·综　述·

退行性腰椎管狭窄症与脊柱－骨盆矢状位失衡及椎旁肌退变关系的研究进展

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摘　要　退行性腰椎管狭窄症（degenerative lumbar spinal stenosis,DLSS）多由机体长期维持不良姿态导致腰椎结构应力分布紊乱,引起脊柱主被动稳定系统失衡,最终造成椎旁肌及周围骨组织退变所致。本文介绍了 DLSS 与脊柱－骨盆矢状位失衡的关系、DLSS 与椎旁肌退变的关系及脊柱－骨盆矢状位失衡与椎旁肌退变的关系 3 个方面的研究进展,以期为 DLSS 的治疗与康复提供借鉴。

关键词　椎管狭窄;腰椎;脊柱－骨盆矢状位平衡;椎旁肌

机体长期维持不良姿态导致腰椎结构应力分布紊乱,引起脊柱主被动稳定系统失衡,最终造成椎旁肌及周围骨组织退变,是引起退行性腰椎管狭窄症（degenerative lumbar spinal stenosis,DLSS）的最主要原因[1]。椎旁肌是维持腰椎稳定的重要结构,其功能紊乱一方面会导致躯体骨盆以下衔接传导功能受损,出现腰骶部疼痛;另一方面会使人体维持脊柱力线平衡的能力下降,使腰椎在矢状面失衡,其失衡程度与患者的生存质量恶化程度呈正相关[2]。以往针对 DLSS 的研究多从脊柱－骨盆矢状位失衡或椎旁肌退变单方面入手,未能将二者结合进行深入探讨,导致治疗方案不够完善,最终影响治疗效果。为此,我们通过查阅近年来国内外有关 DLSS、脊柱－骨盆矢状位失衡及椎旁肌退变的文献,对 DLSS 与脊柱－骨盆矢状位失衡及椎旁肌退变关系的研究进展进行了综述,以期为 DLSS 的治疗与康复提供借鉴。

1　DLSS 与脊柱－骨盆矢状位失衡的关系

脊柱－骨盆矢状位失衡在 DLSS 的发生、发展以及转归中起着重要作用,明确 DLSS 与脊柱－骨盆矢状位失衡的关系,对预判该病的发生、发展、预后和完善治疗方案十分有利。

脊柱－骨盆矢状位平衡参数需在脊柱全长 X 线片上测量,拍片时患者直立位,充分伸展髋、膝关节,肘关节完全屈曲,双拳置于同侧锁骨上[3]。常用的参数包括胸椎后凸角（thoracic kyphosis angle,TKA）、腰椎前凸角（lumbar lordosis angle,LLA）、骨盆入射角（pelvic incidence angle,PIA）、骶骨倾斜角（sacral slope angle,SSA）、骨盆倾斜角（pelvic tilt angle,PTA）及脊柱矢状位垂直轴（sagittal vertical axis,SVA）等。

国内外学者进行了大量有关健康人脊柱－骨盆矢状位平衡参数的研究,试图得到一个标准的脊柱－骨盆矢状位平衡参数。但受种族、地域等因素的影响,相关研究得出的结果存在一定差异。Schwab 等[4]的研究表明,在西方健康人群中 LLA = PIA + 9。孙卓然等[5]对 139 例国内健康志愿者的测定结果表明,国人正常的 PIA 和 LLA 均小于西方人群,其 LLA = 0.623 PIA + 20.611。以往的研究表明,脊柱－骨盆矢状位平衡应满足 3 个条件,即 SVA < 4 cm、PIA－LLA < 10°、PT < 20°;SVA < 5 cm 时患者的生活质量分数较高,SVA ≥ 5 cm 时患者临床症状较重且生活质量分数下降,故 SVA ≥ 5 cm 时可认为存在脊柱－骨盆矢状位失衡[6]。

DLSS 患者的临床症状与脊柱－骨盆矢状位失衡程度密切相关。Abbas 等[7]通过对 67 例 DLSS 患者和 100 例无脊柱疾病的健康志愿者的对比分析发现,DLSS 患者的 LLA 和 SSA 均小于健康志愿者。Suzuki 等[8]根据症状将 93 例 DLSS 患者分为跛行组和神经根组（神经根组主要症状为疼痛）,发现跛行组 SVA 更大,2 组的 LLA 无明显差异;跛行组的身体前倾姿势和骨盆后倾较神经根组更明显。然而 Lim 等[9]在对比分析退行性腰椎滑脱症与 DLSS 患者的脊柱－骨盆矢状位平衡参数时发现,DLSS 患者的 PIA 值正常、

