

doi: 10.13241/j.cnki.pmb.2022.02.010

全身麻醉下达芬奇机器人手术在老年腹部手术中应用观察*

周 瑜 王小雨 徐 黎 刘晓杰 宿明艳[△]

(南京大学医学院附属南京鼓楼医院麻醉科 江苏 南京 210000)

摘要 目的:探究全身麻醉下达芬奇机器人在老年腹部手术中的应用效果。**方法:**选择 2019 年 1 月至 2020 年 12 月于我院接受腹部手术治疗的 200 例老年患者,将其按照术式分为研究组(100 例)与对照组(100 例),研究组选择达芬奇机器人开展手术,对照组选择常规腹腔镜手术,对比两组患者的手术时间、术中出血量、中转开腹率、术后排气时间、总住院费用、住院时间、术后患者自我效能及抑郁情况、术后疼痛度情况以及术后并发症发生情况。**结果:**(1)比较显示研究组患者的术中出血量、中转开腹率、术后排气时间均低于对照组($P<0.05$),但其手术时间、总住院费用高于对照组($P<0.05$);(2)术后研究组患者自我效能得分高于对照组,抑郁得分低于对照组($P<0.05$);(3)术后 24 h 及 48 h 研究组疼痛得分均低于对照组($P<0.05$);(4)研究组患者术后各类并发症发生率为 4.00%,明显低于对照组的 12.00%($P<0.05$)。**结论:**全身麻醉下应用达芬奇机器人对老年患者实施腹部手术可行性较好,能够显著减小对患者的创伤,加快其术后康复,同时还能够降低其术后不良情绪和并发症发生,提高其自我效能,值得临床推广应用。

关键词:全身麻醉;达芬奇机器人;老年患者;腹部手术

中图分类号:R656;R614 **文献标识码:**A **文章编号:**1673-6273(2022)02-254-05

Application of General Anesthesia and Da Vinci Robotic Surgery in Elderly Abdominal Surgery*

ZHOU Yu, WANG Xiao-yu, XU Li, LIU Xiao-jie, SU Ming-yan[△]

(Department of Anesthesiology, Nanjing Gulou Hospital, Nanjing University School of Medicine, Nanjing, Jiangsu, 210000, China)

ABSTRACT Objective: To explore the application effect of Da Vinci robot under general anesthesia in elderly abdominal surgery. **Methods:** 200 elderly patients who underwent abdominal surgery in our hospital from January 2019 to December 2020 were selected, and they were divided into study group (100 cases) and control group (100 cases) according to the differences in surgical procedures. The research group chose Da Vinci robot to perform surgery, and the control group chose conventional laparoscopic surgery. The operation time, intraoperative blood loss, conversion rate of laparotomy, postoperative exhaust time, total hospitalization cost, hospitalization time, and length of stay were compared between the two groups of patients. Postoperative self-efficacy and depression, postoperative pain, and postoperative complications. **Results:** (1) The comparison showed that the intraoperative blood loss, the conversion to laparotomy rate, and postoperative exhaust time of the study group were lower than those of the control group ($P<0.05$), but the operation time and total hospitalization expenses were higher than those of the control group ($P<0.05$). (2) Postoperative self-efficacy scores in the study group were higher than those in the control group, and depression scores were lower than those in the control group ($P<0.05$). (3) Pain scores in the study group were lower than those in the control group at 24h and 48h after surgery ($P<0.05$). (4) The incidence of postoperative complications in the study group was 4.00%, which was significantly lower than 12.00% in the control group ($P<0.05$). **Conclusion:** The application of Da Vinci robot under general anesthesia to perform abdominal surgery on elderly patients is feasible, which can significantly reduce the trauma to the patient, speed up their postoperative recovery, and at the same time reduce their postoperative bad mood and complications. Improving its self-efficacy is worthy of clinical application.

