Hysteroscopic cornual nerve block in operative hysteroscopy: a Randomized controlled trial

Thesis

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✍ *Yasser Mostafa Mahmoud Elrefaey*

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Abstract

Background: Hysteroscopy has become a standard investigation for a lot of gynecological cases and found to be effective in detecting intrauterine pathology and treating it. It is usually performed as an outpatient procedure under either local or no anesthesia. **Aim of the Work:** to assess the anesthetic efficacy of intracornual nerve block versus placebo in reducing pain & discomfort during operative hysteroscopy. **Patients and Methods:** This randomized, double-blind, placebo-controlled study was conducted on 58 patients at the Early Cancer Detection and Endoscopy Unit (Ain Shams university Hospital) after taking Full ethical approval for the study. Patients referred for outpatient hysteroscopy (between march 2018 and December 2018) were informed about the possible role of intracornual nerve block in reducing pain that could be experienced during the procedure, and were asked to participate. Signed informed consent was obtained from all patients who agreed to participate in the study. **Results:** Among the 42 women who underwent successful operative intervention, the visual analogue score for assessment of intra-operative pain was statistically significantly lower in the LA-ICOB group compared to the placebo-ICOB group. In the same context, the number of patients requiring extra analgesia (either as NSAIDs or opioid analgesics) was statistically significantly larger in the placebo-ICOB group compared to the LA-ICOB group. **Conclusion:** This study proved that the use of intracornual nerve block in operative hysteroscopy is both beneficial and effective in reducing pain and discomfort that could associate operative hysteroscopy procedure.

Key words: Hystroscopic cornual nerve block, operative hysteroscopy**,** anesthetic effect

Introduction

Local anesthetic techniques are being used at an increasing rate in modern gynecology. The increased expense of hospital admission has caused many gynecologists to perform uterine operation, hysteroscopy, colposcopy, Laparoscopy, and diagnostic curettage employing local anesthesia in offices and clinics ***(Downes and Al-Azzawi, 2009).***

Direct cervical stromal infiltration or uterosacral ligament block have been most often used for operations on the uterine cervix and corpus; but these methods are seldom totally effective, they required expertise for consistent good results, and potentially toxic doses of anesthetic agents are required in these vascular areas where direct venous injection and systemic toxicity are constant hazards ***(O'Flynn et al., 2011).***

General anesthesia is discouraged, especially for more minor procedures because of the associated risks and attendant costs ***(Stigliano et al., 2010).***

Hysteroscopy has become a standard investigation for abnormal uterine bleeding which has been shown to be effective in detecting intrauterine pathology. It is usually performed as an outpatient procedure under either local or no anesthesia ***(Downes and Al-Azzawi, 2009).***

It is associated with some degree of pain and carries a risk of a vaso-vagal reaction. Pain is the commonest reason for failure to complete the procedure ***(O'Flynn et al., 2011).*** Although paracervical anesthesia is useful for local ablation of the cervix and suction evacuation of the uterus, it has not been shown to reduce pain during hysteroscopy in randomized trials suggesting that the use of local anesthesia may reduce the pain ***(Lau et al., 2008).***

Aim of the Work

This is a double blinded, drug-placebo controlled study to assess the anesthetic efficacy of intracornual nerve block versus placebo in reducing pain & discomfort during operative hysteroscopy.

Anatomical and physiological considerations

The uterus has complex nerve supply. Pain perception from the cervix and the corpus of the uterus is thought to pass through two distinct neural routes **(Sosa-Stanley and Bhimji, 2018).**

The cervix and lower half of the uterus is primarily innervated from the uterovaginal plexus, largely derived from the parasympathetic sacral S1–4 nerve roots, whereas the upper half of the uterus is innervated from the thoracic nerves, largely derived from the sympathetic fibers of the superior hypogastric plexus T8-T10 and L1 roots. These latter nerve fibers enter the uterus along the infundibulopelvic ligament and the path of the ovarian arteries **(Kumar and Gupta, 2013).**

Therefore, specific blocking of the latter nerve pathway with an additional intrauterine myometrial cornual block (ICOB) may result in an improved anesthesia during operative hysteroscopy in addition to the traditional paracervical nerve block **(Kumar et al., 2016).**

