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超声引导下 QLB 复合气管插管全麻对于老年患者 TEP 腹股沟疝 无张力修补术影响因素分析 *

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摘要 目的:探讨与分析超声引导下腰方肌阻滞(quadratus lumborum block, QLB)复合气管插管全麻对于老年患者腹腔镜下全腹膜外(totally extraperitoneal prosthetic, TEP)腹股沟疝无张力修补术的影响,以促进该方法的临床使用。**方法:**2014年9月到2020年6月选择在本院诊治的腹股沟疝老年患者180例,根据随机数字表法分为QLB组与对照组各90例。所有患者都给予腹腔镜下全腹膜外腹股沟疝无张力修补术,对照组给予气管插管全麻,QLB组在对照组麻醉的基础上给予超声引导下QLB,记录两组镇痛与麻醉效果。**结果:**两组的术中出血量、手术时间等对比差异无统计学意义($P>0.05$),QLB组的术后住院时间、术后胃肠功能恢复时间、术后下床活动时间显著短于对照组($P<0.05$)。与术后12h对比,两组术后24h与36h的疼痛VAS评分均降低($P<0.05$),且QLB组术后12h、24h与36h的疼痛VAS评分都显著低于对照组($P<0.05$)。QLB组术后7d的血肿、呼吸抑制、脏器损伤、腹股沟区包块等并发症发生率为8.9%,显著低于对照组的21.1%($P<0.05$)。QLB组的瑞芬太尼用量、术后48h内有效按压自控静脉镇痛泵次数、自控静脉镇痛泵累计用量都显著少于对照组($P<0.05$)。**结论:**超声引导下QLB复合气管插管全麻在老年患者腹腔镜下全腹膜外腹股沟疝无张力修补术中的应用能提高镇痛与麻醉效果,减少术后并发症的发生,有利于促进患者康复。

关键词:超声引导;腰方肌阻滞;气管插管全麻;腹腔镜下全腹膜外腹股沟疝无张力修补术;老年人;多模式镇痛

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Analysis of Influence Factors of Ultrasonic-guided Quadratus Lumborum Block Combined with Endotracheal Intubation for General Anesthesia for Tension-free Repair of Totally Extraperitoneal Prosthetic Inguinal Hernia in Elderly Patients*

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ABSTRACT Objective: To explore and analysis the effect of ultrasound-guided continuous quadratus lumborum block (QLB) combined with tracheal intubation for elderly patients with laparoscopic totally extraperitoneal prosthetic tension-free inguinal hernia repair, so as to promote the clinical use of this method. **Methods:** From September 2014 to June 2020, 180 cases of elderly patients with inguinal hernia were selected for diagnosis and treatment in this hospital were selected and were divided into the QLB group and control group with 90 cases each groups accorded to the random number table method. All patients were given laparoscopic totally extraperitoneal prosthetic tension-free inguinal hernia repair, the control group were given general tracheal intubation anesthesia, and the QLB group were given ultrasound-guided QLB on the basis of anesthesia in the control group. The analgesia and anesthesia effects of the two groups were recorded. **Results:** There were no statistically significant difference in the amount of intraoperative blood loss and operation time compared between the two groups ($P>0.05$). The postoperative hospital stay, postoperative gastrointestinal function recovery time and postoperative time to get out of bed in the QLB group were significantly shorter control group($P<0.05$). Compared with 12 hours after operation, the pain VAS scores of both groups at 24 hours and 36 hours after operation decreased($P<0.05$), the pain VAS scores of the QLB group at 12 h, 24 h and 36 h after operation were significantly lower than those of the control group ($P<0.05$). The incidence of complications such as hematoma, respiratory depression, organ injury, and groin mass in the QLB group at 7 days after operation were 8.9 %, which were significantly lower than the control group's 21.1 %($P<0.05$). The dosage of remifentanyl in the QLB group, the number of times the automatic control intravenous analgesia pump was effectively pressed within 48 hours after the operation, and the cumulative

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dosage of the automatic control intravenous analgesia pump were significantly less than those in the control group ($P<0.05$). **Conclusion:** The application of ultrasound-guided QLB combined endotracheal intubation general anesthesia in laparoscopic totally extraperitoneal prosthetic tension-free inguinal hernia repair in elderly patients can improve the analgesia and anesthesia effects, reduce the occurrence of postoperative complications, and promote the recovery of patients.

