Advances in Clinical Medicine 临床医学进展, 2026, 16(5), 370-378
Published Online May 2026 in Hans. https://www.hanspub.org/journal/acm
https://doi.org/10.12677/acm.2026.1651827

伴有腹主动脉旁淋巴结转移的IIIC2期宫颈癌病例

——影像学评估与个体化治疗的挑战与启示

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收稿日期：2026年4月7日；录用日期：2026年4月28日；发布日期：2026年5月8日

摘　要

宫颈癌作为一种常见的恶性肿瘤，其发病率和死亡率在全球范围内持续上升，尤其在中低收入国家尤为显著。本文报告了一例IIIC2期宫颈癌患者的个体化治疗过程，强调了精准分期和个体化治疗在改善患者预后中的重要性。该患者为低分化鳞状细胞癌，侵及深肌层(>2/3肌壁)，存在神经侵犯及脉管内癌栓，Ki-67标记指数高达80%，显示出侵袭性生物学行为。影像学评估在淋巴结转移的判断中存在局限，术前MRI未能准确反映腹主动脉旁淋巴结的情况，导致临床和病理分期不一致。为应对这一挑战，本文探讨了多模态影像学联合评估的重要性，以提高诊断的准确性。同时，强调了同步放化疗和巩固化疗在高风险患者中的应用，指出免疫治疗在晚期宫颈癌中的潜在价值。通过综合考虑患者的生物学特征和整体健康状态，制定个体化治疗策略，有望提升治疗效果和生存率。虽然本研究为个案报道且随访时间有限，但该病例的分析为今后临床实践提供了新的思路和依据，强调了对宫颈癌早期诊断与个体化治疗策略的持续研究的重要性。后续需在更大规模的患者群体中验证结论，以进一步优化IIIC2期宫颈癌的治疗方案。

关键词

宫颈癌，个性化治疗，淋巴结阳性

Case of Stage IIIC2 Cervical Cancer with Para-Aortic Lymph Node Metastasis

—Challenges and Insights in Imaging Evaluation and Individualized Treatment

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文章引用: 时航, 温妙伟, 周方, 宋轶鹏. 伴有腹主动脉旁淋巴结转移的 IIIC2 期宫颈癌病例[J]. 临床医学进展, 2026, 16(5): 370-378. DOI: 10.12677/acm.2026.1651827

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Received: April 7, 2026; accepted: April 28, 2026; published: May 8, 2026

Abstract

Cervical cancer is a common malignant tumor, with its incidence and mortality rates continuing to rise worldwide, which is particularly significant in low- and middle-income countries. This article reports the individualized treatment process of a patient with stage IIIC2 cervical cancer, emphasizing the importance of accurate staging and individualized treatment in improving the patient's prognosis. The patient was diagnosed with poorly differentiated squamous cell carcinoma, which invaded the deep myometrium (>2/3 of the myometrial wall). Additionally, the patient had perineural invasion, intravascular tumor thrombus, and a Ki-67 labeling index as high as 80%, all of which indicate aggressive biological behavior of the tumor. Imaging evaluation has limitations in determining lymph node metastasis. Preoperative MRI failed to accurately reflect the status of paraaortic lymph nodes, leading to inconsistencies between clinical and pathological staging. To address this challenge, this article discusses the importance of combined multimodal imaging evaluation to improve the accuracy of diagnosis. Meanwhile, this article emphasizes the application of concurrent chemoradiotherapy and consolidation chemotherapy in high-risk patients, and points out the potential value of immunotherapy in advanced cervical cancer. By comprehensively considering the patient's biological characteristics and overall health status, formulating an individualized treatment strategy is expected to improve treatment efficacy and survival rate. Although this study is a case report with a limited follow-up period, the analysis of this case provides new ideas and evidence for future clinical practice, and emphasizes the importance of continuous research on early diagnosis and individualized treatment strategies for cervical cancer. In the future, it is necessary to verify the conclusions in a larger-scale patient population to further optimize the treatment regimen for stage IIIC2 cervical cancer.

Keywords

Cervical Cancer, Personalized Treatment, Positive Lymph Node

1. 引言

宫颈癌是一种严重威胁女性健康的恶性肿瘤，特别是在发展中国家，其发病率和死亡率居高不下[1]。根据全球统计数据，2024 年预计将有约 60 万新发宫颈癌病例，其中 90%的病例发生在中低收入国家[2]。FIGO 2018 分期系统中的 IIIC2 期宫颈癌，特指伴有腹主动脉旁淋巴结转移的局部晚期宫颈癌，此类患者通常面临较差的预后及较高的复发风险[3]。

本病例涉及一名 48 岁女性，在体检中发现宫颈病变，MRI 检查显示宫颈占位并伴有多发淋巴结转移。宫颈癌的典型临床表现包括宫颈病变伴随腰部酸胀等症状[4]，然而诊断难点在于影像学评估的局限性[5]。例如，术前影像学提示为 IIIC1r 期，但术后病理结果证实为 IIIC2p 期，显示出在腹主动脉旁淋巴

结转移评估中的挑战[6]。

近年来，随着影像学技术的进步，MRI 在评估宫颈癌的分期中越来越重要[7]。研究表明，MRI 对宫颈癌的诊断灵敏度和特异性明显优于传统影像学方法[8]。然而，仍需注意的是，微转移灶的存在可能会影响患者的预后，尤其是在手术和放疗的规划中[9]。

