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腹腔镜 TAPP 与李金斯坦(Lichtenstein)疝修补术治疗腹股沟疝对血清睾酮浓度、MMP-2 的影响*

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摘要 目的:探讨腹腔镜腹膜前疝修补术(TAPP)与李金斯坦(Lichtenstein)疝修补术治疗腹股沟疝对血清睾酮浓度、基质金属蛋白酶-2(MMP-2)的影响。**方法:**选取2017年1月~2021年1月80例腹股沟疝患者,采用随机数字表法将其分为TAPP组(n=44)与Lichtenstein组(n=36),记录两组手术指标、术后并发症及复发率,于术前和术后1个月血清检测睾酮和MMP-2水平。**结果:**TAPP组术中出血量、术后肛门排气时间显著少于Lichtenstein组($P<0.05$),两组手术时间比较无差异($P>0.05$);TAPP组术后住院时间少于Lichtenstein组,住院费用高于Lichtenstein组($P<0.05$),两组术后复发率对比无差异($P>0.05$);TAPP组阴囊水肿发生率显著低于Lichtenstein组($P<0.05$),其它并发症组间比较无差异($P>0.05$);两组术前术后血清睾酮均无变化($P>0.05$)。术后两组MMP-2水平均显著降低($P<0.05$),但组间比较无差异($P>0.05$)。**结论:**两种术式对股沟疝患者睾丸功能均无损伤,且均可有效降低血清MMP-2水平,防止股沟疝复发,安全有效;相比之下,腹腔镜ATPP创伤更小,术后恢复更快,但手术难度较大,费用较高,两种术式各有优缺点,需结合患者的实际情况选择术式。

关键词:腹股沟疝;腹腔镜腹膜前疝修补术;李金斯坦疝修补术;睾酮;基质金属蛋白酶-2

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The Effect of Laparoscopic TAPP and Lichtenstein Hernia Repair for Inguinal Hernia on Serum Testosterone Concentration and MMP-2*

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ABSTRACT Objective: To investigate the effects of laparoscopic preperitoneal hernia repair (TAPP) and Lichtenstein hernia repair for inguinal hernia on serum testosterone concentration and matrix metalloproteinase-2 (MMP-2). **Methods:** From January 2017 to January 2021, 80 patients with inguinal hernia were selected, and they were divided into TAPP group (n=44) and Lichtenstein group (n=36) by random number table, and the two groups of surgical indicators and surgery were recorded. For post-operative complications and recurrence rates, serum testosterone and MMP-2 levels were measured before and 1 month after surgery. **Results:** The amount of intraoperative blood loss and postoperative anal exhaust time in TAPP group were lower than those in Lichtenstein group ($P<0.05$), and there was no difference in the operative time between the two groups ($P>0.05$). The postoperative hospital stay in TAPP group was shorter than that in Lichtenstein group, and the hospitalization cost was higher than that in Lichtenstein group ($P<0.05$). There was no difference in postoperative recurrence rate between the two groups ($P>0.05$). The incidence of scrotal edema in TAPP group was lower than that in Lichtenstein group ($P<0.05$), but there was no difference in other complications among groups ($P>0.05$). There was no change in serum testosterone in both groups before and after operation ($P<0.05$). The level of MMP-2 in both groups was decreased after surgery ($P<0.05$), but there was no difference between groups ($P>0.05$). **Conclusion:** Both surgical methods have no damage to the testicular function of patients with inguinal hernia, and both can effectively reduce the serum MMP-2 level, prevent the recurrence of the inguinal hernia, and are safe and effective. In contrast, the laparoscopic ATPP has less trauma and the operation The recovery is faster, but the operation is more difficult and costly. The two surgical methods have their own advantages and disadvantages. The surgical method needs to be selected according to the actual situation of the patient.