Key words: Ultrasound guidance; Quadratus lumborum block; General anesthesia for tracheal intubation; Laparoscopic totally extraperitoneal prosthetic tension-free inguinal hernia repair; Elderly; Multimodal analgesia

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前言

腹股沟疝为临床上的常见疾病, 占全部腹外疝的 90 % 以上, 是缘于腹股沟区形成的先天或者后天形成解剖学特性命名的^[1,2]。该病是腹腔中的内脏器官通过其腹股沟区缺损反应至体表的包块, 可分为腹股沟斜疝、腹股沟直疝, 其中绝大多数为斜疝^[3]。该病若未得到及时医治, 会引发多种严重并发症, 严重危害患者的生活质量, 在一定情况下可造成患者死亡^[4]。手术为腹股沟疝的主要治疗方法, 特别是腹腔镜下腹股沟疝修补术具有微创、患者恢复快、术后并发症少等优点^[5,6]。但是在术后可产生腹壁胀痛, 使患者机体产生不适感和应激反应^[7]。特别是很多老年人伴随有各种基础疾病, 代谢调节能力也比较低, 故对手术麻醉的耐受力较弱, 为此对于手术麻醉的要求更高^[8]。气管插管全麻具有起效快、简便高效等特点, 但是术后会引发患者出现较多的并发症。区域阻滞复合全麻为多模式镇痛方式, 能够减少阿片类镇痛药物的用量及其副作用, 并有效减轻患者的应激反应^[9,10]。目前临床上老年腹股沟疝修补术常采用硬膜外麻醉或全麻下做传统的开腹腹股沟疝修补术, 但是对于腔镜手术, 因为要打气腹撑开腹壁, 打孔的位置比传统开腹腹股沟疝修补术手术切口位置高, 使患者术后产生腹壁胀痛^[11,12]。腰方肌

阻滞(quadratus lumborum block, QLB)可有效缓解术后疼痛, 特别是超声引导下 QLB 具有定位准确、动态与实时等特点, 目前已应用于腹部手术、髋部手术等复合麻醉, 也取得了比较好的效果^[13,14]。本文具体探讨与分析了超声引导下 QLB 复合气管插管全麻对于老年患者腹腔镜下全腹膜外腹股沟疝无张力修补术的影响, 以促进该方法的临床使用。现总结报道如下。

1 资料与方法

1.1 研究对象

2014 年 9 月到 2020 年 6 月选择在本院诊治的腹股沟疝老年患者 180 例, 纳入标准: 单侧疝患者; 首次发病, 年龄 60~75 岁, 具有手术与全麻指征; 符合腹股沟疝的诊断标准; 临床资料完整且随访调查依从性佳; ASA 分级 I-II 级; 体重指数 (body mass index, BMI) $<31\text{ kg/m}^2$; 伦理委员会批准了此次研究; 患者知情同意本研究。排除标准: 对试验药物过敏者; 临床资料缺乏者; 合并恶性肿瘤患者; 精神异常, 不能合作或不能够理解并不能使用量表调查的患者; 有神经系统疾患的患者; 长期使用阿片类镇痛药的患者。

根据随机数字表法分为 QLB 组与对照组各 90 例, 两组患者表 1 资料对比差异无统计学意义($P>0.05$)。

表 1 两组一般资料对比

Table 1 Comparison of two general data

Groups	n	Type of incidence (indirect hernia / direct hernia)	ASA classification (I / II)	Age (years)	BMI(kg/m ²)	Course of disease (months)
QLB group	90	82/8	48/42	66.92± 2.19	22.76± 1.48	21.98± 2.14
Control group	90	81/9	47/43	67.00± 1.84	22.19± 1.11	22.09± 1.74