本病例的临床价值在于其展示了伴有腹主动脉旁淋巴结转移的 IIIC2 期宫颈癌患者的诊疗过程，结合文献综述分析该分期的治疗策略与挑战。该病例强调了精准分期的重要性及个体化治疗的必要性，为未来针对 IIIC2 期患者的研究指明了方向。研究的最终目标是为临床实践提供有益的个体化决策依据，以改善患者的生存率和生活质量。

2. 病例介绍

2.1. 患者信息

本病例报告的患者为 48 岁女性，因 2020 年 10 月 9 日体检发现宫颈病变首次入院。患者既往健康，家族中无肿瘤史。在入院时，妇科查体显示宫颈 12 至 7 点钟方向可见暗红色赘生物，质脆，触碰时出血阳性。肿瘤标志物 SCC：3.2 ng/ml。阴道超声检查结果提示宫颈实质存在不均质低回声肿物，大小为 3.9 cm × 2.3 cm，血供丰富，且与子宫下段分界欠清。盆腔 MRI 检查显示宫颈占位，累及子宫下段及阴道后穹窿，如图 1 示。根据 FIGO 2019 标准，经妇科医生讨论，临床分期评估为 IB2 期，与患者家属商议，决定行手术治疗[10]。

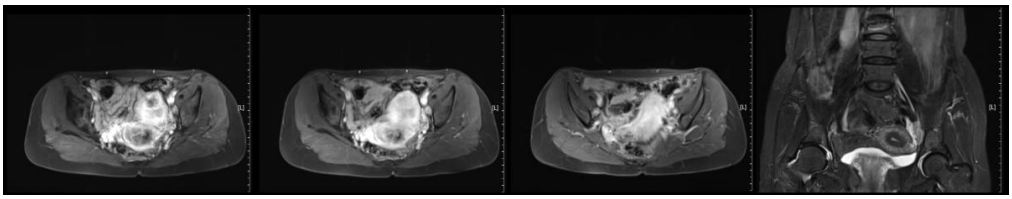


Figure 1. First discovery of pelvic MRI images on October 9, 2020
图 1. 2020 年 10 月 9 日首次发现骨盆 MRI 影像

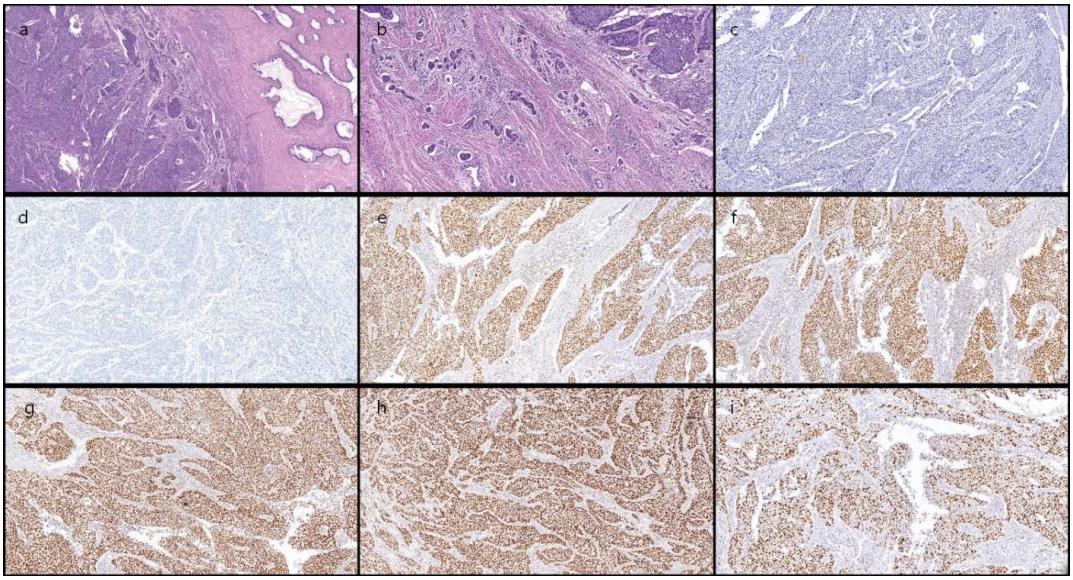
2.2. 临床发现

患者于 2020 年 10 月 15 日接受了开腹广泛子宫切除术、双侧附件切除、盆腔及腹主动脉旁淋巴结清扫以及盆腔粘连松解术[11]。术后病理结果显示为宫颈低分化鳞状细胞癌，肿瘤侵及深肌层(超过 2/3 肌壁)，可见神经侵犯及脉管内癌栓，阴道断端、宫旁及双附件未见癌细胞浸润。标记各组淋巴结：左盆腔 1/6 枚，右盆腔 1/9 枚，腹主动脉 1/4 枚见癌转移。术后多学科讨论，根据病理结果分期评估为 IIIC2p，由于表现出多项术后病理危险因素，提示预后较差，传统治疗面临挑战，医生建议行术后放化疗获取更高的局部控制率和生存周期[12] [13]。