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脊柱－骨盆矢状位平衡良好。谢峰等[10]在测量腰椎间盘突出症和 DLSS 患者的脊柱－骨盆矢状位平衡参数时也得到了同样的结果。以往各项研究的结论虽然存在一定差异,但这些研究者均认为一旦患者的脊柱－骨盆矢状位平衡参数超出正常范围就应进行手术矫正。我们认为,DLSS 常继发于腰椎间盘突出症或腰椎滑脱症等其他腰椎退行性疾病,大多存在一定程度的脊柱－骨盆矢状位失衡;单纯的 DLSS 患者也会因长期的姿势不良造成脊柱－骨盆矢状位失衡。

2　DLSS 与椎旁肌退变的关系

椎旁肌主要分为前后两群,其中前群的腰大肌和后群的多裂肌、竖脊肌常被称为脊柱动态稳定器[11－14]。腰大肌维持腰椎的前倾和曲度[15]、多裂肌辅助腰椎的旋转运动[16]、竖脊肌参与腰椎屈伸运动[17]。

椎旁肌退变(肌量减少、脂肪浸润增加[18－19])与多种腰椎疾病的发生、发展及术后并发症的发生有关[20－24]。单个肌肉的生理功能由肌肉横截面积和密度来体现[25];失神经支配、废用会造成肌肉横截面积减小,脂肪浸润增加可导致肌肉密度减小[26]。Lee 等[27]的研究表明,脊椎退行性变患者椎旁肌的脂肪浸润程度明显高于健康受试者。韦以宗等[28]的研究发现,腰大肌、多裂肌及竖脊肌的横截面积越大,产生的张力越强,对腰椎的稳定越有利。Wan 等[29]发现,慢性腰痛患者患侧腰大肌和竖脊肌的横截面积明显小于健侧。Shafaq 等[30]在研究中发现,合并退行性腰椎侧弯的 DLSS 患者凹侧多裂肌横截面积较凸侧明显减小、脂肪浸润程度较凸侧明显增加,单纯 DLSS 患者双侧多裂肌横截面积和脂肪浸润程度均无明显差异。戎飞龙等[31]在对 DLSS 和退行性腰椎滑脱症患者的观察中也发现了患者腰大肌、多裂肌及竖脊肌的横截面积较健康对照组减少的现象。另有研究表明,DLSS 患者的椎旁肌退变越严重(肌肉横截面积越小、脂肪浸润程度越高),功能评分越低[32－33]。此外,已有研究证实,通过规范锻炼椎旁肌可延缓 DLSS 病情进展[34]。

3　脊柱－骨盆矢状位失衡与椎旁肌退变的关系

脊柱－骨盆矢状位失衡与椎旁肌退变的关系也已受到越来越多的关注。Jun 等[35]分析了 50 位老年人的影像学资料后发现,椎旁肌脂肪浸润程度与 TKA、SVA、PTA 及 PIA 和 LLA 的差值有关,且脂肪浸润程度与 LLA 呈负相关。Hiyama 等[36]通过分析 140 例DLSS 患者的资料发现,L_4、L_5 的腰大肌平均横截面积与 PTA 呈负相关。总体而言,目前对于 DLSS 患者脊柱－骨盆矢状位失衡与椎旁肌退变关系的研究较少,而且大部分未阐明二者的关系。

4　小　结

现有的研究表明,DLSS 的发生、发展与脊柱－骨盆矢状位失衡及椎旁肌退变有关,DLSS 患者大多存在脊柱－骨盆矢状位失衡和椎旁肌退变。但目前的研究多集中在 DLSS 与脊柱－骨盆矢状位失衡、DLSS 与椎旁肌退变两方面,有关 DLSS 患者脊柱－骨盆矢状位失衡与椎旁肌退变关系的研究较少。今后的研究应着重从 DLSS 患者脊柱－骨盆矢状位失衡与椎旁肌退变的关系入手,通过深入研究进一步完善对该病的认识,最终为 DLSS 的治疗和康复提供新的思路。

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