Key words: General anesthesia; Da Vinci robot; Elderly patients; Abdominal surgery

Chinese Library Classification(CLC): R656; R614 **Document code:** A

Article ID: 1673-6273(2022)02-254-05

前言

随着近些年科学技术的进步与发展^[1],达芬奇机器人是现代外科史上跨越性的进步,是微创外科拓展至复杂疑难手术的

* 基金项目:国家自然科学基金项目(81870871)

作者简介:周瑜(1984-),女,硕士,主治医师,研究方向:老年人手术麻醉,达芬奇机器人手术,妇科手术,电话:15895875184, E-mail:zy875184@163.com

△ 通讯作者:宿明艳(1986-),女,硕士,主治医师,研究方向:术后认知障碍,电话:15195860663, E-mail:zy875184@163.com

(收稿日期:2021-04-06 接受日期:2021-04-30)

飞跃式发展,也是现代工业技术与现代医学疾患诊疗的完美融合^[2,3]。达芬奇机器人最早于 1950 年被设计出来,但直至近期才被应用于临床,达芬奇机器人系统主要组成部分包括手术机械臂、手术微器械、医生控制台、3D 腹腔镜等^[4],经过近些年的不断完善,达芬奇机器人系统的性能有了较大的提升,应用范围覆盖面也日益广泛^[5,6]。有学者将达芬奇机器人同传统的 2D 腹腔镜和 3D 腹腔镜开展过对照研究,结果显示达芬奇机器人在手术视野、操作灵活度以及施术者持续操作时间方面具有明显的优势^[7,8]。近些年社会老龄化趋势的显现导致老年外科手术患者病例数不断增加,受身体机能减退、基础疾病多发等因素的影响,老年腹部患者往往出现术后并发症几率更高、术后不良情绪突出、疼痛明显,这些都对患者术后康复造成了一定影响^[9,10]。本研究拟通过设立对照分组的方式,就达芬奇机器人对全麻条件下老年腹部手术患者康复指标的影响进行探究,以期改善此类患者预后提供临床参考。

1 资料与方法

1.1 一般资料

选择 2019 年 1 月至 2020 年 12 月于我院接受腹部手术治疗的 200 例老年患者,将其按照术式的差异区分为研究组(100 例)与对照组(100 例)。

纳入标准:(1)入组对象均具有明确的手术指征需要实施腹部手术;(2)意识清晰能够配合进行调研。

排除标准:(1)并发精神疾患患者;(2)酒精或药物依赖者;(3)无法实施全身麻醉者;(4)并发严重器质性疾患诸如冠心病、肾功能衰竭者;(5)正在进行其他未结题临床调研者。

1.2 干预方法

对照组开展常规全身麻醉下腹腔镜手术,做好术前准备并行静脉麻醉,静吸复合维持麻醉,术中密切监测患者生命体征,术后常规输注抗生素,做好引流管护理等相关工作。

研究组实施达芬奇机器人系统指导下的腹部手术,具体方式如下:患者取仰卧位,建立气腹环境后,对患者腹腔情况进行探查,设置操作孔及观察孔(注意设置观察孔和操作孔时保留适当间距,避免机械臂术中相互干扰),而后根据患者病情由施术者操作机械臂开展相应手术,同样术后常规输注抗生素,做好术后护理等相关工作。

1.3 观察指标

1.3.1 两组一般手术指标比较 分别就两组的手术时间、术中出血量、中转开腹率、术后排气时间、住院时间以及总住院费用进行统计,并开展组间差异性比较。

1.3.2 两组术后自我效能及抑郁得分比较 分别于术后 48 h 时使用自我效能量表和汉密尔顿抑郁量表(Hamilton Depression Scale, HAMD)对两组开展自我效能和抑郁状态评估,其中自我效能评估工具为一般自我效能感量表(General Self-efficacy Scale, GSES),GSES 量表^[11,12]共有 10 个条目,采用 1-4 分四级评分制,总分为各条目得分之和,得分越高代表受试者自我效能越好。HAMD 量表^[13]是由学者 Hamilton 于 1960 年编制的,该量表主要用于临床抑郁情绪的评估,量表共包括 17 项,得分在 36 分及以上的代表存在严重的抑郁情绪,得分在 20-35 分之间代表存在抑郁,得分 8-19 分代表可能有抑郁情绪,得分 8

分以下代表无抑郁情绪。

1.3.3 两组术后疼痛度比较 分别于术后 24 h 和术后 48 h 时对两组的术后疼痛度进行评估并实施组间差异性比较,使用工具为视觉模拟量表^[14,15](Visual analogue scale, VAS),该量表直接利用一条 0-10 cm 的直线,0 代表无痛,10 代表无法忍受的剧痛,由患者根据自身情况选择疼痛程度,PPI 采取 0-5 分制,得分分别代表无痛、轻度、不适、难受、可怕和剧痛 6 个等级。

