prognostic value. The magnitude and course of troponin after reperfusion with primary percutaneous intervention (PPCI) have never been investigated.

Methods: The study comprised 73 consecutive STEMI patients in whom PPCI was performed within 12 hours of pain onset. CTnI and creatinine kinase (CK) were prospectively determined every 4 hours during the first 24 hours and every 24 hours during the next 3 days. Data regarding clinical course, echocardiography and angiography were prospectively collected.

Results: 73 patients were followed (79% male, mean age 60±13 years). In contrast to thrombolysis, after PPCI there was only one peak after 4-8 hours from admission in most of the patients (73%). Late troponin peak (> 8h) was associated with a late arrival of >6h from pain onset, unsuccessful re-vascularization, distal embolization or re-ischemia. When patients were stratified into two groups using the median peak CTnI value as a cut off point (53.7 µg/L), patients with higher troponin levels had a higher rate of decrement left ventricular function (ejection fraction ≤45%), (67% versus 43%, p=0.005).

Conclusions: The characteristics of CTnI curve in acute STEMI patients undergoing PPCI differs from that of thrombolysis with a single peak after 4-8 hours, demonstrating a sharp 50% decline within 24 hours of admission. Higher peak levels correlate with worse ventricular function.

C-Reactive Protein as a Predictor of Active Coronary Disease and Worse Prognosis in Chest Pain Unit

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Objectives: In recent years chest pain units (CPU), have been proven to be an efficient modality for evaluating low-medium risk patients with chest pain. Although C-reactive protein (CRP) was proven to be an inflammation marker and an emerging cardiovascular and atherosclerosis risk factor, its prognostic value in CPU evaluation has yet to be determined.

Methods: The study comprised 621 consecutive patients admitted to the Tel Hashomer CPU. High sensitivity (hs)-CRP was determined in all patients within 8-12hrs of admission. As per CPU protocol all patients were monitored with an ST-analyzer monitor for ST changes and malignant arrhythmias. Patients were tested for troponin levels on admission and after 8-12hrs. Those ruled out for acute myocardial infarction (AMI) underwent non-invasive testing (stress SPECT thallium scan, stress echo, cardiac CT) for detection of significant coronary artery disease (CAD).

Results: 120 out of 621 patients (19%) had hs-CRP \geq 6 (high CRP); 501(81%) had CRP<6 (low CRP). There were no significant differences in baseline characteristics. 21% of high CRP patients were hospitalized compared with 11% of low CRP patients (p=0.006, OR 2.05, 95% CI 1.22-3.45). Although both high and low groups had similarly low incidents of AMI (2.5% vs. 2.2%, p=0.7), high CRP patients had a higher incidence of significant CAD by non-invasive testing (14% vs 7%, p=0.013) and eventually were more likely to undergo percutaneous coronary intervention for significant CAD.

Conclusion: CRP carries an important predictive value and may contribute to the fast tract chest pain evaluation of low-medium risk patients.

STEMI Culprit Lesion Angiographic Characteristics Affect Clinical Outcome

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Background:

Culprit lesion characteristics may influence the technical approach and clinical outcome in patients undergoing primary PCI due to AMI.

Methods:

We evaluated the angiographic characteristics and MACE in 344 consecutive patients undergoing primary PCI between January 2005 and July 2007 in Hadassah University Hospital. Based on angiographic criteria patients were divided to into 2 groups: complicated (group A) and simple simple (group B) culprit lesions.

