ISSN No:2319-5886

International Journal of Medical Research and Health Sciences, 2022, 11 (7): 1-4

Confirmation of Success Rate of Landmark Based Caudal Epidural Block Using Fluoroscopy

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Received: 27-May-2022, Manuscript No. ijmrhs-22-65212; **Editor assigned:** 30-May-2022, PreQC No. ijmrhs-22-65212 (PQ); **Reviewed:** 13-Jun-2022, QC No. ijmrhs-22-65212; **Revised:** 26-Jul-2022, Manuscript No. ijmrhs-22-65212 (R); **Published:** 09-Aug-2022.

ABSTRACT

Background: *The aim of present study was to know the success rate of anatomical landmark based caudal epidural block, confirmed by fluoroscopy.* ***Materials and methods:*** *Four hundred and twenty one patients aged 30-70 years, which were scheduled to go for interventional caudal epidural block for chronic back pain, were selected for study. Caudal block was administered based on anatomical landmarks and needle position was confirmed by fluoroscopy and contrast. Patients were placed in prone position, bilateral posterior superior iliac spine; sacral cornua and hiatus were identified by palpation. The primary objective was to know the success rate of anatomical landmark based epidural caudal block and the secondary objectives were to compare the first attempt success rate and complications like blood tap, dural puncture or other complications.* ***Results:*** *Visibility of anatomical landmarks was easy in 80.50% patient and difficult in 19.50% patients. Palpability of cornua was easy in 84% of patients and difficult in 16% of patients. The success rate of anatomical landmark based caudal epidural block was 78.5% confirmed by fluoroscopy and contrast. The first attempt success rate was in 65.5%, 34.5% patients need more than one attempt for landmark based caudal epidural block. Blood tap was seen in 10.4% patients and in 4% patient's needle was intravenous when contrast was given without showing blood tap.* ***Conclusion:*** *Landmark based technique caudal block technique is still useful where ultrasound or fluoroscopy facilities are not available.*

Keywords: Caudal block, Anatomical landmarks, Fluoroscopy

INTRODUCTION

The caudal epidural block involves placing a needle through the sacral hiatus to deliver medications into the epidural space. This approach to the epidural space is not only widely used for surgical anesthesia and analgesia but also popular in managing a wide variety of chronic pain conditions in adults. It was first reported in 1901 by Cathelin, Pasquier and Sicard. The caudal block was introduced again in 1925 by Viner with its use for treating sciatica. It was popularized only after 1952 when a corticosteroid was added to the local anesthetic for acute and chronic pain by Robecchi and Capra in 1952 and Lievre in 1957.

The caudal epidural block was first introduced as a landmark-based, blind technique. In children, the successful rate with the blind technique is above 96% [1,2]. In adults, however, it was only 68–75% even in the experienced hands. [3-5] with the advent of imaging technology, fluoroscopy and ultrasonography have been increasingly used to guide caudal epidural block.

Ultrasonography and fluoroscopy has revolutionized the pain management interventions. The specialty of pain management has grown to new heights and fluoroscopy is the cornerstone of it. With improvement in the understanding of radiological imaging, anatomy and path physiology of pain, physicians in pain management are much better placed to accurately diagnose and treat the pain generators. But these facilities are not available in all centers especially in developing countries where land marked based caudal block is still commonly performed for pain management. Landmark technique is convenient in centers where ultrasound and fluoroscopy facilities are not available. Landmark-guided caudal blocks are time tested, simple and easy to perform technique. However there are considerable anatomic variations relevant to caudal epidural block, which may contribute to failed block by landmark-based blind technique. Using the advantages of fluoroscopy, we aimed to study success rate of anatomical landmark based caudal blocks confirmed by fluoroscopy.

LITERATURE REVIEW

This study was performed between Jan 2020 to November 2021 at interventional pain center Khyber Medical Institute and Hospital. After informed consent, a total of 400 patients, aged 30-70 years of either sex scheduled for interventional caudal block for chronic pain were included in this study. The patients who are excluded in this study are: patient with raised intracranial pressure, local infection and patient with bleeding disorder, patients on anticoagulants, local anesthetic drug allergy and pregnant women. After insertion of a 20-gauge intravenous cannula and attachment of monitor, baseline measurements of Heart Rate (HR), noninvasive arterial blood pressure, peripheral Oxygen saturation (SpO_2) were recorded before the block was performed. The patients were placed in prone or lateral decubitus position for caudal block. Bilateral posterior superior iliac spine, sacral cornua and hiatus were identified by palpation. 22G or 20G (angiocath) needles was introduced at 60°-90° angle at the apex of the hiatus and observed for “pop” or “loss of resistance.” After the “pop” was felt, the needle was reangulated by 20°-30° to the skin and pushed 2-3 mm inside the hiatus. Needle placement was confirmed by “swoosh” test [6] and later by using fluoroscopy imaging of needle tip and contrast flow in the caudal space. The primary objective was to know the success rate of anatomical landmark based epidural caudal block and the secondary objectives were to compare the first attempt success rate and complications like blood tap, dural puncture or other complications.

