

脊柱转移瘤外科治疗指南



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中华医学会骨科学分会骨肿瘤学组

通信作者:林建华, Email: jianhual@126.com; 肖建如, Email: jianruxiao83@163.com;

胡永成, Email: yongchenghu@126.com

【摘要】 脊柱是恶性肿瘤骨转移最常见的部位,约 30%~70% 的恶性肿瘤患者会出现脊柱转移,严重影响患者生存质量,加速死亡进程。鉴于脊柱转移瘤治疗理念和手段的不断进步,多学科协作的综合治疗日益完善,有必要对脊柱转移瘤外科治疗方案进行更新与优化。本指南旨在通过循证医学的方法,从脊柱转移瘤外科治疗的评估与决策,围手术期处理,治疗方式的选择,微创治疗,椎体成形术等方面为脊柱转移瘤的外科治疗提供可靠的临床依据,从而规范诊疗流程,进而改善脊柱转移瘤患者的预后。

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Guidelines for surgical treatments of metastatic spinal tumors

Chinese Medical Association Society of Orthopedics Bone Oncology Group

Corresponding author: Lin Jianhua, Email: jianhual@126.com; Xiao Jianru, Email: jianruxiao83@163.com;

Hu Yongcheng, Email: yongchenghu@126.com

【Abstract】 Spine is the most common site of tumor metastasis. About 30%~70% of the patients with cancer will be diagnosed with metastatic spinal tumors, always having worse quality of life and survival. In view of the continuous progress in the treatment concept and means of spinal metastases, and the increasingly improvement of multidisciplinary comprehensive treatment, it is necessary to update and optimize the surgical treatment plan for spinal metastases. Under the direction of evidence-based medicine process, the guideline systematically introduces the best evidence on the surgical treatments of metastatic spinal tumors from the aspects of preoperative assessments, decision-making process, perioperative management, surgical methods, minimally invasive spine surgery and vertebroplasty treatment. This guideline may help standardize the treatment process and improve the prognosis of patients with spinal metastases.

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脊柱是恶性肿瘤转移最常见的部位,约 30%~70% 的恶性肿瘤患者会出现脊柱转移^[1-2],其中 5%~10% 的患者会发生脊髓压迫^[3-4]。脊柱转移瘤可导致局部疼痛、高钙血症、脊柱不稳、椎体病理性骨折、脊髓及神经根压迫症状,进而引起神经功能障碍甚至瘫痪,严重影响患者生存质量,加速死亡进程。脊柱转移瘤的治疗方式很多,外科治疗是脊柱转移瘤治疗不可缺少且非常重要的手段。脊柱转移瘤外科治疗的目的在于缓解疼痛、重建脊柱稳定性、改善神经功能、控制局部肿瘤病灶,提高患者生存质量,为患者接受放疗、化疗以及免疫治疗等其他治疗手段提供条件,甚至延长生命^[5]。因此,提高脊柱转移瘤的外科治疗水平具有重要的意义。

然而,目前脊柱转移瘤的治疗还存在许多问题:①脊柱转移瘤被认为是恶性肿瘤的“终末期”,采取“姑息性”全身治疗,甚至放弃治疗^[6];②脊柱转移瘤的治疗普遍局限于手术、化疗、放疗和保守治疗等单学科手段的选择,缺乏多学科的协作;③虽然靶向药物以及新型放疗技术使得恶性肿瘤的治

疗提高到新的水平,但是对于脊柱转移瘤的疗效并不十分乐观;④由于原发灶来源不同,肿瘤学行为各异,内脏转移与脊柱转移危害性不同,使得脊柱转移瘤的治疗理念、术前评估以及治疗策略上均存在不规范和随意性^[7-9]。

