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· 综述 ·

肩关节后方不稳的诊疗现状

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【摘要】 肩关节后方不稳发生率明显低于前方不稳,但是临床上诊疗难度大,误诊和漏诊率较高。其病因、临床表现治疗策略与前方不稳完全不同。因此,深入认识肩关节周围解剖结构、掌握检查方法、基于解剖和受伤方式对肩不稳进行分型对提高诊断准确率具有关键作用。CT 三维重建对肱骨头及肩盂骨缺损的评估和核磁共振造影(magnetic resonance angiography, MRA)对于后方盂唇及关节囊病变评估有助于精确诊断。治疗方法分为保守治疗及手术治疗。对肌性不稳建议保守治疗。创伤性及发育不良性不稳建议手术治疗,具体根据肩盂侧或肱骨头侧损伤行不同术式。肩盂侧损伤根据骨缺损情况行软组织手术、植骨手术或截骨手术来重建后方稳定结构;肱骨头侧缺损则根据前方骨缺损面积行植骨术或肩胛下肌填塞术。手术方式有开放手术和关节镜手术,前者优势在于学习曲线短,固定牢固;后者优势在于微创操作及可以多角度观察病变部位并精确控制骨块位置。本文对将上述问题加以综述。

【关键词】 肩关节; 关节镜; 关节不稳定性

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ABSTRACT The incidence of posterior instability of shoulder joint was significantly lower than that of anterior instability, but the clinical diagnosis and treatment was difficult, and the misdiagnosis and missed diagnosis rate were high. Its etiology, clinical manifestation and treatment strategy are totally different from the anterior instability. Therefore, the deep understanding of the anatomical structure around the shoulder joint, the mastery of the examination method, and the classification of the shoulder instability based on the anatomy and injury mode are of great importance to improve the accuracy of diagnosis. CT three-dimensional reconstruction is helpful to evaluate the defect of humeral head and glenoid bone, and MRA is helpful for the accurate diagnosis of posterior glenoid lip and joint capsule. The treatment was divided into conservative treatment and surgical treatment. Conservative treatment is recommended for muscular instability. Surgical treatment is recommended for traumatic and dysplastic instability. Different operative methods should be performed according to the injury of glenoid side or humeral

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head side. According to the condition of bone defect, soft tissue operation, bone grafting or osteotomy were performed to reconstruct the posterior stable structure of the glenoid injury; according to the area of the anterior bone defect, bone grafting or subscapular muscle packing were performed to the head of humerus defect. The former has the advantages of short learning curve and firm fixation, while the latter has the advantages of minimally invasive operation and the ability to observe the lesions from multiple angles and accurately control the location of bone masses. This paper summarizes the above problems.

KEYWORDS Shoulder joint; Arthroscopy; Joint instability

肩关节后方不稳 (posterior shoulder instability, PSI) 常常发生于癫痫发作诱发、电击伤性或肩关节发育不良等因素造成。肩关节后脱位占有肩关节不稳的 4%~10%, 临床上漏诊率高达 79%^[1]。尽管随着影像学的发展使检出率有所增加, 但其发生率较低使得人们对其认识不足, 临床漏诊误诊率难以下降。如何提高诊断的准确率, 减少患者损伤, 本文对近年来该病的诊断、影像、分型、治疗等进行综述。

1 肩关节后方不稳的临床检查方法

肩关节的稳定性主要基于功能正常的肩袖、结构完整的关节囊和盂唇、盂肱关节的接触面积和神经肌肉系统。查体方法包括肩关节后抽屉试验、Jerk 试验、Kim 试验、Pivot shift 试验、恐惧试验等。其中 Jerk 试验^[2]和 Kim 试验^[3]的特异度较高, 可用于评估后下盂唇复合体的病变, 除外病理性肌性病变。采用健侧与患侧对比检查“手挤压试验”和“肩胛骨辅助试验”即可分辨肌性病变与肩不稳之间的关系, 常常是大脑对位置、活动方向、速度变化的异常感知。总之病因异同则治疗方案应有所差异, 宜采用个性化治疗方案。