RESULTS

Visibility of anatomical landmarks was easy in 80.50% patient and difficult in 19.50% patients. Palpability of cornua was easy in 84% of patients and difficult in 16% of patients. The Success rate of anatomical landmark based caudal epidural block was 78.5% confirmed by fluoroscopy and contrast. The first attempt success rate was in 65.5%, 34.5% patients need more than one attempt for landmark based caudal epidural block. Blood tap was seen in 10.4% patients and in 4% patient’s needle was intravenous when contrast was given without showing blood tap.

DISCUSSION

Even though caudal epidural block has a wide range of clinical applications, it is sometimes hard to determine the anatomical location of the sacral hiatus and the caudal epidural space, especially in adults. The determination of the landmarks by the clinician enables the sacral hiatus to be ascertained and may increase the success rate of caudal epidural block. Caudal epidural block involves injection of a drug into the epidural space through the sacral hiatus to provide analgesia and anesthesia in various clinical settings [7]. The sacrum articulates with the fifth lumbar vertebra above and the coccyx below. The remnants of the inferior articular process elongate downwards on both sides of the sacral hiatus. These two bony processes are called the sacral cornua (horns) and define important clinical landmarks during caudal epidural block [8]. The sacral hiatus is located at the distal (caudal) part of the sacrum and its lateral margins are formed by the two sacral cornua. The sacral hiatus is shaped by incomplete midline fusion of the posterior elements of the distal portion of the fifth or sometimes the fourth sacral vertebra. This inverted U-shaped space is covered by the posterior aspect of the sacrococcygeal membrane and is an important landmark in caudal epidural block [9]. The hiatus is covered only by skin, a subcutaneous fatty layer and the sacrococcygeal membrane [10]. The distal most portions of the dural sac and the sacral hiatus usually terminate between levels S_1 and S_3.

Acute and chronic pain management as a science is progressing rapidly. The technology has advanced and newer technologies are making inroads with a rapid pace. Modern pain management interventions use image guided procedures. The various types of imaging used are fluoroscopy, ultrasonography and computerized tomography. The

gold standard till today is thought to be fluoroscopy. However, ultrasound is posing a real challenge to its supremacy [11]. In the past two decades, fluoroscopy has revolutionized the pain management interventions. The specialty of pain management has grown to new heights and fluoroscopy is the cornerstone of it. With improvement in the understanding of radiological imaging, anatomy and pathophysiology of pain, physicians in pain management are much better placed to accurately diagnose and treat the pain generators [11-13]. But ultrasonography and fluoroscopy image guided pain management technologies are not present in all centers especially in developing countries. Another reason for not doing image guided procedure because it needs trained doctors and staff to use fluoroscopy and ultrasonography. Due to these reasons, many parts of world they are dependent on surface anatomical land marked technique to reach caudal space. With a success rate of 77 to 80%, land mark based is still good technique for caudal block. Landmark guided caudal blocks are time tested, simple and easy to perform technique. However there are considerable anatomic variations relevant to caudal epidural block, which may contribute to failed block by landmark based blind technique. Lucky having the advantages of fluoroscopy, we aimed to study success rate of anatomical landmark based caudal blocks confirmed by fluoroscopy. In our study we found Success rate of anatomical landmark based caudal epidural block was 78.5% confirmed by fluoroscopy and contrast. The first attempt success rate was in 65.5%, 34.5% patients need more than one attempt for landmark based caudal epidural block. Blood tap was seen in 10.4 % patients and in 4% patient's needle was intravenous when contrast was given without showing blood tap. MY Stitz and H M Sommer [14] in their study "Accuracy of blind versus fluoroscopically guided caudal epidural injection" demonstrated Successful injection placement on the first attempt occurred in 74.1% of the patients and concluded that Caudal if fluoroscopic guidance is unavailable, impractical or contraindicated, the presence of readily palpable anatomic landmarks at the sacral hiatus and the absence of palpable subcutaneous airflow over the sacrum significantly increase the operator's confidence in the likelihood of an accurate injection. Manchikanti and their co-authors [15] conducted a prospective observational study to evaluate accuracy of needle placement and flow patterns of fluoroscopically guided caudal epidural injections and their results showed successful injection placement without fluoroscopic visualization was confirmed on subsequent fluoroscopic visualization in 77% of the patients. Intravenous placement of the needle was noted in 14% of the patients with positive flashback and aspiration in 50% of the patients. G Barham and A Hilton [16] conducted a study in 147 patients to assess the accuracy of blind placement of caudal epidural needles and the usefulness of the radio-contrast epidurogram and they found success rate of correct placement of needle in 68% patients confirmed by epidurogram. Nethra et al. [17] demonstrated 80% success rate in their study of confirmation of success rate of landmark based caudal blockade in children using ultrasound.

CONCLUSION

Fluoroscopic guided caudal block is gold standard for accurate needle placement but landmark-guided caudal blocks are time tested, simple and easy to perform technique with good success rates. Landmark technique is convenient in centers where fluoroscopy and ultrasound is not available.

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