随着脊柱肿瘤外科治疗技术和理念的进步,包括全椎切除、肿瘤分离手术、微创治疗等手术方式的普及和应用,脊柱转移瘤的外科治疗水平有了很大的提高。最新的临床研究表明相对积极的手术切除^[6],以及合理的手术时机和手术方式直接影响患者的生活质量和生存时间^[10-11]。同时由于肿瘤的放疗、化疗尤其是靶向治疗,免疫治疗和内分泌治疗的迅猛发展,使得脊柱转移瘤治疗在多学科协作的综合治疗模式下取得了令人欣喜的进步。鉴于脊柱转移瘤治疗理念和手段的不断进步,多学科协作的综合治疗日益完善,有必要对脊柱转移瘤外科治疗方案进行更新与优化,进一步规范脊柱转移瘤外科治疗策略,提高诊疗效果、改善患者预后。为此,中华医学会骨科学分会骨肿瘤学组组织全国

20 余位专家,在原先共识的基础上,根据近年来国内外脊柱转移瘤外科治疗的最新进展,借鉴国外相关指南,遵循循证医学原则,经过反复讨论,制定本指南。

一、目的

制定脊柱转移瘤外科治疗指南,旨在通过循证医学的方法,为脊柱转移瘤的外科治疗措施提供可靠的临床依据,减少或避免不恰当、不规范的诊疗行为,达到节约医疗成本、提高疗效、改善患者生存期的生活质量及预后。

二、涵盖内容及目标使用者

脊柱转移瘤外科治疗指南的内容主要包括脊柱转移瘤外科治疗的术前评估与决策,围手术期处理与手术治疗,脊柱转移瘤的微创治疗及并发症等相关问题。其目标使用者为实施脊柱转移瘤外科诊疗工作的临床医生,并为肿瘤内科医生以及放疗科医生提供参考。

三、文献的等级评定标准与推荐等级

评定标准:本指南采用的文献等级评定标准采用改良北美脊柱协会(North American Spine Society, NASS)标准,参照 Grading of Recommendations Assessment Development and Evaluation(GRADE)工作组和其他工作组的相关方法评估研究证据的质量,结合研究设计和其他证据特征综合判定研究的证据级别。为了易于理解,我们采用 3 级分类标准。

1 级:①差异有统计学意义的高质量随机对照研究,或虽然差异无统计学意义、但可信区间很窄的高质量随机对照研究;②1 级研究的系统综述(前提是这些纳入的研究其结果具有同质性)。

2 级:①质量稍差的随机对照研究(如随访率<80%、非盲法对照、随机化分组不合适);②前瞻性对照研究;③研究结果不同质的 1 级研究或 2 级研究的系统综述;④病例对照研究;⑤回顾性对比研究;⑥所有 2 级研究的系统综述。

3 级:①病例系列研究;②专家意见。

推荐等级:与文献等级评定相对应,分为强度递减的 3 级推荐。

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一、脊柱转移瘤患者如何从外科治疗中受益?

外科治疗可以帮助脊柱转移瘤患者有效地缓解疼痛、保持脊柱稳定性、恢复并维持脊柱功能、延长预计生存时间、更好地控制局部肿瘤病灶,协助确定诊断^[1,2,5,9,12-14]等(1 级推荐)。

脊柱转移瘤可导致疼痛、高钙血症、脊柱不稳、椎体病理性骨折及脊髓压迫症状,进而引起神经功能障碍甚至瘫痪,严重影响患者生存质量,加速死亡进程。最近的临床研究结果表明针对脊柱转移瘤患者可以采取相对积极的外科治疗^[6],合理的手术时机和手术方式直接影响患者的生活质量和生存时间^[13-14]。

二、脊柱转移瘤患者外科干预时机的选择?

当将发生脊柱失稳和(或)脊髓神经压迫时,建议进行外科干预^[15-20](1 级推荐)。外科干预的先决条件是患者预期术后生存时间>3 个月^[9,13-14](2 级推荐)。

及时有效的外科治疗是使脊柱转移瘤患者获益并改善预后的关键因素^[20]。外科治疗可以稳定脊柱,解除肿瘤病灶对脊髓的压迫,改善患者神经功能,缓解疼痛,提高生存质量,为其他的辅助治疗创造有利条件,延长生存时间。因此,脊柱转移瘤患者预期术后生存期超过 3 个月即可以从外科治疗中受益^[21-22]。

三、如何对脊柱转移瘤患者的预后进行评估?