2 影像学诊断

影像学检查, 尤其是 CT、MRI 有助于排除结构性病变, 还有助于定位和量化病变。常规 X 线检查远不如肩关节前脱位明显, 常易漏诊。X 线检查典型特征为灯泡征 (前后位片肱骨颈轮廓消失, 图 1), 真空关节盂 (盂肱关节中肱骨头重叠像丢失), 槽线征 (前后位片显示肱骨头压缩性骨折, 反 Hill-Sachs 损伤, 图 2) 等。CT 及核磁共振造影扫描有助于反 Bankart 损伤 (图 3), 反 Hill-Sachs 损伤 (图 4), 后关节囊松弛 (图 5), 肩袖损伤, 盂肱韧带损伤, Kim 损伤 (后盂唇不完全撕脱), 反 HAGL 损伤 (反向盂肱韧带侧撕脱)、POLPSA (后方盂唇骨膜袖套状撕脱, 图 6), Bennett 损伤 (后下盂唇旁新月形骨化, 图 7) 等疾病的检出率。CT 三维重建可清晰诊断及锁定型后脱位 (图 8)。以上都是较为典型的肩关节后脱位影像, 临床上应提高警惕。对于存在肩关节疼痛、功能受限者, 但 X 线未见明显脱位或关节关系改变者, 应补充 CT 或 MRI 检查, 提高诊断准确率。

反 Bankart 损伤即后方盂唇从肩盂骨质上完全脱离, 有时会合并反 Hill-Sachs 损伤, 主要出现在外

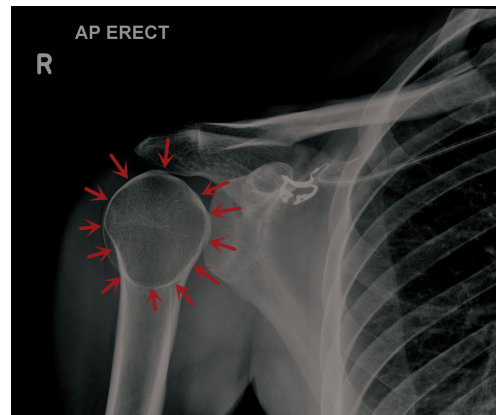


图 1 肩关节前后位 X 线片显示肱骨颈轮廓消失 (灯泡征), 如红色箭头所示。这是由于后脱位时肱骨头内旋造成骨小梁方向与 X 线方向一致而使透光度增加, 形成圆形的灯泡样

Fig.1 Anterior and posterior X-ray of the shoulder joint showing the disappearance of the humerus neck contour (lightbulb sign), as shown by red arrow. This is because the posterior dislocation of the humeral head causes the direction of the trabecular bone to be the same as the X-ray direction, which increases the light transmittance and forms a round lightbulb

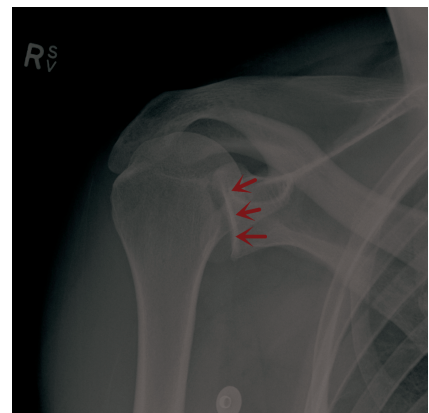


图 2 肩关节前后位 X 线片显示肱骨头压缩性骨折 (槽线征), 如红色箭头所示。肩关节后脱位时肱骨头前内侧压缩性骨折产生致密线, 其位于肱骨头内侧关节面下, 并与肱骨头关节面内侧缘平行, 形如槽线状, 当肱骨头内旋角度增大时, 槽线征消失

Fig.2 Anterior and posterior X-ray of the shoulder joint showing humeral head compression fracture (trough line sign), as shown by red arrow. When the posterior dislocation of the shoulder joint occurs, a compressive fracture of the anterior medial side of the humeral head produces a trough line, which is located below the medial humeral head articular surface and parallel to the medial edge of the humeral head articular surface. The trough line sign disappeared

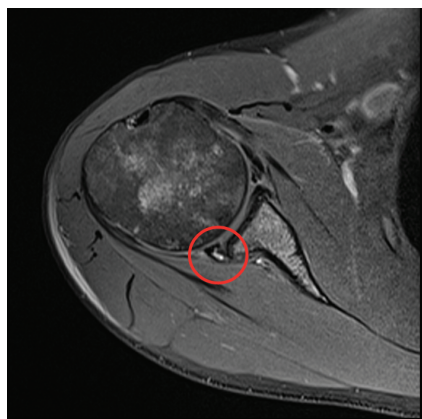


图 3 核磁检查可见后方盂唇出现撕裂(反 Bankart 损伤)(红圈所示)。当发生肩关节后脱位时,肱骨头前内侧面撞击后关节盂,导致肱骨头前内侧面压缩性骨折,以及后盂唇撕裂、关节盂撕脱骨折和反向 Bankart 损伤

