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达芬奇机器人辅助最大程度保留周围结构的 前列腺癌根治术的临床研究

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[摘要] **目的** 观察最大程度保留前列腺周围结构的前列腺癌根治术(MS-RARP)后功能恢复情况。**方法** 选取 2019 年 6 月至 2022 年 6 月于陆军军医大学第二附属医院行 MS-RARP 治疗的 67 例局限性前列腺癌患者为研究对象, 比较术前与术后 6 周、3 个月、6 个月和 12 个月时的尿控功能、勃起功能、生活质量、总前列腺特异性抗原(t-PSA)改变情况。采用扩展前列腺癌指数综合指数(EPIC-50)评价患者的尿控功能, 国际勃起功能指数(IIEF-5)问卷评估患者的勃起功能, 采用 EPIC-50 和美国泌尿系统评分系统(AUA-SS)评估患者生活满意情况。**结果** MS-RARP 患者术后 6 周、3 个月、6 个月和 12 个月尿控功能恢复率、勃起功能恢复率、生活质量满意率逐渐提高, 分别为 71.8%、95.5%、97.3%、98.1%, 31.7%、38.1%、41.3%、44.4%, 38.9%、83.6%、88.1%、97.0%, t-PSA 逐渐降低, 分别为 0.026(0.010, 0.410)、0.009(0.003, 0.060)、0.006(0.001, 0.050)和 0.004(0.001, 0.006)ng/mL。术后各时间点生活质量满意率较术前均明显升高($P < 0.05$), t-PSA 较术前均明显下降($P < 0.05$)。**结论** RARP 可以很好地保护患者术后尿控功能、性功能, 提高患者术后生活质量。

[关键词] 达芬奇机器人; 最大程度保留周围结构; 前列腺癌根治术

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Clinical study on Da Vinci Robot-assisted prostate cancer radical operation with maximal preservation of periprostatic structures

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[Abstract] **Objective** To observe the functional recovery situation after prostate cancer radical operation with maximal preservation of the periprostatic structures (MS-RARP). **Methods** Sixty-seven patients with localized prostatic cancer undergoing MS-RARP in the Second Affiliated Hospital of Army Military Medical University from June 2019 to June 2022 were selected as the study subjects. The changes of urinary control function, erection function, quality of life and total prostate specific antigen (t-PSA) were compared at the time between before operation and postoperative 6 weeks, 3 months, 6 months, 12 months. The expanded prostate cancer index composite index (EPIC-50) was used to evaluate the urinary control function, the international index of erectile function (IIEF-5) questionnaire was used to evaluate the erection function of the patients, and EPIC-50 and the american urological associated symptom score rating scale (AUA-SS) were used to evaluate the life satisfaction of the patients. **Results** The urinary control function recovery rate, erection function recovery rate and life quality satisfaction rate in postoperative 6 weeks, 3 months, 6 months, 12 months were 71.8%, 95.5%, 97.3% and 98.1%; 31.7%, 38.1%, 41.3% and 44.4%; 38.9%, 83.6%, 88.1% and 97.0%, respectively. The median t-PSA was gradually decreased, which were 0.026(0.010, 0.410), 0.009(0.003, 0.060), 0.006(0.001, 0.050) and 0.004(0.001, 0.006)ng/mL, respectively. The life quality satisfaction rates at various postoperative time points were significantly increased when compared with before opera-

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tion ($P < 0.05$). t-PSA was significantly decreased compared with before operation ($P < 0.05$). **Conclusion** RARP could protect the postoperative urinary function and sexual function, and increase the postoperative life quality of the patients.