2.3. 复发诊断

术后患者于 2020 年 11 月至 2020 年 12 月接受盆腔延伸野 VMAT 放疗，处方剂量覆盖腹盆腔淋巴引流区、阴道残端及残端下 3 cm，同时接受顺铂 40 mg/m^2 的同步化疗，持续 5 周[14] [15]。放疗结束后，患者接受腔内后装，剂量为 5 Gy × 2f，治疗耐受良好，急性毒性反应均在 2 级以下[16]。后续复查显示患者在 2023 年 1 月(首程治疗后 27 个月)出现腰部酸胀，进一步 MRI 检查发现 S1 平面骶骨前方软组织肿块，考虑为放疗野内非中心性复发。经过多学科讨论，完善免疫组化检查后结果显示 PD-L1 (SP263)：TPS < 1%，CPS < 1，MMR 蛋白表达完整，HER2 为 0，Ki-67 标记指数为 80%，如图 2 中 a~i 示。再结合病

灶特征及既往治疗史，医生和患者及家属决定进行系统治疗及再程放疗。该方案可在首次复发时同时加强局部控制与全身控制，尤其适用于放射野内局部复发或寡转移的患者，有机会获得较长 PFS 并延缓症状进展[17]。但是再程放疗受累积剂量限制，晚期毒性如瘘、坏死、出血、肠梗阻等风险会显著增加，因此方案必须基于严格的 OAR (Organ or Tissue)累积剂量评估与个体化风险获益权衡。因此，放疗科医生在患者治疗过程中，严格计算患者累积剂量和观察患者的毒副反应。



注：a. 宫颈肿物示低分化鳞状细胞癌，右侧可见残存宫颈管粘液腺体 HE 低倍放大；b. 宫颈管间质内可见多量脉管内癌栓 HE 中倍放大；c. 肿瘤细胞免疫组织化学染色 HER2 IHC 0 EnVision 法中倍放大；d. 肿瘤细胞免疫组织化学染色 PDL1 示 TPS < 1%，CPS 约 5% EnVision 法中倍放大；e~h. 肿瘤细胞免疫组织化学染色 MLH1、PMS2、MSH2、MSH6 均表达 EnVision 法中倍放大；i. 免疫组织化学染色 Ki67 示肿瘤细胞高增殖活性，约 80% EnVision 法中倍放大。

Figure 2. Pathomorphological and immunohistochemical characteristics of postoperative specimens
图 2. 术后标本的病理形态及免疫组化特征

2.4. 治疗措施

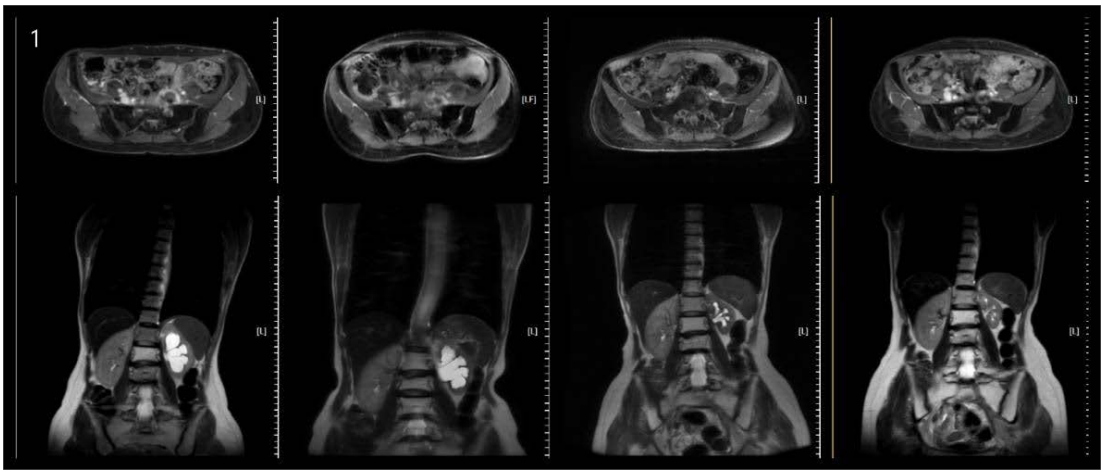


Figure 3. Imaging evaluation of lesion reduction from April 1, 2023 to November 4, 2023
图 3. 2023 年 4 月 1 日至 2023 年 11 月 4 日病灶缩小的影像学评估

患者于 2023 年 4 月至 2023 年 8 月接受一线系统治疗，包括贝伐珠单抗 400 mg、紫杉醇 240 mg 及卡铂 AUC 5，每 3 周一次，共 6 个周期[18]。治疗后第 2 周期 MRI 检查显示病灶明显缩小，左肾积水减轻，评效为部分缓解(PR)；第 6 周期后病灶最大径缩小至 1 cm，缩小幅度超过 70%。患者于 2023 年 9 月 5 日至 2023 年 10 月 9 日接受针对骶骨复发灶的再程 IMRT 放疗，剂量为 50 Gy，共 25 次，OAR 限量为直肠 V40 < 40%，膀胱 V40 < 40%，脊髓 Dmax < 45 Gy，放疗期间未出现≥3 级毒性反应[19] [20]。2023 年 11 月复查肿瘤标志物降至正常，MRI 显示残余病灶约 1 cm (残余病灶为既往受侵破坏的骶骨)，肾积水明显好转，评效为完全缓解(CR)，治疗过程复查如图 3 示。然而，再程放疗后 10 个月(2024 年 4 月)患者再次出现腰骶部疼痛，复查 MRI，肾积水加重，肿瘤标志物 SCCA 明显升高 63.4 ng/ml，考虑肿瘤进展。随即患者于 2024 年 12 月起接受二线全身治疗，方案为卡度尼利单抗 375 mg d1、白蛋白紫杉醇 200 mg d1 及 100 mg d3，每 3 周一次，共 5 个周期，治疗期间最佳疗效为病情稳定(SD) [21]，如图 4 示。如图 5 示，可见病人全程肿瘤标志物变化趋势。

