Role of Ultrasound in Pediatric Anesthesia

Essay

Submitted in partial fulfillment of the master degree in Anesthesiology

By

Ahmed Abdelmoula Abdelsalam

M.B,B.ch.

Faculty of Medicine – Cairo University

Under Supervision of

Prof. Dr. Nabila Abdelaziz Fahmy

Professor of Anesthesiology, Surgical ICU and Pain Management

Faculty of Medicine – Ain Shams University

Prof. Dr. Hatem Said Abdelhamid

Professor of Anesthesiology, Surgical ICU and Pain Management

Faculty of Medicine – Ain Shams University

Dr. Rania Magdy Mohammed Ali

Assistant Professor of Anesthesiology, Surgical ICU and Pain Management

Faculty of Medicine – Ain Shams University

Faculty of Medicine

Ain Shams University

2017

سورة البقرة الآية: ٣٢

Acknowledgments

First and forever, thanks to ***Allah****, Almighty for giving me the strength and faith to complete my thesis and for everything else.*

I would like to express my sincere gratitude to ***Prof. Dr. Nabila Abdelaziz Fahmy,*** *Professor of Anesthesiology, Surgical ICU, and Pain Management, Faculty of Medicine – Ain Shams University, under her supervision, I had the honor to complete this work. I am deeply grateful to her for her professional advice, guidance and support. I really have the honor to complete this work under her supervision.*

My deep gratitude goes to ***Prof. Dr. Hatem Said Abdelhamid,*** *Professor of Anesthesiology, Surgical ICU, and Pain Management, Faculty of Medicine – Ain Shams University, for his valuable efforts and tireless guidance and meticulous supervision throughout this work.*

I can't forget to thank ***Dr. Rania Magdy Mohammed Ali,*** *Assistant Professor of Anesthesiology, Surgical ICU, and Pain Management, Faculty of Medicine – Ain Shams University, for the efforts and time she has devoted to accomplish this work.*

Last but not least, I like to thank all my ***Family,*** *especially my* ***Parents*** *and my* ***Wife,*** *for their kind care, help and encouragement.*

Ahmed Abdelmoula Abdelsalam

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List of Abbreviations

Abbr.	Full-term

ASD : Atrial septal defect

AV : Aortic valve

AV : Atrio-ventricular

CABG : Coronary artery bypass graft

CFD : Colour flow Doppler

CNS : Central nervous system

CPB : Cardiopulmonary bypass

CSF : Cerebrospinal fluid

CT : Computerized tomography

CVC : Central venous catheter

CVP : Central venous pressure

D : Dimensional

ECG : Electrocardiogram

IJV : Internal jugular vein

IVC : Inferior vena cava

IVS : Interventricular septum

LA : Left atrium

LA : Local anesthetics

LV : Left ventricle

LVIDD : Left ventricular internal diastolic dimension

LVISD : Left ventricular systolic dimension

MAC : Minimal alveolar concentration

MIDCAB : Minimally invasive direct coronary artery bypass

MR : Mitral regurgitation

MRI : Magnetic resonance imaging

MV : Mitral valve

OPCAB : Off pump coronary artery bypass

PA : Pulmonary artery

PAC : Pulmonary artery catheter

PICCs : Peripherally inserted central catheters

PNBs : Peripheral nerve blocks

PRF : Pulse repetition frequency

PTCA : Percutaneous transluminal coronary angioplasty

RA : Right atrium

RV : Right ventricle

SAS : Subaortic stenosis

SV : Stroke volume

SVC : Superior vena cava

SWMA : Segmental wall motion abnormalities

TEE : Transesophageal echocardiography

TGC : Time gain compensation

US : Ultrasound

VSD : Ventricular septal defect

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Abstract

Background: Ultrasound is a rapidly rising and flourishing technology invading the local anaesthesia field, as direct visiualization of the nerves and surrounding structures improves the outcome of most techniques especially in pediatric patients due to small field, difficult surface anatomical markings and very small structures. **Aim of the Work:** To discuss role of ultrasound in pediatric anesthesia.

Key words: Ultrasound, pediatric anesthesia

INTRODUCTION

Pediatric anesthesia is a challenge for an anesthesiologist not only due to physiological differences that require wide medical knowledge but also due to anatomical differences that require fine skills to handle techniques needed for anesthesia as peripheral and central venous cannulation, arterial circulation and peripheral and central neuro-axial blocks. Being blind and depend on surface anatomy and individual skills, these techniques are difficult and may carry risk of failure or complications. The use of ultrasound and an aid for accurate administration of local anesthetics is gaining in popularity for regional anesthesia over conventional landmark-based techniques and neurostimulation ***(Marhofer et al., 2014).***

Ultrasound imaging is rapidly emerging as one of the most promising tools as the size, depth and precise location of nerves in their surrounding environment can be determined, depending on correct interpretation. Viewing the moving needle once inserted at an appropriate angle and within the plane of the ultrasound, probe, as well as the spread of local anesthetic provides valuable assistance to the anesthesiologist when performing regional anesthesia ***(Pietrini et al., 2011).***

Regional anesthesia plays an important role in the perioperative management of children and particularly of babies and neonates, where one should avoid or minimize airway manipulation whenever possible. Perfect block techniques are required for an improved perioperative outcome. Interestingly, many peripheral regional techniques are not adequately described, resulting in complications and low success rates whereas central techniques are well-described with ensuing high success rates ***(Rapp et al., 2013).***

Although it has not yet been sufficiently described in an "evidence-based" manner, ultrasonographic guidance for a broad spectrum of regional anesthetic techniques results in safe and effective blocks. Recent publications have illustrated the use of ultrasonography for central and peripheral blocks for children also. The initial results of encouraged scientific study groups to increase their efforts to develop new ultrasound-guided regional techniques targeted towards children, in an effort to introduce these techniques into clinical practice in the future ***(Schafhalter-Zoppoth et al., 2014).***