Results:

Average pain to needle time was 126 minutes. Culprit lesion was localized in the proximal and middle segments of the artery in 256 patients (74%). TIMI O - I flow on admission was detected in 328 patients and TIMI II-III flow in 16 patients. Single, double and triple vessel disease occurred in 40%, 35% and 25% of patients, respectively. Anterior wall MI comprised 46% of the cases. Six patients did not undergo PCI of which two underwent urgent CABG. Cardiogenic shock on admission occurred in 5% of the patients, 4% had malignant arrhythmia and 1% had mechanical complications due to AMI. Group A included 192 patients with large arteries (n=6), bifurcation lesions (n=44), large intracoronary thrombus (n=78), ostial lesions (n=9), acute on chronic occlusion (n=11), uncertain localizations (n=7), simultaneous occlusion of two arteries (n=5), acute instent thrombosis (n= 11), acute graft thrombosis (n=10) and need for multivessel PCI (n= 11). Group B included 152 patients with simple coronary occlusions. The differences in outcome are described in the following table:

	N	Angiographic success	Final TIMI flow II - III	Massive distal embolization	In hospital mortality
Group A	192	80%	80%	16%	2
Group B	152	98%	95%	7%	0
P		0.001	0.001	0.012	0.2

Conclusion:

In our single center experience, complicated lesions are the majority of lesions negotiated during primary PCI. These lesions are associated with lower angiographic success and worse clinical outcome.

Characteristics of Recurrent versus First AMI; Results from the ACSIS 2006 Survey

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Background: Little is known regarding the nature of a recurrent myocardial infarction. We sought to compare the characteristics of an event, in patients presenting with a recurrent MI (PMI – Previous MI group) to those with a first MI (FMI group).

Methods: Data was collected from the 2006 ACSIS (Acute Coronary Syndrome Israeli Survey) - a biannual survey on acute myocardial infarction performed in 26 intensive cardiac care units in Israel during a two-month period. 2074 patients suffered from MI, 30% of who were PMI patients

Results: Presented here are only results with $P < 0.05$.

Presentation: When compared to the FMI group, PMI patients had more risk factors and comorbidities. During the event less PMI patients presented with atypical angina (55 vs. 61%), more with heart failure (7 vs. 3%). Electrocardiographically, less PMI patients had ST elevation (26 vs. 51%); more patients had ST depression (27 vs. 18%), as well as lack of ECG changes (27 vs. 15%). **Treatment:** PMI patients were less likely to receive reperfusion therapy (medically or percutaneously); 12 vs. 25% of patients were treated with primary percutaneous coronary intervention (PCI); 47% compared to 69% had PCI during hospitalization, and 4% compared to 8% were treated with thrombolysis. **Outcomes:** PMI had more complications than FMI patients; heart failure (17 vs. 10%), pulmonary edema (13 vs. 7%), cardiogenic shock (6 vs. 4%), mitral regurgitation (5 vs. 2%) and acute renal failure (7 vs. 4%). Mortality was higher among patients with PMI; 4 vs. 2% at 7 days and 6 vs. 4% at 30 days.

Conclusions: 1. PMI patients were less likely to present with STEMI, possibly due to increased secondary preventive treatment for their disease, vessel collateral formation, and earlier self-referral. 2. Patients with PMI suffered more major complications during hospitalization than FMI patients, and experienced higher mortality rates.

Right Ventricular Dysfunction in Isolated Anterior ST Elevation Myocardial Infarction

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Background: Isolated occlusion of LAD does not usually affect right ventricular (RV) function. We describe for the first time a series of patients in who isolated anterior ST elevation MI (STEMI) was associated with right ventricular dysfunction.

Methods: We retrospectively identified all patients admitted to our medical center between 9/1996 and 1/2007 who had an anterior STEMI, had single vessel disease involving either the LAD, diagonal or ramus arteries who were found to have unexplained RV dysfunction by echocardiography within 24 hours of admission. Patients with any other cardiac pathology or pulmonary hypertension were excluded. Five patients fulfilled these criteria out of 438 patients who had a similar coronary anatomy but no RV dysfunction (1.14%). Demographic, clinical, echocardiographic and angiographic characteristics were studied. Echocardiographic and angiographic data were reviewed by a “blinded” investigator.

