THE ROLE OF REGIONAL ANALGESIA METHODS IN KIDNEY TRANSPLANT RECIPIENT PATIENTS

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РОЛЬ РЕГИОНАРНЫХ МЕТОДОВ ОБЕЗБОЛИВАНИЯ У ПАЦИЕНТОВ-РЕЦИПИЕНТОВ, ПЕРЕНЕСШИХ ТРАНСПЛАНТАЦИЮ ПОЧКИ

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The authors looked at the current status of regional analgesia methods that are in use or could potentially find its way in kidney transplantation surgery. Possible benefits and adverse effects of each technique were discussed from the perspective of chronic kidney disease patient population. Additionally, the challenges that multimodal postoperative analgesia protocols face in the presence of chronic kidney disease are elucidated, as well as some specific patient characteristic that are unique to Uzbekistan and Central Asia that could change the postoperative pain management methods are discussed.

Keywords: *chronic kidney disease, kidney transplantation, postoperative pain, regional analgesia.*

Авторы рассмотрели текущее состояние методов регионарной анальгезии, которые используются или потенциально могут найти применение в хирургии трансплантации почки. Возможные преимущества и побочные эффекты каждого метода обсуждались с точки зрения популяции пациентов с хроническим заболеванием почек. Кроме того, освещаются проблемы, с которыми сталкиваются протоколы мультимодальной послеоперационной анальгезии при наличии хронической болезни почек, а также обсуждаются некоторые специфические характеристики пациентов, уникальные для Узбекистана и Центральной Азии, которые могут изменить методы послеоперационного обезболивания.

Ключевые слова: *хроническая болезнь почек, трансплантация почки, послеоперационная боль, регионарная анальгезия.*

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Introduction

Chronic kidney disease (CKD) is defined as an estimated glomerular filtration rate of less than 60 mL/min per 1.73 m^2, and/or evidence of kidney damage as indicated by presence of albuminuria, persistent for 3 months or more [1]. Chronic kidney disease ranked 18th among global causes of death in 2010–compared to 27th in 1990–and is among the leading causes of loss of life years in regions including Central Latin America, Oceania, and Southeast Asia [2]. Kidney transplantation being the only long-term treatment option for end stage CKD the rate of kidney transplantation surgery is set to increase in the coming decades.

The surgery generates a stress response and tissue injury of variable intensity depending on the severity and duration. It is caused by a combination of endocrine, metabolic, and immunologic factors [3]. This protective mechanism often associated with a risk of postoperative organ dysfunction as well as increased morbidity, mortality, and length of hospital stay [4]. The implications of poorly controlled postoperative pain are substantial, including cardiopulmonary complications, opioid-related side effects, unplanned hospital admissions, prolonged hospital stay, and the subsequent development of chronic pain or opioid addiction [5] Despite advances in both surgical and anesthesia techniques, postoperative pain remains an important issue in patients undergoing renal transplantation [6].

Challenges of postoperative analgesia in kidney recipients

One of the most commonly used groups of analgesics in the postoperative setting are opioids. In looking at transplant outcomes and opioid usage, Lentine et al [7] performed a retrospective analysis of over 16000 kidney transplant recipients to determine the effects of preoperative opioid use on outcomes. They were able to demonstrate that compared with the opioid-naive patient, increased usage of pretransplant opioids is associated with a significantly increased risk of postoperative cardiac arrest and ventricular arrhythmias, mental status changes, substance abuse, and accidents when compared with non-opioid users. Another study demonstrated that kidney transplant recipients requiring opioids preoperatively were more likely to require long-term opioids post-transplant, and post-transplant opioid use was associated with a higher risk of mortality and graft loss when compared with those not on preoperative opioids [8]. On the other hand, with a glomerular filtration rate of less than 50 ml/ min/1.73m^2, a patient could build up morphine-6-glucuronidase and morphine-3-glucoronidase metabolites, that could lead to postoperative nausea

vomiting, unexpected sedation effects, involuntary myoclonus, and respiratory depression [9].

