THE UPDATE OF PAIN RELEIF DURING LABOUR

ESSAY

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BY

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Mohammed Kamel

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List of Abbreviation

(ACOG)	:American college of Obstetricians and Gynecologists
(ACTH)	:Adreno-cortico-trophic hormone
(Am J)	:American Journal
(Br J)	:British Journal
(C.S.F)	:Cerebro-spinal fluid
(C/S)	:Caesarean section
(CSE)	:Combined Spinal Epidural
(E N N S)	:Early neonatal Neuvobehavioral
(F.H.S ، F.H.R)	:Fetal heart rate ، Fetal heart sound
(HZ)	:Hertz
(I L N T)	:Intralaminar neuclei of the thalamus
(I V)	:Intrevenous
(IM)	:Intramuscular
(LUS)	: Lower uterine segment
(MA)	: Millieampere
(MG)	:Microgram
(MG)	: Milligram
(N.A.C.S)	:Neurological and adaptive capacity scoring system
(NBT)	:National Birthday Trust
(PCA)	:Patient Controlled epidular –al analgesia
(PG)	: Prostaglandin
(PPCBB)	: Postparacervical block fetal bradycardia
(T.E.N.S)	:Tranccutanous Electrical never Stimulation
(UK)	: United kingdom
(UUS)	: Upper uterine segment
(V S)	:Versus .
(C E L B)	:Continuous epidural lumber block
(TXA)	: Thromboxan A_2

ABSTRACT

Kay words:

Childbirth is an important experience in a woman's life. Women expect labor to be painful, and for nearly all women it is exceptionally, a very few women may not feel pain; others can control their response to reduce pain. The responsibility of doctors to provide pain control is articulated in the Hippocratic Oath (”I will keep them from harm”) and some, professional bodies craft ethical statements about pain relief, e.g. The American Medical Association (“physicians have an obligation to relieve pain and suffering”). Of all techniques of pain relief in labor, epidural analgesia is the most effective method, however, it requires trained staff and there is considerable controversy regarding its influence on the progress and outcome of labor.

Introduction

Pain management is an essential part of clinical practice, one that is best served by exploring the concept of pain, the manner in which it affects individuals, and methods for assisting the individual in coping with its effects. Many persons today are un-willing to accept pain as a natural condition of life. From infancy through adulthood, pain is viewed as a negative condition that should be avoided or be overcomed at all costs. Controlling pain is one of the foci of guidelines for "Healthy People 2010", issued by the US Department of Health and Human Services **(McCool et al., 2004).**

Childbirth is an important experience in a woman's life **(Goodman et al., 2004)**. Women expect labor to be painful, and for nearly all women it is **(Green, 1993)** exceptionally, a very few women may not feel pain; others can control their response to reduce pain **(Findley and Chamberlain, 1999).**

The responsibility of doctors to provide pain control is articulated in the Hippocratic Oath (”I will keep them from harm”) and some, professional bodies craft ethical statements about pain relief, e.g. The American Medical Association (“physicians have an obligation to relieve pain and suffering”) **(Post et al., 1996).**

Analgesia is often required in labor for humanitarian, medical reasons **(O’Sullivan, 2005)** and Social Values **(Caton, 2004).** In 2002, the American College of Obstetricians and Gynecologists (ACOG) and the American Society of Anesthesiologists issued a joint statement indicating that a woman’s request for pain relief is sufficient medical indication for pain relief **(ACOG, 2002).**

Adequate analgesia during labor is beneficial to the mother, has a positive influence on the course of labor and improves neonatal outcome **(Watts, 2004).** Unrelieved labor pain can have an adverse effect on the physiological status of women. These effects include increases in cardiac output, blood pressure, respiratory rate, oxygen consumption, and catecholamine levels, all of which can have a harmful effect on both the mother and the infant **(Blackburn and Loper, 1992).** Labor pain can also results in loss of emotional control during labor **(Allen, 1998),** which is a key factor in the development of an emotionally traumatic childbirth experience **(Reynolds, 1997)** and psychological disturbances **(Allen, 1998 and Fones, 1996)**.