Results: A blinded investigator confirmed the diagnosis of RV hypokinesis in all subjects. All patients with RV dysfunction were men and their mean age was 52 (range: 40 to 60) years. All of them had no prior cardiac history. All patients had moderate – severe LV dysfunction. Echocardiographic follow-up was available for one patient 5 months after admission; RV dysfunction was completely resolved and LV dysfunction significantly improved. The coronary angiograms of all subjects were reviewed; absence of disease in the RCA was confirmed but we could not identify a coronary basis for RV dysfunction.

Conclusion: Isolated anterior STEMI not involving the RCA may rarely lead to significant RV dysfunction in relatively young subjects.. The mechanism for this previously undescribed observation is unclear. Complete resolution of RV dysfunction is probably common.

Therapeutic Hypothermia in Survivors of out of Hospital Cardiac Arrest is also Beneficial after Cardiac Asystole.

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Out of hospital cardiac arrest is a condition with high mortality and devastating morbidity. Patients who are found in ventricular fibrillation generally have a more favorable outcome than patients found in asystole, which at some places are considered hopeless. This has led many physicians to a less aggressive approach in patients found in asystole. Results from recent clinical trials suggest a beneficial effect of induced mild hypothermia on the neurological outcome and mortality in patients with out of hospital cardiac arrest, and this therapeutic modality is now part of the guidelines. During the last five years we induced mild hypothermia in 102 survivors of out of hospital cardiac arrest. During their stay in the ICCU, 38% regained consciousness and 20% died. 52 patients were initially found in ventricular fibrillation, 35 patients in asystole and the other patients in a variety of other conditions, mainly asphyxia and electromechanical dissociation. Consciousness was regained by 50% of the ventricular fibrillation patients, 31% of the asystole patients and two of the 9 COPD patients. We conclude that cardiac asystole is not a hopeless condition, and induced mild hypothermia may be beneficial in some of these patients.

Spontaneous Reperfusion in ST-Elevation Myocardial Infarction is Associated with more Distal Coronary Lesions

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Background: Spontaneous reperfusion (SR) of the infarct-related artery may occur in patients with ST-segment elevation myocardial infarction (STEMI). Limited data are available on angiographic characteristics of these patients. The objective of this study was to examine if there are differences in the distance of the culprit lesion from the coronary ostium in patients with STEMI with and without SR.

Methods: Patients who presented with acute STEMI within 12 hours after pain onset and who underwent coronary angiography were entered into the study. Measurement of the distance from the coronary ostium to the culprit lesion was performed. SR was defined as significant relief of chest pain with an at least 50% resolution of ST segment elevation on follow-up electrocardiograph

Results: A total of 469 patients with STEMI were included in the study of whom 77 met criteria for SR and 392 who did not. A highly significant difference was seen in ostial to culprit lesion distance with the culprit lesion in the SR group being more distal than those in the non-SR group (45 ± 22 mm vs 39 ± 20 mm, p-value < 0.009).

Conclusions: In conclusion, our findings demonstrate that the location of the culprit lesion in STEMI patients who undergo SR is more distal in the involved artery than in STEMI patients without SR. Our findings suggest that the relatively lower thrombus burden and greater amount of vasoreactivity in these lesions may increase the chances of SR.

Preadmission on the Ambulance Tirofiban Infusion for STEMI Patients on the Way to Primary Percutaneous Intervention.

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Aim: Determining the feasibility and safety of pre admission diagnosis of STEMI by a mobile intensive care unit (MICU) team using telemedicine, and early administration of the GP IIb/IIIa inhibitor (Tirofiban) on the way to immediate PCI

Method and results: During the time February 2006 up to November 2007 27 patients with suspected STEMI were evaluated in the ambulance, using HeartView™ and ECG trans-telephonic Recorder/Transmitter to the cardiac care unit. The diagnosis was confirmed by the cardiologic on call in 24 of them and a loading dose of Tirofiban was infused. The study group included 22 males (91.2%), mean age $59.9 \text{ y} \pm 13.5$, HTN in 47%, DM 20%, smokers 47%, anterior wall infarct in 45.8% and cardiogenic shock in 2 patients (8.3%).

