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List of Abbreviations

ACL	: Anterior cruciate ligament
ACLS	: Advanced Cardiac Life Support Guidelines
AV	: Atrioventricular
CGRP	: Calcitonin gene-related peptide
CNS	: Central nervous system
COX-2	: Cyclooxygenase-2
DPQ	: Dartmouth pain Questionnaire
EAA	: Excitatory amino acids
ECG	: Electrocardiogram
HR	: Heart rate
IVRA	: Intravenous regional anesthesia
LA	: Local anesthetic
LP	: Lumbar plexus
LPB	: Lumbar plexus block
MAOI	: Monoamine oxidase inhibitors
MPQ	: Mc Gill pain Questionnaire
NMDA	: N-methyl-D-aspartic acid
NSAID	: Non-steroidal anti-inflammatory drugs
PCB	: Psoas compartment block
PSIS	: The posterior superior iliac spine
RR	: Respiratory rate
SP	: Spinous process
SPET	: Single positron emission tomography
TCA	: Tricyclic antidepressants
VC	: Vasoconstrictors
VRS	: Verbal rating scale
WDR	: Wide dynamic range
WHYPQ	: West Haven-Yale pain Questionnaire

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Raham Hasan Mostafa

Lumbar Plexus Block as a Method of Postoperative Analgesia after Hip Surgery

Thesis
Submitted for partial fulfillment
Of M.D. Degree in **Anesthesiology**

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تخدير الضفيرة القطنية كوسيلة لتسكين الألم بعد العمليات الجراحية بالفخذ

رسالة
توطئة للحصول على درجة الدكتوراه فى التخدير

مقدمة من
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الملخص العربي

يعتبر الألم تجربة واعية قد تتأثر بالعديد من العوامل مثل التغيرات في التصنيع الحسي–البدني أو العوامل النفسية و الاجتماعية.

الام ما بعد العمليات الجراحية لها العديد من المضاعفات علي سائر أعضاء الجسم مثل القلب و الجهاز العصبي إلخ ... و يعتبر تسكين الألم بعد عمليات الفخذ من أكبر التحديات خصوصا خلال الأربع و عشرون ساعة الأولي بعد العملية الجراحية. مما أدي إلي ظهور العديد من الأساليب لتسكين آلام ما بعد عمليات الفخذ منها علي سبيل المثال البنج النصفي و تخدير الضفيرة القطنية.

علي مدي العشر سنوات الماضية , أدت التطورات العديدة إلي زيادة الاهتمام بتخدير أعصاب الأطراف السفلية.

هدف هذه الدراسة هو تقييم تخدير الضفيرة القطنية كوسيلة فعالة لتسكين آلام ما بعد العمليات الجراحية بالفخذ بالإضافة إلي اختبار فعالية إضافة عقار الكلونيدين للبيوبيفاكين و مدي تأثيره عليه.

.تم تقسيم المرضي إلي ثلاث مجموعات متساوية . كل مجموعة اشتملت علي 20 مريض.

تم تثبيت أسلوب التخدير الكلي في جميع الحالات.

في نهاية العملية الجراحية و بعد عودة القوة العضلية,تم عمل الآتي:

في مجموعة (أ) :

تم سحب الأنبوبة الحنجرية من الحنجرة بعد الوصول إلي معايير سحب الأنبوبة الحنجرية.

في مجموعة (ب) :

للمرضي المنتمين لهذه المجموعة،تم حقن جرعة واحدة من المحلول المكون من مزيج 15 ملل من البيوبيفاكين 0,5% + 15 ملل محلول ملح 0،9% عن طريق استخدام تخدير الضفيرة القطنية ثم تم سحب الأنبوبة الحنجرية مثل مجموعة أ.

في مجموعة (ج) :

للمرضي المنتمين لهذه المجموعة, تم إضافة عقار الكلونيدين (75 ميكروجم) أي ما يعادل (2.5 ميكروجرام /ملل) علي نفس المزيج المستخدم في مجموعة (ب) ثم تم سحب الأنبوبة الحنجرية مثل المجموعتين السابقتين.