Both nonselective non-steroidal anti-inflammatory drugs (NSAIDs) and selective cyclooxygenase-2 (COX-2) inhibitors improve postoperative analgesia in a myriad of surgical populations. A recent meta-analysis of 20 randomized controlled trials (RCT) documented a decrease in 24-h opioid consumption, pain scores, and postoperative nausea and vomiting with preoperative celecoxib administration for non-cardiac surgery. Although single doses of preoperative cyclooxygenase (COX)-2 inhibitors have been growing in popularity in many surgical areas [10], NSAIDs (COX-1 and COX-2 inhibitors) have long been associated with a potential risk of bleeding and nephrotoxicity via inhibition of prostaglandin pathway. The 2009 Kidney Disease: Improving Global Outcomes (KDIGO) Clinical Practice Guideline for the Care of Kidney Transplant Recipients recommends that NSAIDs and COX-2 inhibitors be avoided in kidney transplant recipients whenever possible, due to potential nephrotoxicity. The majority of kidney transplant recipients' maintenance immunosuppression includes calcineurin inhibitors (CNIs, such as cyclosporine or tacrolimus), which can also cause nephrotoxicity [11]. Therefore, the concurrent use of NSAIDs and CNIs in a kidney transplant recipient may worsen intraglomerular hemodynamics leading to graft dysfunction [12]. Even the relatively modern formulation celecoxib has demonstrated nephrotoxicity in kidney transplant recipients, even when initiated 13 weeks following kidney transplantation [13].

Acetaminophen is the commonest ingredient in the 15 multimodal analgesia protocols [14]. This is also supported by several recent meta-analyses. Liang [15] meta-analyzed four studies on IV acetaminophen came to same conclusion. A recent Cochrane meta-analysis on 75 studies of IV paracetamol (acetaminophen or its pro-drug propacetamol) found high-quality evidence that 36% of participants receiving IV paracetamol or propacetamol experienced at least 50% pain relief over 4 h compared with 16% of those receiving placebo (number needed to treat to benefit = 5) [16]. At higher doses or in patients with compromised liver function damage remains a concern [17]. Additionally, according to 2019 data the prevalence of chronic hepatitis B in Uzbekistan was 4.34% and 4.1% for hepatitis C [18]. End stage CKD patients are at high risk to contract blood borne infections and we assume that the prevalence of chronic hepatitis in Uzbekistan in this group of patients could be higher than in general population, which in turn complicates the use of acetaminophen for postoperative analgesia routinely.

TAP (Transversus Abdominis Plane) Block

TAP block was first described by Rafi in 2001 [19]. Main principle of TAP block is to deposit local anesthetic in plane between internal oblique muscle and transversus abdominis muscle to block the sensorimotor innervations of the anterior abdominal wall which is supplied by anterior rami of the spinal segmental T7-T11 [20]. It can be single shot or continuous via catheter to prolong its analgesic effect. TAP catheter can be placed either guided by ultrasonography or by open technique. It is more suitable for operations where parietal pain is a major cause of pain. TAP blocks have been shown to be effective after a variety of abdominal procedures as they provide opioid-sparing effects and improve patient satisfaction [21]. Renal transplant recipients are ideally suited to gain maximum benefit from TAP blocks as the laparotomy is usually covered by this block without any intraperitoneal extension eliminating the visceral pain component [22].

K. Mukhtar et al., were the first to investigate the efficacy of the TAP block in renal transplant recipients. 20 matched patients were equally divided into TAP and control groups. In the control group, patients received bupivacaine 0.5% (20 ml) in the wound edges before the end of anaesthesia. The treatment group received a TAP block using bupivacaine 0.5% (20 ml) after induction of anaesthesia and All patients were prescribed regular acetaminophen 1 g i.v. every 6 h for postoperative pain relief and a patient-controlled analgesia (PCA) pump. They observed a statistically significant reduction in postoperative morphine requirements in the TAP. Pain scores were significantly lower in the TAP group at 3, 6, and 12 h ($p<0.001$), but there was no difference at 24 h. Nausea and vomiting and sedation scores were significantly lower at 3 and 6 h in the TAP group compared with the control group [23].