[Key words] Da Vinci robot; maximal preservation of the periprostatic structures; radical prostatectomy

前列腺癌是男性常见恶性肿瘤,其发病率在全球男性恶性肿瘤中排名第二,致死率排名第五^[1]。在中国男性患者人群中,随着社会的老龄化,前列腺癌患者数近年来一直呈现增长趋势,前列腺癌的发生率和致死率分别排在男性恶性肿瘤第 6 位和第 7 位^[2]。近年来随着我国前列腺癌筛查力度的加强,早期确诊前列腺癌的比例明显上升,是泌尿系肿瘤中增长绝对数最多的肿瘤^[3]。对于初诊局限性前列腺癌,前列腺癌根治性切除术是治疗金标准之一。无论开放、腹腔镜或者机器辅助,保护神经血管束的完整性是术后维持患者功能恢复的关键^[4]。通过对保留神经技术的不断探索,采用最大程度保留周围结构的前列腺癌根治术(radical prostatectomy with maximal preservation of the periprostatic structures, MS-RARP)可更好地保护患者功能,现将陆军军医大学第二附属医院单中心研究结果报道如下。

1 资料与方法

1.1 一般资料

选取 2019 年 6 月至 2022 年 6 月在陆军军医大学第二附属医院采用机器人辅助腹腔镜技术行 MS-RARP 的患者为研究对象。纳入标准:(1)经病理诊断为局限性前列腺癌,即排除远处转移;(2)患者预期寿命 > 10 年、无严重的基础疾病,如心律失常、心力衰竭、重度肺功能不全等。排除标准:(1)术前勃起功能完全丧失或为神经源性膀胱疾病患者;(2)临床分期为 T3~T4、N1 和 M1 的患者。

1.2 方法

全身麻醉下实施手术, Da Vinci Si 平台的端口配置如下:脐上 2 cm 为目镜、脐下 2 cm 腹直肌外缘两侧分别为 1 号、2 号臂,右侧髂前上棘外侧大约 1 cm 处为 3 号臂,机械臂水平间距 8~10 cm。2 个 8 mm 辅助 Trocar 均位于左侧,一个位于目镜和 1 号臂之间,另一个 8 mm 辅助 Trocar 与 3 号臂对称。采用经腹腔前入路方式进入膀胱腹侧面,剥离前列腺腹侧面周围的脂肪及结缔组织。确认膀胱颈、前列腺底部,切开膀胱颈,向耻骨联合处牵拉前列腺,分离膀胱颈,尽量保留膀胱颈部括约肌。找到精囊并充分游离,切断双侧输精管和精囊血管,术中注意精细操作,防止损伤神经血管束。沿输精管汇合根部向下水平小心钝性切开前列腺背侧进入筋膜内腺体,不打开 Denonvilliers 筋膜, Denonvilliers 筋膜内分离至前列腺尖部。分别向外上方提起两侧前列腺角,筋膜内钝性剥离前列腺腺体组织,分离时仔细处理尽量避免使用电

凝,尽可能保留侧面神经血管束。完全游离前列腺后,在前列腺尖部用剪刀离断尿道,保留尽可能长的尿道。所有手术均由同一术者完成。在手术过程中,(1)不切开盆内筋膜;(2)不离断耻骨前列腺韧带;(3)不结扎背深静脉丛;(4)不打开 Denonvilliers 筋膜;(5)保留前列腺腹侧筋膜结构,将神经血管束从前列腺完全游离。