Pain during labor is accompanied by fear, which is related to slower progress of labor **(Saisto et al., 1999),** and requests for cesarean section **(Ryding et al., 1998).**

The management of labor 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 labor can be modified by pharmacological and non pharmacological methods. Pharmacological methods include regional analgesia and anesthesia, systemic agents as opioids and inhalation analgesia. Non pharmacological methods include many techniques that reduce painful stimuli **(Enkin el al., 2000).** Pharmacologic measures for labor pain relief generally have been found to be more effective than non-pharmacologic measures as regards lowering pain levels **(Dickersin, 1989).**

Of all techniques of pain relief in labor, epidural analgesia is the most effective method, however, it requires trained staff and there is considerable controversy regarding its influence on the progress and outcome of labor **(Dickersin, 1989).** Moreover, it may not be feasible in smaller hospital settings and for developing nations **(Jain et al., 2003);** its availability for labor is parallel to the economic status of the country **(Chan, 2000).** Intramuscular analgesia remains a preferred option for a large proportion of women in labor **(Chamberlain et al., 1993).**

Parenteral opioids for labor pain relief are a common option for women worldwide **(Bricker and Lavender, 2002).** Opioids can be a good alternative when epidural is not feasible as they also provide maternal satisfaction in a significant number of cases **(Jain et al., 2003).** They are cheap, simple to use and readily available **(Tsui et al., 2004).**

The first documentation of opioid use in labor appears in ancient Chinese writings, where giving opium to relieve the pain of labor is described **(Bricker and Lavender, 2002).** Of available opioids, the most commonly used is pethidine **(Ally and shilling, 2000; Bricker and Lavender, 2002 and Tsui et al., 2004).**

Pethidine, synthesized in 1939, was first used in labor in the early 1940s **(Hawkins and Beaty, 1999).** In a survey in England, the use of pethidine for labor analgesia was 37% during the 1990s **(Findley and Chamberlain, 1999).** In the United States, the prescription of pethidine for the same purpose in 1999 was estimated between 39% and 56% **(Hawkins and Beaty, 1999).**

Early studies have reported that pethidine has good analgesic effects in labor **(De Kornfeld et al., 1964 and Grant et al., 1970)**. On the contrary, many studies have suggested that intramuscular pethidine may be ineffective at relieving labor pain **(Fairlie et al., 1999; Morrison et al., 1987 and Wilson et al., 1986).** This apparent lack of analgesic effect of systemic opioids has led to considerable controversy **(Reynolds and Crowhurst, 1997).**

Aim Of The Work

The aim of the work is to study causes, mechanism and types of pain occurring during labor,methods used for it's management and effect of pain relife on the course of labor.

CHAPTER I

LABOR PAIN

ANATOMICAL INNERVATION OF THE UTERUS AND BIRTH CANAL

The uterus and lower birth canal possess a sensory and a motor nerve supply.

Sensory:

The uterus:

The parts of the uterus, including the cervix share a common sensory pathway. The afferent nerve fibers from the uterus travel with the sympathetic nerves, but are themselves somatic sensory fibers**.**Emerging from the uterus on each side of the cervix, the sensory fibers pass laterally in paracervical tissue, traverse the cervical plexus (Frankenhauer's plexus) and lying in the base of the broad ligament. The fibers then pass centrally through the inferior, middle and superior hypogastric plexuses to enter the lumbar and lower thoracic parts of the sympathetic chain of ganglia **(Bonica, 1967)**.The central connection from the sympathetic chain is by the white rami communicants of 11^{th} and 12^{th} thoracic nerves, the posterior roots of these nerves and the spinal cord. The first lumbar nerves probably effect an additional connection in some women **(Doughty,1972).**

The lower birth canal:

The principle sensory nerve of the vagina, vulva and perineum is the pudendal nerve (S2,3,4) and it supplies these area through its three terminal branches (haemorrhoidal, perineal and the dorsal nerve of the clitoris). The pudendal nerve is also the motor nerve to the levator ani muscle. Small areas of the perineal and vulval skin receive a sensory from the ileo-inguinal, genito-femoral, posterior femoral cutaneous nerves and the cutaneous branches of the second, third and fourth sacral nerves. A small area of the vaginal vault is supplied through the pelvic parasympathetics **(Doughty, 1972)** (Fig. 1).