可以应用 Tokuhashi 改良评分系统对患者的预后生存期进行评估(1 级推荐)。

目前,针对脊柱转移瘤的预后评价系统主要有 Tomita^[23]、Tokuhashi^[24-25]、Sioutos^[26]、Van der Linden^[27]、Bauer^[28]、Rades^[29]和 Bollen^[30-31]等。而临床最常用的依然是 Tomita 和 Tokuhashi 改良评分系统,尽管提出时间较早,缺乏原发肿瘤对传统的放疗、化疗治疗的敏感程度评价,纳入的患者也未能从靶向治疗等新兴的治疗中获益,纳入的因素中骨转移和脊髓损害相差较大,但相对于其他评分系统, Tomita 和 Tokuhashi 改良评分系统研究的样本无特定的筛选条件,选择上的偏倚相对较小。近期 Tokuhashi 针对接受靶向治疗的肺癌脊柱转移患者设计了新的生存期评价系统,新的系统主要基于患者的一般状况、神经功能、原发肺癌的病理类型以及靶向治疗四个方面进行评估,预判患者的生存期以指导治疗方案的选择^[32]。但受限于单中心以及样本量较小,此全新的评价系统仍有待进一步的临床检验。

四、脊柱转移瘤患者不同的症状是否有量化的

评价体系?

疼痛程度的评估推荐采用疼痛视觉模拟评分 (visual analogue scale, VAS)^[1] (1 级推荐), 脊柱稳定性的评估推荐采用脊柱肿瘤不稳定评分 (spinal instability neoplastic score, SINS)^[33] (1 级推荐), 脊髓受压程度的评估推荐采用硬膜外脊髓压迫六点分级系统^[34] (2 级推荐), 神经功能障碍的评估推荐采用美国脊柱损伤协会 (American spinal injury association, ASIA) 脊髓损伤分级标准 (2 级推荐)。

临床上 83%~95% 的脊柱转移瘤患者会出现疼痛^[6], 往往有脊椎塌陷、后凸或侧凸畸形, 大多需要外科治疗。评价脊柱不稳需要影像学结合临床表现综合进行评估进而制定决策, SINS 评分系统对脊柱潜在不稳定病变或不稳定病变的敏感性及特异性较高, 可以帮助医生发现可能出现椎体不稳或畸形的高风险患者^[33]。脊柱转移瘤患者因脊髓压迫出现神经症状, 但脊髓受压的程度却不尽相同, 依据 MRI 横断面 T2 加权成像对脊髓神经压迫程度进行分级, 可更好地指导外科治疗方案的制定^[34]。Frankel 分级缺乏对反射和括约肌功能的判断, 对膀胱、直肠括约肌功能状况表达不够清楚。而 ASIA 分级包括损伤水平和损伤程度的量化, 便于统计和比较, 因此对于神经功能障碍的分级推荐应用 ASIA 分级系统。

五、脊柱转移瘤外科治疗前如何评估肿瘤学状态?

在脊柱转移瘤组织病理学诊断未明确时, 建议行全身 PET CT 或 PET MR 检查进行辅助诊断^[35], 必要时须行穿刺活检以明确病理性质^[10] (1 级推荐)。针对肿瘤转移的范围和肿瘤的分期评估推荐采用 Tokuhashi 改良评分系统^[24-25] (1 级推荐)。针对既往肿瘤治疗史的评估需要遵循个体化的原则^[15], 依据既往的治疗效果和敏感性, 选择进一步的外科治疗^[1, 5, 34, 36] (1 级推荐)。

针对转移性肿瘤状态的评估主要依据三个方面: ①肿瘤的组织类型; ②肿瘤转移的范围和肿瘤的分期; ③肿瘤的既往治疗史^[13]。在转移瘤组织病理学诊断未明确时, 需行穿刺活检以明确病理性质, 可根据肿瘤的不同病理类型进行术前有针对性的辅助治疗^[13]。

基于神经病学、肿瘤学、生物力学、全身系统情况 (neurological, oncological, mechanical, systemic; NOMS) 治疗决策框架^[5]和基于肿瘤部位、生物力学、神经病学、肿瘤学、治疗反应性 (location, mechani-

cal, neurological, oncological, patient fitness prognosis response to prior therapy; LMNOP) 评价系统^[15, 36]较其他评估系统增加了对肿瘤放疗敏感性的分类。

针对肿瘤转移的范围和肿瘤的分期, 推荐采用 Tokuhashi 改良评分系统^[24-25]。针对既往肿瘤治疗史的评估需要遵循个体化的原则^[15], 患者是否接受过放疗、化疗、靶向药物治疗、激素或内分泌治疗, 治疗效果如何是医生在选择进一步外科治疗前必须考虑的问题。

六、脊柱转移瘤患者术前评估包括哪些方面?