1.3 术前临床病理资料收集及术后随访

本研究纳入了尽可能完善的术前临床病理资料,包括:年龄、Gleason 评分、术前总前列腺特异性抗原(prostate specific antigen, t-PSA)、BMI、TNM 分期及前列腺影像报告数据系统(prostate imaging reporting and data system, PI-RADS)评分。术前所有患者均进行标准 MRI 检查。采用超声引导下经直肠系统(12 针) + 目标靶向(每个靶向 2 针)穿刺,穿刺后病理结果:Gleason 评分 ≥ 8 分定义为高危患者,7 分为中危患者, < 7 分为低危患者。于术后 6 周、3 个月、6 个月、12 个月对患者进行随访,随访项目包括:术后控尿功能(仅 6 周时复查)、勃起功能、生活质量及 t-PSA 水平变化。尿控功能:采用扩展前列腺癌指数综合指数-50(expanded prostate cancer index composite index, EPIC-50)评估,包括观察尿垫使用情况和尿控率;尿垫使用情况:不需要尿垫或使用 1 块/d 为正常;需要尿垫 2~3 块/d 为尿控功能轻度障碍;需要尿垫 > 3 块/d 为重度障碍。尿控率 = 不需要尿垫或使用 1 块/d 患者数/患者总数 $\times 100\%$ 。勃起功能恢复:采用国际勃起功能指数(international index of erectile function, IIEF-5)问卷评估,术前 IIEF-5 问卷评分 ≤ 7 分者根治术后不做勃起功能评测,术后评分与术前一致或较术前好转视为勃起功能恢复。生活质量:采用 EPIC-50 和美国泌尿系统评分系统(american urological associated symptom score rating scale, AUA-SS)评价,根据 EPIC-50 中问题:“总的来说,在过去的 4 周里,你的大便习惯给你带来了多大的问题?”和 AUA-SS 中问题:“如果你不得不忍受你目前的排尿情况,稳定现状不会再产生变化。你会有什么感觉?”,前者分数为 1~5 分,后者分数为 0~6 分,二者相加总分 ≤ 3 分视为生活质量满意。

1.4 统计学处理

采用 SPSS26.0 和 R4.3.0 软件进行数据统计分析。计量资料用 $\bar{x} \pm s$ 表示,组间比较采用方差分析(ANOVA)进行。计数资料采用例数或百分比表示,组间比较使用 χ^2 检验或 Fisher 确切概率法,以 $P <$

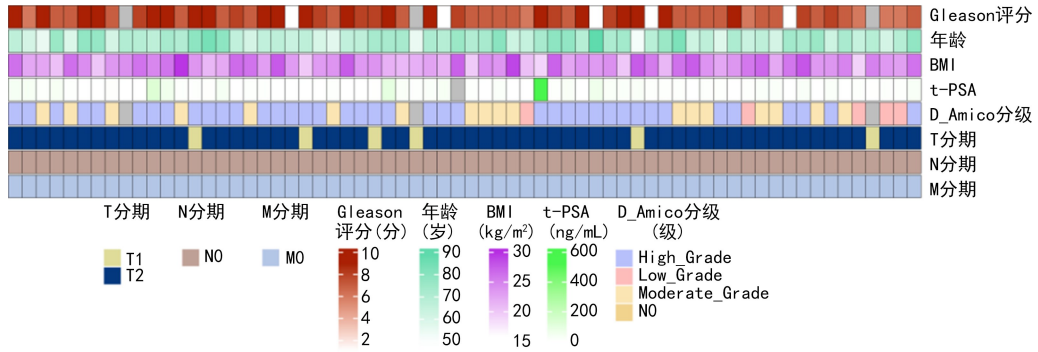
0.05 为差异有统计学意义。

2 结果

2.1 基线特征比较

本研究共纳入 67 例患者,平均年龄(68.2 ± 7.1)岁,入院 t-PSA 为 $50.100(25.110,102.400)$ ng/mL,平均 BMI(24.0 ± 2.5) kg/m²,生活质量满意率为

22.4%。穿刺前平均 PI-RADS 评分为(3.70 ± 0.69)分。病理结果高危患者 46 例(68.7%),中危患者 11 例(16.4%),低危患者 10 例(14.9%)。术前临床分期 T1、T2 期患者分别为 6 例(9.0%)、61 例(91.0%),患者基线临床特征热图见图 1。