1.3.4 两组术后并发症发生率比较 分别统计两组术后切口出血、切口感染、腹腔感染以及肠梗阻等事件的发生情况,并实施组间差异性比较。

1.4 统计学方法

应用 SPSS 22.0,使用 $(\bar{x} \pm s)$ 示计量资料,采用 t 检验,使用 $[n(\%)]$ 示计数资料,应用卡方检验, $P < 0.05$ 有统计学意义^[13]。

2 结果

2.1 两组一般临床资料比较

本次研究合计纳入 200 例病患,其中男性 113 例,女性 87 例,年龄 60~78 岁,平均年龄 (66.89 ± 4.33) 岁,将两组患者的一般临床资料诸如性别、年龄、受教育程度、婚姻状态、疾病类型、平均病程等纳入研究并实施组间差异性比较,结果显示两组上述资料对比无差异($P > 0.05$),有可比性,如表 1 所示。

2.2 两组一般手术指标比较

将两组的一般手术指标诸如手术时间、术中出血量等纳入研究并实施组间差异性比较,结果显示研究组的术中出血量、中转开腹率、术后排气时间均低于对照组($P < 0.05$),但其手术时间、总住院费用高于对照组($P < 0.05$),两组在住院时间无差异($P > 0.05$),如表 2 所示。

2.3 两组术后自我效能及抑郁得分比较

分别于术后 48 h 使用 GSES 量表和 HAMD 量表对两组的自我效能与抑郁状态进行评估,结果显示研究组术后 48 h 时的自我效能评分明显高于对照组,抑郁评分明显低于对照组($P < 0.05$),如表 3 所示。

2.4 两组术后疼痛度比较

分别于术后 24 h 和术后 48 h 时对两组的疼痛度进行评估并实施组间差异性比较,结果显示研究组的术后 24 h 和术后 48 h 疼痛度评分均明显低于对照组($P < 0.05$),如表 4 所示。

2.5 两组并发症发生率比较

对两组术后各类并发症诸如切口出血、切口感染、腹腔感染等事件的发生率开展组间差异性比较,研究组术后并发症总发生率为 4.00 %显著低于对照组的 12.00 %($P < 0.05$),如表 5 所示。

3 讨论

达芬奇机器人最早于 2000 年获得美国 FDA 认证,而后被正式应用于临床中^[16]。2003 年达芬奇机器人被应用于心脏外科直视手术中,2005 年被批准应用于妇科微创手术中,截止目前达芬奇机器人已经基本涵盖了外科手术的大部分领域^[17,18]。我国最早于 2006 年购置首台达芬奇机器人系统,并于 2007 年 1 月开展首例达芬奇机器人手术,近些年随着我国达芬奇机器人辅助手术的不断发

表 1 两组一般临床资料对比

Table 1 Comparison of general clinical data of the two groups

Index	Research group(n=100)	Control group(n=100)
Sex	Male	56(56.00)
	Female	44(44.00)
Age (years)	66.88± 4.98	66.90± 4.21
Education level	illiteracy	11(11.00)
	primary school	43(43.00)
	Junior high school	20(20.00)
	High school and above	26(26.00)
Marital status	Married	89(89.00)
	Not married	11(11.00)
Type of disease	Urinary surgery	42
	General surgery	41
	Gynaecology and obstetrics	17
Course of illness (months)	30.88± 3.76	30.45± 3.87

表 2 两组一般手术指标比较($\bar{x} \pm s$)

Table 2 Comparison of general surgical indicators between the two groups ($\bar{x} \pm s$)

Index	Research group(n=100)	Control group(n=100)
Operation time (min)	234.28± 20.11*	210.29± 19.89
Intraoperative blood loss (mL)	94.29± 10.22*	123.29± 20.11
Transition rate of laparotomy (%)	2.00*	10.00
Postoperative exhaust time (h)	57.19± 2.11*	63.39± 3.29
Hospitalization time (d)	6.11± 2.11	6.34± 1.98
Total hospitalization expenses (ten thousand yuan)	7.53± 0.31*	5.19± 0.41

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

表 3 两组术后自我效能及抑郁得分比较($\bar{x} \pm s$)

