Effectiveness of Intracutaneous Injection of Sterile Water in Presacral Region for Pain Relief in Labour in Comparison to Intramuscular Pethidine

Thesis

Submitted for fulfillment of master degree
In Obstetrics and gynecology

by

Ashraf Abd El Azim Abbas
Resident of obstetrics and gynecology
Nabroh central hospital
M.B.B.Ch

Supervised by

Prof. Magdy Hassan Kolaib
Professor of Obstetrics and Gynecology
Faculty of Medicine-Ain Shams university

Dr. Amr Abd Elaziz Elsayed
Lecturer of Obstetrics and Gynecology
Faculty of Medicine-Ain Shams university

Dr. **Ahmed Elsayed-Hassan Elbohoty**
Lecturer of Obstetrics and Gynecology
Faculty of Medicine -Ain shams university

Faculty of Medicine
Ain Shams University
2010

Contents

Introduction

Childbirth is an important experience in a woman's life ***(Goodman et al., 2004).*** Analgesia is often required in labour for humanitarian, medical reasons, the American College of Obstetricians and Gynecologists ***(ACOG)*** and the American Society of Anaesthesiologists issued a joint statement indicating that a woman's request for pain relief is a sufficient medical indication for pain relief ***(ACOG ; 2002)***.

The management of labour pain is one of the main goals of maternity care and a major concern of clinicians and their clients ***(McCool et al ., 2004)***. Pain of labour can be modified by pharmacological and non pharmacological methods. Pharmacological methods include regional analgesia and anaesthesia, systemic agents as opioids and inhalational analgesia. Non pharmacological methods include many techniques that reduce painful stimuli ***(Enkin el al ., 2000).***

Of all techniques of pain relief in labour, epidural analgesia is the most effective method, but it requires trained staff **(*Dickersin ; 1989*)** and Parenteral opioids for labour pain relief are common options for women worldwide ***(Bricker and Lavender ; 2002),*** opioids can be a good alternative when epidural is not feasible as

they also provide maternal satisfaction ***(Jain et al ; 2003).***

All pharmacologic methods have drawbacks, as regard narcotics; it can cause maternal confusion and neonatal respiratory depression, gastric stasis, nausea and vomiting. As regard nitrous oxide: it is the only widely available inhalational agent for inhalational analgesia in labour , but it may cause dry mouth, peripheral tingling, respiratory alkalosis, and intermittent apnea ***(Cunningham et al ., 2005).***

Meperidine is a simple and cheap drug in the management of labour pain, especially in developing nations where availability of facilities is the main limiting factor for the use of more effective methods for the management of labour pain ***(Kamyabi et al ., 2003)*** while its maternal side effects include sedation, nausea, vomiting, delayed gastric emptying and respiratory depression. Meperidine readily cross the placenta and neonatal side effects include respiratory depression, decreased Apgar scores, sleepiness and a delay in the establishment of breast feeding***(O'Sullivan ; 2005)***

. Most women in the first stage of labor feel pain predominantly in the lower abdomen, where as others feel severe low back pain because the corpus uteri and cervix are supplied by afferent neuron endings in the dorsal

horn of spinal segments T10-L1 and cutaneous afferents from the low back converge in the same segments, there is anatomical support that low back pain in labour is actually referred pain ***(Martensson and Wallin ; 1999***).

There are different methods of pain relief Which based on the gate-control theory ,various attempts have been made to relieve labor pain by treating dermatomes having the same nerve innervation with acupuncture, Transcutaneous Electrical Nerve Stimulation ***(TENS)*** or with intracutaneous sterile water ***(Wiruchpongsanon ; 2006)***

Intracutaneous sterile water is a simple and inexpensive way to provide a medication-free option to women who want to either avoid or delay use of epidural analgesia or for those for whom epidurals are not available ***(Simkin and O'Hara ; 2002).*** It has been used in many countries such as the Scandinavian countries by using 4 intracutaneous injections of sterile water in presacral region and measuring pain on VAS scales fouding that was reduction in scores of pain ***(Wiruchpongsanon ; 2006)***

Many studies have been occurred ***(Renold's; 1998 , Martensson & Wallin ;1999)*** They also found that injection of sterile water in presacral region is effective in relief of labour pain , so it is pleasiable to

study the analgesic effect of intra-cutaneous injection of sterile water on Egyptian labouring women.