Key words: Inguinal hernia; Laparoscopic preperitoneal hernia repair; Li Jinstein hernia repair; Testosterone; Matrix metalloproteinase-2

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前言

腹股沟疝是最常见的一种腹外疝,好发于男性,且可发生于任何年龄,成人腹股沟疝只能通过疝修补术进行治疗^[1,2]。疝修补术的方式方法多样,以往张力修补术因疼痛重、恢复慢、复发率高等明显缺点已被无张力疝修补术取代^[3,4]。腹腔镜腹膜前疝修补术(Transabdominal preperitoneal, TAPP)与李金斯坦(Lichtenstein)疝修补术均属于无张力疝修补术,近几年人们对两种方法的有效性和安全性进行了大量研究,但主要基于宏观指标,极少从微观机制来研究二者的有效性与安全性^[5,6]。基质金属蛋白酶-2(Matrix metalloproteinase, MMP-2)在细胞外基质降解与重构过程中发挥重要作用,研究表明,MMP-2对腹股沟疝的发病与复发具有重要影响^[7,8]。睾酮是雄激素的主要成分,疝修补术操作及补片因素是否会对患者生殖系统产生损伤值得关注^[9,10]。为此,本研究从微观环境探讨了腹腔镜 TAPP 与李ichtenstein 疝修补术的有效性与安全性,报道如下。

1 对象与方法

1.1 研究对象

选取 2017 年 1 月~2021 年 1 月 80 例腹股沟疝患者。

纳入标准:均为男性;单侧腹股沟疝;无嵌顿;自愿签署手术同意书。

排除标准:儿童及女性腹股沟疝患者;复发疝;有睾丸外伤史、生殖系统疾病等病史;有手术及麻醉禁忌等。

采用随机数字表法将其分为两组,TAPP 组($n=44$):年龄 32~77 岁,平均(44.37 ± 8.24)岁;斜疝 13 例,直疝 31 例;Lichtenstein 组($n=36$):年龄 26~74 岁,平均(42.73 ± 10.42)岁;斜疝 16 例,直疝 20 例。两组一般资料比较均无统计学意义($P > 0.05$)。

1.2 研究方法

1.2.1 TAPP 组主要手术步骤 于脐下缘开弧形小切口,置入 10 mm 套管针,建立 CO₂ 气腹,置入腹腔镜,然后分别于左右麦氏点开两个 5 mm 操作孔。沿疝环边缘 4 mm 用电钩将腹膜切开,电钩游离内环处腹膜瓣,钝性分离腹膜前间隙,向中线分离

至脐内侧韧带,向下分离至 Cooper 韧带、髂耻束,向外分离至内环口外侧 3 cm 处,充分暴露腹股沟区重要解剖标志。完整游离疝囊,斜疝疝囊较大需横断并结扎。根据具体情况剪裁聚丙烯补片(美国巴德公司),将其平铺覆盖于缺损区,完整覆盖股环、内环及腹股沟三角。最后用 3-0 可吸收线缝合腹膜结束手术。

1.2.2 Lichtenstein 组主要手术步骤 于患侧内外环体表投影连线开一 5~7 cm 长的切口,切开腹外斜肌腱膜,游离腱膜下间隙,上端至少达弓状缘 2 cm 处,下缘至少达耻骨结节 1~2 cm 处,外侧须充分显露腹股沟韧带。然后游离精索,于精索前内侧找到疝囊,较小或中等大小的斜疝疝囊,高位游离后翻转到腹腔内,较大的疝囊于腹股沟管中上部横断,远端旷置,近端高位游离后翻转到腹腔内缝扎,对疝囊进行荷包内翻缝合。根据具体情况剪裁聚丙烯补片的大小,内侧依外口形状修剪,外侧剪开分成上下两片燕尾状,留一圆孔容精索通过。将补片平铺于精索后方腹横筋膜表面,用可吸收缝线固定于耻骨结节表面筋膜上,以"燕尾状交叉"法将内片压外片缝合两叶网片。最后缝合外斜肌腱膜结束手术。

1.3 观察指标

记录两组患者手术时间、术中出血量、术后肛门排气时间、住院费用、术后住院时间。两组出院后均门诊或电话随访,TAPP 组平均随访 14.3 个月,Lichtenstein 组平均随访 15.7 个月,了解两组患者术后近远期并发症及复发情况。同时于术前和术后 1 个月抽取外周静脉血 3 mL,分离血清检测睾酮和 MMP-2 水平,其中睾酮采取化学发光法检测(美国 RB 生物公司试剂盒),MMP-2 采取 ELISE 法检测(美国 ADL 公司试剂盒)。

