Heart, Lung and Circulation (2014) **23,** 913–923
1443-9506/04/$36.00
http://dx.doi.org/10.1016/j.hlc.2014.03.030

REVIEW

The Use of Gastrointestinal Cocktail for Differentiating Gastro-oesophageal Reflux Disease and Acute Coronary Syndrome in the Emergency Setting: A Systematic Review

Samuel Chan, MBBS [a,b*], Andrew P. Maurice, MBBS [a,b], Suzanne R. Davies, MPH [c,d], Darren L. Walters, MBBS, FRACP [a,b]

[a]Heart and Lung Institute, The Prince Charles Hospital, Brisbane, Queensland, Australia
[b]The University of Queensland, School of Medicine, Brisbane, Queensland, Australia
[c]The University of Tasmania, School of Medicine, Sydney Campus, Australia
[d]The Distributed Research in Acute and Emergency Medicine (DREAM) Collaboration, Sydney, Australia

Received 2 March 2014; accepted 31 March 2014; online published-ahead-of-print 12 April 2014

Background Differentiating acute chest pain caused by myocardial ischaemia from other, potentially more benign causes of chest pain is a frequent diagnostic challenge faced by Emergency Department (ED) clinicians. Only 30% of patients presenting with chest pain will have a cardiac origin for the pain, and gastro-oesophageal disorders are one of the common sources of non-cardiac chest pain, yet remain clinically difficult to differentiate from cardiac pain.

Aim A systematic review of the literature was conducted to locate and evaluate clinical trials comparing the use of an oral gastrointestinal (GI) cocktail (oral viscous lidocaine/ antacid ± anticholinergic) to standard diagnostic protocols (serial electrocardiograms (ECGs), serial biomarkers, imaging and/ or provocative testing) to differentiate emergency patients presenting with acute chest pain caused by gastro-oesophageal disease from those with other aetiologies.

Methods Studies were identified by searching electronic databases, scanning reference lists of articles, and searching clinical trial databases for relevantly currently registered trials. The search included PubMed (1966 – present), Embase (1980 – present) and Cochrane Central Register of Controlled Trials (CENTRAL). The identified studies were evaluated with a modified QUADAS tool.

Results A total of four studies were identified for inclusion in the review. Studies were of low methodological quality with heterogeneous results. There were no adequately powered and appropriately designed studies identified.

Discussion Current diagnostic protocols for Acute Coronary Syndrome (ACS) revolve around early and serial ECG monitoring and cardiac biomarker testing, imaging and careful clinical examination. In patients with chest

Abbreviations: ED, Emergency Department; ACS, Acute Coronary Syndrome; AMI, Acute Myocardial Infarction; ECG, Electrocardiograph; GI, Gastrointestinal; GERD, Gastro-oesophageal Reflux Disease

*Corresponding author at: Heart and Lung Institute, The Prince Charles Hospital, Brisbane, Queensland, Australia. The University of Queensland, School of Medicine, Brisbane, Queensland, Australia. Tel.: +61 7 3139 4000; fax: +61 7 3139 4220, Emails: samuel.chan@uqconnect.edu.au, andrew.maurice@uqconnect.edu.au

pain and suspected ACS, the use of a GI cocktail compared with standard diagnostic protocols (serial ECG and biomarkers and provocative testing or imaging) is not proven to improve accuracy of diagnosis, and cannot reliably exclude myocardial ischaemia.

Keywords Chest pain • Gastrointestinal • Cocktail • Ischaemia • Cardiac • Acute coronary syndromes

Introduction

There are over eight million annual Emergency Department (ED) presentations for chest pain and other symptoms consistent with myocardial ischaemia in the United States alone, and chest pain remains one of the most common presenting symptoms to EDs in both developed and developing countries [1].

Differentiating acute chest pain caused by myocardial ischaemia from other, potentially more benign causes of chest pain is a frequent diagnostic challenge faced by ED clinicians. Admission of a patient with a non-malignant cause of chest pain for investigation and monitoring is an inefficient and costly use of hospital resources; however, failure to detect an Acute Coronary Syndrome (ACS) and subsequent discharge of these patients carries a risk-adjusted mortality ratio twice that of hospitalised ACS patients [2]. Failure to diagnose an AMI is the leading cause of litigation against ED physicians and cardiologists in North America, and recent Australian Institute of Health and Welfare data (2011-2012) report that 76% of all new claims against ED physicians involved missed or incorrect diagnoses [3,4].

