# Caudal block versus penile block for postoperative analgesia in children undergoing hypospadias repair

## Thesis

A thesis for partial fulfillment ofmaster degree in anesthesia

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# LIST OF CONTENTS

# LIST OF ABBREVIATIONS

| Abb. | | Full Term |
|---|---|---|
| **AAG** | : | alpha-1 acid glycoprotein |
| **AP** | : | anteroposterior |
| **ASA** | : | American Society of Anesthesiologists |
| **ASRA** | : | The American Society of Regional Anesthesia and Pain Control |
| **CA** | : | caudal anesthesia |
| **CNS** | : | central nervous system |
| **CPR** | : | Cardiopulmonary resuscitation |
| **DPNB** | : | dorsal penile nerve block |
| **FLACC** | : | Face, leg,activity, cry, Consolability |
| **G** | : | gauge |
| **Hr** | : | hour |
| **HR** | : | heart rate |
| **IASP** | : | The International Association for the Study of Pain |
| **IV** | : | intravenous |
| **LA** | : | Local Anesthetics |
| **LMA** | : | laryngeal mask airway |
| **MBP** | : | mean blood pressure |
| **MBP** | : | Mean arterial blood pressure |
| **Mcg** | : | microgram |
| **Mg** | : | milligram |
| **Ml** | : | milliliter |
| **Mm** | : | millimeter |
| **N** | : | number |
| **NIBP** | : | non invasive blood pressure |
| **PACU** | : | postanesthesia care unit |
| **PO** | : | per oris |
| **Pr** | : | per rectal |
| **SCL** | : | sacrococcygeal ligament |
| **SD** | : | Standard deviation |
| **VAS** | : | Visual Analogue scale |

# LIST OF TABLES

## Table No. Title Page No.

# LIST OF FIGURES

## Abstract

**Background:** Hypospadias repair is one of the most frequently performed surgical procedures in the pediatric population. Using optimal analgesic regimen provides safe and effective analgesia, reduce postoperative stress response and accelerate recovery from surgery. **Aim of the Work:** The aim of this work is to evaluate the success rate and the effectiveness of penile block for hypospadias repair in pediatric patients in comparison with caudal block. **Patients and Methods:** This prospective randomized study was conducted in Ain Shams University Hospitals; Pediatric Surgery Unit. It included 80 ASA I or II patients undergoing hypospadias (distal penile and mid penile) repair. They were divided into two groups: Group P: Group P penile block (n = 40) received dorsal penile nerve block by using the subpubic approach technique. Group C: Group C caudal block (n = 40) received caudal epidural block using a 22-G needle in the lateral decubitus position.**Results:** There was no statistically significant difference between two groups regarding haemodynamics including MBP (P>0.05) and HR (P>0.05). FLACC pain scores were significantly lower in group C compared with group P ($P < 0.01$). Also, the time to first need for analgesia was significantly lower in group C compared with group P ($P < 0.001$) .The total rescue analgesic requirement was also significantly lower ($P < 0.001$) in group C compared with group P.Postoperative time of ambulation was also significantly lower ($P < 0.05$) in group P compared with group C. **Conclusion:** the current study revealed that caudal block provided significantly prolonged postoperative analgesia, reduced the postoperative analgesic requirements and prolonged time of ambulation as compared with penile block in pediatric patients undergoing hypospadias repair.

**Key words:** Caudal block, penile block, postoperative analgesia, children, hypospadias repair

# INTRODUCTION

Pain is one of the most misunderstood, underdiagnosed, and untreated medical problems, particularly in children. New Joint Commission on Accreditation of Health Care Organization regards pain as fifth vital sign and requires caregivers to regularly assess pain. Postoperative pain can result in an uncooperative and restless child. Hence, it is preferable to prevent the onset of pain rather than to relieve its existence **(Al-Zaben et al., 2015)**.

Evidence suggests that inadequate relief of postoperative pain may result in harmful physiological and psychological consequences that may lead to significant morbidity, which may delay recovery and return to daily living besides untoward behavioral changes in children. Specific early analgesic interventions may reduce the incidence of pain**(Joshi GP and Ogunnaike BO, 2005)**.

Regional anesthesia, in combination with general anesthesia, is frequently used for children undergoing surgical procedures. Advantages of this technique are a smoother intraoperative course and decreased requirements of general anesthetics, often leading to a faster, smoother wake up, decreased stress response and excellent pain relief in the immediate postoperative period **(Telgarsky et al., 2006).**

Single-shot caudal block is one of the most useful and most often performed regional blocks in pediatric anesthesia. They are

suitable for lower extremity, perineal, inguinal, and lower abdominal surgery. Properly performed, a single-shot caudal block is a rapid and safe technique that leads to better patient comfort and potentially better outcome, and it could also decrease the anesthesia time by speeding room turnover **(Miller et al., 2010).**

Penile blocks have became more commonly used in pediatric patients as adjunct to general anesthesia for procedures on the penis such as circumcision, hypospadias repair, urethral dilation and papilloma laser fulguration. It provides anesthesia to the distal 2/3 of the penis only **(Manuel et al., 2012)**.

An advantage of penile block over caudal anesthesia is the lack of sensory and motor block to the lower extremities, which might interfere with ambulation postoperatively in a day surgery patient **(Ashrey andBosat, 2014).**

# AIM OF THE WORK

The aim of this work is to evaluate the success rate and the effectiveness of penile block for hypospadias repair in pediatric patients in comparison with caudal block .