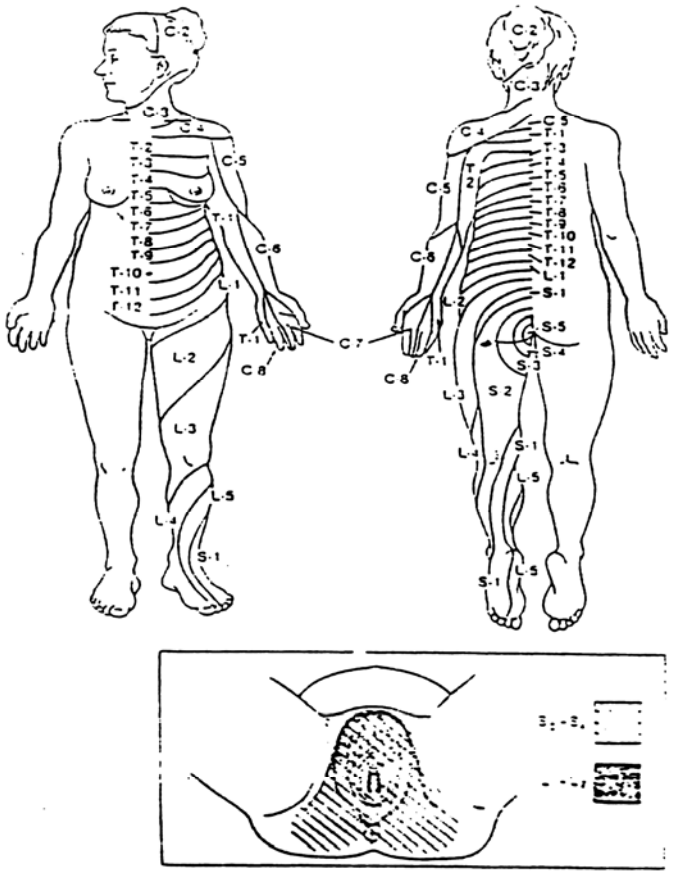

Fig. (1): The cutaneous innervation of spinal dermatomes. The face is innervated by cranial nerves (not shown), C3 and C4 may overlap T2 and T3 (stippled) on the anterior chest. The upper half of vulva region has mixed innervation LI and L2 in addition to S2-4 **(Albright, 1978).**

***Motor*:**

Sympathetic and parasympathetic nerves are involved in the motor innervation of the uterus. Preganglionic parasympathetics arise from S2, 3 and 4 spinal segments and accompany the uterine artery to the uterus. The synapse between pre and post-ganglionic fibers takes place in the paracervical tissues very close to the uterus. So post-ganglionic fibers are not interrupted by any regional block. The pre-ganglionic sympathetic fibers originate in a portion of the spinal cord which includes the fifth thoracic to the second lumbar segments. These fibers then synapse, according to their level of origin, in the coeliac, aortic, inferior mesenteric or hypogastric plexuses or in the lumbar sympathetic chain. Finally these various motor fibers unite to form the hypogastric nerves and these, together with the pelvic parasympathetic, enter the pelvic plexus (Frankenhauser' plexus) **(Doughty, 1972)** ((Fig. 2).

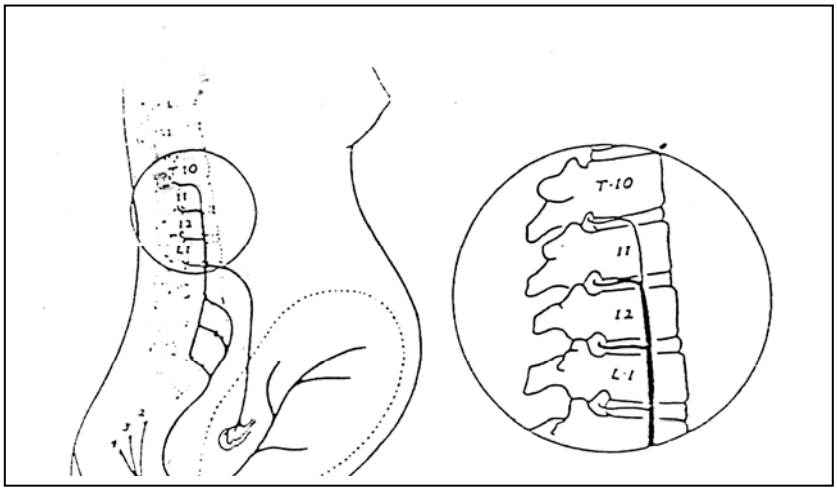

Fig. (2): Parturition pain pathways. Afferent pain impulses from the cervix and uterus are carried by nerves which accompany sympathetic fibers and enter the neuraxis at TIO, Til, T12 and LI spinal level. Pain pathway from the perineum travels to S2, S3 and S4 via the pudendal nerve **(Shnider, 1979).**

Pain pathways during labor :

