بسم الله الرحمن الرحيم

(رَبِّ أَوْزِعْنِي أَنْ أَشْكُرَ نِعْمَتَكَ الَّتِي أَنْعَمْتَ عَلَيَّ وَعَلَى وَالِدَيَّ وَأَنْ أَعْمَلَ صَالِحاً تَرْضَاهُ وَأَصْلِحْ لِي فِي ذُرِّيَّتِي إِنِّي تُبْتُ إِلَيْكَ وَإِنِّي مِنَ الْمُسْلِمِينَ)

صدق الله العظيم

(سورة الأحقاف –من آية: 15)

Acknowledgement

First and foremost, all thanks to ***Allah****, the most kind and merciful.*

Words will never be able to express my deepest gratitude to all those who helped me during preparation of this work.

Iam greatly honored to express my sincere appreciation to ***Prof. Bahera Mohammed Tawfek,*** *Professor of Anaesthesiology and Intensive Care, Ain Shams University, for her constructive guidance and general help in accomplishing this work.*

I gratefully acknowledge the sincere advice and guidance of ***prof. Sahar Kamal Abul-Ella,*** *Professor of Anaesthesiology and Intensive Care, Ain Shams University, for her continuous support, direction and sincere advice in accomplishing this work.*

I owe a particular dept of gratitude to ***Dr. Fahmy Saad Latif,*** *Assistant Professor of Anaethesiology and Intensive Care, Ain Shams University, for his valuable help, effort and meticulous revision of this work.*

Shaimaa Wageh Abdel Rahman Zeina

EFFECTS OF DIFFERENT ANESTHETIC TECHNIQUES ON POSTOPERATIVE PAIN AND GASTRO-INTESTINAL FUNCTIONS FOLLOWING ABDOMINAL HYSTERECTOMY

THESIS
SUBMITTED AS PARTIAL FULFILLMENT OF M.D. DEGREE
IN Anesthesiology

BY

Shaimaa Wageh Abdel Rahman Zeina
Assistant Lecturer of Anesthesiology – Ain Shams University

Under Supervision of

Prof. Bahera Mohammed Tawfek
Professor of Anesthesiology and Intensive Care
AinShamsUniversity

Prof. Sahar Kamal Abul-Ella
Professor of Anesthesiology and Intensive Care
AinShamsUniversity

Dr. Fahmy Saad Latif
Assistant Professor of Anesthesiology and Intensive Care
AinShamsUniversity

AinShamsUniversity
Cairo – Egypt
2012

تأثيرات الأساليب التخديرية المختلفة عليآلام ما بعد الجراحة و علي وظائف الجهاز الهضمي بعد عملية استئصال الرحم عن طريق البطن

دراسة مقدمة كجزء متمم للحصول على درجة الدكتوراه في التخدير

بواسطة

شيماء وجيه عبد الرحمن زينة

مدرس مساعد التخدير- جامعة عين شمس

تحت إشراف

الأستاذ الدكتور/ بهيرة محمد توفيق

أستاذ التخدير والرعاية المركزة - جامعة عين شمس

الأستاذ الدكتور/ سحر كمال ابو العلا

أستاذ التخدير والرعاية المركزة - جامعة عين شمس

الدكتور/ فهمي سعد لطيف

أستاذ مساعد التخدير والرعاية المركزة - جامعة عين شمس

جامعة عين شمس - القاهرة

2012

Contents

List of Tables

List of Figures

List of Abbreviations

12	Adrenocortical tropic hormone
ADH	Antidiuretic hormone
ASA	American society of anesthesiologist
C1	First cervical vertebra
CNS	Central nervous system
COAD	Chronic obstructive air way disease
COX-2	Cyclooxygenase-2
CSF	Cerebrospinal fluid
CTZ	Chemoreceptor trigger zone
ECG	Echo cardiogram
ENT	Ear, nose and trachea
GA	General anesthesia
GI	Gastrointestinal
HCL	Hydrochloride
hrs.	Hours
IASP	The International Association for the Study of Pain
INR	International normalization ratio
IV-PCA	Intravenous patient-controlled analgesia
L5	Fifth lumbar vertebra