# Review of Literature

# Anatomical consideration

## Hypospadias:

Hypospadias is one of the most common congenital anomalies in males. Hypospadias is an abnormality of anterior urethral and penile development in which the urethral opening is ectopically located on the ventral aspect of the penis proximal to the tip of the glans penis, which, in this condition, is splayed open. The urethral opening may be located as far down as in the scrotum or perineum. The penis is more likely to have associated ventral shortening and curvature, called chordee, with more proximal urethral defects **(Van der Horst and De Wall, 2017).**

## Embryology:

The first, hormone-independent stage of genital development consists of forming a urethral plate in the midline of the genital tubercle. This takes place during 12th week of gestation in both male and female fetuses. During the second stage, between 11 and 16 weeks of gestation, the genital tubercle elongates under the influence of fetal testicular androgens. The urethral plate elongates into a groove towards the tip of the phallus. Fusion of the labioscrotal folds in the midline forms the scrotum, and fusion of the urethral folds

adjacent to the urethral plate results in creation of the penile urethra. Eventually, the glans of the penis and the foreskin close in the midline **(Blaschko et al., 2012)**.

## Classification of hypospadias:

The location of the abnormal urethral meatus classifies the hypospadias. Although several different classifications have been described, most physicians use the one proposed by **Barcat** and modified by **Duckett**, which describes the location of the meatus after correction of any associated chordee. Descriptive locations described include the following:

1-Anterior (glanular and subcoronal).

2-Middle (distal penile, midshaft, and proximal penile).

3-Posterior (penoscrotal, scrotal, and perineal).

The location is anterior in 50% of cases, middle in 20%, and posterior in 30%; the subcoronal position is the most common overall **(Duckett et al., 1998).**

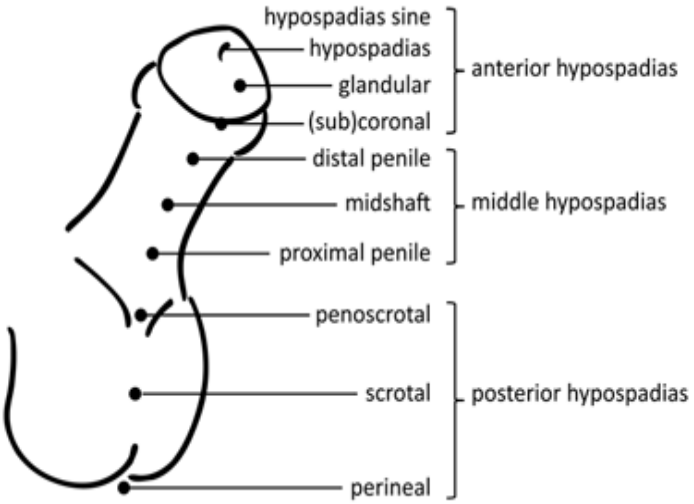


**Fig.(1):** Types of hypospadias **(Duckett et al., 1998).**

## Surgical repair:

Surgical intervention for hypospadias can be performed at any age, however, most authors recommend operative intervention at 6–18 months **(Manzoni et al., 2004).** The American Academy of Pediatrics suggests this time interval to limit psychological stress and subsequent behavioural problems seen in toddlers undergoing genital surgery **(Yildiz et al., 2013)** and **(Lu et al., 2012)**.

The surgical management of hypospadias aims to achieve a straight penis with a slit-shaped and adequate caliber meatus at the apex of the glans together with an acceptable cosmetic outcome.

Surgical options include meatotomy and repair with a local flap.Surgery may be performed at a single stage or more stages **(Snodgrass and Bush, 2016)**.

**Sensory penile innervation:**

Local anesthesia of the penis is used as preparation to perform various procedures, including release of paraphimosis, dorsal slit of the foreskin,circumcision and repair of penile lacerations **(Telgarsky et al., 2006)** .

The penile shaft is composed of 3 erectile columns, the 2 corpora cavernosa and the corpus spongiosum, as well as the columns' enveloping fascial layers, nerves, lymphatics, and blood vessels, all covered by skin.

The penis is innervated by the pudendal nerve (S2-S4). This nerve eventually divides into the right and left dorsal nerves of the penis that pass under the pubis symphysis to travel just below the Buck fascia to supply the sensory innervation to the penis **(Garry et al., 2006)**.

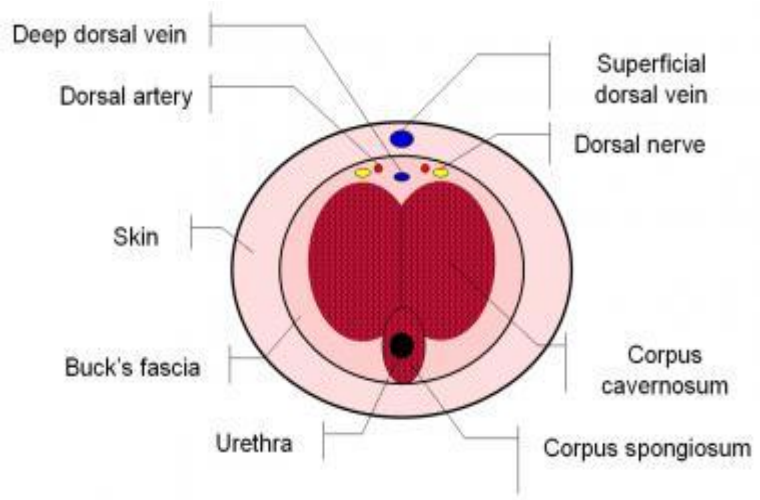


**Fig.(2):** Transverse section through the base of the penis **(Garry et al., 2006).**

In contrast to typical glabrous skin, the so-called mucocutaneous tissue of the glans penis contains a predominance of free nerve endings, numerous genital end bulbs and rarely Pacinian and Ruffinian corpuscles. Merkel nerve endings and Meissner corpuscles are not present **(Johnson and Halata, 1991)**.