و قد تم متابعة الآتي خلال الساعات الأربع و العشرين للدراسة: قياس معدل الألم ،قياس استهلاك الأدوية المسكنة،قياس معدل التهدئة،قياس الوظائف الحيوية، قياس معدل حدوث أعراض جانبية بالإضافة إلي قياس نسبة مستوي الكورتيزول بالدم.

و قد أوضحت الدراسة النتائج الآتية:

تخدير الضفيرة القطنية يعتبر وسيلة فعالة و ممتازة لتسكين آلام ما بعد العمليات الجراحية بالفخذ و أن إضافة عقار الكلونيدين للبيوبيفاكين قد أدي إلي تقليل استهلاك الأدوية المسكنة لمدة 12 ساعة بعد العملية الجراحية.

Introduction

Clinical experience has demonstrated that postoperative pain in total hip arthroplasty is severe and worsens with patient mobilization. Effective relief of postoperative pain is essential for patient comfort and satisfaction, allows greater mobility, minimizes postoperative morbidity and mortality, and promotes faster recovery by preventing or decreasing muscle spasms that hinder early joint mobilization ***(Fischer and Simanski, 2005).***

Pain after hip surgeries is severe, especially during the first 24 hours after surgery. Techniques used more commonly for analgesia after hip surgeries include patient-controlled analgesia (PCA) with IV opioids, subarachnoid analgesia, epidural analgesia, and anterior or posterior (psoas compartment block) lumbar plexus block ***(Capdevila et al., 2002).***

Posterior lumbar plexus block promotes effective unilateral analgesia after total hip arthroplasty, reducing pain scores and consumption of analgesics ***(Duarte et al., 2009)***

The posterior approach to the lumbar plexus is associated with the risk of dispersion or inadvertent injection of the anesthetic solution in the epidural or subarachnoid space (***Duarte and Saraiva, 2006).***

Clonidine is an α_2-adrenergic agonist that is increasingly used as an adjuvant to local anesthetics administered peripherally. α_2 agonists such as clonidine, produce analgesia via supraspinal and spinal adrenergic receptors. Clonidine has also direct inhibitory effects on peripheral nerve conduction (A and C nerve fibers) ***(Duflo et al., 2005).***

Aim of the Work

The purpose of this study is to evaluate lumbar plexus nerve blockade as an effective technique in managing postoperative pain after hip surgery.

The aim of this thesis is also to test the efficacy of addition of clonidine to bupivacaine in prolongation of bupivacaine's effect.

CHAPTER (1)
Pain

Definition of pain :

The International Association for the Study of Pain defines pain as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage." This definition recognizes the interplay between the objective physiologic sensory aspects of pain and its subjective emotional and psychological components ***(Carr and Goudas, 1999).***

Pain is clinically divided into: acute pain which is primarily due to nociception and chronic pain which may also be due to nociception, but in which psychological and behavioral factors often play a major role. Postoperative pain is one of the types of acute pain and can be further differentiated based on the origin and feature into somatic and visceral pain. Somatic pain is due to nociceptive input arising from skin, subcutaneous tissues and mucous membranes. It is characterized by being well-localized and described as sharp, pricking, throbbing or burning sensation. Visceral pain - on the other hand - is due to nociceptive input arising from internal organ or one of its covering. It is usually dull diffuse pain which is frequently associated with abnormal sympathetic or parasympathetic activity causing nausea, vomiting, sweating and /or changes in blood pressure or heart rate ***(Grubb, 2001).***

Many factors influence the occurrence, intensity, quality and duration of postoperative pain like the site, nature and duration of operation, type of incision, the preoperative psychological, physical and pharmacological preparation of the patient, added to this the anesthetic management and the quality of post operative care ***(Grubb, 2001).***

So, in order to achieve good quality of postoperative analgesia, careful history should be taken from the patients about any coexisting medical conditions such as substance abuse or withdrawal, anxiety disorder, affective disorder, hepatic or renal impairment and any past history of poor pain management. In addition, preoperative patient education should be done to the patients to improve expectations, compliance and ability to effectively interact with pain management techniques ***(Chris, 2003).***