LA	Local anesthetic
LMWH	Low molecular weight heparin
MPQ	McGill Pain Questionnaire
Na	Sodium
NSAIDS	Non-steroidal anti-inflammatory drugs
O2	Oxygen
PAC	patient-controlled analgesia
PACU	Post anesthesia care unit
PEA	Perioperative epidural anesthesia and analgesia
PGID	postoperative gastrointestinal tract dysfunction
POI	Postoperative ileus
PONV	Postoperative nausea and vomiting
PT	Prothrombin time
PTT	Partial thromboplastin time
S5	Fifth sacral vertebra
T1	First thoracic vertebra
TEA	Thoracic epidural anesthesia
UK	United kingdom
VAS	Visual Analogue Scale
VRSs	Verbal Rating Scales

INTRODUCTION

Hysterectomy is amongst the commonly performed operative procedures. The abdominal route is the most common [66.1%] followed by vaginal [21.8%] and laparoscopic [11.8%] routes**.** It is thus considered the most frequent non obstetric surgical procedure among women **(*Wu et al., 2007).***

The main problems of abdominal hysterectomy in the immediate perioperative period are pain, PONV, and gastrointestinal paralysis, which may postpone recovery. The optimal anesthetic regimen for this procedure should carry a low risk, along with effective pain relief and minimal, if not protective, effects on gastrointestinal dysfunction and PONV induced by surgery. Hence, anesthetics and analgesics, which produce effective analgesia with a low potential for gastrointestinal side effects, should be advantageous ***(Jorgensen et al., 2001).***

One of the first key management decisions the anesthesiologist can help guide is the prevention and management of pain. Because opioid use is clearly linked to adverse GI effects, there is a general consensus that epidural analgesia and other opioid-sparing techniques will improve postoperative GI outcomes. The two most common techniques currently used for management of postoperative pain are epidural analgesia and intravenous patient-controlled analgesia (IV-PCA). Epidural analgesia is generally initiated in the perioperative period and continued throughout the postoperative period for up to 3 postoperative days ***(Holte and Kehlet, 2000)***.

AIM OF THE WORK

The aim of this study is to evaluate the effects of different anaesthetic techniques on postoperative pain and gastro-intestinal functions following abdominal hysterectomy.

PHYSIOLOGY OF PAIN

Pain is a universal human experience and the most common reason people seek medical care. Pain tells us something is wrong in the structure or function of our body and that we need to do something about it. Because pain is such a strong motivator for action, it is considered one of the body's most important protective mechanisms ***(Watkins et al., 2008).***

Definition of pain:

The International Association for the Study of Pain (IASP) defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" ***(Merskey, 2008).***

There are two different approaches to pain: the sensory-discriminative (perception of the intensity, location, duration, temporal pattern, and quality of noxious stimuli) and motivational-affective (relationship between pain and mood, attention, coping, tolerance, and rationalization) ***(Lin, 2009).***

Pain is always subjective and it is a sensation in part of the body and also has an emotional component. Many people report pain in the absence of tissue damage or any probable pathophysiologic cause; usually this happens for psychological reasons. There is no way to distinguish their experience from that due to tissue damage ***(Collett, 2007).***

Pathophysiologic Consequences of Untreated Pain

Untreated pain can lead to the following consequences:

- Impaired breathing: segmental reflex arches directly hamper the muscles involved in breathing by increasing their tone. Furthermore abdominal pain inhibits deep inspiration resulting

in a reduced respiratory capacity predisposing to atelectasis and pneumonia which in turn may cause respiratory insufficiency.