1.2 麻醉方法

所有患者都给予腹腔镜全腹膜外腹股沟疝无张力修补术, 患者取头低脚高位。

对照组: 给予气管插管全麻, 术前禁食 8~12 h, 入室后开放外周静脉, 监测生命体征。麻醉诱导采用静脉注射咪达唑仑 0.05 mg/kg、依托咪酯 0.3~0.4 mg/kg、舒芬太尼 0.5~0.6 $\mu\text{g/kg}$ 、顺式阿曲库铵 1.5 mg/kg, 置入气管插管后行机械通气。麻醉维持为吸入 0.5 %~1.5 %七氟烷、静脉丙泊酚 4~12 mg/kg/h、瑞芬太尼 0.1~1 $\mu\text{g/kg/min}$ 、顺式阿曲库铵 1~2 $\mu\text{g/kg}\cdot\text{min}$ 速度静脉泵注, 手术结束前半个小时停用肌松药顺式阿曲库铵。关腹时静脉注射昂丹司琼 8 mg、舒芬太尼 0.1 $\mu\text{g/kg}$ 。术后采用自控静脉镇痛: 地佐辛 15 mg、舒芬太尼 100 μg 、昂丹司琼 8 mg, 负荷剂量 3~5 mL, 锁定时间 15 min, 自控剂量 0.5 mL, 背景输注速

度 2 mL/h。

QLB 组: 在对照组麻醉的基础上给予超声引导下 QLB, 使用日立数字化彩色超声波诊断装置 (型号 ARIETTA 60, 国械注进 20153232705), 选用后路 QLB 入路, 超声探头放在 Petit 三角区域, 找到腰方肌与腰方肌后缘, 使用超声显影穿刺针穿刺到腰方肌后缘, 注入 0.375 %盐酸罗哌卡因 (进口药品注册证号 H20140764, AstraZeneca AB Sweden) 15~30 mL, 当药物在腰方肌后的胸腰筋膜间隙梭形扩散表示注射成功。

1.3 观察指标

(1) 记录两组的术中出血量、手术时间、术后住院时间、术后胃肠功能恢复时间、术后下床活动时间等。(2) 记录两组术后 7 d 出现的血肿、呼吸抑制、脏器损伤、腹股沟区包块等并发症情况。(3) 记录与评定两组术后 12 h、24 h 与 36 h 的腹股沟区域疼

痛情况,使用疼痛视觉模拟评分法(Visual Analogue Scale/Score,VAS)评分,分数越高,疼痛越严重。(4)记录两组的瑞芬太尼用量、术后48 h内有效按压自控静脉镇痛泵次数、自控静脉镇痛泵累计用量。

1.4 统计方法

选择SPSS 23.00软件进行数据分析,计量数据以均数 $\pm$ 标准差表示(对比为t检验),计数数据以百分比表示(对比为卡方

χ^2 分析),检验水准为 $\alpha=0.05$, $P<0.05$ 表示有统计学意义。

2 结果

2.1 围手术指标对比

两组的术中出血量、手术时间等对比差异无统计学意义($P>0.05$),QLB组的术后住院时间、术后胃肠功能恢复时间、术后下床活动时间显著短于对照组($P<0.05$),见表2。

表2 两组围手术指标对比($\bar{x}\pm s$)

Table 2 Comparison of perioperative indexes between the two groups ($\bar{x}\pm s$)

Groups	n	Operation time (min)	Intraoperative bleeding (mL)	Post-operative movement (h)	Postoperative recovery time of gastrointestinal function (h)	Postoperative hospitalization (d)
QLB group	90	44.25 $\pm$ 1.48	34.20 $\pm$ 4.10	33.28 $\pm$ 3.24*	12.87 $\pm$ 0.55*	2.78 $\pm$ 0.44*
Control group	90	44.19 $\pm$ 2.00	34.89 $\pm$ 3.14	43.76 $\pm$ 2.17	16.76 $\pm$ 1.77	4.17 $\pm$ 0.17

Note: Compared with control group, * $P<0.05$.

