



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكروفيلم

# بسم الله الرحمن الرحيم



**HANAA ALY**



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# شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



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# جامعة عين شمس

## التوثيق الإلكتروني والميكروفيلم

### قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



### يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



**HANAA ALY**



# **Nalbuphine as an Adjuvant to Levobupivacaine in Caudal Analgesia in Children**

*Thesis*

*Submitted for Partial Fulfillment of Master Degree in  
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

# قَالَ

سَبِّحْ اِنَّكَ لَا تَعْلَمُ لَنَا  
اِلَّا مَا عَلَّمْتَنَا اِنَّكَ اَنْتَ  
الْعَلِيمُ الْعَظِيمُ

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## *List of Abbreviations*

Abb.	Full term
AAG .....	Alpha-1-acid glycoprotein
ASA.....	American Society of Anesthesiologists
CBC .....	Complete blood count
Cl .....	Clearance
CNS .....	Central nervous system
CYP.....	Cytochrome
ECG .....	Electrocardiography
ETT.....	Endotracheal tube
HR.....	Heart rate
INR.....	International normalized ratio
LAST .....	Local anesthetic systemic toxicity
MAC .....	Minimum Alveolar Concentration
MAP .....	Mean arterial pressure
PABA.....	Para-amino benzoic acid
PCEA.....	Patient-controlled epidural analgesia
PDPH.....	Post dural puncture headache
PONV .....	Postoperative nausea and vomiting
PT .....	Prothrombin time
PTT.....	Partial thromboplastin time
SPO2 .....	Oxygen Saturation
TFAR .....	Time to first analgesic requirement
VAS.....	Visual analogue scale
VDss .....	Higher volumes of distribution at steady state



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# INTRODUCTION

Various multimodal techniques have been designed for pediatric pain relief. These include both systemic and regional analgesia. The most commonly used regional technique is caudal epidural block (*Xiang et al., 2013*).

Caudal anesthesia (CA) is the single most important pediatric regional anaesthetic technique. The technique is relatively easy to learn, has a remarkable safety record and can be used for a large variety of procedures (*Jöhr and Berger, 2012*).

In children, CA is most effectively used as adjunct to general anesthesia and has an opioid-sparing effect, permitting faster and smoother emergence from anesthesia (*O’Raux et al., 2010*).

A successful caudal anesthetic blockade affords the anesthesiologist the opportunity to reduce intraoperative use of volatile anesthetic agent and to use a narcotic-sparing approach that ultimately may benefit the patient while providing a better postoperative course with less nausea and vomiting (*Mukherji et al., 2011*).

Prolongation of anesthesia can be achieved by adding various adjuvants, such as opioids like fentanyl and non-opioids like, dexmedetomidine, ketamine, midazolam,

clonidine with varying degrees of success (*Sanwatsarkar and kapur et al., 2017*).

Nalbuphine can be added in caudal analgesia and provide an increase in the efficacy and the duration of postoperative analgesia (*Abdallah et al., 2019*).

## **AIM OF THE WORK**

To compare the effects of plain levobupivacaine 0.25% versus levobupivacaine 0.25% plus nalbuphine 0.1 mg/kg single-shot caudal epidural for postoperative pain relief in children undergoing hypospadias repair surgeries.



## Chapter 1

# CAUDAL CANAL BLOCK

### Caudal Epidural Block:

Caudal anesthesia has been used for many years and is the easiest and safest approach to the epidural space. When correctly performed there is little danger of either the spinal cord or dura being damaged (*Chen et al., 2004*).

### Applied Anatomy:

The caudal (sacral) canal extends from the upper border of sacral bone (in relation to lumbar epidural space) to the sacral hiatus. Whole of this canal is enclosed in sacral bone.

### Sacrum:

The five sacral vertebrae unite to form sacrum. The anterior surface of sacrum has four paired openings for the exit of anterior rami of sacral nerves (*figure 1*).

The posterior surface is convex & rough in nature because of fusion of vertebral elements. The posterior surface has four pairs of foramina for escape of posterior rami of sacral nerves. The laminae of fifth sacral vertebra (sometimes fourth also) fails to fuse; the resultant gap is called the sacral hiatus. The sacral hiatus is covered by sacrococcygeal membrane which is an extension of the ligamentum flavum and is pierced