شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

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جامعة عين شمس

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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

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Introduction

Urology is regarded as the home of endoscopy, many diseases of the urinary tract require endoscopic surgery. These include kidney stones, ureteropelvic junction obstruction, urethral strictures, tumors within the kidney collecting system, ureter, and to relieve blockage in the kidney due to various reasons. Endoscopy is used in both diagnosis and therapeutic settings. There are two main approaches to endoscopic surgery; the first approach is "retrograde". This means to proceed from the lower part of the urinary tract up. The second approach is "antrograde". This means to approach the kidney through the skin (Percutaneous). Recently Urology has been at the forefront of endoscopic use in clinical practice.[1]

The first patient to undergo Percutaneous Nephrolithotomy (PCNL) for treatment of kidney stone was in 1976. Since then, this technique has had constant evolution, which increases its success rate. Also usage of open Nephrolithotomy has been reduced to very minimal rates and (PCNL) has become the 1st choice of treatment for stag horn and other large renal stones (>2 cm in maximum diameter).[2]

With development with other techniques, like ESWL (Extracorporeal shock wave) and flexible ureteroscopy, the

indications have been markedly changed. In early days, PCNL was used for treatment of large stones, while ESWL was used for small ones. Recently with the advancement in the optics and endoscope, the concept have been changed and even though the small stones can be removed with PCNL with better outcome than ESWL.[3]

Despite the safety of PCNL, like any other procedure, it has its own complications as injury to related organs, hemorrhage and pain.[4] Surgical stress is accompanied by pain, immune-dysfunction, nausea/vomiting, ileus, which increases cardiac demands, sleep disturbance and fatigue. Also post operative pain can cause prolonged length of stay in hospitals and increased recovery period. However, despite an explosion in our knowledge of the pathophysiology of acute pain, the development of a few new analgesics, methods of drug delivery, and implementation of pain reducing minimal invasive surgical techniques, acute postoperative pain management remains a huge challenge for optimization.[5]

In a standard PCNL, a nephrostomy tube of various sizes and types is traditional and believed to be required at the end of the surgery to facilitate urinary drainage and prevent blood loss from the percutaneous tract. The main cause of postoperative

pain of PCNL is due to the local inflammatory reaction caused by the nephrostomy tube. However, tubeless PCNL may increase the risk of postoperative complications as infections due to absence of appropriate urinary system drainage. Also the mentioned procedure can only be done in patients with high selectivity and not commonly used in clinical practice. It's known that local anesthetics can suppress local inflammatory response by directly inhibiting some phases of inflammation. Peritubal local infiltration is one of the modalities that was developed to overcome the postoperative pain of PCNL, and it was proved to be effective in postoperative analgesia and decreasing the need to the oral or IV analgesics.[6]

NSAID and IV opioids have their benefits, but also they can cause some side effects especially to patients vulnerable to renal complications.[7]

Infiltration of the surgical site with local anesthetics is well known in practice [8], but subcutaneous infiltration around PCN was found not to be very sufficient in postoperative pain alleviation[9]. However local anesthetic infiltration with Ropivacaine along the nephrostomy tract from renal capsule to the skin gives excellent postoperative analgesia and significantly reduced rescue analgesic requirement after PCNL. [6]

Many regional anesthesia techniques have been prescribed for postoperative pain control for abdominal wall surgeries, Quadratus Lumborum block is one of them. Ultrasound guided Quadratus Lumborum block was described by Blanco for controlling postoperative pain following abdominal surgery as an ultrasound-guided "posterior" Transversus Abdominis plane (TAP) block by injection of local anesthetic drug into the anterolateral margin of the Quadratu Lumborum muscle. Furthermore, the Quadratus Lumborum block III described by Børglum et al. was a transmuscular block where the local anesthetic is injected anteriorly between the Psoas major muscle and the Quadratus Lumborum muscle; also he defined this block by using the shamrock sign. Quadratus Lumborum block III was considered to be an effective method for reducing the postoperative pain score and the analgesic consumption.[10] This study was initiated to compare the postoperative analgesic effect of Quadratus Lumborum block III versus Peritubal local infiltration for PCNL.

Aim of the Work

The aim of this study is to compare the postoperative analgesia offered by local anesthetic in ultrasound guided Quadratus Lumborum III block versus the postoperative analgesia of Peritubal local infiltration under fluoroscopy in patients undergoing Percutanous Nephrolithotomy.