2.2 疼痛情况对比

与术后12 h对比,两组术后24 h与36 h的疼痛VAS评

分均降低($P<0.05$),且QLB组术后12 h、24 h与36 h的疼痛VAS评分都显著低于对照组($P<0.05$),见表3。

表3 两组术后不同时间点的疼痛评分对比(分, $\bar{x}\pm s$)

Table 3 Comparison of pain scores between the two groups at different time points after surgery (points, $\bar{x}\pm s$)

Groups	n	12 h	24 h	36 h
QLB group	90	2.76 $\pm$ 0.44*	1.73 $\pm$ 0.09**	0.78 $\pm$ 0.14**
Control group	90	5.66 $\pm$ 0.24	3.29 $\pm$ 0.11 [#]	2.11 $\pm$ 0.29 [#]

Note: Compared with the control group, * $P<0.05$, compared with the 12 h, [#] $P<0.05$.

2.3 并发症情况对比

QLB组术后7 d的血肿、呼吸抑制、脏器损伤、腹股沟区包

块等并发症发生率为8.9%(8/90),显著低于对照组的21.1%(19/90),两组对比差异有统计学意义($P<0.05$),见表4。

表4 两组术后并发症发生情况对比(例,%)

Table 4 Comparison of postoperative complications between the two groups (n, %)

Groups	n	Hematococcus	Organ damage	Inguinal mass	Respiratory depression	Total
QLB group	90	2	1	2	3	8(8.9)*
Control group	90	5	3	6	5	19(21.1)

Note: Compared with control group, * $P<0.05$.

2.4 麻醉情况对比

QLB组的瑞芬太尼用量、术后48 h内有效按压自控静脉

镇痛泵次数、自控静脉镇痛泵累计用量都显著少于对照组,两组对比差异均有统计学意义($P<0.05$),见表5。

表5 两组麻醉情况对比($\bar{x}\pm s$)

Table 5 Comparison of anesthesia between the two groups ($\bar{x}\pm s$)

Groups	n	Remifentanyl (μ g)	Effective compression times within 48 h (times)	Cumulative dosage of auto-controlled intravenous analgesia (ml)
QLB group	90	708.33 $\pm$ 45.95*	6.58 $\pm$ 0.55*	37.03 $\pm$ 2.58*
Control group	90	1344.09 $\pm$ 241.91	13.09 $\pm$ 2.17	50.77 $\pm$ 7.14

Note: Compared with control group, * $P<0.05$.

3 讨论

腹股沟疝是老年人的常见病和多发病,腹腔镜下全腹膜外

腹股沟疝无张力修补术具有恢复快、安全性高、创口小等优点,但腹腔镜术后常常引起腹壁胀痛,引起患者不适等应激反应,特别是可影响老年患者的预后情况^[15]。同时老年患者存在肌肉

萎缩等原因,解剖标记不明显,使得区域阻滞也存在一定的难度^[16]。超声引导下区域阻滞具有精确化、麻醉效果确切、可视化、并发症少等优势,其可清晰显示阻滞区域内解剖结构和穿刺针位置,保障了神经阻滞的效果^[17,18]。本研究显示两组的术中出血量、手术时间等对比差异无统计学意义,QLB组的术后住院时间、术后胃肠功能恢复时间、术后下床活动时间显著短于对照组;与术后12h对比,两组术后24h与36h的疼痛VAS评分均降低,QLB组术后12h、24h与36h的疼痛VAS评分都显著低于对照组,与张媛^[19]的研究类似,该学者探讨QLB对结直肠癌手术患者的影响,结果QLB组术后24h和48h的VAS评分明显降低,深睡眠时间更长。