Fig.3 MRI examination shows posterior labrum tear (reverse Bankart lesion), as shown by red circle. When a posterior dislocation of the shoulder occurs, the anterior medial side of the humeral head hits the posterior glenoid, resulting in a compressive fracture of the anterior medial side of the humeral head, as well as a posterior labial tear, glenoid avulsion fracture and reverse Bankart lesion

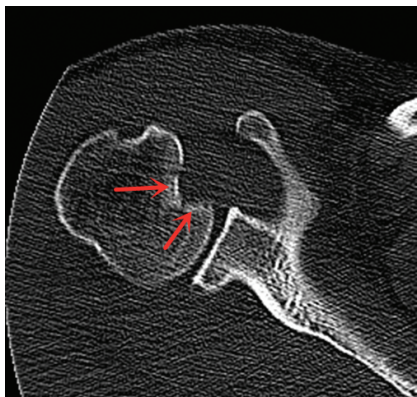


图 4 CT 显示反 Hill-Sachs 损伤,肱骨头严重压缩性骨折(红色箭头所示)

Fig.4 CT shows reverse Hill-Sachs injury, severe compression fracture of humeral head, as shown by red arrow

伤性后脱位病例中,称为“双极损伤”。肱骨头前方缺损范围对肩关节后方稳定性影响很大,而常规放射检查难以判断损伤范围。Moroder 等^[4]研究发现以肱骨头中心为圆点,骨性缺损边缘及二头肌长头腱沟为两边的 γ 角若 $>85.5^\circ$,则易发生锁定性脱位(图 9)。而双极损伤时 δ 角(以肱骨头中心为中心,骨性缺损边缘及肩盂后缘为两边)缩小,肩关节不稳程度进一步恶化,此时即便较轻的反 Hill-Sachs 损伤也需修复。

肩关节后方不稳与创伤性后盂唇撕裂相比,后下关节囊隐窝松弛扩大是无创伤性肩后方不稳的常



图 5 MRI 显示后关节囊松弛盂唇损伤(红色椭圆所示)
Fig.5 MRI shows posterior joint capsule loosening labrum injury, as shown in the red ellipse



图 6 POLPSA(后方盂唇骨膜袖套状撕脱)(红色箭头所示)。撕裂的后唇仍然附着在后盂唇间隙骨膜套撕脱伤的骨膜套上,这是一种公认的反向 Bankart 变异。这种病变与后肩不稳有关,需要手术治疗

Fig.6 POLPSA (posterior labrocapsular periosteal sleeve avulsion), as shown by red arrow. The avulsed posterior lip is still attached to the avulsed periosteal sheath of the posterior labial space, which is a recognized reverse Bankart variation. This lesion is related to hind shoulder instability and requires surgery

见特征(图 10)。在肩关节核磁造影横断位 T2 扫描中,后关节囊充盈的横截面积与患侧后向或多向不稳之间存在相关性,尚需要进一步研究证实^[5]。

肩盂后方骨缺损(反骨性 Bankart 损伤)的发生率较低。肩盂后下区域正常形态呈较为标准的 1/4 圆形,因此 PSI 患者经常发现此部位发育不良,从而导致关节磨损性退变,这比创伤性骨缺损更多见^[6]。大多数后方肩盂发育不良表现为后关节盂过于平滑,几乎呈椭圆形的圆角(“Lazy J”形状),甚至是关节线呈锐利边缘并带有三角形骨缺损(“Delta 形状”,即“ Δ 形状”)^[7](图 11)。对于严重的肩胛盂后方骨缺损,建议进行去肱骨头的 CT 三维重建有助于判断骨缺损的大小和面积,为制定手术方案提供重要参考。



图 7 CT 显示 Bennett 损伤(后下盂唇旁新月形骨化(红圈所示), 肩关节盂唇下后方接近下盂肱韧带复合体后束近端的骨赘形成

Fig.7 CT shows Bennett's injury (crescent ossification near the posterior inferior labrum) as shown by red circle, and the formation of osteophytes near the posterior part of the inferior glenohumeral ligament complex near the posterior inferior glenoid labrum