Table 3 Comparison of postoperative self-efficacy and depression scores between the two groups ($\bar{x} \pm s$)

Groups	n	Self-efficacy	Depression
Research group	100	80.29± 7.32*	43.29± 4.33*
Control group	100	73.29± 6.21	54.19± 3.29

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

表 4 两组术后疼痛度比较($\bar{x} \pm s$)

Table 4 Comparison of postoperative pain degree between the two groups ($\bar{x} \pm s$)

Groups	n	24 h after operation	48 h after operation
Research group	100	3.11± 0.13*	1.89± 0.32*
Control group	100	3.87± 0.32	2.34± 0.19

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

目前我国达芬奇机器人中诸如心脏外科领域已达到世界先进水平,其他诸如普外科、泌尿外科等也呈现快速发展趋势^[22,23]。随着达芬奇机器人系统在临床的推开,围绕达芬奇机器人与传统手术之间优劣比较的研究也日益增多,有学者的研究认为,

达芬奇机器人是未来医疗技术发展的方向,将会给患者带来更好的手术体验^[24,25],还有学者指出,达芬奇机器人存在手术时间长、手术费用昂贵、延迟明显等缺点^[26,27]。

我们通过设立不同分组的方式,就达芬奇机器人和传统腹

表 5 两组并发症发生率比较[例(%)]

Table 5 Comparison of the incidence of complications between the two groups[n(%)]

Groups	n	Incision bleeding	Incision infection	Abdominal infection	Bowel obstruction	Total incidence
Research group	100	1	2	0	1	4(4.00)*
Control group	100	3	3	2	4	12(12.00)

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

腹腔镜手术对全麻状态下老年腹部手术患者的影响进行了分析,结果显示,相比于实施传统腹腔镜手术的对照组患者,应用达芬奇机器人开展手术的研究组患者在术中出血量、中转开腹率、术后排气时间方面具有明显的优势,但在手术时间、总住院费用方面劣于对照组,提示达芬奇机器人的应用降低了对患者术中的创伤、加快了患者术后康复,但增加了手术时间和患者治疗费用。学者 J Yu^[28]等将 404 例局部进展期 Siewert II 型和 III 型食管胃结合部腺癌患者设为研究对象的方式,就达芬奇机器人手术系统、腹腔镜以及开腹手术的优劣进行了比较,结果显示,在术中出血量、手术切口长度、近端切缘长度方面,达芬奇机器人系统较腹腔镜组和开腹组患者优势更为明显,在术后淋巴结清扫方面,达芬奇机器人系统对胰腺上区淋巴结清扫优势更为突出,在术后情况方面,达芬奇机器人系统组患者术后首次肛门排气时间、术后首次下床活动时间、术后住院时间方面均更低,这些都与本研究结果类似。学者 HP Huang^[29]等则通过对 162 例行微创局部进展期胃癌根治术患者的研究发现,达芬奇机器人系统组患者术中出血量、术后第 1-3 天的腹腔引流液中淀粉酶水平均较腹腔镜组更低,该学者认为达芬奇机器人能够较好的降低患者术中创伤程度。我们分析认为,同传统的腹腔镜手术相比较,达芬奇机器人具有视野放大倍数更高、手术器械更为灵活稳定的优势,这些都能够保证术中视野清晰干净,最大程度的避免了术中副损伤的发生,因而研究中患者术后康复更快、术后疼痛情况更好,但由于达芬奇机器人手术需要开机调试、机械臂安装、镜头擦拭、器械转换的时间,因而会增加手术时间,此外可能施术者的熟练程度也会对手术时间造成一定影响。

文中还就不同术式对患者术后自我效能和抑郁情绪的影响开展了分析,结果显示研究组患者术后自我效能得分明显更高,抑郁情绪得分明显更低。学者 F Pu^[30]等的研究也有类似的结论,该学者的研究结果显示达芬奇机器人组患者术后自我效能管理感平均得分为(80.84±8.52)分,明显高于腹腔镜组的(74.61±6.89)分,正性态度得分为(44.51±5.79)分,明显高于腹腔镜组的(39.91±6.02)分。本文作者分析认为其原因可能与达芬奇机器人组患者术中损伤程度更低、术后疼痛更为轻微以及术后康复进程更快联系密切,这也侧面印证了达芬奇机器人能够降低术中损伤这一观点。最后文中关于两组患者并发症发生率的比较,我们分析认为其原因可能为达芬奇机器人能够更清晰的显示患者血管等细小的解剖结构,从而降低患者术中损伤程度,同时达芬奇机器人能够更彻底的杜绝手术环境对患者的影响有关。