A- from the Uterus : Pain during the first stage of labor is generated largely from the uterus. Visceral sensory fibers from the uterus, cervix, and upper vagina traverse through the Frankenhauser ganglion, which is just lateral to the cervix, into the pelvic plexus, and then to the middle and superior internal iliac plexuses. From there, the fibers travel in the lumbar and lower thoracic sympathetic chains to enter the spinal cord through the white rami communicantes associated with the T10 through T12 and L1 nerves. Early in labor, the pain of uterine contractions is transmitted predominantly through the T11 and T12 nerves. **(Cunningham et al., 2005).**

The motor pathways to the uterus leave the spinal cord at the level of the T7 and T8 vertebrae. Theoretically, any method of sensory block that does not also block the motor pathways to the uterus can be used for analgesia during labor. **(Cunningham et al., 2005).**

B- from the Lower Genital Tract : Pain with vaginal delivery arises from stimuli from the lower genital tract. These are transmitted primarily through the pudendal nerve, the peripheral branches of which provide sensory innervation to the perineum, anus and the more medial and inferior parts of the vulva and clitoris. The pudendal nerve passes

beneath the posterior surface of the sacrospinous ligament just as the ligament attaches to the ischial spine. The sensory nerve fibers of the pudendal nerve are derived from the ventral branches of the S2 through S4 nerves **(Cunningham et al., 2005).**

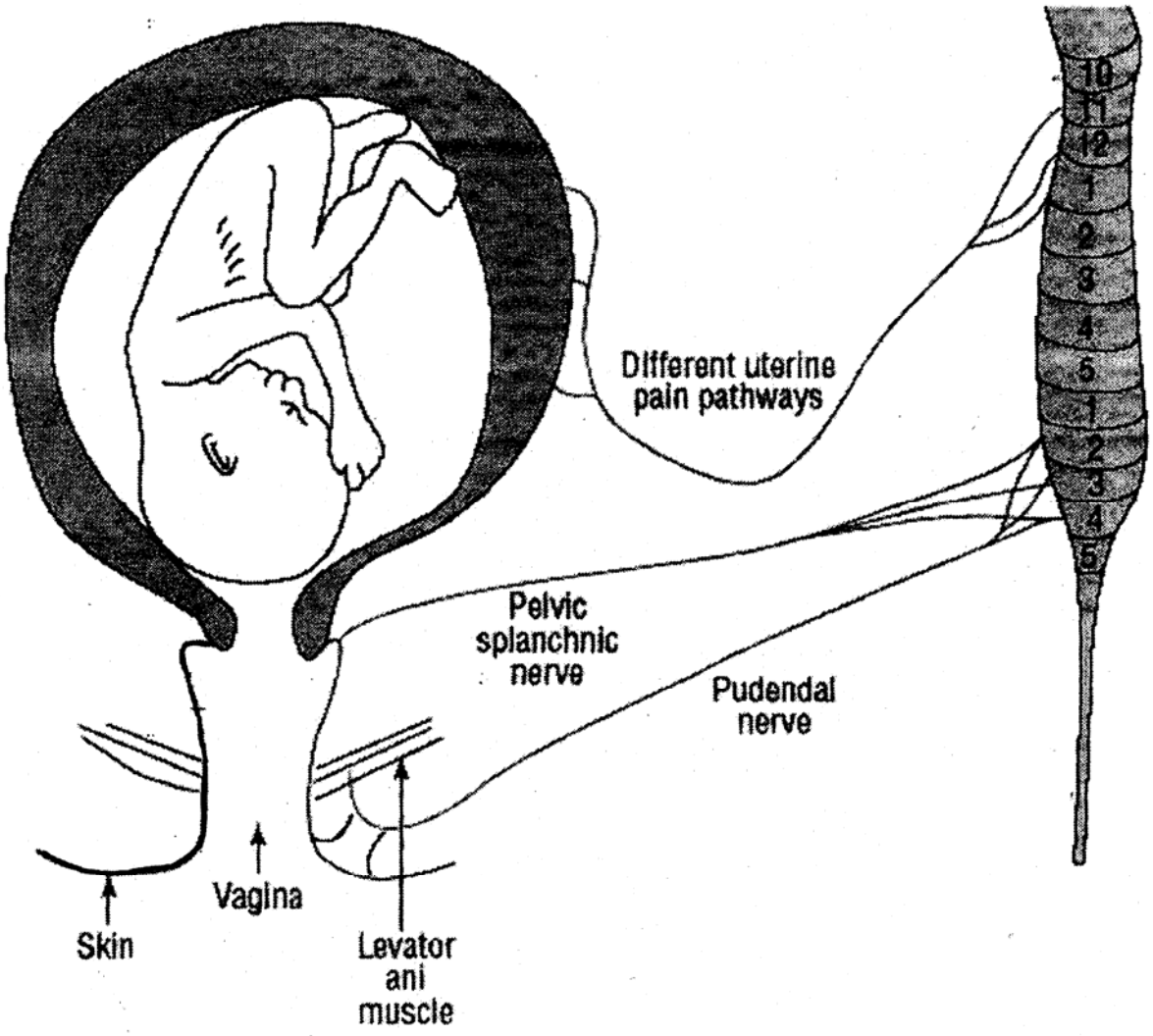

Figure 3: Nerve supply of the uterus and birth canal **(Findley and Chamberlain, 1999).**