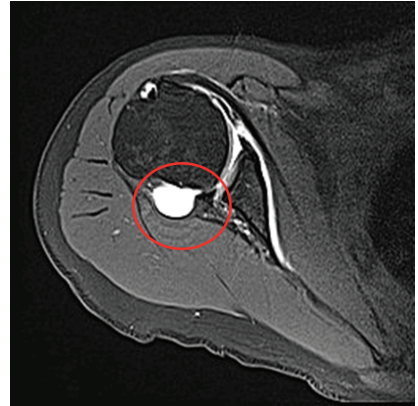


图 10 MRI 造影显示后下关节囊隐窝的松弛扩大(红圈所示)。这是无创伤性肩后方不稳的常见特征

Fig.10 MRI contrast showing relaxation and enlargement of the posterior inferior joint capsule crypt, as shown by red circle. This is a common feature of noninvasive posterior shoulder instability



图 8 CT 三维重建显示锁定型后脱位。肱骨头前方严重骨缺损, 脱位时锁定在肩盂骨质后方

Fig.8 CT three-dimensional reconstruction shows engaging posterior dislocation. Severe bone defect in front of the humerus head, locked behind the scapula during dislocation

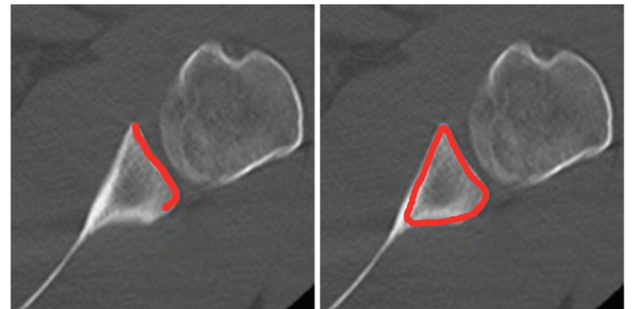


图 11 CT 显示后方肩盂发育呈 Lazy J 及 Δ 形状(红线所示)。表明后方肩盂发育不良

Fig.11 CT shows Lazy J and delta shape in posterior scapula, as shown by the red line. It shows that the posterior glenoid is hypoplastic

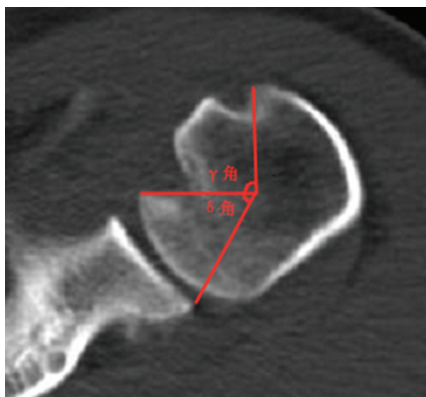


图 9 反 Hill-Sachs 损伤时, γ 角及 δ 角评估关节稳定性

Fig.9 In the case of reverse Hill-Sachs injury, the γ and δ angles evaluate joint stability

3 肩关节后方不稳的分型

肩关节稳定性主要基于以下因素: 功能正常的肩袖、关节囊和盂唇结构完整、盂肱关节足够的接触面积、正常的神经肌肉系统^[8]。基于肩关节解剖盂功能^[9]可采用 Gerber 前方不稳分型^[10-11]和 Moroder-Scheibel^[4]分型。大多数创伤性后脱位为肩关节过度松弛, 分型的意义在于指导临床治疗方案的选择。Stanmore 三角有助于合理选择治疗方案^[12](图 12)。创伤性不稳定和结构性病变的患者(Polar I)通常手术治疗; 但无结构性病变, 尤其是先天或后天神经肌肉系统异常者(Polar III), 建议保守治疗。肩关节不稳定类型为“Polar II”的患者治疗方案仍值得进一步探讨。

