POSTOPERATIVE NEUROLOGICAL COMPLICATIONS FOLLOWING ON-PUMP BIDIRECTIONAL GLENN SHUNT, VERSUS OFF-PUMP GLENN SHUNT WITH CAVO-ATRIAL TEMPORARY SHUNT, EARLY POSTOPERATIVE RESULTS.

Thesis

Submitted for partial fulfillment Of Master Degree In Cardiothoracic Surgery

By

Mostafa Mohammed Abdalraouf Yousof

(M.B.B.Ch.)

Supervised By

Prof. Dr. Mohammed Abdalraouf Khalil

Professor of Cardiothoracic Surgery
Faculty of Medicine, Cairo University.

Dr. Hossam M. Hassanein

Assistant Professor of Cardiothoracic Surgery
Faculty of Medicine, Cairo University.

Dr. Tarek Salheldein Abdallah

Assistant Professor of Cardiothoracic Surgery
Faculty of Medicine, Cairo University.

Faculty of Medicine
Cairo University
2014


بسم الله الرحمن الرحيم
﴿قَالُواْ سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا
عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ﴾
سورة البقرة
آية رقم :(□□)

Acknowledgment

First and foremost, I should express my deep thanks to ***ALLAH,*** *without his great help, I would never accomplish this work.*

I would like to express my special appreciation and thanks to my supervisor Professors in cardiothoracic surgery Department Faculty of Medicine, Cairo University, ***Prof. Dr. Mohamed Abdalraouf*** *Professor of Cardiothoracic Surgery Faculty of Medicin Cairo University,* ***Dr. Hossam M. Hassanein,*** *Assistant Professor of Cardiothoracic Surgery Faculty of Medicin Cairo University and* ***Dr. Tarek Salheldein Abdallah*** *Assistant Professor of Cardiothoracic Surgery Faculty of Medicin Cairo University, they had been tremendous mentors for me. I would like to thank them for encouraging my research, their advice on both my research as well as on my career and their brilliant comments and suggestions, thanks to you.*

I would like also to offer my thanks to my colleagues in ***pediatric cardiac surgery department in Kaser Al-Aini University Hospitals,*** *without their help and cooperation, I would never accomplish this work.*

A special thanks to my ***family****. Words cannot express how grateful I am to my* ***mother and father*** *for all of the sacrifices that they've made on my behalf. Their prayer for me was what sustained me thus far. I would also like to thank my* ***brother*** *who met his pain with pleasure for his family . I would also like to thank all of* ***my friends*** *who supported me in writing, and incented me to strive towards my goal. At the end I would like express appreciation to my beloved* ***wife,*** *who spent sleepless nights with me and was always my support in the moments when there was no one to answer my queries, and my little baby,* ***Ahmed,*** *who gave me the hope.*

Abstract

As there is a higher rate of survival after Congenital heart surgery, there is a growing concern about quality of life. Neurological dysfunction is a significant problem after congenital heart surgery that may affect quality of life. Also due to better surgical outcome &higher survival rate, the focus is increasingly on the late neurodevelopmental and behavioral problems associated with pediatric cardiac surgery.

Objective: Bidirectional Glenn shunt is a well-established procedure performed as a part of the single ventricle palliation pathway. Whether the bidirectional Glenn shunt is better performed without the support of cardiopulmonary bypass, is still a matter of debate. In this study, we report & Compare early post operative neurological outcome after on pump and off pump Bidirectional Glenn shunt with temporary cavo-atrial shunt.

Methods: between July 2012 & Feb. 2014 , 50 Patients indicated for Glenn shunt were divided into two groups. Group I (25 patients) where It was done with cardiopulmonary, and Group II (25 patients) where it was done without cardiopulmonary Bypass and with Cavo-atrial shunt. In our study, the Mean ± SD age of the patients was (36.26 ± 19.149 Month), in the range of 15 months and 86 month. Preoperative evaluation to select patients according to exclusion and inclusion criteria, documenting different variables. Intraoperative and postoperative monitoring documenting different variables of CVP, O_2 Sat. ,Operative time , shunt time, bypass time, HCT , S.Creat., Also neurological evaluation using Modified Glasgow Coma Scale for Infants and Children .

Results: There was insignificant difference between both groups regarding preoperative variables and postoperative neurological outcome.

Conclusion: Bidirectional Glenn Shunt may be done on pump or offpump with cavo-atrial temporary shunt with insignificant difference in the early postoperative neurological outcome, but we report that late complications and neurodevelopmental abnormalities should be traced in other longterm studies. we also want to focus on better techniques of intraoperative monitoring, As Near-infrared spectrography, transcranial Doppler, should be adopted as standard of care ,as it was not available during our study.

Key words:
Bi-directional cardiopulmonary shunt, off-pump, Neurological Complications.

List of Contents

List of Abbreviations

BDG	**Bidirectional Glenn**
CPB	**Cardiopulmonary bypass**
CT	**Computed tomography**
DHCA	**Deep hypothermic cardiac arrest**
DORV	**Double outlet right ventricle**
EEG	**Electro-encephal gram**
FIQ	**Full-scale IQ**
HLHS	**Hypo plastic left heart syndrome**
IVC	**Inferior Vena Cava**
LPA	**Left Pulmonary Artery**
NIRS	**Near infra red spectrography**
R.A.	**Right Atrium**
RPA	**Right Pulmonary Artery**
RCT	**Randomized controlled trial**
SIRS	**Systemic inflammatory response**
SVC	**Superior vena cava**
TCD	**Trans-cranial Doppler**
TCPC	**Total cavopulmonary connection**
TGA	**Transposition of the great vessels**
UVH	**Univentricular heart**
VIQ	**Verbal IQ**

List of Tables

List of Figures

INTRODUCTION

Because of increased survival rate, the focus in congenital heart surgery in increasingly on quality of life. Discussing the issue of quality of life of children receiving cardiac surgery early in life, we found that neurological complications are the most important aspect that may affect them due to many reasons.

Patients with univentricular heart remain at increased risk of neurodevelopemental sequelae caused by several brain mechanisms. Hypoplastic left heart syndrome is associated with the poorest outcome. Because of developments in surgical methods and preoperative and postoperative care, recent results are better than those of the first reports.

AIM OF WORK

Bidirectional Glenn shunt is a well-established procedure performed as a part of the single ventricle palliation pathway. Whether the bidirectional Glenn shunt is better performed without the support of cardiopulmonary bypass, is still a matter of debate. In this study, we report & Compare early post operative neurological outcome after on pump and off pump Bidirectional Glenn shunt with temporary cavo-atrial shunt.

HISTORICAL BACKGROUND OF UNIVENTRICULAR REPAIR

Ever since the masterful description of the circulation by William Harvey, the importance of the right ventricular function has always been debated. From the early 1940s, numerous experiments were performed to determine whether the pumping action of the right ventricle is necessary to maintain a normal circulation. [(1)]

As early as 1942 , Starr and his colleagues concluded that extensive cauterization of the canine right ventricle caused only minimal increase in peripheral systemic venous pressure. In addition, **Bakos (1950)** demonstrated that there was no fall in pulmonary arterial pressure. [(2)]

Right ventricular exclusion was successfully achieved by **Rodbard and Wagner in 1949** , which ligated the main pulmonary artery and anastomosed the right atrial appendage to the pulmonary artery. The right ventricle, however, was still thought to contribute to the pulmonary circulation because of functional tricuspid regurgitation. Several other experimental studies confirmed the feasibility of right ventricular exclusion when the right atrium had been prepared to sustain an additional workload. [(3)]