脊柱转移瘤患者的术前评估主要包括: ①患者的一般健康状况; ②患者的临床表现 (脊髓神经功能、疼痛及脊柱稳定性); ③肿瘤组织学类型、分期、既往治疗情况; ④患者预后生存期的评估; ⑤手术方案的可行性评估, 包括手术方式、手术入路、重建方式及切口愈合^[1, 5, 10, 34, 36] (1 级推荐)。

目前, 脊柱转移瘤的治疗方案越来越多元化, 在制定治疗决策之前, 必须从多学科角度对患者进行全面、综合地评估, 制定个体化的治疗策略。患者的一般健康状况、营养情况决定了对手术的耐受能力、切口及软组织创面愈合能力、后续辅助治疗的时间间隔; 临床表现和症状的严重程度、肿瘤学状态及预计生存期等则决定了治疗方式的选择。手术治疗是脊柱转移瘤治疗中创伤最大的一种干预措施, 对于肿瘤晚期的患者则更容易出现严重的并发症^[10, 37-39], 只有合理、谨慎地制定外科治疗策略, 并充分考虑到影响切口、软组织愈合的因素, 才能减少并发症、改善预后、充分发挥外科手术在脊柱转移瘤综合治疗中的作用。

七、脊柱转移瘤患者术前常规检查包括哪些?

注重既往病史、生活习惯、肿瘤家族史等信息采集; 综合利用影像学、实验室及其他检查手段判断转移瘤的来源、侵犯范围, 制定手术策略并评估患者对手术的耐受情况 (1 级推荐)。原发病灶不明的患者, 利用影像学、实验室等辅助检查手段判断可能的组织来源 (1 级推荐)。对于伴有基础疾病, 如循环系统疾病、呼吸系统疾病、糖尿病、血液系统疾病等的患者, 术前应严格评估并调整患者基础疾病状态 (1 级推荐)。

脊柱转移瘤患者一般为各种恶性肿瘤的晚期, 术前应常规进行全身检查, 评估患者一般情况。对怀疑脊柱转移瘤患者应注重既往病史、生活习惯、肿瘤家族史等方面的信息采集, 有利于转移瘤诊断的确定。除常规脊柱专科体检外, 还应当注意全身

及局部的淋巴结检查。对于原发病灶不明的患者,应对肺、肝、甲状腺、肾、乳腺、前列腺等器官进行详细检查,完善影像学及相关的实验室检查,初步评价肿瘤的性质及受累范围,评估患者对手术的耐受情况^[23-25]。对全身情况欠佳的患者应给予支持治疗,改善全身状况,同时积极治疗原发肿瘤^[40]。对于特殊类型的转移瘤,如激素敏感的乳腺癌、前列腺癌等,可以采用内分泌治疗等辅助方式控制转移灶^[41]。双膦酸盐类药物有助于控制脊柱转移灶的溶骨性破坏,并缓解骨痛症状^[42]。血管内皮生长因子(vascular endothelial growth factor, VEGF)、表皮生长因子受体(epithelial growth factor receptor, EGFR)等为靶点的分子靶向药物可能影响组织血供,延缓手术切口愈合,应在术前3~6周停止使用^[43-45]。

八、脊柱转移瘤患者术前需要进行活检吗?术前栓塞如何选择?