4 肩关节不稳的治疗

创伤性不稳定和结构性病变的患者通常手术治疗。先天或后天神经肌肉系统异常者无结构性病变建议保守治疗。肩关节后方不稳肩关节疼痛与功能

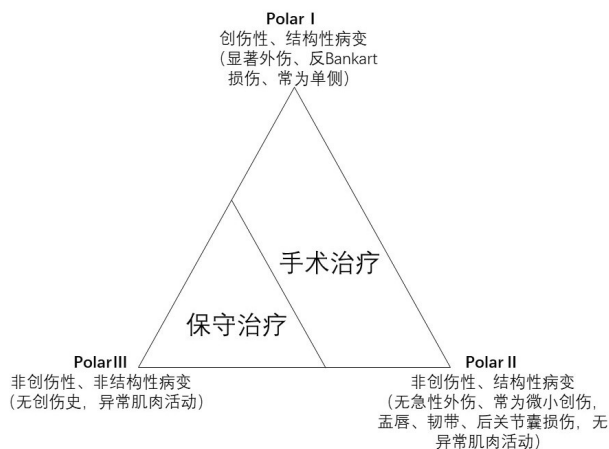


图 12 Stanmore 肩关节不稳定分类法有助于指导临床治疗

Fig.12 Stanmore triangle single-term instability typing

障碍是选择治疗方法的指征。通过保守治疗功能训练达到肩胛骨运动节律协调,优化肩袖肌肉共同作用,改善盂肱关节囊和肩袖肌群的本体感受器,增强稳定性。文献报告疼痛保守治疗 80% 的效果较差,有学者对 50 例非创伤性肩关节后方不稳采用保守治疗,取得了良好的效果^[13]。盂唇刺激性疼痛是由于肩关节后方不稳所致,可作为选择手术适应证的指征(表 1)。

手术治疗则需根据具体伤情选取不同的手术方案。对于肱骨头损伤,即反 Hill-Sachs 损伤,取决于肱骨头前方骨缺损的大小。对于骨缺损占关节面积 20%~40% 者,采用同种异体骨植骨进行解剖重建^[14-15]。对肱骨头缺损为 40%~45% 的急性脱位病例采用肩胛下肌止点移位术来填补肱骨头前方缺损^[16]。对老年退变性及慢性脱位病例却并不适用^[15]。研究表明对肱骨头急或慢性前方缺损 30%~55% 的病例,采用自体髂骨移植填充法,取得了良好的远期疗效^[17]。继发性肩外旋功能受限和退变性关节炎、持续不稳是其常见的术后并发症。综上,对肱骨头前方

骨缺损的处理应采用植骨+肩胛下肌填塞术处理,尽管术后可能存在旋转功能的丢失,但手术治疗的目首先要重建其关节稳定性,再通过后期康复训练逐渐改善关节功能。

有学者采用肱骨近端旋转截骨术治疗肩关节后方不稳,术中将肱骨头截骨后外旋位固定,为了达到盂肱关节旋转平衡,小结节也可截骨重建于骨缺损处(McLaughlin 手术)^[16,18]。肱骨近端旋转截骨术在肱骨头缺损尺寸<40% 的较早研究中被认为是正确的治疗选择^[19]。但该术式的缺点是术后旋转明显受限和假关节形成。有学远期疗效随访发现术后 15 年约 70% 患者出现退变性关节炎^[20]。笔者认为此术式尽管可以恢复关节稳定性,但由于改变了肱骨近端及肩袖的解剖结构,改变了肱骨头旋转中心,远期效果可能较差,可作为人工肩关节置换的过渡术式,但目前缺乏临床数据支撑。

肩盂侧骨性缺损是手术治疗的绝对指征。Wellmann 等^[21]研究认为由肩盂发育不良引起的关节不稳,且肩盂后倾角>25°,则需行开放截骨手术,调整后倾角。Coyner 等^[22]对 17 例 PSI 患者行此手术,随访 5 年,其中优良率 82%,复发率 13%,25% 出现退变性关节炎。Hawkins 等^[23]发现肩盂发育不良患者的肩盂后倾角在-1°~24° 范围内变化不等,且存在肩胛颈骨折、植骨块脱落等并发症。因此,对肩盂截骨术需持谨慎态度,做好充分的术前测量及评估。

对反骨性 Bankart 损伤(缺损大于 25% 者)需行骨块移植以填补骨性缺损,即反 Lartarjet 手术^[24-25]。该术式仅针对 Lartarjet 手术而言,是对肩盂侧骨性缺损患者的骨块移植手术,区别在于后者是将骨块固定于前下肩盂,而前者则将骨块固定于后下肩盂。手术入路选择位于腋后褶皱水平的背侧入路,劈开三角肌,水平方向钝性分离后方肩袖组织,然后纵向切开后方关节囊。对后方肩盂创面新鲜化处理,再将移植骨块固定至后方肩盂作为盂肱关节区的延伸,并