STUDY OBJECTIVES(AIM OF THE WORK)

Primary Objective

To document the efficacy of sterile water injection into the presacral region during active phase of labour in comparison to IM injection meperidine (pethidine)

Secondary Objectives

1-Subsequent need of additional analgesia

2-To document safety and evaluate adverse events recorded during the study either fetal or maternal

Anatomy of Pain

Pain is an unpleasant sensation that may be associated with actual or potential tissue damage and may contain physical and emotional components. ***(IASP ; 2008)***

Pain can be classified as acute or chronic:-

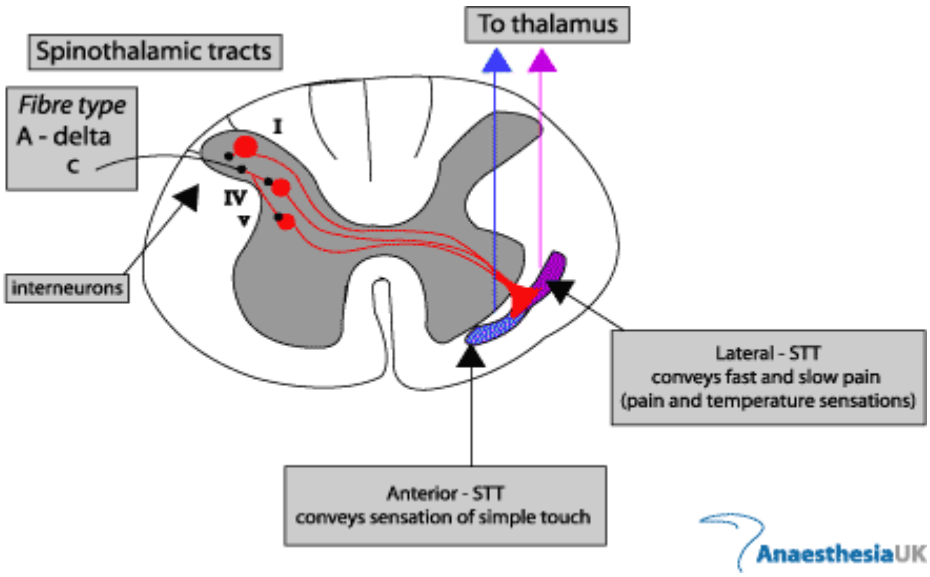
Acute pain is defined as short- term,fast and sharp pain or pain with an easily identifiable cause. .This type of pain usually function as endogenous protective mechanism that signals the brain of occurance of tissue injury ***(Renn , Dorsey ; 2005 ,Meyr & Steinberg ; 2008)***

Chronic pain as pain can persists beyond point of tissue healing and develop into a chronic and deblitating state,Clinically ,this pain has the characteristics of a disease state and can produce psychological disturbances (***Renn & Dorsey ; 2005***)

Pain transmission

The aascending pain pathway transmit nociceptive informations from peripheral tissues to cerebral cortex for interpretation ,Ascending Pain pathways are complex structures, involving both

peripheral and central nervous systems(***Renn & Dorsey ; 2005***)



1-Nociceptors

Nociceptors, or pain receptors,are free nerve endings that respond to painful stimuli. Nociceptors are found throughout all tissues except brain, They are stimulated by biological,electrical, thermal, mechanical, and chemical stimuli.(***Janifer et al.,2008)***

There are two types of fibers for conducting pain impulses which are (A delta) and C fibres and ***(Julius & Basbaum ; 2001)***

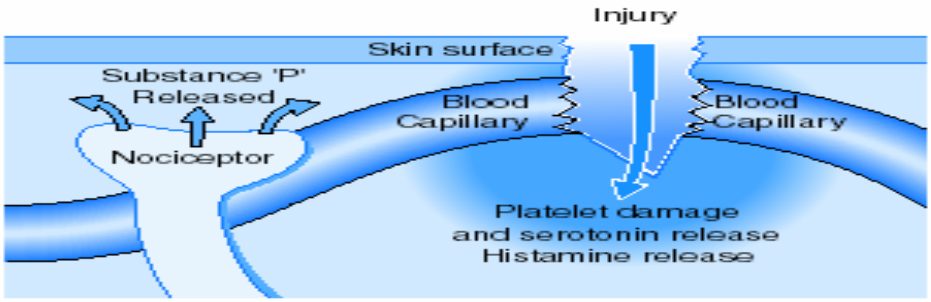
A delta are relatively large ,myelinated,and faster fibers, and of two types depending on specificity of

their responses ,The mechanoreceptors respond to intense and harmfull mechanical stimulations and The polymodal A delta fibers respond to chemical,thermal and chemical stimuli **(Marchand ; 2008)**