既往无恶性肿瘤病史、肿瘤原发灶不明等诊断存疑者,建议行病灶穿刺活检以明确病理学诊断(1级推荐)。既往有恶性肿瘤病史,就诊时全身多发转移者,可不行活检;对于原发灶已有效控制5年以上,条件允许者应行活检(3级推荐)。对血供丰富的肿瘤建议术前行血管栓塞(3级推荐)。

病灶活检在脊柱转移瘤的诊治中具有重要意义,活检结果不仅可提示病理学类型,还可进一步进行分子分型,协助制定个体化治疗策略。对于伴有明显骨质破坏、影像学提示溶骨性病变或病理性骨折、既往无恶性肿瘤病史、肿瘤原发灶不明等诊断存疑者,应首先采用病灶穿刺活检以明确病理学诊断^[46-47]。既往有恶性肿瘤病史,已出现全身多发转移者可不行活检;对于原发病灶已有效控制超过5年的患者,条件允许者可行穿刺活检明确病理类型^[48]。

选择性动脉栓塞已在不同部位、不同病理类型脊柱转移瘤患者外科治疗中证实其有效性和安全性,总体并发症发生率较低。建议对于血供丰富的肿瘤术前行血管栓塞^[49-52],并在栓塞后48 h内手术。

九、脊柱转移瘤行全脊椎切除的适应证?

对于无重要脏器转移,出现胸、腰椎单节段转移,肿瘤原发灶控制良好,且预期生存期较长的患者,在外科技术允许的条件下可考虑行全脊椎切除;全脊椎切除建议行前方椎体重建以及后方固定;对于病灶边界外en bloc切除难以完成的患者,可行肿瘤分块切除(3级推荐)。

全脊椎切除的手术适应证应严格掌握,一般为

胸、腰椎单节段的转移瘤,原发灶控制良好且恶性程度较低,如肾癌、甲状腺癌、乳腺癌、前列腺癌及对化疗或靶向药物敏感的肺癌等;不伴有重要脏器转移;患者预期生存期较长者^[53-54]。一般认为脊柱转移瘤患者行全脊椎切除术适用于不超过邻近2个椎体的病变^[54-57],且需常规行前方椎体重建以及后方固定。在外科技术允许、手术创伤可控的情况下,尽量达到肿瘤边界外的en bloc切除;对于en bloc切除困难,或患者耐受性较差者,经病灶的肿瘤分块切除也可以接受^[23]。对于一般情况差,基础疾病多的患者选择该术式需谨慎。

十、脊柱转移瘤行分离手术的适应证如何把握?

对于脊髓或神经根压迫症状明显、存在脊柱不稳或病理性骨折风险,但可耐受手术切除、责任椎体明确、预期生存期>3个月的患者可行分离手术;分离手术需行可靠地重建以恢复脊柱稳定性;分离手术后必须配合立体定向放疗对脊柱转移瘤病灶进行控制(1级推荐)。

脊柱转移瘤手术治疗成功的标准:有效缓解疼痛,恢复或维持脊柱稳定性及脊髓功能,患者超过预期生存时间,肿瘤局部控制获益等^[12]。分离手术通过对脊髓环形减压扩大肿瘤与硬膜的间隙,重建脊柱稳定性,为进一步放疗提供条件和时间,并减少放疗引起的脊髓损伤^[58]。脊柱转移瘤完全瘫痪超过48 h的患者可能在脊髓直接减压术后也不能获得满意的脊髓神经功能恢复^[58]。分离手术后必须配合立体定向放疗,分离手术联合放疗较单纯放疗可明显地改善患者术后神经功能,缓解疼痛^[58-60]。

十一、脊柱转移瘤患者放射治疗的时机选择?

对于无明显脊柱不稳或无脊髓压迫症状,且放疗敏感的患者,立体定向局部放疗可作为首选治疗方法;不推荐术前进行常规术区放疗;手术与术区放疗的间隔时间应>2周或待切口愈合后(3级推荐)。对于接受病灶姑息性切除的患者,建议行术后辅助放疗(1级推荐)。

脊柱转移瘤患者放射治疗的目的是缓解疼痛、预防进一步的病理性骨折、缓解或预防脊髓神经根受压^[61]。立体定向放疗在提高肿瘤部位放疗剂量的同时可减少脊髓等组织的放射损伤,对于无明显脊柱不稳或无明显脊髓损害症状的患者可作为首选治疗方法^[12,62]。立体定向放疗作为初次治疗的适应证:脊柱稳定性无破坏;一般情况差,不能耐受外科手术;放疗敏感的肿瘤患者;患者预期生存期较