Jankovic et al., studied continuous TAP block in seven kidney recipient patients; postoperative pain and morphine patient controlled analgesia (PCA) consumption was reduced compared with 35 previously examined patients receiving morphine PCA only. They found that TAP block reduced mean IV morphine requirements by more than 80% [24].

S. Soltani Mohammadi et al., randomized 44 patients into two equal groups; bupivacaine 15 ml – 0.25% or saline was deposited into transversus fascia plane on the side of the surgery after the induction of anesthesia. There was significant difference in median of NRS score measured at all-time points in the study groups ($P<0.001$). The 24-hour morphine consumption (mean±SD) was 10.8±9.5 mg in bupivacaine group compared with 41.2±3.8 mg in the saline group ($P=0.001$). There was statistically significant reduction in intraoperative fentanyl consumption in the TAP group 120±20 μg compared to the control group 358 ±24 μg ($P=0.001$) [25].

Parikh B.K. et al., investigated the efficacy of continuous TAP block in 40 randomized open renal transplant recipients. At the end of surgery during closure, a multiorifice epidural catheter was placed in TAP plane. Study group (Group S) received Inj bupivacaine bolus 1 mg/kg (0.25%) followed by infusion 0.25 mg/kg (0.125%) through the catheter, whereas control group (Group C) received normal saline through the catheter. Patients in Group S had significant lower VAS scores, longer time to first rescue analgesic [26].

Farag et al., used continuous 0.5% ropivacaine infusion for TAP block in kidney transplant recipients and reported similar reports of opiod reduction and improved pain scores in the postoperative period as in studies were bupivacaine was used [27].

Gopwani S.R. et al., retrospectively compared 13 patients who received TAP block using 20ml – 0.25% bupivacaine with 37 control patients where no regional anesthesia was implemented. Overall morphine consumption during the first 48 hours of the postoperative period was compared. A statistically significant decrease in cumulative morphine consumption was found in the group that received the TAP block at 6 h (2.46 mg vs. 7.27 mg, $P=0.0010$), 12 h (3.88 mg vs. 10.20 mg, $P=0.0005$), 24 h (6.96 mg vs. 14.75 mg, $P=0.0013$), and 48 h (11 mg vs. 20.13 mg, $P=0.0092$) [28].

Singh et al., included 10 studies with 258 and 237 control patients in their meta analyses and concluded that TAPblock significantly lowers the intraoperative and cumulative postoperative 24h opioid consumption in renal transplant recipients. Persistent and better pain control was achieved with TAPBlock utilization and the benefits of TAP block extended beyond the analgesic actions alone as it also decreased the 24h incidence of postoperative nausea vomiting as well [29].

During the last two decades TAP block has become one of the main components of ERAS protocols and the multimodal postoperative analgesia in the abdominal surgery, especially with the wide implementation of the ultrasound machine the procedure became safer [30]. The disadvantages of the TAP block are limited practical dermatome T10 – L1 coverage and the absence of the visceral analgesia [31]. Additionally, the possible adverse outcomes of the procedure as local anesthetic systemic toxicity, transient femoral nerve block, bowel hematoma, liver laceration and infections, especially when the catheter is implemented [32] should not be forgotten.

Quadratus Lumborum Block (QLB)

Quadratus lumborum was first described by anesthesiologist Dr. Rafael Blanco as a variant of the TAP block in 2007 [33]. Much later, he gave a detailed description of the block technique using the name QLB [34]. In the spring of 2013, Dr. Jens Børglum from the University Hospital in Copenhagen (Denmark) published a new ultrasound-guided transmuscular QL blockade, describing the so-called "Shamrock sign," the sign of a shamrock for the detection of a local anesthetic injection point [35].

