NERVE INJURY RELATED TO ANESTHESIA

Essay

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In Anesthesiology

By

Sawsan Haridi Ahmed Abu El Hassan
M.B.B.Ch, Faculty of Medicine, Ain Shams University

Supervised by

Prof. Dr. Bahaa Eldeen Ewees Hassan
Professor of Anesthesia and Intensive Care
Faculty of Medicine - Ain Shams University

Prof. Dr. Ahmed Nagah El Shaer
Professor of Anesthesia and Intensive Care
Faculty of Medicine - Ain Shams University

Dr. Assem Adel Moharram
Lecturer of Anesthesia and Intensive Care
Faculty of Medicine - Ain Shams University

Faculty of Medicine
Ain Shams University
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بسم الله الرحمن الرحيم

اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ * خَلَقَ الْإِنسَانَ مِنْ

عَلَقٍ * اقْرَأْ وَرَبُّكَ الْأَكْرَمُ * الَّذِي عَلَّمَ بِالْقَلَمِ *

عَلَّمَ الْإِنسَانَ مَا لَمْ يَعْلَمْ *

صدق الله العظيم

سورة العلق(١-٥)

I DEDICATE THIS WORK TO MY MOTHER WHO IS THE GIFT OF ALLAH FOR ME, MY KIND FATHER WHO IS WITHOUT HIS KIND HELP I CAN'T CONTINUE IN MY LIFE, AND TO ALL THE MEMBERS OF MY FAMILY FOR THEIR CONTINUOUS SUPPORT AND HELP ...

Sawsan Abu Elhassan
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List of Abbreviations

Abb.	Full term

CN XI : Spinal Accessory Nerve.

CSF : Cerebrospinal fluid.

CT : Computed Tomography.

EMG : Electromyography.

GA : General Anesthesia.

MRI : Magnetic Resonance Imaging.

PPNI : Perioperative peripheral Nerve Injury.

RA : Regional Anesthesia.

SCBF : spinal cord blood flow.

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INTRODUCTION

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The anesthetized patient is at risk of complications resulting from the actions, or inaction, of the anesthetist, from the actions of the surgeon, and from failure or malfunction of anesthetic equipment. The state of anesthesia may be considered to be intrinsically unsafe. Patients are subjected to administration of drugs which have side-effects, particularly on the cardiovascular and respiratory systems. Unconsciousness carries with it risks of airway obstruction, soiling of the lungs, and inability to detect peripheral injury ***(Aitkenhead, 2005).***

Perioperative peripheral nerve injuries (PPNI) are common and potentially catastrophic complication of anesthesia and surgery. These injuries include a range of morbidity from transient and clinically minor injury, through to severe permanent injury ***(Webster, 2012).***

The exact incidence is difficult to determine, and underreporting of nerve injury complications is likely. Commonly injured nerves include the ulnar nerve (28%), brachial plexus (20%), lumbosacral root (16%), and spinal cord (13%). Injury is less common for the sciatic, median, radial and femoral nerves ***(Webster, 2012).***

There are many factors that can lead to a PPNI. A nerve injury can occur with a single mechanism, or several can combine to damage the nerve. There are also nerve injuries that occur with no known cause, especially in the case of ulnar nerve injury ***(Webster, 2012).***

Peripheral nerve injury following regional anesthesia occurs in approximately 1 in 5000 peripheral nerve blocks (0.02%). Factors

which may increase the likelihood of nerve injury during regional anesthesia include high injection pressure, use of long-bevelled needles, performance of nerve blocks in the unconscious patient, seeking of paraesthesia, and failure of muscular twitch to disappear when the nerve stimulator current is <0.2 mA. The evidence supporting these factors is not strong; most recommendations are based on consensus or indirect evidence ***(Contractor and Hardman, 2012).***

The incidence of nerve injury following central neuraxial block is 0.3–10 per 10000 (0.003–0.1%). Currently, the consensus is that the performance of central blocks in an anaesthetized patient increases the likelihood of nerve injury because the patient cannot warn of the impingement upon a nerve. Pain or paraesthesia during needle insertion or injection of drug is suggestive of nerve injury and multiple unsuccessful attempts increase the likelihood of damage ***(Contractor and Hardman, 2012).***

Once damage to nerves has occurred it can take several forms, ranging from a mild, reversible neurapraxia to a permanent sensorimotor deficit. The neurophysiological investigations can often provide useful diagnostic and prognostic information, and the assistance of a trained neurophysiologist should be sought in these cases. A carefully completed anesthetic record documenting limb position and appropriate protective measures should be standard for all cases ***(Sawyer et al., 2000).***

In most cases, injuries resolve within 6-12 weeks. More than 50% of patients typically regain full sensory and motor function within 12 months. Patients with poor recovery can have ongoing or permanent symptoms. Permanent injury may be minor (such as small area of

sensory loss that is minimally inconvenient to the patient), or major and disabling (such as significant motor loss and chronic pain). Poor recovery can have a profound impact on quality of life for patients with ongoing nerve injury ***(Webster, 2012).***

AIM OF THE WORK

The Aim Of This Essay is to discuss various etiological factors that lie behind different peripheral neurological losses in the setting of operative procedures and measures for prevention and management.

CHAPTER 1

ANATOMY OF THE PERIPHERAL NERVOUS SYSTEM

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The nervous system consists of the central nervous system (brain and spinal cord) and peripheral nervous system. The later consists of the spinal roots that unite together to form a nerve plexus. Each plexus gives rise to peripheral nerves that give motor and sensory nerve supply to the limbs or the trunk ***(Chawla, 2011)***.

Spinal nerves

Thirty one pairs of spinal nerves exist: 8 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 1 coccygeal.

- Proximal branches: Each spinal nerve branches into a posterior root and an anterior root.
- Distal branches: After emerging from the vertebral column, the spinal nerve divides into a posterior (dorsal) ramus, an anterior (ventral) ramus, and a small meningeal branch that leads to the meninges and vertebral column. The posterior ramus innervates the muscles and joints of the spine and the skin of the back. The anterior ramus innervates the anterior and lateral skin and muscles of the trunk, plus gives rise to nerves leading to the limbs ***(Chawla, 2011).***