短;多平面或弥漫性病变^[22,63]。

对于已出现病理性骨折或濒临骨折的患者,尽管放疗能缓解疼痛和控制肿瘤,但不能恢复脊柱的稳定性。术前放疗可增加切口并发症的发生率,增加内固定失败的风险,因此,不建议术前常规进行术区放疗^[64-65]。对于进行术前放疗的患者,手术与放疗的时间间隔应>2周。对于术后配合放疗的患者,建议切口愈合后再进行放疗^[12,66]。

十二、脊柱转移瘤的微创治疗手段有哪些?如何把握适应证和注意事项?

对于脊柱转移瘤,常用的微创治疗手段包括射频消融、选择性动脉栓塞、微波治疗、激光间质热疗、腔镜治疗等。射频消融主要用于缓解癌性疼痛,常与经皮椎体成形术(percutaneous vertebroplasty, PVP)和经皮椎体后凸成形术(percutaneous kyphoplasty, PKP)联合应用,但对伴有椎体后壁破损及椎弓根累及的患者一般不推荐使用;对于血供丰富的脊柱转移瘤患者,可采用选择性动脉栓塞治疗;小切口或通道下单纯微波治疗仅适用于局限于间室内的脊柱转移瘤(3级推荐)。

脊柱微创手术是指借助医学影像、显微内窥镜等特殊手术器械和仪器对脊柱疾患进行诊疗的技术和方法^[67]。因微创外科技术创伤小、恢复快、易为患者接受且符合骨转移瘤外科治疗选择的原则,越来越多地被应用于脊柱转移瘤的外科治疗。射频消融可以改善脊柱转移瘤患者的症状,特别是在减轻局部疼痛方面有着较好的疗效,但不推荐单独使用^[68-70]。联合 PVP 或 PKP 可以有效缓解患者疼痛,且具有足够的安全性^[71-72]。但在伴有椎体后壁破损及椎弓根累及的患者应谨慎选择该术式^[73]。

对于血供丰富的脊柱转移瘤,选择性动脉栓塞可以在一定程度上减少术中出血,甚至改善脊柱转移瘤患者的疼痛和神经损害症状^[74]。微波治疗具有杀伤肿瘤且不影响脊柱稳定性的优点,但目前认为微波治疗仅适用于单纯局限于间室内的肿瘤(Tomita 分级中 1~3 区),对于间室外的肿瘤治疗应考虑联合手术或其他辅助治疗手段^[75-78]。近年来,激光间质热疗常与手术或放疗联合应用,有证据提示该技术可改善脊柱转移瘤患者的生存质量^[75,79]。但具体疗效有待观察。

十三、脊柱转移瘤椎体成形术的适应证和禁忌证?

适应证为脊柱转移瘤椎体破坏,但椎体后壁相对完整,导致疼痛和轻、中度不稳定的脊柱转移瘤

患者(SINS 评分 ≤ 12 分,1级推荐)。

相对禁忌证:①硬膜囊受压;②严重的凝血功能障碍;③伴发感染;④已知对骨水泥(聚甲基丙烯酸甲酯, polymethyl methacrylate, PMMA)过敏;⑤妊娠;⑥一般情况差,或预期生存期<3个月者(3级推荐)。

椎体成形术主要包括 PVP、PKP 和 Kiva 系统。该术式是一种安全、可靠的治疗手段,对于转移瘤引起的椎体压缩性骨折患者,在疼痛控制、神经功能改善及生活质量提高方面均优于非手术的保守治疗者。PMMA 可以通过细胞毒效应、热效应及骨水泥固化阻断肿瘤的血供等产生抗肿瘤作用;热效应可以导致椎体内神经纤维变性坏死,对疼痛的敏感性降低或消失^[80],同时骨水泥还可以为脊柱病理性骨折椎体提供结构性支撑作用。

十四、脊柱转移瘤椎体成形术并发症的处理与预防?