表明超声引导下QLB复合气管插管全麻在老年患者腹腔镜下全腹膜外腹股沟疝无张力修补术的应用能更好的发挥镇痛效果,促进患者康复。从机制上分析,超声引导下QLB能够清晰地看见腹横肌浅面的腰方肌,阻滞在腰方肌前外侧,与腹横筋膜交界处给药,声探头扫描不受肋骨影响,应用比较方便^[20,21]。并且其可阻滞肋下神经、髂腹股沟神经、髂腹下神经,能够有效发挥镇痛效果,提高了镇痛成功率^[22]。

多数腹腔镜下全腹膜外腹股沟疝无张力修补术后患者存在切口疼痛、炎性疼痛、内脏痛,同时气管插管全麻对机体也为一种剧烈应激反应,可导致患者恢复不良。QLB具有用药量少、内脏痛镇痛效果好、镇痛范围广等优势^[23,24]。特别QLB更利于药液扩散至胸椎旁间隙,只需较少的药量就可较好地达到胸7-腰1,可经内、外侧弓状韧带向椎旁间隙扩散,形成椎旁阻滞的效果^[25]。本研究显示QLB组的瑞芬太尼用量、术后48h内有效按压自控静脉镇痛泵次数、自控静脉镇痛泵累计用量都显著少于对照组。与乔克坤^[26]等学者的研究类似,探讨超声引导下腰方肌阻滞联合全麻对腹腔镜子宫肌层剔除术中血流动力学及镇痛效果的影响,结果显示观察组全麻用药量,镇痛泵用量及有效按压次数明显少于对照组,睁眼时间,气管导管拔管时间,恢复室停留时间明显短于对照组,躁动率明显低于对照组。当前也有研究显示QLB时局部麻醉药能扩散至L1-L3神经根分布区域,且能扩散至腰方肌、腰大肌,向外可至外侧弓韧带及胸内筋膜后方,向下可达椎旁间隙阻滞部分腰丛神经,从而提高阻滞效果^[27]。并且QLB能够切断内脏神经和腹壁神经的传入道路,能够有效地减少使用镇痛药物的数量,不仅可以抑制伤口疼痛,还能够抑制腹腔镜的非切口疼痛,从而持续促进患者康复^[28,29]。

腹腔镜下全腹膜外腹股沟疝无张力修补术后并发症比较多见,包括血肿、呼吸抑制等,与多种因素相关,不合理麻醉药物的使用也可能增加并发症的发生^[30,31]。本研究显示QLB组术后7d的血肿、呼吸抑制、脏器损伤、腹股沟区包块等并发症发生率为8.9%,显著低于对照组的21.1%。从机制上分析,QLB能够阻断内脏神经及腹壁神经的传入通道,可以减少阿片类止痛药物的使用,提高镇痛效果,避免止痛药物带来的并发症和副作用^[32]。同时其阻滞范围确切,对机体影响小,血流动力学状态稳定,为此在临床上具有更好的安全性^[33]。不过本研究的对象局限于老年人,在其他人群中的有效性及安全性还需进一步研究。

总之,超声引导下QLB复合气管插管全麻在老年患者腹腔镜下全腹膜外腹股沟疝无张力修补术中的应用能提高镇痛与麻醉效果,减少术后并发症的发生,有利于促进患者康复。

参考文献(References)