Neuro-physiology of pain :

Nociceptors:

Sensation is often described as either protopathic (noxious) or epicritic (non-noxious). Epicritic sensation (light touch, pressure, proprioception and temperature discrimination) is received by low-threshold receptors (specialized endorgans on the afferent neurons) (fig. 1) and conducted by large myelinated nerve fibers while; protopathic sensation (pain) is sub served by high-threshold receptors (free nerve endings) ***(Carr and Goudas, 1999).***

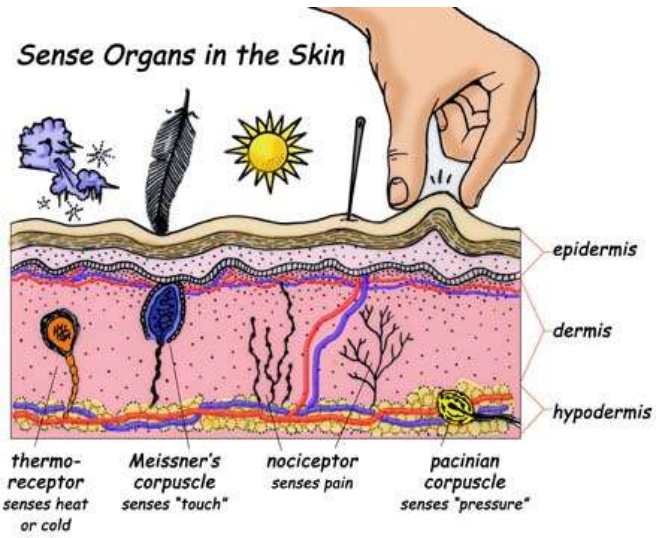

Figure (1): Sense organs in the skin *(Julius and Basbaum, 2001)*

Noxious sensations can often be broken down into two components: a fast, sharp and well-localized sensation "first pain" which is conducted by A- delta fibers; and a duller, slower onset and poorly localized sensation "second pain" which is conducted by C fibers (fig. 2) ***(Julius and Basbaum, 2001).***

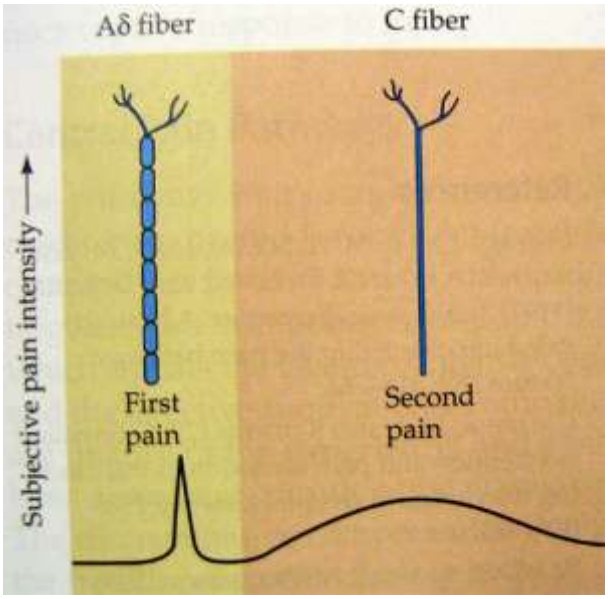

Figure (2): A- delta and C fibers *(Julius and Basbaum, 2001)*

This protopathic pain is transmitted mainly by free nerve endings that sense mechanical or chemical tissue damage. Several types of these pain receptors are recognized; (1) Mechano-nociceptors, which respond to pinprick (2) Silent nociceptors, which respond only on the presence of inflammation (3) Polymodal mechano-heat receptors which are more prevalent and respond to excessive pressure, extreme of temperature and pain producing substance ***(Richardson and Mustard, 2009).***

Pain pathway:

Pain is conducted along three neuron pathways; from the periphery to the cerebral cortex.