بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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Sternal Closure Using Steel Wires by Figure of Eight versus Interrupted Simple Sutures in Adult Cardiac Surgeries

Thesis

Submitted for Partial Fulfilment of Master Degree in
Cardiothoracic Surgery

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بسم الله الرحمن الرحيم

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم الحكيم

صدق الله العظيم

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List of Abbreviations

Abb.	Full term
BMI	Body mass index
CPB	Cardio-pulmonary bypass
CXR	Chest X-ray
COPD	Chronic kidney Disease
CKD	Chronic Kidney Disease.
CoNS	Coagulase Negative Staphylococcus
C.T	Computed Tomography
CABG	Coronary artery bypass graft
CCT	Cross Clamp Time
DSWI	Deep Sternal Wound Infection
DM	Diabetes Mellites
ECHO	Echocardiography
EF	Ejection Fraction
ECG	Electrocardiogram
HF	Heart Failure
HBO	Hyperbaric Oxygen Therapy
HTN	Hypertension
ICU	Intensive Care Unit
IMA	Internal Mammary Artery
NYHA	New-York Heart Association
PTFE	Polytetra Fluro-eythelene
SWI	Sternal Wound Infection
S/I	Sternal/Intercostal branch
S/P	Sternal/Perforating branch
SSWI	Superficial Sternal Wound Infection
TLC	Total Leucocytic Count
TEE	Transesophageal Echocardiography
TTE	Transthoracic Echocardiography
VAC	Vacuum-Assisted Closure

INTRODUCTION

Median sternotomy is a commonly performed incision with distinct advantages for exposure of mediastinal and pulmonary hilar structures ***(Dürrleman and Massard, 2006).***

Median sternotomy was originally introduced by Milton in 1897 and was performed infrequently for various conditions of the mediastinum until cardiac surgery as a field developed in the 1950s ***(Milton, 1897).***

Median sternotomy for cardiac surgery was advocated in 1957 by Julian and colleagues. Since then, it has been the standard approach for many open-heart operations ***(Julian et al., 1957).***

Wiring, interlocking, plate-screw, and cementation techniques have been examined for sternotomy closure. All techniques have their advantages and disadvantages. The ideal sternal closure should ensure stability, reduced rate of post-operative complications, and a short hospitalization period, alongside cost-effectiveness ***(Alhalawani and Towler, 2013).***

The stainless-steel encircling wire used as either interrupted simple sutures or as figure of eight sutures is the current standard method of median sternotomy closure in cardiothoracic operations ***(Goodman et al., 1986).***

It is assumed that little or no significant lung injury is sustained during sternotomy and that post-sternotomy changes in pulmonary functions are related to changes in the mechanics of the thoracic cavity itself ***(Güler et al., 2001).***

A well-defined incidence of wound complications is associated with sternotomy, which are costly and potentially lethal in cases of deep sternal wound infection (DSWI) or mediastinitis ***(Hollenbeak et al., 2000).***

Not only DSWI is associated with significant perioperative mortality, but historically even successfully treated DSWI is associated with reduced mid and long-term survival compared with matched cardiac surgical patients without this devastating postoperative complication ***(Karra et al., 2006).***

Resuming sternal integrity following sternotomy for open heart surgery remains one of the main stays for an expeditious recovery. Sternal split remains today a significant risk factor with an incidence of dehiscence and infection ***(Kotnis-Gąska et al., 2018).***

Although sternotomy closure is straight forward, it is not without complications. The reported incidence of sternal dehiscence varies from 20%– 25%. If not recognized early, instability of the bone fragments interferes with healing and can lead to complete sternal breakdown, sternal wound infection,

and mediastinitis, which are major causes of morbidity and mortality after open- heart surgery ***(Dell'Amore et al., 2018).***

Various studies have shown mediastinitis rates of 1%–2.5% and mortality rates of 15%–50%. Other risk factors for sternal dehiscence include chronic obstructive pulmonary disease (COPD), redo surgery, renal failure, diabetes mellitus, chronic steroid use, obesity, concurrent infection and immunosuppression. Intraoperative risk factors such as off-midline sternotomy, osteoporosis, prolonged cardiopulmonary bypass, transverse fractures of the sternum, and bilateral internal mammary artery harvest have been identified ***(Olbrecht et al., 2006).***