综上所述,全身麻醉下应用达芬奇机器人对老年患者实施腹部手术可行性较好,能够显著减小对患者的创伤,加快其术

后康复,同时还能够降低其术后不良情绪和并发症发生,提高其自我效能。但同时也要认识到,达芬奇机器人也存在手术操作时间长、手术费用明显增加,以及术中如出现紧急事件撤机过程繁琐等不足,临床使用中应结合患者实际选择恰当的术式开展治疗。

参考文献(References)

- [1] Kato S, Lewis SJ. Recognition of posterior thoracolumbar instrumentations used in spinal deformity surgery and techniques for implant removal[J]. Journal of Clinical Neuroscience, 2021, 86: 217-222
- [2] A L M, B J M B, C V G, et al. Case report: Mini-invasive surgery assisted by Da Vinci robot for a recurrent paravertebral schwannoma[J]. Neurochirurgie, 2020, 66(3): 179-182
- [3] Liu P, Zhang Y, Qi X, et al. Unilateral Axilla-Bilateral Areola Approach for Thyroidectomy by da Vinci Robot: 500 Cases Treated by the Same Surgeon[J]. Journal of Cancer, 2019, 10(16): 3851-3859
- [4] Li Y, Hu J, Tao B, et al. Automatic robot-world calibration in an optical-navigated surgical robot system and its application for oral implant placement[J]. International Journal of Computer Assisted Radiology and Surgery, 2020, 15(11): 1685-1692
- [5] Kang SK, Jang WS, Kim SW, et al. Robot-assisted laparoscopic single-port pyeloplasty using the da Vinci SP system: initial experience with a pediatric patient [J]. Journal of Pediatric Urology, 2019, 15(5): 576-577
- [6] Ozben V, Muijnck CD, Karabork M, et al. The da Vinci Xi system for robotic total/subtotal colectomy vs. conventional laparoscopy: short-term outcomes [J]. Techniques in Coloproctology, 2019, 23(9): 861-868
- [7] Hong N, Kim M, Lee C, et al. Head-mounted interface for intuitive vision control and continuous surgical operation in a surgical robot system[J]. Medical & Biological Engineering & Computing, 2019, 57(3): 601-614
- [8] Liu Y, Ge Z, Yang S, et al. Elephant's Trunk Robot: An Extremely Versatile Under-Actuated Continuum Robot Driven by a Single Motor[J]. Journal of Mechanisms and Robotics, 2019, 11(5): e1
- [9] Adams PD, Ritz J, Kather R, et al. The differential effects of surgical harm in elderly populations. Does the adage: "they tolerate the operation, but not the complications" hold true?[J]. American Journal of Surgery, 2014, 208(4): 656-662
- [10] Frid MG, Li M, Gnanasekharan M, et al. Sustained hypoxia leads to the emergence of cells with enhanced growth, migratory, and promitogenic potentials within the distal pulmonary artery wall [J]. AJP Lung Cellular and Molecular Physiology, 2009, 297(6): L1059-72
- [11] Toygar SA, Kiriolu M. The Evaluation of Construct Validity of the General Self-Efficacy Scale in Health and Social Workers' Sample