无症状的骨水泥渗漏,主要采用密切观察,一般症状均可以在 30 d 内消失而不需要外科干预(3级推荐)。骨水泥渗漏的预防可采用:①严格把握适应证,对于椎体骨折尤其是后壁有明显破损者,以及严重压缩性骨折患者(压缩>75%)慎用;②把握好穿刺部位、进针角度及深度;③使用快速凝固的 PMMA 和相对较小的注入剂量(2~8 ml);④术中严密监测,发现骨水泥渗漏或达到椎体后 1/3 时,应停止注入骨水泥;⑤可以通过激光或球囊加压的方法预防骨水泥渗漏的发生(3级推荐)。

椎体成形术可以联合外科手术、放疗和微波治疗等多种治疗方法同时使用^[81-82]。椎体成形术可以使脊柱得到即刻的稳定且减轻疼痛^[83-86],其中椎体成形术联合放疗对疼痛的控制比两者单独应用效果更佳^[87-88]。椎体成形术并发症的发生率大约为 10%^[83,89],主要是骨水泥渗漏所致(如肺栓塞、血管栓塞、心脏异物及椎管内骨水泥渗漏等)^[90-94]。大部分患者为无症状的骨水泥渗漏,可采取密切观察。预防骨水泥渗漏可采用快速凝固的 PMMA 和相对较小的注入剂量(2~8 ml)^[95-96]。当术中 X 线透视发现有骨水泥渗漏或达到椎体后 1/3 时,应停止注入骨水泥。骨水泥的注入量与症状缓解情况不呈正相关,而加压充填必然会导致骨水泥渗漏。PKP 技术可以降低骨水泥渗漏的发生率^[97-99]。对于后壁受累的椎体转移瘤,在 CT 和 X 线引导下进行经皮椎体成形术是安全可靠的^[100]。另外,脊柱转移瘤行椎体成形术后是否会增加邻近椎体新发骨折的概率尚

无报道^[101-102]。经皮骨水泥螺钉植入能够增强转移瘤椎体的稳定性,同时可较为明显地缓解疼痛,改善患者生存质量^[103-105]。

十五、切口并发症的防治?

如术前需要放疗,建议控制放疗暴露范围,同时将放疗与手术的时间间隔 2 周以上,以减少术后切口感染发生率;对于脊柱转移瘤手术及翻修手术,软组织缺损采用整形修复技术进行软组织重建(3 级推荐)。

脊柱转移瘤手术切口感染发生率约为 10.22% (3.51%~20.00%),后路手术较前路手术感染发生率更高,最常见为金黄色葡萄球菌感染^[106-108]。术前营养状态差(如低蛋白血症)、围手术期应用激素、医源性脑脊液漏、糖尿病、手术时间>4 h、固定节段多(≥7 个节段)、术中出血量大(>3 000 ml)、术前深静脉血栓、术前神经功能障碍、急诊手术等是导致术后切口感染的危险因素^[106-108]。目前对于术前放疗是否易造成术后切口感染尚存在争议^[109-110],本指南推荐控制放疗暴露范围,同时将放疗与手术的时间间隔 2 周以上。预防性软组织重建的患者术后切口并发症发生率明显低于未行软组织重建者^[111]。

脊柱转移瘤外科治疗指南编写组人员名单

编写组组长:林建华

编写组副组长:牛晓辉、肖建如、李建民、邵增务、胡永成

参与制定人员(按姓氏拼音排序):

初同伟 陆军军医大学新桥医院

郭卫 北京大学人民医院

胡永成 天津医院

李建民 山东大学齐鲁医院

林建华 福建医科大学附属第一医院

陆宁 解放军总医院

牛晓辉 北京积水潭医院

邵增务 华中科技大学协和医院

沈慧勇 中山大学附属孙逸仙纪念医院

汤小东 北京大学人民医院

王晋 中山大学附属第一医院

王臻 空军军医大学西京医院

魏海峰 海军军医大学长征医院

吴苏稼 东部战区总医院

肖建如 海军军医大学长征医院

闫景龙 哈尔滨医科大学附属第一医院

杨诚 海军军医大学长征医院

叶招明 浙江大学医学院附属第二医院

于秀淳 中国人民解放军九六〇医院

项目牵头及执笔人员:肖建如、林建华、胡永成

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