The ultrasound landmark for block performance is the quadratus lumborum muscle (QLM), and the key to the analgesia lies in the thoracolumbar fascia (TLF) [36]. TLF is connective tissue of tubular structure formed by binding aponeuroses and fascia layers, which, enveloping the back muscles, connects the anterolateral abdominal wall with the lumbar paravertebral region. The true mechanism of analgesia provided by QLB has not yet been fully clarified. It is believed that the local anesthetics spread along the TLF and the endothoracic fascia into the paravertebral space, is responsible in part for the analgesia. An additional mechanism of action of local anesthetics can be explained by the anatomical–histological characteristics of the TLF, namely the superficial layer of the TLF, there is a thick network of sympathetic neurons. In the fascia, there are the high-threshold and low-threshold mechanoreceptors and pain receptors sensitive to the effects of the local anesthetics. The QLB analgesia could be, at least partially, explained by local anesthetic blockade of these receptors [37].

Obviously, the coverage of the QLB will depend on the variations of the performed block. Mostly analgesia is achieved in T7–L1 dermatomes, although there are descriptions of cranial spread to T4–T5, and caudal spread to L2–L3 [38] dermatomes. The height of the block can be influenced by the choice of the site for the application of local anesthetics, both in relation to QLM and in relation to the distance from the iliac crest and costal margin [39]. The rate of the drug application [40], and the individual anatomical variations can also influence the height of the block.

Sindwani et al., conducted a randomized double blind clinical study, where they divided 60 renal transplant recipients equally into placebo (received QLB with a normal saline) and a study group (QLB with 0.25% – 20 ml of bupivacaine). Fentanyl consumption, numerical rating score, and sedation score were significantly less in group A when compared to group B at 1, 4, 8, 12, and 24 h (P< 0.001) [41].

Rahendra R. et al., compared postoperative pain intensity, opioid consumption, IL-6 and CRP levels in 62 living kidney donor patients dividing them equally into QLB and continuous epidural groups. No difference was observed between the groups in postoperative pain intensity, opioid consumption, the plasma concentration of IL-6 and CRP either after surgery or 24 hours [42]

In 2020 Uppal V. et al., conducted a meta-analyses looking into 42 randomized controlled trials where the efficacy of QLB was compared to TAP block, no block, placebo, fascia iliaca block, intrathecal morphine, continuous epidural, femoral nerve block, erector spinae plane block and intravenous lidocaine infusion in various surgical patient groups. Quadratus lumborum block provided analgesic benefits compared with placebo for use in the abdominal wall and hip surgery, with only marginal benefits compared with other regional analgesic techniques [43].

In the most recent 2022 systemic review and meta-analyses Behera B.K. et al., looked at the data of 774 patients from 10 studies and concluded that QLB as part of multimodal analgesia did not result in any significant analgesic benefits in patients undergoing hip arthroplasty in terms of either postoperative opioid consumption or pain scores at rest and on movement [44].

Although the complications of the QLB are rare, this technique still carries the possible complications that are applicable to other regional anesthesia methods such as local anesthetic systemic toxicity, infectious complications and the failed block. Femoral nerve block and the quadriceps weakness was reported with the use of QL3 [45]. QLB is a relatively ''deep'' block in comparison to other abdominal wall blocks and carries the greater risk of the hematoma, especially in patients with coagulation and platelet disorder [46].

Neuraxial analgesia

In 1901, the first Epidural anesthesia via a caudal approach was independently described by two Frenchman Jean-Anthanase Sicard and Fernand Cathelin. The Spanish military surgeon, Fidel Pagés Miravé, completed the lumbar approach successfully in 1921. As early as 1931 Eugene Aburel, a Romanian obstetrician, injected local anaesthetics via a silk catheter to perform lumbar obstetric Epidural analgesia. In 1949 the first successful continuous lumbar Epidural anaesthesia was reported by Manuel Martinez Curbelo [47].

For many decades some form of epidural analgesia was widely successfully applied in many surgical fields, especially in obstetric surgery, orthopedic, thoracic and abdominal surgery. Superior postoperative pain control, opiod sparing effect and patient satisfaction associated with epidural analgesia has been shown in many meta-analyses and systematic reviews [48]. In our paper we would like to discuss the role and the place of epidural analgesia in renal transplantation patients.