The drug was given 27 ± 6 minutes pre arrival to the hospital, and 33 ± 19 minutes pre initiation of the angiography. an ST segment resolution pre angiography was noted in 20.4% and initial TIMI grade flow of 2 or 3 was demonstrated in 40% of the patients.

All patients had successful PCI to the culprit artery. The hospitalization course was uneventful for all patients, and no excess bleeding complications were noted. All patients were discharge home after 4.4 ± 1.6 days.

For analysis, a comparison was done between the study group to consecutive 145 other STEMI patients treated with primary PCI during the same time period in our center. No statistically significant difference was found for clinical, laboratory and outcome parameters.

Conclusion: based on this small pilot study, pre hospital diagnosis of STEMI using telemedicine equipment, and initiating GP IIb/IIIa antagonist seems to be feasible and safe, yet a larger study is needed for evaluation of beneficial effect.

Pseudonormal Electrocardiogram During Evolving Myocardial Infarction and Severity of the Infarct Related Artery (IRA) Stenosis

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Pseudonormalization of negative T waves is a well known indicator of myocardial ischemia. Pseudo-normalization of T waves during evolving ST elevation myocardial infarction (STEMI) and its correlation with the IRA has not been described. We studied the coronary angiographies of 34 pts. with STEMI which were divided into 2 groups according to their ECG evolution. Group A consisted of 18 pts whom during the course of STEMI evolved to a normal ECG pattern within 24 hours of admission. Group B consisted of 16 pts with T wave inversion within 24 hours. All pts of group A had T wave inversion at a later time or after PCI of the IRA. The table presents a summary of the relevant data.

		Group A	Group B	P value
Patients		18	16	
Male		13	13	
Mean age		57,6	58,7	NS
IRA		14LAD, 3Cx,1RCA	12LAD,3Cx,1RCA	
%stenosis	LAD	91.8(SD=10.6)	85.3 (SD=11.7)	P<0.07
	Cx	86.7% SD=5.8	68.3 SD=16.1	P<0.07
	RCA	91% SD=8.2	70.5 SD=21.7	NS

Results: There were no demographic differences between both groups. The severity of coronary stenosis was significantly higher in group A for the LAD, Cx and RCA, however for the RCA the severe stenosis was not statistically significant since there was only one pt. in each group. Thus, we conclude that this regressive pseudo normal pattern is a transitional ischemic stage probably due to incomplete revascularization of the IRA. These findings may explain cases of myocardial infarction with apparently normal ECG at presentation.

ST Deviation Pattern in Acute Myocardial Infarction is not Related to Lesion Location

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Background: Myocardial infarction may be classified as ST-elevation MI (STEMI) or non-ST elevation MI (NSTEMI). In STEMI the culprit artery is usually occluded, whereas in NSTEMI it is usually patent. The location of the ruptured plaque may influence the MI type. Herein we examine whether the distance from the coronary ostium to the culprit lesion is different in STEMI as compared to NSTEMI.

Methods: We reviewed our database and selected patients who presented with an acute MI and underwent coronary angiography within 7 days of admission. The analysis included 754 patients of whom 514 had STEMI and 240 had NSTEMI. QCA was performed and the distance from the ostium of the coronary artery to the site of thrombosis was measured.

Results: For both STEMI and NSTEMI patients the first 50mm (LAD and LCX) or the first 60mm (RCA) of the coronary artery contained 75% of the culprit lesions. There were no significant differences in median distances from the vessel ostium to the site of thrombosis between STEMI and NSTEMI patients

Conclusions: the distance from coronary ostium to culprit lesion is similar in STEMI and NSTEMI patients. Culprit lesion location does not appear to influence the development of STEMI as opposed to NSTEMI.