- Impaired gastrointestinal and urological smooth muscle activity, also caused by segmental reflex arches and sympathetic over activity lead to hypomotility and eventually ileus and urinary retention ***(Francesca et al., 2003).***

- Stimulation of the sympathoadrenal axis and the **neuroendocrinal stress response**. Direct stimulation of the sympathetic nervous system plus release of catecholamines results in positive inotropic and chronotropic heart function and increased systolic blood pressure causing an increased myocardial O2 consumption, a risk for myocardial ischemia. The vasoconstriction diminishes the microcirculation and is one factor of impaired wound healing. In this context the risk of cerebrovascular accidents (of hemorrhagic or ischemic insult) is also increased. Besides noradrenaline augments free fatty acids in the blood adding another cardiovascular risk factor in the long term. Increased level of stress-induced catabolic hormones like ACTH, cortisol, glucagon, and reduced anabolics like insulin, testosterone, and growth factors results in a catabolic state. In addition, cortisol brings on immunosuppression. Together with the induced hyperglycemia, there is an increased risk of wound healing disorders or infections. Increased secretion of aldosterone and ADH leads to a reduced diuresis, potassium loss and sodium retention, and therefore fluid retention with all its potential harm such as hypertension and pulmonary edema ***(Tenti and Hauri, 2004).***

- Prolonged pain impairs mobilization and leads to a specific morbidity associated with long bed confinement such as pulmonary atelectasis, and infections, thromboembolic manifestations, urinary tract infections and decubitus ulcers.

- Pain leads to anxiety and insomnia sustaining the neuroendocrinal response.

- Prolonged pain leads to sensitization (physiological amplification) and therefore to a greater susceptibility and possible chronification of pain.

- For all of the above untreated pain leads socioeconomically to a more expensive and longer hospital stay with delayed work integration ***(VanLaecke and Oosterlinck, 1994).***

Gate Theory for Control of Pain

The gate control theory of pain refers to the mechanism(s) which diminish conduction of painful stimuli from the first to the second order neuron. According to the gate control theory there is a gating mechanism within the **dorsal horn of the spinal cord** which controls the entry of pain signals into the pain pathway ***(George, 2006)***.It is controlled by nerve cells in the substantia gelatinosa of Rolandi **(*Koga et al., 2005).***

The gating mechanism acts as a modulating system that controls the transmission of nerve impulses from afferent fibres to transmission cells (T cells) in laminae V and VI in the dorsal horn. Myelinated and unmyelinated fibres control the gating mechanism. Activation of large myelinated A-δ fibres (not pain signaling) tends to block transmission of impulses to neurons concerned with pain (*close the gate*). Therefore stimulation of large sensory fibres from the peripheral tactile receptors tends to depress the transmission of pain. Whereas activation of small C fibres tends to facilitate transmission (*open the gate*). Descending signals from the brain also affect the gating mechanism in the spinal cord ***(Costigan and Woolf, 2002).***

Opiate receptors also play a powerful role in the gate control mechanism. Opioid receptors are found at all levels of

pain transduction (nerve endings, dorsal horn of spinal cord, thalamus, and sensory cortex) and are stimulated by endogenous opioids (encephalins) as well as exogenous opioids. In the dorsal horn encephalins are released by A-δ fibres. They decrease impulse frequency of the second order neuron. Opioids have both presynaptic and postsynaptic effects in the dorsal horn and affect the modulation of nociceptive input. **(*De Leon and Lema, 1996)***

Evaluation of Pain

By its definition, pain is an internal, subjective experience that cannot be directly observed by others or by the use of physiological makers or bioassays. The assessment of pain, therefore, relies largely upon the use of self-report. Although the self-report of pain or any other construct is subject to a number of biases, a good deal of effort has been invested in testing and refining self-report methodology within the field of human pain research ***(Benzon et al., 2005)***.

Assessing pain requires measurement tools that are valid and reliable, as well as an ability to communicate (using language, movements, etc.).In addition, pain is a multidimensional experience incorporating sensory and affective components which may be assessed separately ***(Benzon et al., 2005)***.

Valid and reliable assessment of pain is essential for both clinical trials and effective pain management. The nature of pain makes objective measurement impossible. Acute pain can be reliably assessed, both at rest (important for comfort) and during movement (important for function and risk of postoperative complications), with one-dimensional tools such as numeric rating scales or visual analogue scales ***(Breivik et al., 2008)***.