1.4 统计学方法

采用 SPSS18.0 处理数据,计数资料以率表示,行 χ^2 检验;计量资料以($\bar{x} \pm s$)表示,行 t 检验。 $P < 0.05$ 表示有统计学意义。

2 结果

2.1 两组手术相关指标比较

TAPP 组术中出血量、术后肛门排气时间显著少于 Lichtenstein 组($P < 0.05$),两组手术时间比较无差异($P > 0.05$),见表 1。

表 1 两组手术相关指标比较

Table 1 Comparison of surgery-related indicators between the two groups

Groups	Operation time($\bar{x} \pm s$, min)	Intraoperative blood loss($\bar{x} \pm s$, mL)	Postoperative anal exhaust time($\bar{x} \pm s$, h)
TAPP group($n=44$)	57.61 \pm 9.25	11.74 \pm 3.29 [#]	11.82 \pm 2.36 [#]
Lichtenstein group($n=36$)	55.27 \pm 10.66	15.09 \pm 3.07	13.75 \pm 3.92

Note: Compared with Lichtenstein group, [#] $P < 0.05$.

2.2 两组术后住院时间、住院费用及术后复发率比较

TAPP 组术后住院时间少于 Lichtenstein 组,住院费用高于 Lichtenstein 组($P < 0.05$),两组术后复发率对比无差异($P > 0.05$),见表 2。

2.3 两组术后并发症比较

TAPP 组阴囊水肿发生率显著低于 Lichtenstein 组($P < 0.05$),其它并发症组间比较无差异($P > 0.05$),见表 3。

2.4 两组术前后血清睾酮、MMP-2 水平比较

两组术前后血清睾酮均无变化($P > 0.05$)。术后两组 MMP-2 水平均显著降低($P < 0.05$),但组间比较无差异($P > 0.05$),见表 4。

3 讨论

疝修补的概念经历了从 Bassini 修补到 Lichtenstein 无张

表 2 两组术后住院时间、住院费用及术后复发率比较

Table 2 Comparison of postoperative hospitalization time, hospitalization cost and postoperative recurrence rate between the two groups

Groups	Hospitalization Expenses ($\bar{x} \pm s$, yuan)	Postoperative hospital stay($\bar{x} \pm s$, d)	Postoperative recurrence[n(%)]
TAPP group(n=44)	10403.11± 531.05 [#]	3.11± 1.05 [#]	1(2.3)
Lichtenstein group(n=36)	7897.24± 681.52	7.24± 1.52	3(8.3)

Note: Compared with Lichtenstein group, [#]P<0.05.

表 3 两组术后并发症比较[n(%)]

Table 3 Comparison of postoperative complications between the two groups [n(%)]

Groups	Scrotal edema	Hematoma	Local chronic pain	Ischemic orchitis	Local skin sensory disturbance
TAPP group(n=44)	2(4.5) [#]	0(0.0)	0(0.0)	1(2.3)	1(2.3)
Lichtenstein group (n=36)	7(19.4)	1(2.8)	1(2.8)	4(11.1)	1(2.8)

Note: Compared with Lichtenstein group, [#]P<0.05.

表 4 两组术前后血清睾酮、MMP-2 水平比较($\bar{x} \pm s$)

Table 4 Comparison of serum testosterone and MMP-2 levels before and after operation between the two groups($\bar{x} \pm s$)

Groups	Testosterone(ng/mL)		MMP-2(μg/L)	
	Preoperative	Postoperative	Preoperative	Postoperative
TAPP group(n=44)	4.08± 1.27	4.03± 1.31	89.14± 25.38	32.24± 7.67*
Lichtenstein group(n=36)	4.22± 1.95	4.16± 1.67	78.03± 27.75	36.63± 10.51*

Note: Compared with before operation, *P<0.05.