表 1 肩关节后方不稳的治疗适应证对照
Tab.1 Comparison of PSI treatment indications

保守治疗	手术治疗
肌性不稳	发育不良性不稳
Jerk 试验和 Kim 试验无疼痛	Jerk 试验和 Kim 试验疼痛明显
MRI 未见盂唇病变	MRI 见反 Bankart 或 Kim 病变(I-III 型)
MRI 见正常的后下关节囊隐窝	MRI 见扩大的后下关节囊
MRI 或 CT 未见骨质破坏及肩盂骨关节炎	后肩盂退变或肩盂缺损
微创伤或无创伤病史	创伤性初次脱位或初次半脱位合并创伤
理疗后症状改善	理疗后症状无改善
麻醉状态检查后抽屉试验平移 ≤2+	麻醉状态检查后抽屉试验平移 ≥2+

保持关节面平整。然后用锚钉缝合固定在后肩盂边缘,对松弛的后关节囊采用折叠缝合处理。Qi 等^[26]对 21 例患者行该术式并随访 6 年,仅 2 例出现了复发性不稳及退行性改变。Struck 等^[27]对比随访 12 个月和 42 个月的疗效,功能评分无差异,患者满意度高。Coyner 等^[22]进行了长达 18 年的远期疗效随访,在 11 例入组病例中有 36% 的复发不稳和骨关节炎,其中 3 例对术后疗效非常满意。有学者进行了 Meta 分析,认为后方植骨肩盂重建术是改善肩关节功能和稳定性的可靠方法,但是约 1/3 病例出现骨块吸收和退变性关节炎等并发症^[28-30]。笔者认为移植的骨块在固定前应对形状进行打磨以匹配肩盂的形态,避免对肱骨头的磨损;并且骨块应确保坚强固定,避免因微动而致骨块吸收。

反 Lartarjet 手术也可以在关节镜辅助下完成手术。手术采用沙滩椅位或侧卧牵引位。除前、后标准入路外,还需另建立 Neviaser 入路(冈上肌上方入路)和 Wilmington 入路。将皮质骨移植植物制备成 3 cm×1 cm×1 cm 大小,根据肩盂缺损的形态设计移植骨块在肩盂后缘采用 2 枚 3.5 mm 空心螺钉固定。最后重建孟唇,紧缩缝合关闭后关节囊^[31]。Besnard 等^[16]对 19 例后方不稳患者行该术式,随访时间平均 21 个月,无复发性脱位报告,其中 16 例功能良好。Woodmass 等^[32]报道了 5 例随访 18 个月的病例,均取得了良好的疗效,肩关节稳定、无复发、无翻修。Duerr 等^[33]对 18 名运动员进行了关节镜下后方孟唇及关节囊重建手术随访 3 年,ASES 评分从 45 分提高到 86 分,并且 90% 的患者能够恢复训练重返赛场。关节镜下手术的优势在于可以多角度观察病变部位并精确控制骨块位置;可以处理多向不稳;对移植骨块和肩盂后缘的打磨更加精细以提高匹配度,增加骨块愈合率;术后关节粘连、僵硬、感染臂丛神经损伤的风险降低,有利于功能康复锻炼^[34]。不足之处在于学习曲线较长,难以掌握。但目前尚无开放手术和关节镜下手术的远期功能及并发症对比,无法评估其疗效优劣。

5 术后康复

术后康复方案与前向不稳的方案不同。在开放或关节镜下手术后,将患肢维持在中立位,10°~20°外展位固定 6 周。不限制肘、腕关节活动,远端肢体功能锻炼避免肌肉萎缩。在前 6 周内,被动功能练习允许最大外展 60°,最大屈曲 60°,最大外旋 20°;禁止内旋。术后第 7 周起可以逐步恢复全程活动,从被动运动开始,然后辅助运动,最后进行主动运动^[35]。当前曲、外展和外旋运动基本恢复之后,才可训练内旋功能。因为过早内旋会拉伸后关节囊,导致手术失

败。一般在术后 12 周左右开始内旋功能训练。其次是加强肩袖和三角肌肌力训练。术后 6 个月可恢复过顶运动。总之,科学完善的康复方案有助于患者更好的回归生活及运动,方案的设计也应根据伤情及术式不同制定个体化方案。

6 小结

尽管肩关节后方不稳发生率较低,一旦漏诊或治疗不当,可能会导致严重功能障碍。影像学检查有助于正确的诊断。可先尝试规范化保守治疗,必要时选择开放或关节镜手术治疗,修复肱骨侧或肩盂侧骨性缺损,调整软组织平衡,早期恢复孟肱关节的解剖关系^[27]。

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