سورة البقرة الآية: ٣٢

Mini Dose Versus Large Dose Spinal Anesthesia For Laparoscopic Cholecystectomy

Thesis

Submitted for the Partial Fulfillment of MD in **Anesthesiology**

By

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2013

Acknowledgement

First and foremost, thanks to **Allah** to whom I relate any success in achieving any work in my life.

I wish to express my sincere gratitude **Professor Dr. Mahmoud Abd El Aziz Ghallab** Professor of Anesthesiology and Intensive Care; Faculty of Medicine; Ain Shams University, for his patience, supervision, continuous encouragement, effective criticism and kind care.

I would like to express much appreciation and deepest gratitude to **Professor Dr. Amr Mohamed El Said** Professor of Anesthesiology and Intensive care; Faculty of Medicine; Ain Shams University, for his great support and faithful advices.

I wish to thank **Dr. Reem Hamdy El kabarity,** Assistant professor of Anesthesiology and Intensive Care; Faculty of Medicine; Ain Shams University, for her kind help and cooperation.

My thanks and appreciation to **Dr. Dalia Abd El Hamid Nasr** Assistant Professor of anesthesiology and Intensive care; Faculty of Medicine; Ain Shams University, for kind help and supervision throughout the period of this work.

Finally my deepest thanks to my family for their continuous support throughout the work.

Heba Zakaria

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List of Abbreviations

ASA : American society of anesthesiologist
ACTH : Adreno corticotrophic hormone
ADH : Antidiuretic hormone
AVP : Arginine vasopressor
BMI : Body mass index
COPD : Chronic obstructive pulmonary disease
CI : Cardiac index
CO : Cardiac output
CO_2 : Carbon dioxide
CSE : Combined spinal epidural
CSF : Cerebro-spinal fluid
CVP : Central venous pressure.
DVT : Deep venous thrombosis
ECG : Electro-cardiogram
$EtCO_2$: End tidal carbon dioxide
FRC : Functional residual capacity
GA : General anesthesia
GB : Gall bladder
IAP : Intra-abdominal pressure
ICP : Intra-cranial pressure
IOP : Intra-ocular pressure
IPPV : Intermittent positive pulmonary ventilation
IV : Intravenous
IVC : Inferior vena cava

LDSA : **Large-dose spinal anesthesia**

LDS-group : **Large dose spinal anesthesia group**

LC : **Laparoscopic cholecytectomy**

LMA : **Laryngeal mask airway**

MAC : **Minimum alveolar concentration**

MAP : **Mean arterial pressure**

MB : **Motor block**

MBP : **Mean Blood Pressure**

MBS : **Modified Bromage scale**

MDSA : **Mini-dose spinal anesthesia**

MDS-group : **Mini dose spinal anesthesia group**

MV : **Minute volume**

NIBP : **Non-invasive blood pressure**

NMDA : **N-methyl-D- aspartate**

NSAIDs : **Nonsteroidal Anti-inflammatory Drugs**

PCA : **Patient controlled analgesia**

PCWP : **Pulmonary capillary wedge pressure**

PDPH : **Postdural puncture headache**

PO : **Postoperative**

PONV : **Post-operative nausea and vomiting**

PPP : **Positive pressure pneumoperitoneum**

PVR : **Pulmonary vascular resistance**

$PaCO_2$: **Partial pressure of carbon dioxide in arterial blood**

$PeCO_2$: **Partial pressure of carbon dioxide in expired air**

RAP : **Right atrial pressure**

SA : **Spinal anesthesia**

SB : **Sensory block**

SBP : **Systolic blood pressure**

SpO_2 : **Arterial oxygen saturation**

SVR : **Systemic venous resistance**

TIVA : **Total intravenous anesthesia**

TV : **Tidal volume**

VC : **Vital capacity**

V/Q : **Ventilation/Perfusion**

VR : **Venous return**

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Introduction

Laparoscopic cholecystectomy was first introduced by Phillipe Mouret in 1987 and is now generally performed by many surgeons ***(Vecchio et al., 2000).*** Laparoscopic cholecystectomy has become firmly established as the method of choice for the treatment of asymptomatic gall stones because of obvious advantages of minimally invasive character of the procedure associated with less pain, reduced hospital stay, and earlier return to daily activities ***(Savas et al., 2004).***

However, considerable difficulties in anesthetic management could be encountered as wide hemodynamic fluctuation may develop due to pneumoperitoneum and position changes during the operation. Also, serious complications such as tissue damage or air embolism could occur ***(Pursani et al., 1998***).

Laparoscopic cholecystectomy is classically performed under general anesthesia to prevent aspiration and respiratory problems due to the pneumoperitoneum ***(Savas et al., 2004).*** Laparoscopic cholecystectomy done under spinal anesthesia may have several advantages over laparoscopic surgery done under general anesthesia ***(Sinha et al., 2008)***.

Since the patient is awake, there is early detection of complications. Also it provides excellent post-operative analgesia with a lower incidence of post-operative nausea and vomiting. However, extensive sensory block (T4) is required to abolish the discomfort of manipulation of the upper gastrointestinal structures ***(Sood & Kumara, 2003)***.

