بسم الله الرحمن الرحيم

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تم رفع هذه الرسالة بواسطة / مني مغربي أحمد

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات: لا يوجد

General Anesthesia, versus Axillary Block for Ambulatory Hand Surgery: randomized prospective study

Thesis

Thesis submitted for partial fulfillment of M.D degree in Anesthesia,

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2022

Acknowledgement

First to all, I would like to thank ***Allah*** *the almighty, for having made every thinking possible by giving me strength and courage to do this work.*

It is a pleasure to me to express my deepest gratitude to ***Prof. Dr. Zakarya Abdel Aziz Moustafa*** *Professor of Anesthesia, Intensive Care and Pain Management, Faculty of Medicine - Ain Shams University, for his continuous scientific guidance, precious time and efforts.b*

Also, I'm deeply indebted and grateful to ***Prof. Dr. Azza Atef Abd El Alem****, Professor of Anesthesia, Intensive Care and Pain Management, Faculty of Medicine - Ain Shams University, for her kind help, guidance and follow up throughout the whole work.*

Also, thanks to ***ASST. Dr. Marwa Ahmed Khairy Elbeialy*** *Assistant Professor of Anesthesia, Intensive Care and Pain Management, Faculty of Medicine - Ain Shams University, for her supervision, guidance and constant encouragement.*

I'm also grateful to ***Dr. Wael Abdel Moneim Mohamed****, Lecturer of Anesthesia, Intensive Care and Pain Management. Faculty of Medicine - Ain Shams University, who helped me to complete this work.*

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Abbr.	Full term
C5	Fifth Cervical
GA	General Anesthesia
GABA	Gamma-Aminobutyric Acid
LOAF muscles	Lateral 2 lumbricals, Opponens Pollicis, Abductor Pollicis Brevis and Flexor Pollicis Brevis
MHz	Mega Hertz
NREM	Nonrapid Eye Movement
PACU	Postanesthesia Care Unit
PACU	Postansthesia Care Unit
PONV	Postoperative Nausea and Vomiting
PSQI	Pittsburgh Sleep Quality Index
REM	Rapid Eye Movement
SWS	Slow Wave Sleep
T1	First Thoracic
TIVA	Total Intravenous Anesthesia
VAS	Visual Analog scale

INTRODUCTION

General anesthesia (GA) has been used successfully for surgery of the upper extremities. It has faster induction time but GA may result in low blood pressure, undesirable decreases in cardiac output, central nervous system depression, respiratory depression, post-operative sleep disturbances, loss of protective airway reflexes (such as coughing), need for tracheal intubation and mechanical ventilation, and residual anesthetic effects ***(Song et al., 2009)***.

Axillary block technique is an alternative method for anesthesia of the upper extremity. This technique involves the injection of local anesthetic agents in close proximity to the brachial plexus, temporarily blocking the sensation .Regarding advantages of axillary block it does not cause injury or paresis to the phrenic nerve,being away from pleura so no pneumothorax. Disadvantages of the axillary block includes inadequate anesthesia in the distribution of the musculocutaneous nerve. This nerve supplies motor function to the biceps, brachialis, and coracobrachialis muscles and one of its branches supplies sensation to the skin of the forearm. If the musculocutaneous

nerve is missed, it may be necessary to block this nerve separately **(*Urmey, 2006)*.**

Patients benefit from axillary block in reduction of postoperative central apnea index (***Chung, et al 2014)***. as well as reduction in postoperative pain and postoperative nausea and vomiting (PONV) when regional anesthesia is used. Regional anesthesia techniques provides economic benefits to the facility and to the patient by decreasing stay in post anesthesia care unit (PACU), and increasing patient satisfaction . ***(Li et al, 2000).***

AIM OF THE WORK

This study aims to compare between different anesthetic techniques for ambulatory hand surgery regarding their effect on postoperative pain and adverse effects of each anesthetic technique and postoperative sleep disturbances.