Origin and Transmission of Labor Pain:

Labor pain is made up of visceral and somatic components. The *visceral* component involves distension of the cervix and the lower uterine segment (and possibly also the uterine body) during the first stage of labor contractions. The patient usually only feels pain if the intrauterine pressure exceeds 25 mmHg and she experience minimal discomfort below

this pressure. Myometrial and cervical ischemia during contractions may also cause additional pain via other nerve afferents in uterine muscle fibers **(Collis et al., 2002 and Wagih, 2006).**

Early labor pain is referred to T 11—T12 dermatomes so that pain is felt in the lower abdomen and back. At this early stage of labor the pain is dull, predominantly C-fibre transmitted and sensitive to opioid drugs. As labor progresses to the active first stage (3-4 cm) and uterine contractions become more intense, the pain becomes sharper and spreads to the adjacent dermatomes (T10, LI). The sharper pain is thought to be predominantly Aδ fibre transmitted and more opioid resistant. Stretching and distension of the pelvic floor, perineum and vagina during the late first stage and second stage of labor causes *somatic* pain. This pain is also opioid resistant **(Collis et al., 2002 and Wagih, 2006).**

A- Pain of the First Stage of Labor:

The first stage of labor pain is caused by uterine contractions and stretching of the cervix. This continues throughout the first stage until complete dilatation is achieved. The Aδ and C primary afferent fibers that supply the uterus and cervix accompany the sympathetic nerves as follows; first, the uterine and cervical plexus; second, the pelvic (inferior hypogastric) plexus; third, the middle hypogastric plexus or nerve, and fourth, the superior hypogastric and aortic plexuses. **(Cunningham et al., 2005)**.

The nociceptive afferents then pass to the lumbar sympathetic chain and onward through the lower thoracic sympathetic chain. As is often the case, pain from the viscera, such as the pain caused by uterine contractions, is directly referred to dermatomes supplied by the same spinal cord segments that receive input from the uterus and cervix **(Cunningham et al., 2005).**

B- Pain of the Second Stage of Labor:

When complete dilatation of the cervix occurs there is a notable reduction of nociceptive signals, but uterine contractions persist. The pain that develops in the second stage emanates from continued distention of the entire vaginal canal as the fetus descends toward the vaginal outlet.

Some of the painful signaling comes from muscular tension and tearing during this final descent and dilatation of the birth canal. Continued distension causes intense stretching and actual fascia tearing. Distension and stretching of the tissues of the mid and lower vagina, distention of the outlet and eventual dilatation to make way for the passage of the largest portion of the fetus - the fetal head. , these latter anatomical changes are accomplished with maximum stimulation via the nociceptive pathways by way of the pudendal nerves to dorsal root ganglia located at the S2-4 levels. **(Cunningham et al., 2005).**

There is also a significant sensory spillover to other adjacent pathways via the lower sacrum, perianal and even upper thigh regions. Just like the pain caused by stimulation of superficial somatic structures, the perineal pain is sharp and well localized. In the late part: of the first stage and during the second stage, a number of parturients develop aching, burning or cramping discomfort in the thigh and less frequently in the legs **(Cunningham et al., 2005).**

This can be the result of the stimulation of pain-sensitive structures in the pelvic cavity that include traction on the pelvic peritoneum, stretching and tension of the bladder, urethra and rectum, stretching and tension of ligaments, fascia and muscles of the pelvic cavity and abnormal pressure on roots of the lumbosacral plexus. The neural pathways for the second stage of labor involve the pudendal nerve and other smaller branches, which are derived from S2, S3 and S4 **(Cunningham et al., 2005).**

physiology of Pain

Pain is defined as an unpleasant sensory and emotional experience associated with either actual or potential tissue damage, or described in terms of such damage **(Morgan et al., 2002).**

Pain receptors:

There are three types of pain receptors: .

1-Mechanosensitive pain receptors: which are stimulated by strong mechanical stimuli.