力修补的演变。1984 年美国医生 Lichtenstein 等提出了 "无张力疝修补手术", 并一跃成为疝修补手术的原则。Lichtenstein 疝修补术使腹股沟疝的术后复发率明显降低, 且手术操作较简单, 学习曲线短, 适合于各型腹股沟疝。近些年随着腹腔镜技术的发展, 无张力疝修补术也开始结合腹腔镜的优势^[11-13]。网片放置可通过开放手术与腹腔镜技术实现。虽然大多研究已探讨了腹腔镜手术修复腹股沟疝的相对优点和潜在风险, 但多数研究样本量较少, 无法证明一种手术修复比另一种手术修复有明显好处, 因此还需大量数据进行证明^[14]。本结果显示, 与 Lichtenstein 组比较, TAPP 组术中出血量、术后肛门排气时间、术后住院时间更少, 这一结果与 Wakasugi M^[15]以及鞠雷^[16]的研究具有一致性。进一步分析可知: 腹腔镜 TAPP 符合无张力修补原则, 并且与 Lichtenstein 疝修补术相比, 其切口更小, 疼痛更轻, 术后恢复更快。腹腔镜 TAPP 手术操作准确、便捷, 手术视野清晰, 可对周围组织结构进行精确的解剖、分离。

无张力疝修补术后复发率是人们十分关心的问题。据报道, 我国自 1997 年-2006 年间, 有 15 万人进行了无张力疝修补术, 术后复发率为 1%~3%, 而二次手术后再次复发率为 11.3%, 呈现出手术次数越多复发率越高这一趋势^[17,18]。目前两种方法术后复发率是否有差异尚无确切结论。本研究结果显示 TAPP 组术后复发率为 2.3%, Lichtenstein 组为 8.3%, 两组术后复发率相近, 与潘成文等^[19]研究一致。但 Zhu X 等^[20]研究表明, 腹腔镜 TAPP 在术后复发率方面较 Lichtenstein 术具有优势。造成这种差异的原因可能与本研究样本数偏少有关, 故需国内多中心、前瞻性、大样本研究进行证实。TAPP 组阴囊

水肿发生率显著低于 Lichtenstein 组, 其它并发症组间比较无差异。这一结果与吴劲风等人^[21]的报道具有差异性。进一步分析可知: 疝修补术后的并发症较多, 尤其是股沟疝的位置特殊, 邻近生殖系统, 因此可能会产生阴囊水肿这一并发症^[22,23]。需考虑手术操作及补片因素是否会对生殖系统产生影响。为了进一步探究手术操作及补片因素是否会对生殖系统产生影响, 本研究尝试从微观机制上进行探讨。结果显示, 两组术前后血清睾酮均无变化, 但术后两组 MMP-2 水平均显著降低。这一结果与 Henriksen N A 等^[24]研究具有一致性。分析原因可知: 腹股沟疝的发病原因复杂, 其中与间质结缔组织尤其是胶原代谢改变密切相关。胶原是支持腹横筋膜正常生理功能必不可少的物质^[25,26]。原发性与复发性腹股沟疝并不仅仅由原发缺陷引起的, 而是由于胶原分布方面的后天性障碍引起的。MMP-2 是基质金属蛋白酶家族中的成员之一, 具有降解 IV 型胶原、弹性蛋白、明胶、纤维结合素及其它基质成分等作用^[27,28]。睾酮是一种十分重要的性激素, 男性主要由睾丸间质细胞分泌睾酮, 它对男性的性欲、勃起功能和射精功能等都具有重要影响, 可通过中枢及外周作用调控阴茎勃起^[29,30]。通过检测血清睾酮水平可反映患者生殖系统有无受到损伤。从微观机制上提示两种手术方法在治疗腹股沟疝及预防复发方面的效果相当, 且对股沟疝患者的生殖系统影响轻微, 安全性均较高。但本研究也存在一定不足, 后续将继续从微观角度探究。

综上所述, 腹腔镜 ATPP 与 Lichtenstein 术对股沟疝患者睾丸功能均无损伤, 且均可有效降低血清 MMP-2 水平, 防止股沟疝复发, 安全有效; 相比之下, 腹腔镜 ATPP 创伤更小, 术后