Seasonal Variation in Myocardial Infarction is Limited to Patients with ST-Elevations on Admission

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Background: Previous studies have demonstrated a seasonal variation in the incidence of acute myocardial infarction (AMI) with an increase in cases during the winter months. These studies have not assessed whether ST-elevation MI and non-ST-elevation MI exhibit similar changes. The object of this study was to compare the seasonal variation of STEMI as compared to NSTEMI.

Methods: All patients who presented with AMI and underwent coronary angiography within 7 days of admission were identified via the institutional database. STEMI diagnosis required admission ECG demonstrating ST elevation in at least two contiguous leads. All acute MI's not meeting criteria for STEMI were defined as NSTEMI. Patients were divided into monthly and seasonal groups based on the date of admission with MI.

Results: A total of 784 patients were included; 549 patients with STEMI on the basis of the admission ECG and 235 with NSTEMI. When STEMI patients were analyzed by season there were 170 patients (31%) in the winter months, a statistically significant difference of excess MI. ($p < 0.005$). When NSTEMI patients were analyzed there were 62 patients (26%) in the winter with no statistically significant difference in the seasonal variation.

Conclusions: Our findings suggest that the previously noted seasonal variation in the incidence of AMI is limited to patients presenting with STEMI. This suggests there are important physiological differences between STEMI and NSTEMI, the nature of which remain to be elucidated.

A Pilot Study on Physical Conditions Related to Right Ventricular Infarction and Cardiogenic Shock in Acute Myocardial Infarction (AMI)-PCI Data

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In 1170 primary PCI for AMI (2000-2006) 123 (10.5%) were described as right ventricular infarction (RVI) and 102 (8.72%) accompanied by cardiogenic shock (CSh) -factors negatively affecting AMI prognosis. The **aim** of this study was to check if these two conditions are related by some specific environmental physical activity markers.

Methods: daily physical activity parameters geomagnetic (GMA)-I-IV levels and cosmic ray activity –by neutron activity on the Earth's surface (imp/min) were obtained for each day in the study period (n=2557), days of AMI with culprit artery at LAD, RCA, CRX - and at days with AMI –right ventricular and with cardiogenic shock.

Results: patient characteristics-it was significantly more men in the RVI group (p=0,0005) as in the CSh and, inverse, for women (p=0,06). Patients in the CSh group were older than in RVI (p<0,0002). Woman >80y. old were more often in the CSh group. (p=0,05). On days of both RVI and CSh it was higher CRA (neutron) activity as at the whole study period (p=0,0003 for RVI; p=0,018 for CSh) and higher as in LAD, RCA AMI for RVI, (p=0.006 -LAD, 0,027-for RCA; p=0.014 for CRX) and CSh-AMI (p=0,009 for LAD; p=0,029 for RCA; 0.089 for CRX). RVI took place more often than CSh at two highest levels of GMA. (p=0,06).

Conclusion: AMI is accompanied by RVI and CSh on days with higher CRA compared with other groups of AMI; RVI is more often seen with concomitant high levels of GMA than AMI with CSh. CSh patients were older than RVI and woman in CSh prevailed.

It can be presumed that higher neutron (CRA) activity is predisposing to expanded myocardial damage in AMI. `

Cardiac Telemedicine from the Prospective of the Patient and the Physician: an Update

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Telemedicine, a direct offshoot of cutting-edge technology, is assuming an important place in modern healthcare. 'SHL' telemedicine provides professional care to subscribers who contact its monitor center by telephone, describe their symptoms to the professional staff, and transmit their real-time ECGs (lately by cardiobeeperes with cellular telephone transmission). These data, combined with those stored in a central computer for instant access, determine individually appropriate therapeutic measures, including the dispatch of mobile intensive care units.

The telecardiological system monitors blood pressure, pulmonary peak flow, and selected cardiac parameters. The new 'Telemarker' device for transtelephonically measuring cardiac markers in whole blood was found safe and efficacious for independent use at the patient's home.

There are currently >60,000 'SHL' subscribers (age range 15-102 years). Since its establishment (1987), the service has handled >9,100,000 calls and ECG transmissions: solely telephonic medical assistance was required by >85% of the callers. SHL's CHF program led to 66% fewer hospitalizations.