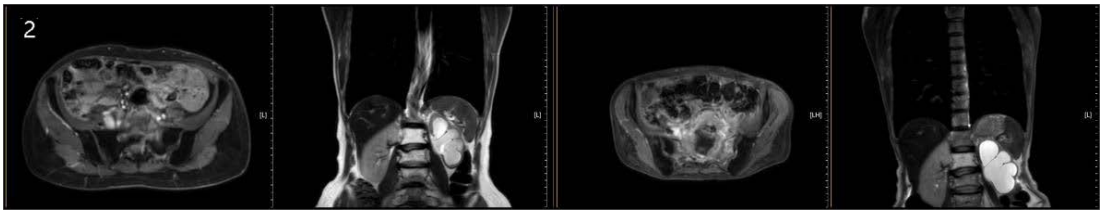


Figure 4. Recurrent imaging data on April 24, 2024 and December 15, 2024
图 4. 2024 年 4 月 24 日和 2024 年 12 月 15 日的复查影像学资料

2.5. 随访与结局

患者在随访过程中经历了多次治疗调整，尽管在多次干预下肿瘤标志物有所改善，且影像学检查显示病灶缩小，但仍面临复发风险。最终，患者在随访中保持稳定状态，ECOG 评分为 1，显示出一定的生活质量。通过多学科讨论制定的治疗方案为患者提供了个体化的治疗思路，显示出在复杂病例管理中的重要性[22]。综合来看，患者的治疗过程不仅反映了 IIIC2 期宫颈癌的治疗挑战，也为未来临床实践提供了有价值的参考。

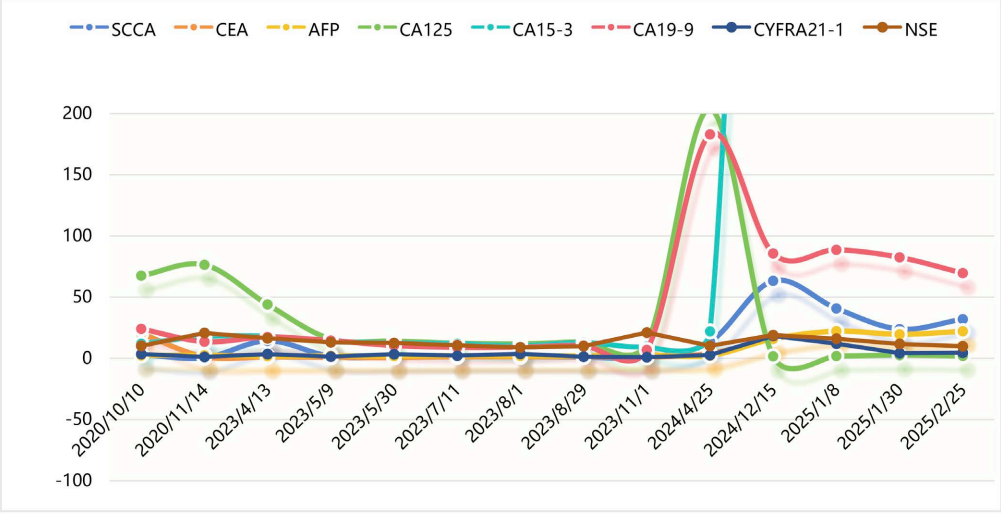


Figure 5. Chart of tumor marker changes during the disease course
图 5. 病程中肿瘤标志物变化图表

3. 讨论

本病例中，患者在 FIGO 2018 分期 IIIC2 期的宫颈癌治疗中展现出与文献报道不同的临床特点和治疗反应[3]。相关研究显示，IIIC1 和 IIIC2 期患者的 3 年生存率分别为 77.6%和 63.2%，而本病例中患者在接受个体化治疗后生存状况显著改善，提示该患者可能存在独特的生物学特征[23]。文献中还指出，影像学评估的局限性可能导致对淋巴结转移的误诊，强调了结合多模态影像学(如 PET-CT)进行更准确的评估的重要性[24]。在本病例中，术前 MRI 未能准确识别腹主动脉旁和盆腔淋巴结转移，进一步影响了治疗决策，这与文献中提到的单一影像学手段所导致的误诊风险一致[25]。近期，有研究提出了基于 Node-RADS 评分系统对淋巴结阳性状态进行重新定义，其诊断准确率达 80%。本案例基于该评分标准，对该患者初入院时的影像资料进行了回顾性评估，发现一处评分为 4 分的阳性淋巴结在原报告中未被识别，如图 6 所示，而该淋巴结恰好为后续疾病复发的部位。这一发现为 Node-RADS 评分系统的临床价值提供了部分验证[26]。