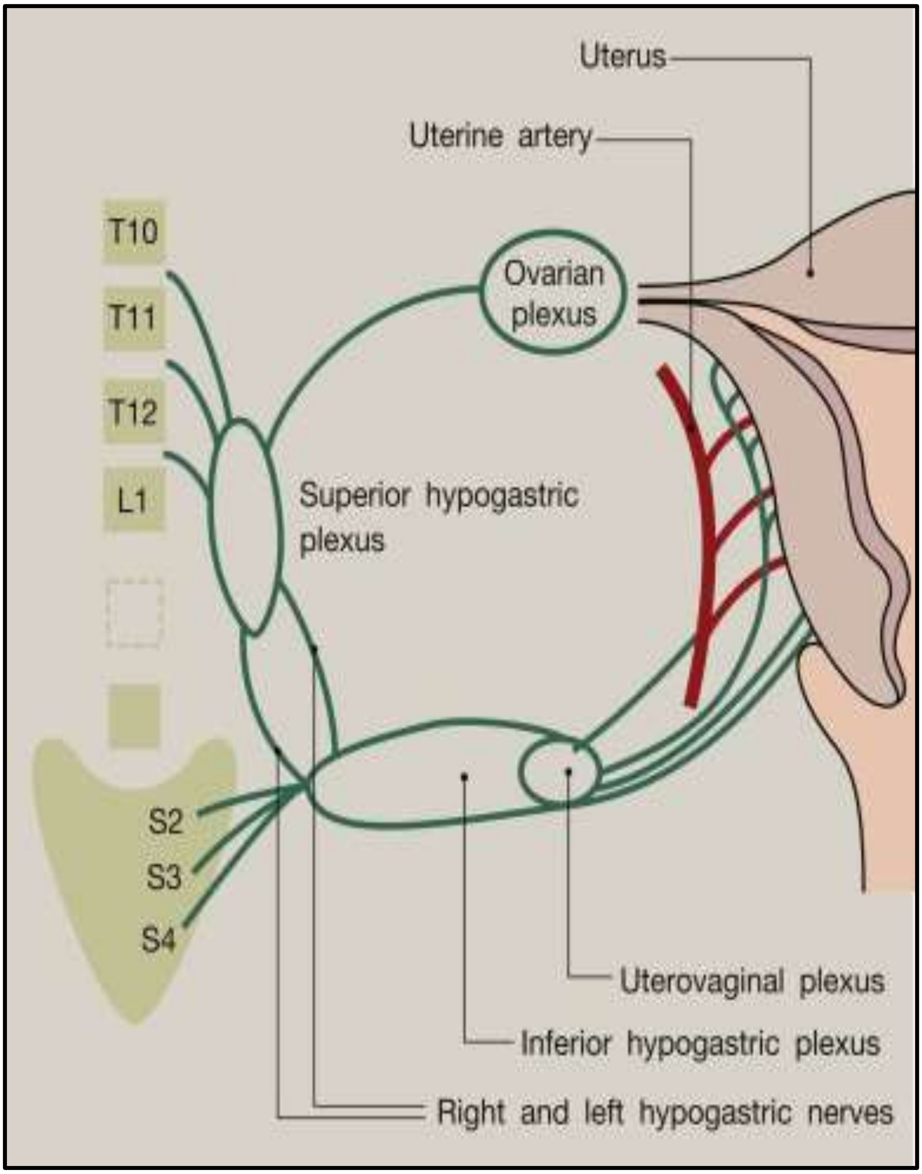

Figure (1): Nerve supply of the uterus
(Source : Anaesthesia & Intensive Care Medicine

Volume 17, Issue 7, July 2016, Pages 346-348).

Physiology of neural transmission

Neural tissue has the unique capability of transferring messages in the form of electrical potentials from one area of the body to another. These electrical potentials are initiated by mechanical, electrical, or thermal stimuli. Each nerve cell or neuron consists of a cell body, axon, and multiple dendrite extensions ***(Rayburn & Zuspan, 1980).***