Anatomy of the Kidneys and Thoracolumbar fascia

The Kidneys are reddish solid organs that are located in both sides of the midline in the retroperitoneal space. Their weight is correlative to body size, averaging 150 g and 135 g in both genders, Kidneys in adults have average length from 11.0 cm to 14.0 cm, in width from 5.0 cm to 7.0 cm, and in thickness from 2.5 cm to 3.0 cm.

Both kidneys share relatively symmetric relationships to the posterior abdominal wall. The upper third or upper pole of each kidney lies on the diaphragm, behind which the pleural reflection is, an operative approach to this area with a high incision above the 11th or 10th rib risks entering the pleural space. The upper border of the left kidney usually extends to the upper border of the 11th rib, whereas the upper pole of the right kidney, which is lower, is usually at the level of the 11th intercostal space. The lower two' thirds of the posterior surface of both kidneys lie on three muscles, which from medial to lateral are the Psoas major, Quadratus Lumborum, and aponeurosis of the transversus abdominis muscles. The renal vessels and pelvis lie against the contour of the Psoas muscle, which tilts the lower pole of each

kidney away from the midline. Alterations in this alignment may be seen with space-occupying lesions and should prompt a careful assessment.(Figure1)[11]

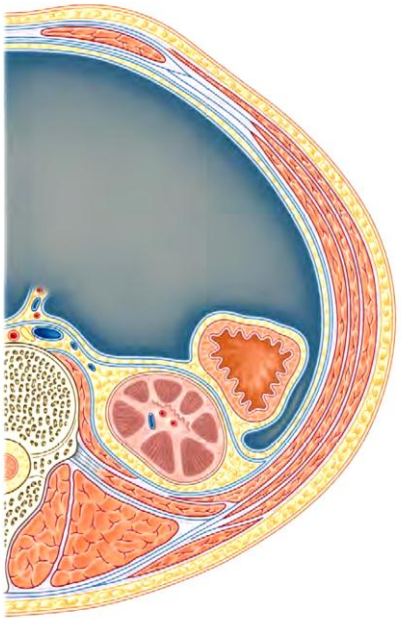

Figure (1): Sagittal section through the posterior abdominal wall showing the relations of the renal fascia of the right kidney.

Innervations of the kidney include both afferent and efferent fibers of the renal plexus. This plexus is a combination of fibers originating from the celiac plexus, intermesenteric plexus, and lumbar splanchnic nerves. Nerves from these plexuses attach along the renal artery and vein, entering the hilus of the kidney. The afferent innervation is essential for nociception recognition. Efferent innervations is primarily

sympathetic and receives input from each contributing plexus. Little evidence exists for parasympathetic innervations of the kidney.[12]

Afferent renal nerves originate from the renal pelvic area at the highest density, but also the renal cortex. These nerves project to some brain regions, including the subfornical organs, the hypothalamus, and brainstem. [13] Afferent fibers are activated by an increase in wall tension. During renal injuries such as ischemia or parenchymal injury, the pain radiates in a dermatomal pattern covering the anterior abdominal wall and flanks.

Kidney innervations consists of both afferent and efferent nerves, of which the efferent is strictly sympathetic. These nerves make up the renal plexus, and receive inputs from the celiac and aorticorenal plexuses as well as the least splanchnic nerves. The least splanchnic nerve is primarily responsible for the afferent signaling from the kidney to the brain. The least splanchnic nerve also carries visceral efferent fibers.[12]

The **Thoracolumbar fascia** consists of anterior, middle, and posterior layers (Figure 2). The posterior layer of the TLF forms an attachment to the strong membranous aponeurosis of the Latissimus dorsi. The three layers of the TLF are

continuous with the fused posterior aponeurosis of the internal oblique and transversus abdominis muscles.

The posterior layer of the TLF covers the superficial side of the erector spinae. In the lumbar region, the posterior layer extends from the spinous processes medially to the lateral margin of the erector spinae, where it fuses with the middle layer of the TLF and forms the so-called lateral raphe, which is a dense connective pillar that extends from the iliac crest to the 12th rib. The deepest lamina of the posterior layer is called the paraspinalretinacular sheath (PRS), which encapsulates the erector spinae muscles. The lateral interfascial triangle (LIFT) is made by the lateral margin of the erector spinae muscle (base), the PRS with overlying posterior and middle layers of the TLF (sides), and the lateral raphe (apex). The middle layer of the TLF separates the QL and erector spinae muscles. The anterior layer of the TLF covers the anterior aspect of the QL muscle.