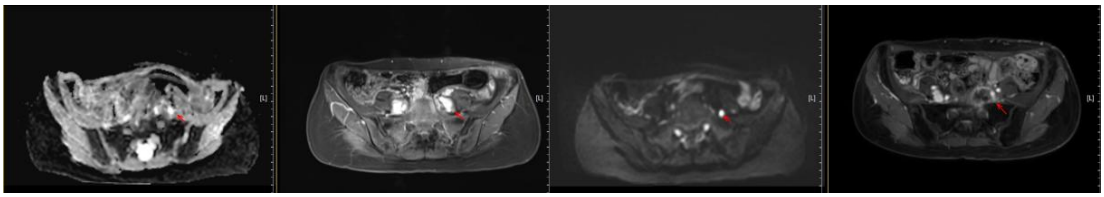


Figure 6. Imaging data of lymph nodes were omitted at the patient's initial admission
图 6. 患者初入院时遗漏淋巴结的影像资料

此外，患者的微转移情况及其对治疗反应的影响在文献中得到了充分讨论。研究表明，微小转移灶的存在与术后复发密切相关，尤其是在高危患者中[27]。本病例中，患者的 Ki-67 标记指数高达 80%，提示肿瘤增殖活跃，这与预后不良密切相关，强调了病理分型在制定个体化治疗方案中的重要性[28]。但是仅靠手术后病理指标的金标准指导治疗，往往有着较长的滞后性，我们需要更新的生物标志物或者检验信息，如有研究显示循环肿瘤 DNA (circulating tumor DNA, ctDNA)、中性粒细胞与淋巴细胞比值(NLR)等相关探索结果为预后评估提供了新的方向[29]-[31]，既能够在患者初入院时兼顾其需求，又能及时反馈预后情况，制定更贴切的治疗方案。当然这些仍需更大规模的前瞻性与多中心验证。通过对比相关文献，本文突出了本病例在治疗方案及临床反应上的独特性，为相似病例的管理提供了重要参考[32]。

在本病例的讨论中，患者的治疗反应与文献中报道的 IIIC2 期宫颈癌患者的典型特征有所不同，这提示了在个体化治疗中考虑患者独特生物学特征的重要性[23] [33]。影像学评估的局限性在此病例中得到进一步体现，术前 MRI 未能准确识别腹主动脉旁淋巴结转移，可能导致临床分期与病理分期不一致[34]。这与现有文献强调的单一影像学手段导致误诊的风险相吻合，说明多模态影像学(如 PET-CT)结合使用的重要性，以提高淋巴结转移的诊断准确性[35]。此外，患者术后病理宫颈低分化鳞状细胞癌，侵及深肌层(>2/3 肌壁)，存在神经侵犯及脉管内癌栓，Ki-67 标记指数 80%，腹盆腔淋巴结转移等病理指标均提示较差的预后，进一步强调了病理危险因素分层对制定个体化治疗方案的重要性[12] [33]。

微转移的存在也被认为与术后复发密切相关，尤其是在高危患者中[27]。研究指出，微小转移灶的检测对于预后评估和后续治疗策略的制定至关重要[36]。因此，个体化治疗方案中应重视对微转移的监测与评估，以便及时调整治疗策略，从而提高生存率和生活质量。综上所述，本病例的独特性不仅为相似病例的管理提供了重要的参考，也为未来的研究方向指明了潜在的探索领域。

在对本病例的总结与反思中，我们发现尽管患者在个体化治疗下生存状况显著改善，但治疗过程中的临床综合评估局限性仍给临床决策带来了不小的挑战[37]。既往研究与本病例均提示，基于常规 MRI

的淋巴结分期存在系统性误差，其原因并非单纯“技术不足”，而是同时受到微转移导致的形态学不可见性、炎症与放疗相关性改变导致的假阳性、扫描覆盖范围与序列参数差异可能导致的漏诊与定量不可比，以及现有的淋巴结判读体系标准造成的读片一致性不足等多因素影响[25] [38] [39]。本病例术前影像评估为 IB2 而术后病理升级为 IIIC2p，提示在疑似淋巴结转移人群中，仅依赖盆腔视野的形态学评估可能低估腹主动脉旁受累风险。基于此，我们建议在疑似淋巴结阳性或高危原发灶患者中建立标准化流程：在盆腔 MRI 基础上强化腹膜后覆盖并规范 DWI/ADC 方案，同时引入结构化淋巴结判读标准如 Node-RADS 评分系统，并在影像不确定但将改变治疗策略时，采用 PET-CT、影像引导活检或分期手术完成病理验证[26] [35]。同时我们还需要关注患者的体格检查、肿瘤标志物特征及常规检验信息，以避免炎症和身体状况对诊断的影响。现在，我们迫切需要建立一个具有说服力的宫颈癌治疗前综合的临床中心模型，将现有的信息整合，为确定分期、制定治疗决策指明方向，提高患者的生存期和幸福指数，而在未来，血液学标志物(如 ctHPV DNA/ctDNA)及影像组学和 AI 的联动等“生物学驱动”的风险分层方法，可能在影像阴性但高风险人群中提供额外信息，但这些目前都需前瞻性与多中心验证。

