Al Azhar University
Faculty of Medicine
Anesthesiology and Intensive
Care Department

Comparative Study between Combined High Thoracic Epidural Block and General Anesthesia with General Anesthesia Alone on Left Ventricular Functions by Using Transesophageal Echocardiography during Coronary Artery Bypass Graft Surgery

Thesis
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Presented By
Khaled Elsheshtawy Mahmoud Shrief
M.B.,B.Ch., M.Sc. Anesthesia

Supervisors

Prof. Dr.
Essam Ali Mustafa
Professor of Anesthesia and Intensive Care
Faculty of Medicine
Al Azhar University

Prof. Dr.
Ayman Ibrahim Tealeb
Professor of Anesthesia and Intensive Care
Faculty of Medicine
Al Azhar University

Dr.
Maged Salah Abdulla
Assistant Professor of Anesthesia and Intensive Care
Faculty of Medicine
Cairo University

Dr.
Abdulla Mohammed El Sheikh
Assistant Professor of Anesthesia and Intensive Care
Faculty of Medicine
Al Azhar University

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Al Azhar University
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كلية الطب
جامعة الأزهر
قسم التخدير والرعاية المركزة

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من الطبيب

خالد الششتاوي محمود شريف

ماجستير التخدير والرعايه المركزه – كلية الطب – جامعة الأزهر

المشرفون

الاستاذ الدكتور
عصام علي مصطفي
أستاذ التخدير والرعاية المركزة
كلية الطب – جامعة الأزهر

الاستاذ الدكتور
أيمن إبراهيم تعيلب
أستاذ التخدير والرعاية المركزة
كلية الطب – جامعة الأزهر

الدكتور
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أستاذ مساعد التخدير والرعاية المركزة
كلية الطب – جامعة القاهرة

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عبد الله محمد احمد الشيخ
أستاذ مساعد التخدير والرعاية المركزة
كلية الطب – جامعة الأزهر

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2013

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Introduction

High thoracic epidural anesthesia (HTEA) administered in addition to general anesthesia in cardiac surgery has been extensively investigated because of its potential beneficial effects including perioperative stress response attenuation, cardiac sympathetic nerve block and excellent analgesia ***(Chaney,1997)***.

Moreover, HTEA dilates epicardial coronary arteries, partly normalize the myocardial blood flow in response to sympathetic stimuli, improves left ventricular function, has anti-ischemic properties, and reduces postoperative release of cardiac troponinI (cTnI) and T (cTnT) ***(Loick et al, 1999)***.

The anti-ischemic effects of the inhibition of sympathetic nervous outflow to the heart are supposed to arise from changes in the major determinants of myocardial oxygen demand because it reduces heart rate (HR) and preload and afterload of the left ventricle (LV) without affecting coronary perfusion pressure (CPP). Furthermore, HTEA attenuates the paradoxical vasoconstrictor response that has been observed at the site of atherosclerotic lesions and increases the luminal diameter of dynamic stenosis of epicardial coronary arteries. Thus, HTEA is assumed to alleviate myocardial ischemia by improving global myocardial oxygen balance and by redistributing myocardial blood flow to vulnerable regions ***(Blomberg et al., 1990)***.

Both effects of HTEA may result in an improvement of overall systolic and diastolic LV function. Despite several previous clinical and experimental studies, questions remain about the effect of HTEA on systolic left ventricular function, which has variably been reported to be unchanged, impaired, or even improved in healthy individuals and in patients with coronary artery disease (CAD). The use of HTEA in patients who receive perioperative anticoagulation during cardiac surgery has been questioned because of the theoretical increased risk of epidural hematoma formation facilitated by full anticoagulation. Evidence from randomized trials has not been conclusive.

The increased sympathetic activity associated with injury induces distinct changes in the host's hormonal and immune response and in the coagulation system .these highly conserved defense mechanisms can turn against the host in the case of coexisting cardiovascular disease. Number of synergistic mechanisms is involved in cardiac complications during stress. Increased catecholamine levels increase left ventricular afterload and heart rate, while decreasing the time for coronary perfusion ***(Scott et al., 2001)***.

Altered and stenotic coronary arteries do not respond to sympathetic stimulation. Raised corticotropin-releasing hormone levels reduce cardiac nitric oxide (NO) release and increase endothelin production. This aggravates coronary endothelial dysfunction. After both minimally invasive and major open surgery increased serum levels of stress hormones have been recorded. Stress induces a pro-coagulatory state in the absence of any trauma. This effect is prolonged with increasing age and may persist for weeks after surgery. Finally, early after stressful events, a pro-inflammatory response may lead to plaque instability via activation of matrix metallo proteinases. This triad triggers acute coronary syndrome and myocardial infarction during and after stressful events. Consequently, cardiovascular causes account for 63% of perioperative mortality in a high-risk patient population and are still responsible for 30% of perioperative mortality in low-risk patients ***(Kozian et al., 2005)***.

Furthermore, the fact that the occurrence of major postoperative complications is usually low, in the range of 1% to 5%, strongly limits the power of these studies to detect significant differences (***Bignami E et al., 2009).***

Aim of the Work

The aim of this study is to compare between two groups the first group is general anesthesia alone and the second group is combined general anesthesia and high thoracic epidural block on systolic and diastolic left ventricular function in coronary artery diseased patients undergoing elective CABG surgery.

It also compare between both groups in hemodynamic stability Such as (mean blood pressure ,heart rate, central venous pressure) And surgical time, cross clamp time, bypass time, post-operative ICU stay. Also it will study the need of inotropic support and vasodilator drugs during surgery.

The study compare between both groups in post-operative narcotic consumption in ICU.

Principle of Transesophgeal Echo

Understanding of ultrasound physics and the control settings of ultrasound machines is very essential to obtain good quality images. Ultrasound is high-frequency sound, which is produced when a piezoelectric crystal, mounted in a transducer, is stimulated by electrical current. The sound waves are too high in frequency to be audible by human ears. They are thought to be harmless to tissue at the intensities used in diagnostic imaging. In echocardiography, sound is directed into the body and is reflected by interfaces between tissues of different acoustic impedance such as myocardium, valves and blood. Blood reflect little sound so it appears relatively black (hypoechoic, or anechoic) in compare with the myocardium, which reflects more of the ultrasound waves and therefore appears relatively white (hyperechoic or echoic). The endocardium and valves are the most echogenic structures.

An ultrasound wave does not pass through air or bone. The echo machine consists from three important parts: the transducer or the echo probe, the monitor and the processing unit. There are different modes of echocardiography; each has its advantages and disadvantages.

***Fig.* (1): Photograph of a currently available multiplane TEE probe.**

Historical Perspective:

In an effort to overcome the shortcomings of the transducers available for routine transthoracic echocardiographic imaging, the possibility of imaging the heart posteriorly, from within the esophagus, was explored, thus avoiding ultrasound attenuation by the lung. Transesophageal echocardiography grew from the development and the concurrent advancements of the fiber-optic gastroscope, as shown in the historical time line in figure. Most notably, the development of a flexible