Current diagnostic protocols for chest pain revolve around early and serial electrocardiograph (ECG) monitoring, repeated cardiac biomarker testing, imaging and careful clinical examination. Prompt diagnosis of acute coronary occlusion and the initiation of early reperfusion therapy are associated with decreased morbidity and mortality [5]. However, patients with clearly ischaemic ST-segment changes on an ECG comprise less than 5% of chest pain presentations to ED; most patients presenting with chest pain will instead have non-specific or no ECG changes and no early changes in biomarkers indicating myocardial necrosis, such as troponin [2]. Only 30% of patients presenting to an ED with chest pain will subsequently be found to have a cardiac origin for their symptoms [6].

Whilst admitting non-ACS chest pain patients (into an ED, or to a Chest Pain Assessment Unit) is resource intensive, inappropriately discharging a patient with undiagnosed ACS has potentially life-threatening consequences. To meet this challenge, a number of diagnostic strategies are utilised. These include novel cardiac biomarkers, non-invasive imaging modalities, provocative testing and various risk-stratification scoring systems. An invasive evaluation is usually reserved for those patients in whom these tests are positive. The aim is to accurately exclude myocardial ischaemia, whilst simultaneously avoiding unnecessary investigations in those patients without ACS. The diagnostic algorithm must have a high level of both sensitivity and specificity for the diagnosis of ACS.

Of the patients who present to an ED with chest pain, 30-58% are subsequently diagnosed with gastro-oesophageal reflux disease (GERD) or oesophageal motility disorders [6–9]. Distinguishing ischaemic from oesophageal chest pain can be difficult on patient history and clinical observation, as both ischaemic cardiac chest pain and the pain associated with GERD can share very similar characteristics, including dyspepsia, and a response to nitrates or an antacid cocktail [10,11]. When pathology in the gastro-intestinal tract is suspected as the underlying cause of acute chest pain, anecdotally, it has been common ED practice to administer an oral gastrointestinal (GI) ''cocktail'', generally composed of a mixture of liquid antacid and viscous lidocaine, with or without an anticholinergic. These GI cocktails are variously referred to as ''pink ladies'', ''green goddesses'' or ''green dragons'', dependent upon the colour of the mixture. It has been suggested by some experts that if a patient has complete or partial relief of symptoms with GI cocktail administration, the diagnosis is reflux oesophagitis, thereby serving as a 'rule-out' test for ACS [12].

Given that this practice is based solely on clinical feasibility, rather than any evidence of diagnostic accuracy, we conducted a systematic review of the literature, to locate and evaluate studies comparing the use of GI cocktail (oral viscous lidocaine/ antacid ± anticholinergic) to standard diagnostic protocols (serial ECGs, serial biomarkers, imaging and/ or provocative testing) to differentiate emergency patients presenting with acute chest pain caused by gastro-oesophageal disease from those with other aetiologies. The rationale for this review was to determine if the use of a GI cocktail to exclude myocardial ischaemia was safe and accurate, and if such a strategy was supported by the published literature.

Methods

Literature Search and Study Selection

We included primary studies reporting patient diagnostic outcomes after the oral administration of a liquid mixture of antacid and lidocaine (± anticholinergic) to differentiate GERD-related chest pain from ischaemic chest pain in adult patients presenting to the ED, where confirmation of ACS was by current accepted best practice (ECG/biomarkers/ imaging). We included studies irrespective of language, publication status, or study design (prospective or retrospective). The primary outcome was the subsequent diagnosis of an ACS as the primary cause of the chest pain. We excluded animal studies, reviews and studies examining the therapeutic use only of the GI cocktail. No date limitations were imposed on the search. The last search was run on December 3, 2013.

Studies were identified by searching electronic databases, checking reference lists of relevant articles, utilising citation tracking and 'related articles' searching modalities and