总体而言，本病例为 IIIC2 期宫颈癌的临床管理提供了重要的参考，突显了精准分期和个体化治疗的必要性。通过对患者的独特治疗反应进行分析，不仅帮助我们理解该患者潜在的生物学特征，也为今后相似病例的管理提供了宝贵的经验。然而，本研究仍存在局限性，主要包括样本量小及随访时间短等问题，未来需要进行更大规模的研究，以验证相似病例的治疗策略及其效果。因此，针对 IIIC2 期宫颈癌患者的进一步研究应聚焦于治疗方案的个体化设计及微转移的检测，以期为改善患者的生存率和生活质量提供更为坚实的依据。

声　明

本研究获得烟台毓璜顶医院伦理委员会批准(审批号：K2026-225)。

参考文献

[1] Shao, D., Wu, P., Jiang, H. and Wang, Z. (2026) Global Trends and Future Projections of Cervical Cancer Burden: An Integrated Analysis of GBD 2021, UN Population and WHO HPV Vaccination Data. *Frontiers in Public Health*, **14**, Article ID: 1702186. https://doi.org/10.3389/fpubh.2026.1702186

[2] Perez Bianchi, P., Anselmo, S., Vásquez Currié, M., Medel, J., Uelf, E., Dos Santos, A., *et al*. (2025) RIVA: An Image Dataset of Conventional Pap Smear Cytology with Multiple Independent Annotations. *Scientific Data*, **12**, Article No. 1991. https://doi.org/10.1038/s41597-025-06280-2

[3] Han, L., Chen, Y., Zheng, A., Tan, X. and Chen, H. (2024) Stage Migration and Survival Outcomes in Patients with Cervical Cancer at Stage IIIC According to the 2018 FIGO Staging System: A Systematic Review and Meta-Analysis. *Frontiers in Oncology*, **14**, Article ID: 1460543. https://doi.org/10.3389/fonc.2024.1460543

[4] Zhou, K., Wang, Y., Xie, Y., Yang, S., Liu, S., Fang, Y., *et al*. (2023) Symptom Burden Survey and Symptom Clusters in Patients with Cervical Cancer: A Cross-Sectional Survey. *Supportive Care in Cancer*, **31**, Article No. 338. https://doi.org/10.1007/s00520-023-07802-7

[5] Ogut, E. (2025) Artificial Intelligence in Clinical Medicine: Challenges across Diagnostic Imaging, Clinical Decision Support, Surgery, Pathology, and Drug Discovery. *Clinics and Practice*, **15**, Article No. 169. https://doi.org/10.3390/clinpract15090169

[6] De Tommasi, O., Spagnol, G., Marchetti, M., Bigardi, S., Noventa, M., Saccardi, C., *et al*. (2024) Lymph Node Metastasis in Advanced Ovarian Cancer: Squaring the Circle? *Gynecology and Obstetrics Clinical Medicine*, **4**, e000112. https://doi.org/10.1136/gocm-2024-000112

[7] Bonatti, M., Valletta, R., D'Erme, L., Dolciami, M., Chianura, R., Azzaro, P.P.M., *et al*. (2025) Preoperative Staging of Cervical Cancer: Time to Shift from Cystoscopy to MRI. *European Radiology*, **36**, 3033-3042. https://doi.org/10.1007/s00330-025-12039-5

[8] Woo, S., Atun, R., Ward, Z.J., Scott, A.M., Hricak, H. and Vargas, H.A. (2020) Diagnostic Performance of Conventional and Advanced Imaging Modalities for Assessing Newly Diagnosed Cervical Cancer: Systematic Review and Meta-Analysis. *European Radiology*, **30**, 5560-5577. https://doi.org/10.1007/s00330-020-06909-3

[9] Pantel, K., Cote, R.J. and Fodstad, O. (1999) Detection and Clinical Importance of Micrometastatic Disease. *JNCI Journal of the National Cancer Institute*, **91**, 1113-1124. https://doi.org/10.1093/jnci/91.13.1113

[10] Salib, M.Y., Russell, J.H.B., Stewart, V.R., Sudderuddin, S.A., Barwick, T.D., Rockall, A.G., *et al*. (2020) 2018 FIGO Staging Classification for Cervical Cancer: Added Benefits of Imaging. *RadioGraphics*, **40**, 1807-1822. https://doi.org/10.1148/rg.2020200013

[11] Zhu, T., Chen, X., Zhu, J., Chen, Y., Yu, A., Chen, L., *et al*. (2017) Surgical and Pathological Outcomes of Laparoscopic versus Abdominal Radical Hysterectomy with Pelvic Lymphadenectomy and/or Para-Aortic Lymph Node Sampling for Bulky Early-Stage Cervical Cancer. *International Journal of Gynecological Cancer*, **27**, 1222-1227. https://doi.org/10.1097/igc.0000000000000716

[12] Yang, Q. and Han, X. (2025) Prognostic Value of Risk Factors in Cervical Squamous Cell Carcinoma Based on Tumour Infiltration Depth. *BMC Cancer*, **25**, Article No. 1412. https://doi.org/10.1186/s12885-025-14849-8