Sahajananda H. et al., in 2006 published retrospective analyses of 101 kidney transplant patients of whom 20 were children. Minor post-op complications among patients who received epidurals included leakage of drug and disconnections (3 patients), epidural associated motor block (3 patients), pruritis (1) and nausea (2). 3 patients developed pruritis and 8 patients developed nausea and vomiting among patients who received opioids intravenously. 3 patients in epidural group and 2 patients in non-epidural group developed acute rejection which responded promptly to methylprednisolone therapy. Quality of analgesia was better in patients who received epidural than those who did not receive epidurals. Only 6 patients in epidural group received supplementary analgesia. In these 6 patients the epidural catheters leaked or got disconnected [49].

Retrospective review of 53 pediatric renal transplantation patients who received epidural analgesia was published by Coupe N. et al., in 2005. Half the patients who had epidural analgesia required parenteral opioid supplementation. Five patients had postoperative pulmonary edema. Minor postoperative adverse events included epidural associated motor block (three cases) and opioid related oversedation (one patient). No perioperative mortality or major morbidity was recorded [50].

Baar W. et al., conducted a retrospective analyses of 291 living donor kidney transplantations, where 99 patients received postoperative epidural analgesia and 192 did not. The outcome variable they examined was delayed graft function, defined as at least one hemodialysis within seven days postoperatively, once hyperacute rejection, vascular or urinary tract complications were ruled out. 9 out of all 291 recipients required renal replacement therapy during the first 7 days due to delayed graft function; none of these donors received epidural analgesia. The observed rate of delayed graft function in recipients whose kidney donors received epidural analgesia was significantly lower (0% vs. 4.6%; p=0.031) [51].

The failure rate of epidural analgesia has been reported to be as high as 12% [52]. Risk of haematoma and abscess formation is especially dangerous in the presence of chronic renal failure where potential coagulopathy, platelet dysfunction and immunosuppression exist [53]. The incidence is epidural hematoma from a review of case reports from 1952–1996 reported to be 1 in 190,000 [54]. Catheter related infection and abscess formation are also rare [55].

Intratechal morphine has been used since 1979 for postoperative pain management [56]. low doses of intrathecal morphine ranging (ITM) from 0.1 to 0.25 mg have been showed to retain comparable to continuous epidural analgesic effect in the first 24 hours, while reducing used to reduce side-effects and complications. Low-dose ITM in combination with spinal anaesthesia has provided effective and safe analgesia for Caesarean section, haemorrhoidectomy, tubal ligation, transurethral prostatectomy, gynaecological surgery, orthopaedic surgery and pediatric surgery.

In the recent 2022 paper Ja. E. L., et al., studied the effects of ITM on postoperative pain intensity, agitation and delirium in 296 living-donor kidney transplant recipients. Peak numeric rating score of pain, postoperative opioid consumption were significantly lower in the ITM group (p<0.0001). Delirium occurred in 2.6% (4/154) and 7.0% (10/142) of ITM and control groups, respectively. Multivariable analysis showed age (OR: 1.07, 95% CI: 1.01–1.14; P=0.031), recent smoking (OR: 7.87, 95% CI: 1.43–43.31; P=0.018), preoperative psychotropics (OR: 23.01, 95% CI: 3.22–164.66; P=0.002) were risk factors of postoperative delirium while ITM was a protective factor (OR: 0.23, 95% CI: 0.06–0.89; P=0.033) [57].

Jun J.H. et al., compared ITM (32 patients) with surgical site injection of ropivacaine (21 patients) in living-donor kidney transplant recipients. The ITM group showed significantly lower NRS scores, at rest and when coughing, for up to 12 and eight hours. NRS scores were comparable between the groups at other times. The ITM group had significantly less postoperative systemic opioid requirement in the first 24 hours, but there was no significant difference between the systemic opioid consumption of the groups on postoperative Day 2. In the ITM group, 3 (9.4%) patients presented with bradypnoea and 1 (3.1%) with excessive sedation in the first 12 postoperative hours. More patients in the ITM group developed pruritus requiring treatment during the first 24 hours. There were no differences between the groups in other outcomes (e.g. nausea/vomiting, change in pulmonary or kidney functions) [58].

It is interesting to note that in 2020 Park J. et al., discussed the possible benefits of ITM in delayed remnant kidney recovery in living kidney donors [59].