Telemedicine services improved diagnosis and benefitted survivors of AMIs by decreasing mortality at one year from discharge following infarction. In addition numerous cases of unexplained episodes of weakness and pre-syncopacal episodes were also diagnosed as arising from rhythm and conduction disturbances.

Transtelephonic instruction to laymen who provided basic life support measures until professionals arrived at the scene resulted in a 10% survival rate of otherwise terminal patients.

Accurate diagnosis in the pre-hospital setting of patients with cardiac symptoms enhances identification of those with acute coronary syndromes, conserves resources by appropriate triage, and improves patients' motivation to seek medical assistance.

The Value of Computed Tomography Coronary Angiography before Invasive Coronary Angiography in Patients after Coronary Artery Bypass Grafts

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Background: Coronary imaging using multidetector computed tomography (MDCT) might be an initial non-invasive modality for the diagnosis of coronary artery disease. In patients after coronary artery bypass grafts (CABG) the value of MDCT before invasive coronary angiography (ICA) had not been tested.

Objective: To examine the value of MDCT in patients after CABG who are planned for ICA with optional percutaneous coronary intervention (PCI).

Methods: We enrolled patients post CABG, high risk for ICA, who were admitted to our department for ICA due to acute coronary syndrome or electively for angina and objective ischemia on stress testing. All patients before ICA had undergone 64-slice MDCT for the detection of culprit vessel stenosis. Patients who had MDCT finding of significant stenosis (diameter stenosis >50%) had undergone ICA with optional PCI.

Result: Seven patients, 5 male and 2 female, mean age 77 ± 5 years were enrolled till now. According to MDCT finding, 4 patients underwent successful PCI of target saphenous venous graft (SVG) (PCI group); 3 of them had selective imaging of target vessel only. Three patients in whom MDCT showed significant target vessel stenosis were, according to ICA, not suitable for PCI (non-significant stenosis in 2 and chronic total occlusion in 1 patient), (intention to treat group). One patient in this group had selective imaging of target vessel only. Mean fluorescence time in patients with selective imaging of target vessel was 7 ± 4 minutes (min) compared with 9.5 ± 12 min in those with non-selective imaging. The mean amount of contrast media that given during ICA was 90 ± 76 ml compared with 110 ± 45 in selective and non-selective imaging respectively. All patients early after PCI and during the follow-up were clinically stable and uneventful.

Conclusion: In our study patients, MDCT before ICA is feasible and safe. MDCT guided PCI was associated with high procedural success rate, less fluorescence time and less amount of contrast media. In 3 of 7 patients the MDCT were not accurate with ICA findings. For statistical power, our study is still in progress.

Mild Therapeutic Hypothermia Improves Outcome after Out-of-Hospital Cardiac Arrest

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Treatment of coma following resuscitation with mild hypothermia has been incorporated into the guidelines following publications showing improvement in survival and neurological status after resuscitation for ventricular fibrillation (VF). We present the results of this treatment in our coronary care unit from 02/2003- 10/2007.

Results: Thirty patients (80% male) between ages of 23-82yrs were treated with mild hypothermia (34°C) following resuscitation. 23 had VF, 1 had VT and 6 had asystole as initial rhythm. Twenty two patients (73%) survived to discharge from hospital, 16 (53%) were discharged in good condition or moderate neurological deficit, and 6 (20%) had severe anoxic brain damage or vegetative state.

Predictors for good outcome included age <65yrs, length of resuscitation, and number of DC shocks. Asystole was not a predictor of poor outcome as 5 of the 6 patients admitted with asystole were discharged home with good neurological function.

Conclusions: This series of patients treated with mild hypothermia confirms the results of the randomized trials and suggests that treatment with hypothermia improved the outcome of survivors of sudden cardiac death and its indication may be broadened to include patients admitted not only with VF but also after asystolic cardiac arrest.