C fibers are of small ,slower and un-myelinated and represent 3 quarters of the sensory afferent input ***(Marchand ; 2008)***

Nociceptors are also stimulated by neuorotransmitters and inflammatory mediators as K, serotonin ,bradikinin ,histamine ,prostaglandins, substance P and others which are released after injury or tissue damage**(*Julius,Basbaum ; 2001 ,Renn & Dorsey ; 2005*)**

Nociceptors are located next to mast cells and blood vessels,the 3 components function together in response to injury and inflammatory process**(Julius & Basbaum ; 2001)**



These neurochemicals stimulate mast cells and the resulting cascade of chemicals ultimately activates

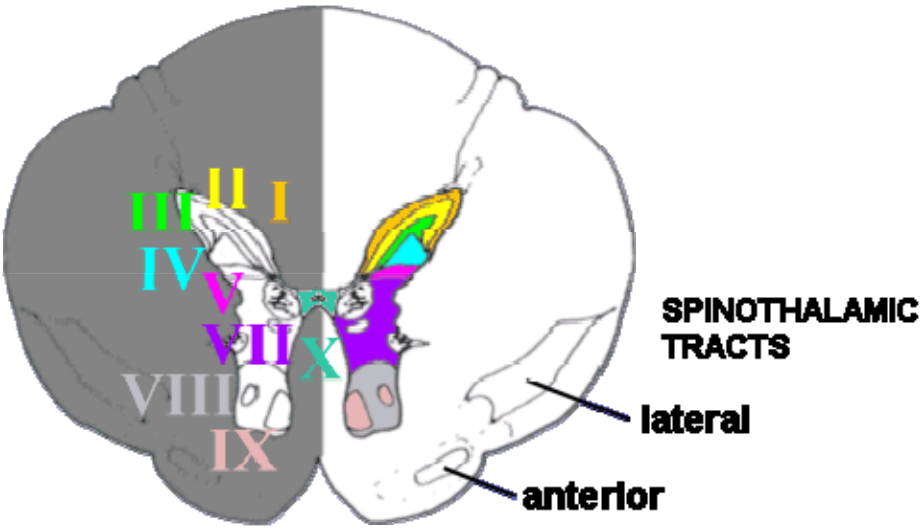
protein receptors in nociceptors membrane causing ion channel to open,positively charged ion channels as Na and Ca flow into nciceptor lowering the voltage across the membrane leading to generation of electrical impulses and transmitted along nerve fibers towards the spinal cord***(Mc Hugh & Mc Hugh ; 2000)***

2-Spinal Dorsal Horn

When noxious stimulus is transduced by nociceptors a signal is generated that transmitted as an electrical action potential along A-delta fibers and C fibers (**(Renn & Dorsey ; 2005**)

On cross section,the spinal gray matter form buttrefly shape and can be dividedinto 10 laminae as illustrated in the following figure(1) , (laminae I- II). Ad fibres enter lamina I (and V) and synapse on a second set of neurons***(Farquhar et al ., 2007).*** These neurons will carry the signal to the thalamus and are part of the spinothalamic tract (STT). The C fibres enter the spinal cord and synapse on lamina I cells and lamina II interneurons - neurons that make synaptic connections with other cells within the local environment. The interneurons convey the signal to the STT cells that reside mainly in laminae I, IV and V. The axons of the STT cells project across the spinal cord to the STT, which is located

in the ventrolateral quadrant of the contralateral spinal cord white matter **(Renn & Dorsey ; 2005)**



Fig(1)

3-AscendingTracts

The function of the ascending pathways is simply the transmission of the nociceptive information. to supraspinal structures in the brain stem and diencephalon, including the medullary reticular formation, periaqueductal gray, hypothalamus, thalamus,and various limbic structures ,so the ascending pain pathways are quite complex ***(Marchand ; 2008)***