[13] Soochit, A., Zhang, C., Feng, Y., Luo, X., Huang, H. and Liu, J. (2023) Impact of Different Post-Operative Treatment Modalities on Long-Term Outcomes in International Federation of Gynecology and Obstetrics (FIGO) 2018 Stage IIICp Cervical Cancer. *International Journal of Gynecological Cancer*, **33**, 882-889. https://doi.org/10.1136/ijgc-2022-004234

[14] Fields, E.C., Bosch, W.R., Albuquerque, K.V., Bhatia, R., Chino, J., Dyer, B., *et al*. (2025) Consensus Guidelines for Delineation of Clinical Target Volumes for Intensity Modulated Radiation Therapy for Intact Cervical Cancer: An Update. *Practical Radiation Oncology*, **15**, 171-179. https://doi.org/10.1016/j.prro.2024.11.004

[15] Isohashi, F., Takano, T., Onuki, M., Arimoto, T., Kawamura, N., Hara, R., *et al*. (2019) A Multi-Institutional Observational Study on the Effects of Three-Dimensional Radiotherapy and Weekly 40 mg/m^2 Cisplatin on Postoperative Uterine Cervical Cancer Patients with High-Risk Prognostic Factors. *International Journal of Clinical Oncology*, **24**, 575-582. https://doi.org/10.1007/s10147-018-01380-z

[16] Wu, H., He, Y., Chen, D., Liu, M. and Zhao, X. (2024) High-Dose-Rate Brachytherapy in Uterine Cervix Carcinoma: A Comparison of Dosimetry and Clinical Outcomes among Three Fractionation Schedules. *Frontiers in Oncology*, **14**, Article ID: 1366323. https://doi.org/10.3389/fonc.2024.1366323

[17] Lee, N., Kim, S.I., Lee, M., Kim, H.S., Kim, J.W., Park, N.H., *et al*. (2019) Bevacizumab Efficacy and Recurrence Pattern of Persistent and Metastatic Cervical Cancer. *In Vivo*, **33**, 863-868. https://doi.org/10.21873/invivo.11551

[18] Tanigawa, T., Takeshima, N., Ishikawa, H., Nishio, S., Usami, T., Yamawaki, T., *et al*. (2022) Paclitaxel-Carboplatin and Bevacizumab Combination with Maintenance Bevacizumab Therapy for Metastatic, Recurrent, and Persistent Uterine Cervical Cancer: An Open-Label Multicenter Phase II Trial (JGOG1079). *Gynecologic Oncology*, **165**, 413-419. https://doi.org/10.1016/j.ygyno.2022.04.011

[19] Ren, X., Fu, Y., Liu, Z., Lin, X., Qiu, L., Li, Y., *et al*. (2022) Image-Guided Interstitial Brachytherapy for Recurrent Cervical Cancer after Radiotherapy: A Single Institution Experience. *Frontiers in Oncology*, **12**, Article ID: 943703. https://doi.org/10.3389/fonc.2022.943703

[20] Yu, D., Bai, Y., Feng, Y., Wang, L., Yun, W., Li, X., *et al*. (2020) Which Bone Marrow Sparing Strategy and Radiotherapy Technology Is Most Beneficial in Bone Marrow-Sparing Intensity Modulated Radiation Therapy for Patients with Cervical Cancer? *Frontiers in Oncology*, **10**, Article ID: 554241. https://doi.org/10.3389/fonc.2020.554241

[21] Romero, D. (2025) Cadonilimab Is Effective and Safe in Recurrent Cervical Cancer. *Nature Reviews Clinical Oncology*, **22**, Article No. 2. https://doi.org/10.1038/s41571-024-00962-3

[22] Jääskeläinen, E., Kärkkäinen, H., Palmgren, J., Haataja, M., Hinkula, M. and Anttila, M. (2025) Implementing Treatment According to the Guidelines Is of Paramount Importance in Locally Advanced Cervical Cancer: A Real-World Study. *Frontiers in Oncology*, **15**, Article ID: 1562067. https://doi.org/10.3389/fonc.2025.1562067

[23] Li, Y., Cao, S., Fan, Y., Zhang, Y. and Li, J. (2025) Survival Outcomes in IIIC Cervical Cancer by Treatment Strategies: A Systematic Review and Meta-Analysis. *BMC Cancer*, **25**, Article No. 1340. https://doi.org/10.1186/s12885-025-14697-6

[24] Lakhman, Y., Aherne, E.A., Jayaprakasam, V.S., Nougaret, S. and Reinhold, C. (2023) Staging of Cervical Cancer: A Practical Approach Using MRI and FDG PET. *American Journal of Roentgenology*, **221**, 633-648. https://doi.org/10.2214/ajr.23.29003

[25] Luo, S., Guo, Y., Ye, Y., Mu, Q., Huang, W. and Tang, G. (2025) Prediction of Cervical Cancer Lymph Node Metastasis Based on Multisequence Magnetic Resonance Imaging Radiomics and Deep Learning Features: A Dual-Center Study. *Scientific Reports*, **15**, Article No. 29259. https://doi.org/10.1038/s41598-025-13781-y