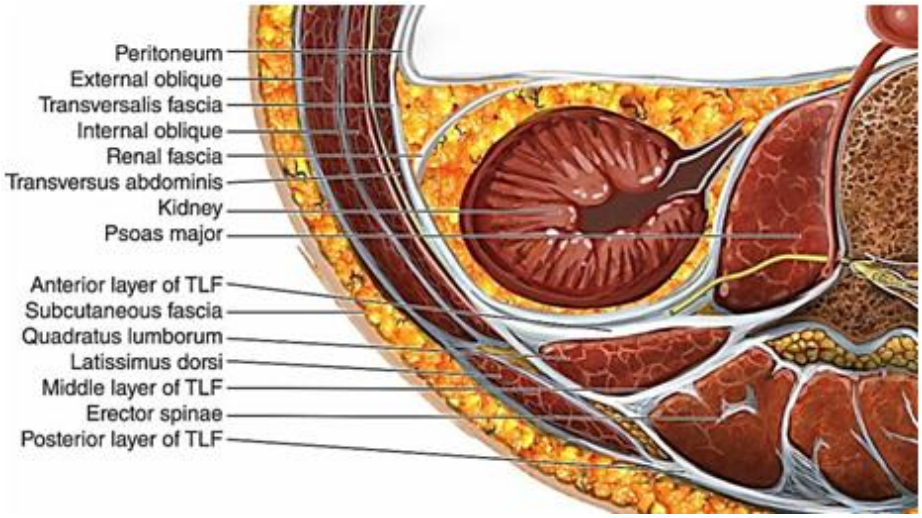

Figure (2): The different layers of the Thoracolumbarfascia (TLF). (Grays anatomy)

The Iliohypogastric and Ilioinguinal nerves (ventral ramus of L1 with occasional contributions from T12, L2, and L3) depart through the proximal and lateral aspect of the Psoas major muscle and traverse the ventral surface of Quadratus Lumborum.[14]

Pharmacology of Bupivacaine

Indications

Bupivacaine is a potent local anesthetic with unique characteristics from the amide group of local anesthetics, first discovered in 1957. Local anesthetics are used in regional anesthesia, epidural anesthesia, spinal anesthesia, and local infiltration. Local anesthetics generally block the generation of an action potential in nerve cells by increasing the threshold for electrical excitation. The progression of anesthesia is dependent on factors such as the diameter, degree of myelination, and conduction velocity of nerve fibers. In clinical practice, the order of a loss of nerve function is as follows: pain, temperature, touch, proprioception then skeletal muscle tone[15].

Bupivacaine is commonly injected into surgical wound sites to reduce pain for up to 20 hours after surgery in comparison to other local anesthetics it has a long duration of action. It is also the most toxic to the heart when administered in large doses[16]. This problem has led to the use of other long acting local anesthetics. LevoBupivacaine is a derivative, specifically an enantiomer, of Bupivacaine[17]. Systemic absorption of local anesthetics produces effects on the

cardiovascular and central nervous systems. At blood concentrations achieved with therapeutic doses, changes in cardiac conduction, excitability, refractoriness, contractility, and peripheral vascular resistance are minimal. However, toxic blood concentrations depress cardiac conduction and excitability, which may lead to atrioventricular block, ventricular arrhythmias and to cardiac arrest, sometimes resulting in fatalities. In addition, myocardial contractility is depressed and peripheral vasodilation occurs, leading to decreased cardiac output and arterial blood pressure. Following systemic absorption, local anesthetics can produce central nervous system stimulation, depression or both.[18]

Mechanism of Action

All local anesthetics contain three structural components: an aromatic ring, a connecting group which is either an ester (procaine) or an amide (Bupivacaine), and an ionizable amine group. All LAs have two chemical properties that determine their activity: Lipid solubility and Ionization constant (PKA)[19].

Lipid solubility determines potency, duration of action, and plasma-protein binding of local anesthetics. Local anesthetics enter nerve fibers as a neutral free base. Ionized