Although ITM offers great benefits in postoperative pain control, it still carries risks and side effects such as epidural hematoma, meningitis, urinary retention, nausea, vomiting, pruritus and respiratory depression [60].

Errector spinae plane (ESP) block

Another regional analgesia method which is rapidly finding its way in the thoracic, abdominal and orthopedic surgeries is ESP block. It was first described by Forero et al. [61] in 2016 for the treatment of chronic thoracic neuropathic pain and postoperative pain in thoracic surgery.

Soffin E.M. et al., in a 2022 retrospective propensity score matched study of 242 patients, who underwent lumbar spinal fusion observed that 24-hour opioid consumption was significantly lower in the erector spinae plane block group (30 mg (0, 144); without-blocks: 45 mg (0, 225); p=0.03). There were no significant differences in pain scores in the postanesthesia care unit (with blocks: 4 (0, 9); without blocks: 4 (0,8); p=0.984) or on the nursing floor (with blocks: 4 (0,8); without blocks: 4 (0,8); p=0.134). Total length of stay was 5 hours shorter in the block group (76 hours (21, 411); without blocks: 81 (25, 268); p=0.001). Fewer patients who received blocks required postoperative antiemetic administration (with blocks: n=77 (64%); without blocks: n=97 (80%); p=0.006) [62].

The efficacy of ESP block in pediatric patients was assessed in a recent systematic review and meta-analyses by Lou R. et al. Seven randomized controlled trials involving 379 patients were reviewed. Compared with no block, erector spinae plane block slightly reduced the pain scores at 0 h (standardized mean difference [SMD]: −1.07; 95% confidence interval [CI]: −1.60 to −0.54; I2=52%), 6 h (SMD: −0.82; 95% CI: −1.39 to −0.25; I2=79%) postoperatively at rest and significantly reduced the need for rescue analgesics (odds ratio 0.09; 95% CI: 0.04 to 0.21; I2=16%). One trial demonstrated the analgesic effect of erector spinae plane block was similar to a quadratus lumborum block, while another trial demonstrated the analgesic effect of ESPB was superior to an ilioinguinal nerve block [63].

The opioid sparing effect of ESP block was published in a meta-analysis by Jiao B. et al. The study included 25 randomized controlled trials with 1461 patients. The authors concluded that the use of ultrasound-guided ESPB was associated with reduced opioid consumption at 24 h after surgery [SMD: −2.14, 95% CI: −2.61 to −1.67, p<0.001] and during the intraoperative period [SMD: −2.30, 95% CI: −3.21 to −1.40, p<0.001]. In addition, it took a longer time to administer the first rescue analgesia in the ESPB group [SMD: 3.60, 95% CI: 2.23–4.97, p<0.001] and the group was associated with lower incidences of postoperative nausea or vomiting (PONV) [OR: 0.50, 95% CI: 0.34–0.72, p<0.001] [64].

In a 2022 meta-analyses Chang-Hoon K. et al., analyzed studies, including 1,092 patients, were included in the final analysis. ESP block reduced 24-hour postoperative opioid consumption (mean difference [MD] –17.49, 95% CI –26.87 to –8.12), pain score at rest (MD –0.82, 95% CI –1.31 to –0.33), and pain score at movement (MD –0.77, 95% CI –1.20 to –0.3) compared to no block. Compared with other regional blocks, various results have been observed. Although statistical results showed that ESP block is inferior to thoracic paravertebral block and intercostal nerve block and superior to serratus anterior plan block in postoperative analgesia, clinical differences remain unclear. The incidence of hematoma was lower in the ESP block group than in the other groups (odds ratio 0.19, 95% CI 0.05–0.73) [65].