D-Amico 分级:前列腺癌风险分级。

图 1 患者的基线临床特征热图

2.2 MS-RARP 术后功能恢复

所有患者术前均已排除神经源性膀胱疾病,本组患者平均尿失禁时间为(32.0 ± 8.3)d。术后 6 周,绝大多数患者 [64 例(95.5%)]所需尿垫 < 2 块/d,仅有部分患者为 2~3 块/d 和 > 3 块/d,分别占 2 例(3.0%)和 1 例(1.5%)。术后 6 周、3 个月、6 个月和 12 个月尿控率逐步增加,分别为 72.5%、96.2%、97.5%和 98.4%。本组有 63 例进行了勃起功能随访和评估,在术后 6 周、3 个月、6 个月和术后 12 个月患者勃起功能逐步恢复,分别为 31.7%、38.1%、41.3%、44.4%。术后 6 周、3 个月、6 个月和 12 个月时患者生活质量满意率逐渐升高,分别为 38.9%、83.6%、88.1%和 97.0%。术后各时间点较术前明显升高($P < 0.05$)。术后 6 周、3 个月、6 个月和 12 个月时的 t-PSA 逐渐降低,分别为 $0.026(0.010,0.410)$ 、 $0.009(0.003,0.060)$ 、 $0.006(0.001,0.050)$ 和 $0.004(0.001,0.006)$ ng/mL,术后各时间点较术前明显下降($P < 0.05$)。

3 讨论

随着我国社会老龄化进程的加剧,前列腺癌疾病发病率不断攀升。在我国,确诊的局限性前列腺癌占比约 30%^[5-6],前列腺癌根治性切除术仍是目前主流的治疗手段^[7-9],然而,前列腺癌根治性切除术后所致的尿控和性功能障碍是其难以回避的问题,对于术前有性生活需求的患者,采用前列腺癌根治性切除术仍然存在术后性功能丧失的巨大风险,因此探索一种更精细的手术类型对患者术后尿控功能和性功能恢复显得尤为重要^[10-13]。

术后功能恢复的关键因素包括手术入路的选择、周围功能结构的保护及重建技术。手术入路的选择

根据目镜位置不同,有经腹腔、经腹膜外、经会阴、经膀胱等方式,其中经会阴和经膀胱入路在术后功能保护方面具有优势,但技术难度较高。机器人手术比传统腹腔镜更加灵活,具有 540°的机械臂自由度和三维立体成像能力,能够更好地放大术野,减少操作震颤和疲劳。前列腺癌根治性切除术中,机器人手术和传统腹腔镜在手术时间上无明显差异,但机器人手术在经腹腔入路方面展现了解剖优势^[14-16]。

前列腺周围组织结构的保护包括对前列腺背深静脉、耻骨前列腺韧带、逼尿肌群、盆侧筋膜腱弓、副会阴动脉周围结构的保护^[4,12,17-18]。前列腺侧面韧带顺行筋膜内剥离,结合超级面纱技术实施前列腺腹侧面筋膜外组织的保护,以及狄氏筋膜内解剖进入前列腺界面,这些技术的实施能最大化保留性功能和尿控功能^[19-20]。手术方式要点包括术前 MRI 进行功能尿道评估,术中精确定位膀胱颈和保留前列腺尖部尿道,以及筋膜内剥离侧韧带和保护侧韧带 NS 及其分支。重建技术包括膀胱颈的“网球拍”样重建和膀胱前列腺肌吻合技术,这些技术可对前列腺周围结构最大化保留和重建,有助于促进术后患者功能的早期恢复。本研究中,根治术后 1 月内尿控功能超过 50%,性功能恢复的比例超过 40%。

机器人辅助前列腺根治手术(robot-assisted radical prostatectomy, RARP)的挑战在于肿瘤的控制和功能的保护。文献报道根据术前患者临床分期,术后有临床意义的切缘阳性率为 5%~35%^[21-23]。这提示对于局限性晚期前列腺癌,实施 MS-RARP 时存在切缘阳性率过高的风险^[24-25]。因此,对这部分患者,我们根据术后 t-PSA 监测水平,实施挽救性放疗进行综合治疗。

本研究的局限性:(1)本研究为单中心数据分析,手术患者术前临床分期、局限晚期病例比例较高,长期随访数据仍需要密切随访和跟踪;(2)与常规根治手术比较,患者最大的获益在于患者尿控功能、性功能恢复更好、更快,但 MS-RARP 在局限晚期前列腺癌患者中所表现的切缘阳性率需要警惕,因此患者术后依从性显得尤为重要,适时跟进患者后续放疗,可提高患者功能保护的同时也提高患者的生存质量。

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