- [1] Adhikary SD, Short AJ, El-Boghdady K, et al. Transmuscular quadratus lumborum versus lumbar plexus block for total hip arthroplasty: A retrospective propensity score matched cohort study[J]. *J Anaesthesiol Clin Pharmacol*, 2018, 34(3): 372-378
- [2] Aditjaningsih D, Pryambodho, Anasy N, et al. A randomized controlled trial on analgesic effect of repeated Quadratus Lumborum block versus continuous epidural analgesia following laparoscopic nephrectomy[J]. *BMC Anesthesiol*, 2019, 19(1): e221
- [3] Ahmed A, Fawzy M, Nasr MaR, et al. Ultrasound-guided quadratus lumborum block for postoperative pain control in patients undergoing unilateral inguinal hernia repair, a comparative study between two approaches[J]. *BMC Anesthesiol*, 2019, 19(1): e184
- [4] Akerman M, Pejčić N, Veličković I. A Review of the Quadratus Lumborum Block and ERAS[J]. *Front Med (Lausanne)*, 2018, 5: e44
- [5] Almeida C, Assunção JP. Hypotension associated to a bilateral quadratus lumborum block performed for post-operative analgesia in an open aortic surgery case [J]. *Rev Bras Anesthesiol*, 2018, 68 (6): 657-660
- [6] Almeida CR. The role of quadratus lumborum block in the hemodynamic management during hepatic resection surgery [J]. *Rev Bras Anesthesiol*, 2019, 69(6): 635-637
- [7] Carvalho R, Segura E, Loureiro MD, et al. Quadratus lumborum block in chronic pain after abdominal hernia repair: case report [J]. *Braz J Anesthesiol*, 2017, 67(1): 107-109
- [8] Elsharkawy H, El-Boghdady K, Barrington M. Quadratus Lumborum Block: Anatomical Concepts, Mechanisms, and Techniques[J]. *Anesthesiology*, 2019, 130(2): 322-335
- [9] Fei Y, Xu Z, Huang Y, et al. Transversus abdominis plane block and quadratus lumborum block did not reduce the incidence or severity of chronic postsurgical pain following cesarean section: a prospective, observational study[J]. *Trials*, 2019, 51(4): 257-261
- [10] Corso RM, Piraccini E, Sorbello M, et al. Transmuscular quadratus lumborum block versus serratus-intercostal interfascial plane block: the game has just begun[J]. *Minerva Anesthesiol*, 2018, 84(7): 873-874
- [11] Dam M, Hansen CK, Poulsen TD, et al. Transmuscular quadratus lumborum block for percutaneous nephrolithotomy reduces opioid consumption and speeds ambulation and discharge from hospital: a single centre randomised controlled trial [J]. *Br J Anaesth*, 2019, 123 (2): 350-358
- [12] Deng W, Long X, Li M, et al. Quadratus lumborum block versus transversus abdominis plane block for postoperative pain management after laparoscopic colorectal surgery: A randomized controlled trial[J]. *Medicine (Baltimore)*, 2019, 98(52): e18448
- [13] Garg C, Khanna S, Mehta Y. Quadratus lumborum block for post-operative pain relief in patient with Prune belly syndrome [J]. *Indian J Anaesth*, 2017, 61(10): 840-842
- [14] Genç Moralar D, Tok Cekmecelioglu B, Aslan M, et al. Effect of quadratus lumborum block on postoperative analgesic requirements in pediatric patients: a randomized controlled double-blinded study

