



بسم الله الرحمن الرحيم

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Low dose caudal VS dorsal penile nerve block for postoperative analgesia after circumcision

Thesis

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Anesthesia, Intensive Care and Pain Management*

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالَ

سَبَّحَانَكَ لَا إِلَهَ إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
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List of Abbreviations

Abb.	Full term
CNB	Caudal nerve block
DBP	Diastolic blood pressure
DPNB	Dorsal penile nerve block
HR.....	Heart rate
MAP	Mean arterial pressure
SBP	Systolic blood pressure

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INTRODUCTION

Circumcision is one of the oldest surgical operations which was performed and described from ancient times (*Remondino, 2001*). Thirty percent of males undergo circumcision worldwide (*Homfray et al., 2015*).

It is performed for medical indications but mostly religious ones. Religious circumcision is commonly performed in Muslim and Jewish community. Medical indications for circumcision are chronic sclerosing inflammation, phimosis, to prevent urinary infection and also sexually transmitted diseases. Surgery success and complication rates depend on good preoperative preparation including anesthetic care and proper knowledge about complications (*Jöhr et al., 2015*).

Circumcision in children is followed by severe pain, especially during the first 2 hours of postoperative period. Pain control after surgery increases patient satisfaction and shortens hospital stay (*Weksler et al., 2005*).

Pain is one of the most under diagnosed, and untreated medical problems in children. Inadequate pain control during childhood may have long-term negative effects including harmful neuroendocrine responses, disrupted sleep cycles and increased pain perception during subsequent painful experiences. It also can result in an uncooperative and restless child. Hence, it is best to prevent the onset of pain rather than to relieve its existence (*Al- Zaben et al., 2015*).

In children, regional anesthesia procedures can be safely used to achieve intra- and postoperative analgesia in all age groups. It is an essential element of a multimodal pain concept and should be performed on children wherever appropriate and possible (*Ecoffey et al., 2010*).

An effective pain therapy improves the operative outcome, as an untreated surgical stimulus leads to a range of hemodynamic, hormonal, metabolic, immunological-inflammatory reactions and behavioral abnormalities. The use of regional anesthesia results in greater hemodynamic stability; the intraoperative opioid consumption is reduced, thus enabling a rapid and smooth recovery of children from anesthesia (*Bosenberg, 2012*).

Caudal anesthesia is one of the most important pediatric regional anesthetic technique. The technique is relatively easy to learn, has a remarkable safety record and can be used for a large variety of procedures (*Schuepfer et al., 2000*).

Peripheral nerve blocks provide prolonged analgesia restricted to the site of surgery e.g. penile nerve block (PNB) for circumcision or sciatic nerve block for pediatric surgery. Caudal nerve block (CNB) is preferred as all types of surgery below the umbilicus can be covered by it: ‘one technique fits all’. The main goal of CNB is to provide postoperative pain relief, in addition to intraoperative analgesia (*Krane et al., 1998*).

AIM OF THE WORK

The current study is planned to compare the effectiveness, duration of post-operative analgesia, and the complications among dorsal penile nerve block (DPNB), caudal nerve block (CNB) and the combination of both.

Chapter 1

ANATOMY OF THE SACRUM

The sacrum is a large bone located at the terminal part of the vertebral canal, where it forms the posterior aspect of the pelvis. It is remarkably thick, which aids in supporting and transmitting the weight of the body (*Netter, 2014*).

Bony Landmarks:

The sacrum is formed by the fusion of the five sacral vertebrae. It has an inverted triangular, concave shape. The bone consists of a base, apex and four surfaces:

- **Base** – articulates superiorly with the fifth lumbar vertebra and its associated intervertebral disc.
- **Apex** – abuts the coccyx inferiorly.
- **Auricular surfaces** – located laterally on the sacrum, and shaped like the outer ear – hence the name. Each articulates with the auricular surface of the ilium.
- **Anterior and posterior surfaces** – provide attachment to pelvic ligaments and muscles (*Netter, 2014*).

Internally, the central canal of the vertebral column continues along the core of the sacrum and ends at the 4th sacral foramina, as the sacral hiatus (*Sinnatamby and Last, 2011*).

Surfaces of Sacrum:

There are two surfaces of the sacrum – a coarse dorsal surface and a relatively smooth pelvic surface. When the patient is standing, the pelvic surface faces antero-inferiorly while the dorsal surface is in the posterosuperior direction (*Netter, 2014*).

Dorsal Surface:

The dorsal surface of the sacrum is coarse and rugged. This can be attributed to the fusion of the sacral vertebrae, which give rise to three bony ridges (or crests). Figure (1)

In the midline of the dorsal surface, there is a central ridge of bone, called the median sacral crest. It is formed by the fusion of the spinous processes of the first three sacral vertebrae. It gives attachment to the supraspinous ligament (*Netter, 2014*).

The intermediate sacral crests are formed by the fusion of the sacral articular processes. The posterior sacroiliac ligaments are attached along this crest. It should be noted that the superior articulating process of S1 and the inferior articulating process of S5 are not fused. Therefore, the former articulates with the inferior articulating process of L5, while the latter – also known as the sacral cornu – articulates with the coccygeal cornu (superior articulating process of coccyx) (*Netter, 2014*).

Finally, the transverse processes of the five sacral bones fuse to form the lateral sacral crests, which offers a point of attachment to the posterior sacroiliac ligaments as well as the sacrotuberous ligament. Fortunately, the fusion of these processes is not complete, therefore the sacral nerve fibers are allowed to enter and leave the central canal through the four pairs of posterior sacral foramina (*Netter, 2014*).

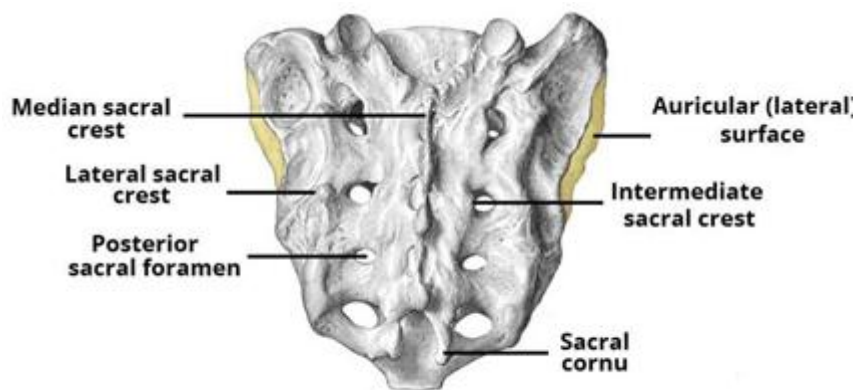


Figure (1): The articular surface of the sacrum (*Netter, 2014*).

Pelvic Surface:

The pelvic surface of the sacrum is less remarkable than the dorsal surface. Figure (2) In the adult, the surface is marked by four transverse lines – the remnants of the fused sacral intervertebral discs (fusion of the sacral vertebrae begins at age 20) (*Netter, 2014*).

Superiorly, there is an anterior projection of bone, known as the sacral promontory. It forms the posterior margin of the pelvic inlet and as a result, it is serially continuous with the