- with Confirmatory Factor Analysis [J]. Anemon Mu Alparslan niversitesi Sosyal Bilimler Dergisi, 2020, 8(6): 1695-1701
- [12] A VF, B RA, A NA, et al. Psychometric properties of the Persian version of General Self-Efficacy Scale (GSES) among substance abusers the year 2019-2020 in Kermanshah city [J]. Clinical Epidemiology and Global Health, 2020, 8(3): 949-953
- [13] Joseph O, Deng ZD, Lisanby S. Factor Structure of the Hamilton Depression Rating Scale During Electroconvulsive Therapy and Magnetic Seizure Therapy in the Treatment of Major Depression[J]. Biological Psychiatry, 2020, 87(9): S288
- [14] Yang J, Yang C, Wang Y, et al. Effect of subcutaneous needling on visual analogue scale, IgG and IgM in patients with lumbar disc herniation: Study protocol clinical trial (SPIRIT Compliant) [J]. Medicine, 2020, 99(9): e19280
- [15] Raj-Kozia D, Gos, Elżbieta, Źwierniak, Weronika, et al. Relationship Between Tinnitus Loudness Measure by Visual Analogue Scale and Psychoacoustic Matching of Tinnitus Loudness [J]. Otology & Neurotology, 2019, 40(1): 16-21
- [16] Agarwal DK, Sharma V, Toussi A, et al. Initial Experience with da Vinci Single-port Robot-assisted Radical Prostatectomies - ScienceDirect[J]. European Urology, 2020, 77(3): 373-379
- [17] Hu M, Han C, Guo T, et al. Application of da Vinci robot with the "3 + 2" mode in radical gastrectomy for gastric cancer [J]. Medicine, 2020, 99(46): e22988
- [18] Feng, Guo, Dongjie, et al. Compare the prognosis of Da Vinci robot-assisted thoracic surgery (RATS) with video-assisted thoracic surgery (VATS) for non-small cell lung cancer: A Meta-analysis[J]. Medicine, 2019, 98(39): e17089
- [19] Mariani A, Pellegrini E, Momi ED. Skill-oriented and Performance-driven Adaptive Curricula for Training in Robot-Assisted Surgery using Simulators: a Feasibility Study [J]. IEEE Transactions on Biomedical Engineering, 2020, PP(99): 1-1
- [20] Drain A, Brucker B, Grucela A, et al. V13-03 robot-assisted laparoscopic abdominal sacrocolpopexy of neovagina using da vinci sp[J]. J Urol, 2020, 203: e1211
- [21] Benlice C, Demirkaya A, Aghayeva A, et al. 196-Totally Robotic Ivor-Lewis Esophagectomy with Intrathoracic Robot-Sewn Anastomosis for Cardioesophageal Cancer with the Da Vinci Xi [J]. Gastroenterology, 2019, 156(6): S-1386
- [22] Anooshahpour F, Yadmellat P, Polushin IG, et al. A Motion Transmission Model for a Class of Tendon-Based Mechanisms With Application to Position Tracking of the da Vinci Instrument [J]. IEEE/ASME Transactions on Mechatronics, 2019, PP(2): 1-1
- [23] B M C MA, A SB, C MS, et al. Comparing the Approach to Radical Prostatectomy Using the Multiport da Vinci Xi and da Vinci SP Robots: A Propensity Score Analysis of Perioperative Outcomes[J]. Eur Urol, 2021, 79(3): 393-404
- [24] Marks JH, Salem JF, Anderson BK, et al. Single-port robotic left colectomy: first clinical experience using the SP robot (rSILS)[J]. Techniques in Coloproctology, 2019, 24(2): 1-7
- [25] Mukherjee UK, Sinha KK. Robot-assisted surgical care delivery at a hospital: Policies for maximizing clinical outcome benefits and minimizing costs [J]. Journal of operations management, 2020, 66(1/2): 227-256
- [26] Takahiro, Homma, Naoya, et al. Initial experiences of robot-assisted thoracic surgery: Safety approach and comparison with video-assisted thoracoscopic surgery[J]. The Journal of the Japanese Association for Chest Surgery, 2019, 33(2): 113-121
- [27] Osmonov D, Prell F, Kalz A, et al. VS-1-9 Da Vinci Robot-Assisted Vasovasostomy and Vasoepididymostomy [J]. Journal of Sexual Medicine, 2020, 17(6): S149
- [28] Yu J, Wang Y, Li Y, et al. The safety and effectiveness of Da Vinci surgical system compared with open surgery and laparoscopic surgery: a rapid assessment [J]. Journal of Evidence-Based Medicine, 2014, 7(2): 121-134
- [29] Huang HP, Xiong WJ, Peng YH, et al. Safety and Feasibility of No. 12a Lymph Node Dissection by Portal Vein Approach in Radical Laparoscopic Gastrectomy for Gastric Cancer[J]. Technology in Cancer Research & Treatment, 2020, 19(1): 153303382097127
- [30] Pu F, Zhang Z, Chen Z, et al. Application of the da Vinci surgical robot system in presacral nerve sheath tumor treatment[J]. Oncol Lett, 2020, 20(5): e125