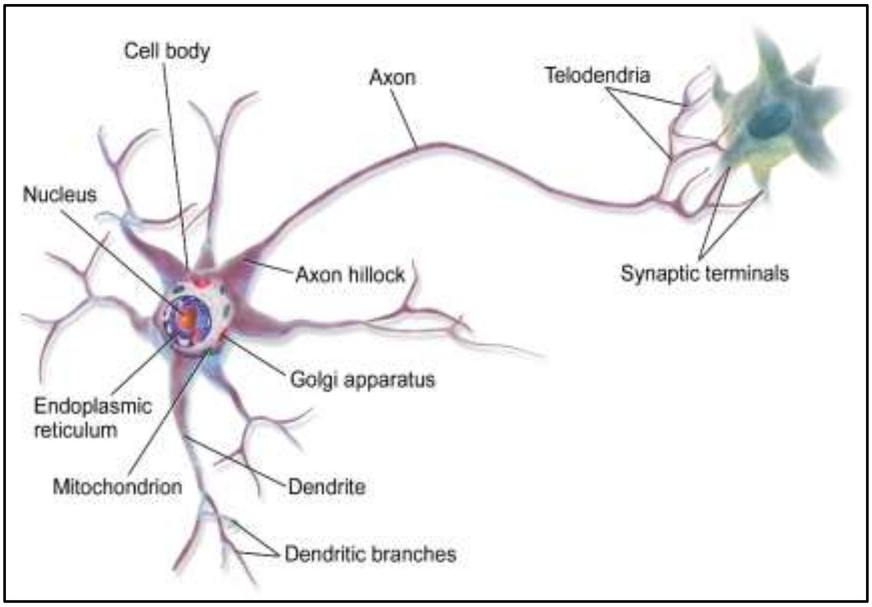

Figure (2): Multipolar Neuron

Bruce Blaus Blausen.com staff (2014). "Medical gallery of Blausen Medical 2014". WikiJournal of Medicine 1 (2). DOI:10.15347/wjm/2014.010. ISSN 2002-4436.

The axon or nerve fiber is a cylinder of axoplasm which is encased in a semi permeable membrane. The membrane consists of a double-thickness layer of phospholipids molecules. This structure is thinly covered by inner and outer layer of protein. A large portion of the protein molecule is distributed in the bimolecular phospholipids layer, giving rise to a mosaic-type pattern on the surface. The nerve membrane also contains small channels which connect the extra-cellular and intracellular spaces. These channels vary in size and are selective for either sodium or potassium ions' passage ***(Rayburn & Zuspan, 1980).***

Located on the internal portion of the channel are voltage-dependent "gates" which open and close to either block or allow ionic migration. At rest, the sodium channel is relatively impermeable to the passage of sodium ions. The potassium channel is considerably more permeable, allowing the easy passage of potassium between the extra cellular and intracellular spaces. When a stimulus is applied to the nerve, the generated electrical field causes the gates in the sodium and potassium channels to open. This results in an inward surge of sodium ions with a change in electrical potential. If the stimulus is weak, only a few gates will open, and the sodium will be quickly pumped out of the cell. With a larger stimulus, many gates are opened, and a threshold is reached eventually where sodium influx matches sodium efflux (firing threshold). When this is reached, depolarization and sodium influx occur at an extremely rapid rate. This process of depolarization gives rise to an impulse or action potential and is rapidly followed by repolarization of the nerve membrane ***(Rayburn & Zuspan, 1980).***

During repolarization, the sodium channels close, and sodium is actively pumped out of the cell to reestablish the original resting, membrane potential.If the process of depolarization is interrupted along the axon, an impulse cannot be transmitted and the nerve becomes blocked ***(Rayburn & Zuspan, 1980).***

Many nerve fibers are surrounded by myelin, a fatty material. The myelin sheath is interrupted at regular intervals by gaps, known as nodes of Ranvier, at which a small portion of the nerve membrane is exposed to the surrounding medium. The myelin sheath acts 'as an electrical insulator which enables the nerve to conduct an impulse at a faster rate than an unmyelinated nerve of comparable width ***(Rayburn & Zuspan, 1980).***

Regional anesthesia provides a temporary interruption of painful impulses from any portion of the body without a loss of consciousness. Local infiltration and major regional blokes using local anesthetics are used frequently for pain relief during labor and delivery. Local anesthetics are capable of reversibly inhibiting the transmission of impulses in neural tissue. These agents exhibit marked selectivity, since they can inhibit neural transmission from one part of the body without significantly affecting other areas ***(Becker and Reed, 2012).***

Local anesthetics produce anesthesia by inhibiting excitation of nerve endings or by blocking conduction in peripheral nerves. This is achieved by anesthetics reversibly binding to and inactivating sodium channels. Sodium influx through these channels is necessary for the depolarization of nerve cell membranes and subsequent propagation of impulses along the course of the nerve. When a nerve loses depolarization and capacity to propagate an impulse, the individual loses sensation in the area supplied by the nerve ***(Tsuchiya and Mizogami, 2013).***