恢复更快,但手术难度较大,费用较高,两种术式各有优缺点,需结合患者的实际情况选择术式。

参考文献(References)

- [1] Wright R, Salisbury T, Landes J. Groin anatomy, preoperative pain, and compression neuropathy in primary inguinal hernia: What really matters[J]. *Am J Surg*, 2019, 217(5): 873-877
- [2] Lee K, Jin H L, Nam S, et al. Outcomes of open versus single-incision laparoscopic totally extraperitoneal inguinal hernia repair using propensity score matching: A single institution experience [J]. *PLoS ONE*, 2021, 16(1): e0246189
- [3] ESSola B, Himpens J, Limbga A, et al. Fully extraperitoneal laparoscopic inguinal hernia repair using conventional mesh versus tailor-made mosquito mesh: a randomized controlled trial from Cameroon[J]. *Br J Surg*, 2021, 15(9): 9
- [4] Pal A K, Dwivedi A D, Kumar A, et al. Comment to "Endoscopic retromuscular technique (eTEP) vs conventional laparoscopic ventral or incisional hernia repair with defect closure (IPOM+) for midline hernias: a case-control study"[J]. *Hernia*, 2021, 25(4): 1105-1106
- [5] Altin O, Kaya S. Comparison of Total Extraperitoneal Laparoscopic Surgery for Inguinal Hernia Repair between Elderly and Non-Elderly Patients[J]. *Int J Geron*, 2020, 14(2): 115-118
- [6] Favaro M, Gabor S, Souza D, et al. Quadratus Lumborum Block As A Single Anesthetic Method For Laparoscopic Totally Extraperitoneal (Tep) Inguinal Hernia Repair: A Randomized Clinical Trial [J]. *Sci Rep*, 2020, 10(1): 8526
- [7] Li J, Zhang X, Sun Q, et al. Circulating matrix metalloproteinases and procollagen propeptides in inguinal hernia [J]. *Hernia*, 2018, 22(3): 541-547
- [8] Chuang C Y, Ho Y C, Lin C W, et al. Salvianolic acid A suppresses MMP-2 expression and restrains cancer cell invasion through ERK signaling in human nasopharyngeal carcinoma [J]. *J Ethnop*, 2020, 252(1): 112601
- [9] Zhang D B, Wei X Y. Steroidal Glycosides from *Allium tuberosum* Seeds and Their Roles in Promoting Testosterone Production of Rat Leydig Cells[J]. *Molecules*, 2020, 25(22): 5464
- [10] Leakey J, Althaus Z R, Bailey J R, et al. Dexamethasone increases UDP-glucuronyltransferase activity towards bilirubin, oestradiol and testosterone in foetal liver from rhesus monkey during late gestation [J]. *Bio J*, 2019, 225(1): 183-188
- [11] Karim T, Katiyar V K, Jain A, et al. Comparison of trans-abdominal preperitoneal repair with Lichtenstein tension-free hernioplasty: A prospective study[J]. *Form J Surg*, 2021, 54(1): 19
- [12] Nigam V K, Nigam S. Nigam's inverted curtain hernioplasty: a modified lichtenstein tension free hernioplasty for inguinal hernia[J]. *Int Surg J*, 2019, 6(9): 3241
- [13] Erbin A, Canat H L, Ucpinar B, et al. Bladder Hernia, Bladder Stone and Contralateral Bowel Hernia: An Usual Combination [J]. *J Coll Physicians Surg Pak*, 2019, 29(6): S62-S64
- [14] 刘竞, Savu Michelle, 智迎辉, 等. 机器人辅助腹腔镜经腹膜前间隙腹股沟疝修补术的临床分析 [J]. *中华医学杂志*, 2020, 100(36): 2858-2860
- [15] Wakasugi M, Hasegawa J, Y Ikeda. Single-incision laparoscopic totally extraperitoneal inguinal hernia repair with tumescent local anesthesia: report of more than 2000 procedures at a day-surgery clinic[J]. *Surg Today*, 2021, 51(4): 545-549