[26] Ninkova, R.V., Calabrese, A., Curti, F., Riccardi, S., Gennarini, M., Miceli, V., *et al*. (2024) The Performance of the Node Reporting and Data System 1.0 (Node-RADS) and DWI-MRI in Staging Patients with Cervical Carcinoma According to the New FIGO Classification (2018). *La Radiologia Medica*, **129**, 1062-1075. https://doi.org/10.1007/s11547-024-01824-9

[27] Sun, X., He, L. and Wang, S. (2025) Risk Factors for Pelvic Lymph Node Metastasis in Cervical Cancer: A Retrospective

Analysis of 186 Patients. *Frontiers in Oncology*, **15**, Article ID: 1525946. https://doi.org/10.3389/fonc.2025.1525946

[28] Nakano, T. and Oka, K. (1993) Differential Values of Ki-67 Index and Mitotic Index of Proliferating Cell Population. An Assessment of Cell Cycle and Prognosis in Radiation Therapy for Cervical Cancer. *Cancer*, **72**, 2401-2408. https://doi.org/10.1002/1097-0142(19931015)72:8<2401::aid-cncr2820720818>3.0.co;2-d

[29] 温妙伟, 周方, 赵冰莹, 等. 伴腹盆腔淋巴结转移宫颈癌综合治疗现状与研究进展[J/OL]. 肿瘤学杂志: 1-8. https://link.cnki.net/urlid/33.1266.R.20260320.1323.003, 2026-04-23.

[30] Monk, B.J., Toita, T., Wu, X., Vázquez Limón, J.C., Tarnawski, R., Mandai, M., *et al*. (2023) Durvalumab versus Placebo with Chemoradiotherapy for Locally Advanced Cervical Cancer (CALLA): A Randomised, Double-Blind, Phase 3 Trial. *The Lancet Oncology*, **24**, 1334-1348. https://doi.org/10.1016/s1470-2045(23)00479-5

[31] Liu, Z., Zhang, S., Wang, Y., Zong, Y., Zhou, T., Wu, D., *et al*. (2025) Development and Validation of Immunotherapy Nomogram for Predicting the Efficacy and Prognosis of Recurrent and Metastatic Cervical Cancer. *Frontiers in Immunology*, **16**, Article ID: 1662605. https://doi.org/10.3389/fimmu.2025.1662605

[32] Guo, W., Ren, R., Li, N. and Hu, Y. (2024) Prognosis and Treatment Regimens for Patients with Different Lymph Node Statuses in Locally Advanced Cervical Cancer. *European Journal of Surgical Oncology*, **50**, Article ID: 108522. https://doi.org/10.1016/j.ejso.2024.108522

[33] Cibula, D., Raspollini, M.R., Planchamp, F., Centeno, C., Chargari, C., Felix, A., *et al*. (2023) ESGO/ESTRO/ESP Guidelines for the Management of Patients with Cervical Cancer—Update 2023. *International Journal of Gynecological Cancer*, **33**, 649-666. https://doi.org/10.1136/ijgc-2023-004429

[34] Shylasree, T.S., Gurram, L. and Das, U. (2021) Para-Aortic Lymph Node Involvement in Cervical Cancer: Implications for Staging, Outcome and Treatment. *Indian Journal of Medical Research*, **154**, 267-272. https://doi.org/10.4103/ijmr.ijmr_4183_20

[35] Jiang, C.-Q., Li, X.-J., Zhou, Z.-Y., Xin, Q. and Yu, L. (2025) Imaging Based Artificial Intelligence for Predicting Lymph Node Metastasis in Cervical Cancer Patients: A Systematic Review and Meta-Analysis. *Frontiers in Oncology*, **15**, Article ID: 1532698. https://doi.org/10.3389/fonc.2025.1532698

[36] Olthof, E.P., van der Aa, M.A., Adam, J.A., Stalpers, L.J.A., Wenzel, H.H.B., van der Velden, J., *et al*. (2021) The Role of Lymph Nodes in Cervical Cancer: Incidence and Identification of Lymph Node Metastases—A Literature Review. *International Journal of Clinical Oncology*, **26**, 1600-1610. https://doi.org/10.1007/s10147-021-01980-2

[37] Xu, Y., Li, Y., Wang, F., Zhang, Y. and Huang, D. (2025) Addressing the Current Challenges in the Clinical Application of AI-Based Radiomics for Cancer Imaging. *Frontiers in Medicine*, **12**, Article ID: 1674397. https://doi.org/10.3389/fmed.2025.1674397

[38] Bhatla, N., Berek, J.S., Cuello Fredes, M., Denny, L.A., Grenman, S., Karunaratne, K., *et al*. (2019) Revised FIGO Staging for Carcinoma of the Cervix Uteri. *International Journal of Gynecology & Obstetrics*, **145**, 129-135. https://doi.org/10.1002/ijgo.12749

[39] Bao, Y.H., Chen, Y., Xiao, M.L., Li, Y.A., Ma, F.H., Li, H.M., *et al*. (2026) Primary Tumor-Derived, Multiparametric MRI-Based Deep Learning-Radiomics-Clinical Model for Predicting Lymph Node Metastasis in Early-Stage Cervical Cancer. *Insights into Imaging*, **17**, Article No. 38. https://doi.org/10.1186/s13244-026-02211-w