Aim of the Work

This study aimed at comparing the effect of mini dose spinal anesthesia (MDSA) versus large dose spinal anesthesia (LDSA) on intraoperative hemodynamics and blood gases changes in patients undergoing laproscopic cholecystectomy. It also compared the motor effect, the duration of anesthesia and the hospital stay in both procedures.

Neuroanatomy of Extrahepatic Biliary System

The innervation of the gall bladder (GB) in humans involved three routes: the anterior and posterior hepatic plexus and the phrenic nerves ***(Yi et al., 2005).***

Via the anterior hepatic plexus

The hepatic division of the vagus arises from the anterior vagal trunk, runs through the hepatogastric ligament near the edge of the liver (caudal liver), and joins the anterior hepatic plexus in the hepatoduodenal ligament. The plexus, containing parasympathetic and sympathetic fibers arises from the celiac plexus and around the common hepatic artery, then sends some branches to the GB via the deep and superficial branches of the cystic artery, which are distributed in the peritoneal aspect of the GB and the site of attachment of this organ in the bed between the GB and hepatic artery **(figure 1)** ***(Yi et al., 2005).***

On the other hand, the anterior hepatic plexus sends some branches directly to the GB along the cystic duct, i.e., forward to the neck, body, fundus of the GB. However, the branches of anterior hepatic plexus is concentrated mainly in the cystic duct and the neck of the GB compared with the

body and fundus of the GB. However, it was not observed that the branches arising from the hepatic division of the vagus were sent directly to the GB ***(Yi et al., 2005)***.

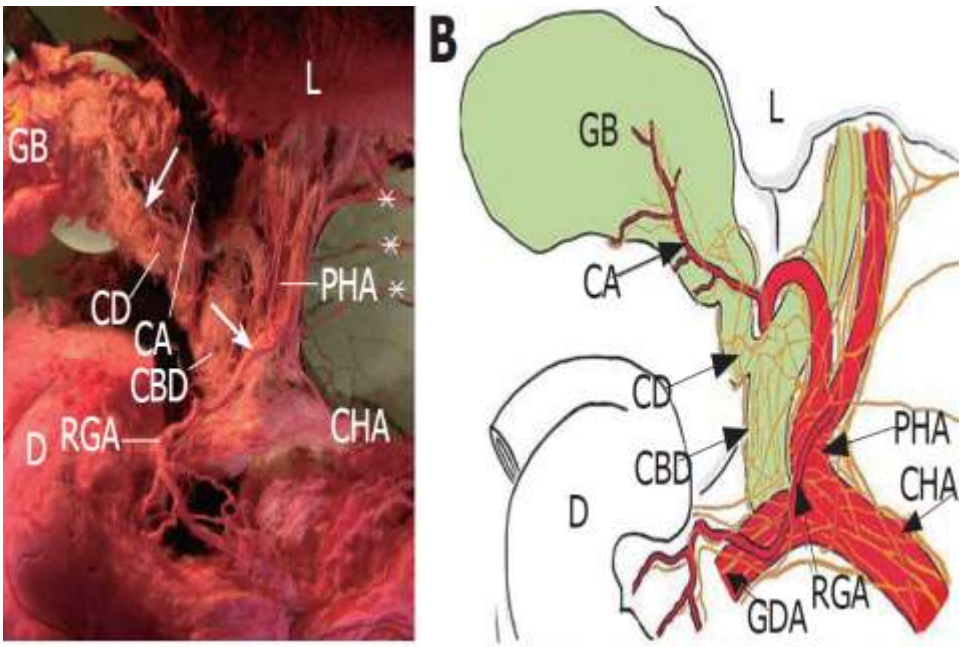

Figure (1): Innervation of the gallbladder (GB) from the ventral aspect (A) in a cadaver and a schematic representation of it (B) (Yi et al., 2005).

The branches innervating the GB originate from the anterior hepatic plexus, and run along the cystic duct (CD) and the cystic artery (CA). The hepatic divisions of the vagus join in the anterior hepatic plexus in the proper hepatic artery (PHA). Arrows indicate nerve branches. CBD: common bile duct; CHA: common hepatic artery; D: duodenum; GDA: gastroduodenal artery; L: liver; RGA: right gastric artery.

Via the posterior hepatic plexus

The posterior hepatic plexus or the dorsal hepatic plexus arises from the celiac plexus on its right side and runs along the dorsal side of celiac plexus to the portal vein. The posterior hepatic plexus is composed of 4-5 nerve fascicles, divided into two groups of nerve bundles, and the thickest branches, about 80% of the nerve fibers, extend along the upper part of the common bile duct and portal vein, join the liver and the GB, or descend, sending branches to the proximal side of the descending part of the duodenum and the lower common bile duct**.** Abundant communicating rami behind the common bile duct and portal vein between the ascending and descending plexuses are observed, showing the existence of direct bidirectional neural connections between the duodenal papilla and the biliary tract containing the GB ***(Yi et al., 2005).***

As in the case of the anterior hepatic plexus, the branches sent to the GB are distributed mainly in the cystic duct and the neck of the GB. Moreover, abundant communicating rami are seen between the anterior and posterior hepatic plexuses around the cystic duct ***(Yi et al., 2005).***