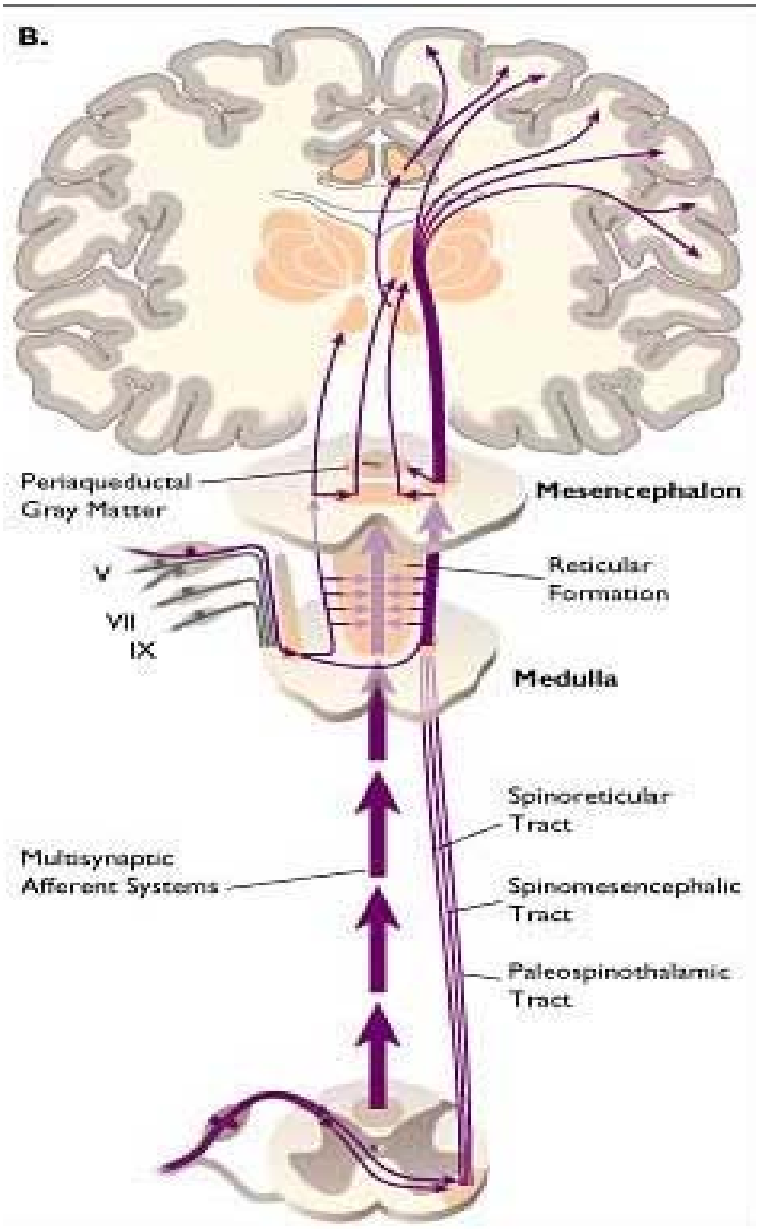
Ascending transmission tracts.

(A) Spinothalamic tract (STT)

(B)-Spinomesencephalic tract(SMT).

(C) Spinoreticular tract (SRT). As indicating in the following diagram

(Renn & Dorsey ; 2005)



Fig(2)

4-Thalamus

the major supraspinal relay structure for the integration, the thalamus not only receives input from the STT, but it also receives input from collateral projections sent out of the other ascending tracts that carry nociceptive information **(Renn & Dorsey ; 2005**)

5-Cerebral Cortex

Ultimately, the nociceptive signal reaches the cerebral cortex where it is integrated and undergoes cognitive and emotional interpretation as stemming from a painful stimulus **(Renn & Dorsey ; 2005)**

The areas of cortex which involved in the processing of painfull stimuli are thought to be primary and secondary somatosensory cortices, insula and the anterior cingulated cortex ***((Farquhar et al., 2007)***

Anatomical neural pain pathway

The nociceptive pathways from the periphery will conduct to the brain after two synaptic relays. The A delta and C-fibers will make their first synapse with the projection neurons in the dorsal horn of the spinal cord. The secondary neurons will decussate immediately in the cord and conduct to the thalamic nuclei, where they will

make the second synaptic contact, The third neurons will finally project to the somatosensory cortices for the sensory-discriminative component of pain, and to limbic structures (anterior cingulated cortex & nsula) for the motivational component of pain. ACC, anterior cingulate cortex; NRM, nucleus raphe magnus; SI, SII, somatosensory cortices; PAG, as in fig ***(2) (Marchand ; 2008)***