- [J]. *Minerva Anesthesiol*, 2020, 86(2): 150-156
- [15] Gómez-Ríos M, Gómez-Ríos D. Continuous bilateral quadratus lumborum block after abdominal surgery[J]. *J Anaesthesiol Clin Pharmacol*, 2017, 33(2): 261-262
- [16] Gürkan Y, Yörükoğlu HU, Uluğöl H, et al. Quadratus lumborum block for both cholecystectomy and right-sided nephrectomy[J]. *Agri*, 2019, 31(3): 153-154
- [17] Jadon A, Amir M. In response to-Quadratus lumborum block failure: "A must know complication" [J]. *Turk J Anaesthesiol Reanim*, 2018, 62(8): 646-647
- [18] Jadon A, Jain P, Dhanwani L. Bilateral transmuscular quadratus lumborum block performed in single lateral decubitus position without changing position to the contralateral side[J]. *Indian J Anaesth*, 2018, 62(4): 314-315
- [19] 张媛, 斯妍娜, 吕云落, 等. 超声引导下腰方肌阻滞对结直肠癌手术患者术后早期认知功能的影响 [J]. *临床麻醉学杂志*, 2019, 35(1): 17-20
- [20] Kadam VR, Howell S. Ultrasound-guided continuous transmuscular quadratus lumborum block- L4 or L2 level catheter insertion for analgesia in open abdominal surgery: Case series [J]. *Indian J Anaesth*, 2018, 62(7): 555-557
- [21] Keraï S, Saxena KN. Quadratus lumborum block for post-caesarean analgesia[J]. *Indian J Anaesth*, 2017, 61(4): e364
- [22] Krohg A, Ullensvang K, Rosseland LA, et al. The Analgesic Effect of Ultrasound-Guided Quadratus Lumborum Block After Cesarean Delivery: A Randomized Clinical Trial [J]. *Anesth Analg*, 2018, 126(2): 559-565
- [23] Kumar GD, Gnanasekar N, Kurhekar P, et al. A Comparative Study of Transversus Abdominis Plane Block versus Quadratus Lumborum Block for Postoperative Analgesia following Lower Abdominal Surgeries: A Prospective Double-blinded Study [J]. *Anesth Essays Res*, 2018, 12(4): 919-923
- [24] Lu Y, Zhang J, Xu X, et al. Sensory assessment and block duration of transmuscular quadratus lumborum block at L2 versus L4 in volunteers: a randomized controlled trial [J]. *BMC Anesthesiol*, 2019, 85(12): 1273-1280
- [25] Mieszkowski MM, Mayzner-Zawadzka E, Tuyakov B, et al. Evaluation of the effectiveness of the Quadratus Lumborum Block type I using ropivacaine in postoperative analgesia after a cesarean section - a controlled clinical study[J]. *Ginekol Pol*, 2018, 89(2): 89-96
- [26] 乔克坤, 李向, 向志雄. 超声引导下腰方肌阻滞联合全麻对腹腔镜子宫肌瘤剔除术中血流动力学及镇痛效果的影响[J]. *广西医科大学学报*, 2020, 37(4): 751-755
- [27] Nair A. Bilateral quadratus lumborum block for post-caesarean analgesia[J]. *Turk J Med Sci*, 2017, 61(4): 362-363
- [28] Kmen K, Metin kmen B, Sayan E. Ultrasound-guided lateral versus posterior Quadratus Lumborum Block for postoperative pain after laparoscopic cholecystectomy: a randomized controlled trial [J]. *Turk J Surg*, 2019, 35(1): 23-29
- [29] Kmen K, kmen BM. Ultrasound-guided anterior quadratus lumborum block for postoperative pain after percutaneous nephrolithotomy: a randomized controlled trial [J]. *Korean J Anesthesiol*, 2020, 73(1): 44-50
- [30] Plečko M, Boháček I, Tripković B, et al. Applications and critical evaluation of fascia iliaca compartment block and quadratus lumborum block for orthopedic procedures [J]. *Acta Clin Croat*, 2019, 58(Suppl 1): 108-113
- [31] Rao Kadam V, Ludbrook G, Van Wijk RM, et al. Comparison of ultrasound-guided transmuscular quadratus lumborum block catheter technique with surgical pre-peritoneal catheter for postoperative analgesia in abdominal surgery: a randomised controlled trial [J]. *Anaesthesia*, 2019, 74(11): 1381-1388
- [32] Sú M, Cardoso JM, Reis H, et al. Quadratus lumborum block: are we aware of its side effects? A report of 2 cases [J]. *Rev Bras Anesthesiol*, 2018, 68(4): 396-399
- [33] Salama ER. Ultrasound-guided bilateral quadratus lumborum block vs. intrathecal morphine for postoperative analgesia after cesarean section: a randomized controlled trial[J]. *Korean J Anesthesiol*, 2020, 73(2): 121-128