- [16] 鞠雷, 魏士博, 尚海. 腹腔镜经腹股沟膜前疝修补术与 Lichtenstein 无张力疝修补术治疗腹股沟疝临床对照研究 [J]. *临床军医杂志*, 2019, 47(7): 693-694
- [17] Yasukawa D, Aisu Y, Hori T. Crucial anatomy and technical cues for laparoscopic transabdominal preperitoneal repair: Advanced manipulation for groin hernias in adults[J]. *World J Gastrointest Surg*, 2020, 12(7): 307-325
- [18] Choi B J, Kwon W, Baek S H, et al. Single-port laparoscopic Deloyers procedure for tension-free anastomosis after extended left colectomy or subtotal colectomy: A 6-patient case series [J]. *Medicine*, 2020, 99(31): e21421
- [19] 潘成文, 刘芸, 朱励民. 局麻 Lichtenstein 无张力疝修补术与腹腔镜经腹膜前疝修补术的比较 [J]. *浙江医学*, 2017, 39(18): 1577-1580
- [20] Zhu X, Liu Z, Shen J, et al. Triangle Trocar Configuration in Laparoscopic Totally Extraperitoneal Inguinal Hernia Repair: A Prospective Randomized Controlled Study [J]. *J Surg Res*, 2019, 239(2): 149-155
- [21] 吴劲风, 胡抢, 陈剑, 等. 腹腔镜探查联合 Lichtenstein 或经腹膜前疝修补术治疗腹股沟嵌顿疝的临床对比研究[J]. *腹腔镜外科杂志*, 2018, 23(7): 531-534
- [22] Wani I. Double direct hernia, triple indirect hernia, double Pantaloon hernia (Jammu, Kashmir and Ladakh Hernia) with anomalous inferior epigastric artery: Case report [J]. *Int J Surg Case Rep*, 2019, 60(1): 42-45
- [23] Karaku O Z, Ulusoy O, Ate O, et al. Indirect inguinal hernia repair conducted with single conventional port intracorporeal conventional equipment-endoscopic surgery[J]. *Hernia*, 2020, 24(5): 1063-1068
- [24] Henriksen N A, Mortensen J H, Lorentzen L, et al. Abdominal wall hernias-A local manifestation of systemically impaired quality of the extracellular matrix[J]. *Surgery*, 2018, 12(1): 220-227
- [25] Obayashi J, Wakisaka M, Tanaka K, et al. Risk factors influencing ascending testis after laparoscopic percutaneous extraperitoneal closure for pediatric inguinal hernia and hydrocele [J]. *Pediatr Surg Int*, 2021, 37(2): 293-297
- [26] Bullen N L, Massey L H, Antoniou S A, et al. Open versus laparoscopic mesh repair of primary unilateral uncomplicated inguinal hernia: a systematic review with meta-analysis and trial sequential analysis[J]. *Hernia*, 2019, 23(3): 461-472
- [27] Wang D, Han Y, Xu X, et al. Matrix Metalloproteinases (MMP-2) and Tissue Inhibitors of Metalloproteinases (TIMP-2) in Patients with Inguinal Hernias[J]. *World J Surg*, 2020, 44(11): 3679-3686
- [28] Marchenko G N, Marchenko N D, Leng J, et al. Promoter characterization of the novel human matrix metalloproteinase-26 gene: regulation by the T-cell factor-4 implies specific expression of the gene in cancer cells of epithelial origin [J]. *Biochem J*, 2019, 363(2): 253-262
- [29] Dong H A, Kim H, Lee D, et al. Serum Testosterone Level as Possible Predictive Marker for Prognosis in Metastatic Castration-Resistant Prostate Cancer Patients Treated with Enzalutamide[J]. *Urol Oncol*, 2021, 19(1): 60-69
- [30] Mansoori A, Hosseini S, Zilae M, et al. Effect of fenugreek extract supplement on testosterone levels in male: A meta-analysis of clinical trials[J]. *Phytother Res*, 2020, 34(7): 1550-1555