Recently (2021–2022) several studies looking at the efficacy and the role of ESP block in urological surgeries have been published. ESP block was found to be equally efficient in opioid sparing and pain control as QLB III following the open nephrectomy [66]. When compared with patient controlled intravenous morphine analgesia, ESP block was superior in providing postoperative analgesia following renal malignancy surgeries [67]. Onay M. et al., compared ESP block to QLB II following open nephrectomy. The ESPB and QLB 2 groups showed similar total morphine consumption (20.95+12.40 mg and 25.05+13.60 mg, p=0.870) and morphine demands (37.85+29.43 and 41.15+31.75, p=1.000), respectively. Despite the lower VAS scores at rest and movement in the ESPB group, there were no statistically significant differences between groups [68]. In a single center double blind study by Sahin A. et al., ESP block was superior in comparison with no block at providing better postoperative analgesia following nephrectomy [69]. According to Baishya M. et al., ESP block offered no advantage over intrathecal morphine following percutaneous nephrolithotomy [70].

One of first reports using ESP block in kidney transplant recipients was reported by Sharipova V et al. In retrospective analyses of 28 patients, of whom 14 received ESP block for postoperative pain management authors reported that patients in the study group demonstrated significantly less pain (2.1±1.09 at rest and 3.8±1.18 during movement per the numerical rating scale) compared with the control group (3.3±1.17 and 5.2±2.15, respectively) (P=.009 and P=.042) and less opioid requirements (15.9±7.1 vs 4.7±6.2 mg of morphine; P<.001). In addition, incidences of nausea and vomiting were less frequent in the study group [71].

Complications are very rare because the site of injection is far from the pleura, major blood vessels, and the spinal cord. Infection at the needle insertion site, local anesthetic toxicity/allergy, vascular puncture, pleural puncture, pneumothorax, and failed block are the primary complications. Because of the few published data, more investigations (e.g., randomized con-

trolled trials, RCTs) are needed to verify the safety, complications rates, and efficacy of this strategy [72].

Conclusion

One of the most studied regional analgesia methods in kidney transplant recipients was TAP block, but its lack of visceral pain coverage and insufficient proximal dermatome coverage (T6-T9) could be pointed as disadvantages. Neuraxial analgesia techniques offer great pain control, better hemodynamic stability in chronic kidney disease patients and possible protection against graft function, but the risk of hematoma formation rises exponentially in the presence of coagulopathy and platelet dysfunction, which are not uncommon in the chronic kidney disease population. QLB variations were equal and in some cases superior to TAP block after kidney transplant surgery, especially due to its visceral pain coverage properties, but the more than one variations of the block, unpredictable dermatome coverage depending on the variant and the injection site, as well as quadriceps weakness rates, that are higher in comparison to other truncal blocks could be stated as disadvantages of QLB. ESP block is relatively new method and comprehensive data in the field of transplantology lacks at the moment to widely recommend this technique, but in our opinion ESP block offers the same benefits as QLB and TAP blocks, also at the same time has much safer adverse effects profile. More well designed studies are needed to in the future to further evaluate the safety and efficacy of regional analgesia methods in kidney recipient patients.

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BUYRAK TRANSPLANTATSIYASI RETSIPIYENT BEMORLARIDA MAHALLIY OG‘RIQSIZLANTIRISH USULLARINING O‘RNI

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Mualliflar buyrak transplantatsiyasi jarrohligida qo‘llaniladigan yoki salohiyatli qo‘llanilishi mumkin bo‘lgan mahalliy og‘riqsizlantirish usullarining hozirgi holatini ko‘rib chiqdilar. Har bir usulning mumkin bo‘lgan ijobiy va salbiy ta’sirlari surunkali buyrak kasalligi bilan og‘rigan bemorlarning populatsiyasi nuqtayi nazaridan muhokama qilindi. Bundan tashqari, surunkali buyrak kasalligi mavjud bo‘lganda operatsiyadan keyingi multimodal og‘riqsizlantirish uchun protokollar oldida turgan qiyinchiliklar yoritiladi hamda O‘zbekiston va Markaziy Osiyoga xos bo‘lgan, operatsiyadan keyingi og‘riqsizlantirishni o‘zgartirishi mumkin bo‘lgan ayrim xususiyatlari ko‘rib chiqiladi.

Kalit so‘zlar: *buyraklarning surunkali kasalligi, buyrak transplantatsiyasi, operatsiyadan so‘nggi og‘riq, reginar analgeziya.*

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