Chapter (1)
HAND SURGERY

The hand contains many specialized structures which work in synchrony providing precise motor biomechanics and fine tactile senses. Hands can be affected by a wide range of conditions, congenital and acquired. Even minor traumatic injuries can result in significant stiffness and loss of function . ***(Whitaker and Borley, 2010).***

Anesthetic modalities for hand surgery

Surgery of the hand or wrist is a common procedure usually performed on an outpatient basis. Hand surgeries includes a wide variety of operations such as fracture repairs, releases, transfer and repairs of tendons and reconstruction of injuries, rheumatoid deformities, and congenital defects ***(Lalonde, 2011).***

Both general anesthesia (GA) and peripheral nerve blocks have been used successfully for surgery of the upper extremities. An ideal general anesthetic technique should provide smooth and rapid induction, optimal operating conditions, and rapid recovery with minimal (if any) side effects. However, it has been suggested that use of peripheral

nerve blocks may have some potential benefits in the outpatient setting and result in a lower risk of nausea and vomiting, earlier ambulation, enhanced pain relief, and earlier discharge. ***(Hadzic and Vloka, 2004).***

General Anesthesia for hand surgery

General anesthesia may be suited for those patients who refuse or have contraindications to peripheral nerve blocks , and for those who develop stress and anxiety secondary to the fear of undergoing an operation. Also for the patients who wants to be completely unaware of what is taking place in the operating room. In this situation a general anesthetia is commonly used over a regional technique. ***(Copeland et al , 2008).*** General anesthesia is also a suitable option for long procedure.Before anesthesia general medical assessment,should be performed including medical diseases,current medications and it is important to investigate if any anesthesia-related problems, such as air way assessment,history of suxamethonium (succinylcholine) apnea ,malignant hyperthermia and other related complications, and to check for a family history of bad reactions and postoperative nausea and vomiting (PONV) ***(Hinkelbein etal, 2015).*** The use of rapid anesthetics, such as propofol, sevoflurane, and desflurane, allow easy titration,

early awakening, and a reduce the time required to meet post anesthesia care unit (PACU) discharge criteria . However, the absence of analgesia during the postoperative period requires addition of opioids, which carry risks of mental obtundation and post operative nausea and vomiting. (Inhalational agents themselves carry a 20-50% risk of PONV), which can be minimized by addition of antiemetic drugs. ***(Shields et al, 2006).***

Regarding intravenous anesthetic, propofol shows a rapid rate of metabolism, resulting in quick recovery from anesthesia with fewer side effects ***(Arain et al., 2005)*** Because of its lower incidence of nausea and vomiting, propofol is commonly used for induction and maintenance of anesthesia in ambulatory surgery. ***(White& Eng., 2007)*** Remifentanil is also useful during ambulatory surgery, because of its rapid onset and short duration of action, which leads to rapid awakening and recovery from anesthesia Because of the rapid analgesic offset of remifentanil, it may be necessary to also use long- acting opioids or non-opioid analgesics to provide postoperative pain relief . Maintenance of Anesthesia with desflurane or sevoflurane results in shorter times to awakening and tracheal extubation ***(Copeland et al ,2008).***

Standered monitors, including non invasive blood pressure cuff in non operating hand , pulse oximetry, electrocardiogram. The majority of cases are best managed with endotracheal intubation and controlled ventilation since profound muscular relaxation is frequently requested by the surgeon.As regard patient position, the non-operated arm should not be abducted to greater than 90. The hand and forearm should be in full supination when abducted. Extreme flexion should be avoided for prolonged periods. The elbow should be generously padded, especially to protect the ulnar nerve. ***(Lenters et al, 2007)***

The arm should be at level with the body. Brachial plexus retracting or stretching, on both sides, needs to be limited or avoided. In the lateral position care should be taken to place the axillary roll just below the axilla so as not to occlude the vessels or compress the nerves of the upper extremity. ***(Liu et al , 2010).*** Care should also be taken in either position, to avoid compression of the eyes and nose and folding of the ears. The head and neck should be in a neutral position. The endotracheal tube can also shift with positioning of the patient, equal& bilateral lung sounds should always be verified after patient positioning. ***(Copeland et al ,2008).***