·临床研究·

体格检查联合X线平片在诊断老年肩袖损伤中的应用

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【摘 要】 目的 分析体格检查联合X线平片在诊断老年肩袖损伤中的应用。**方法** 选取2022年1月至2024年1月河北燕达医院收治的疑似单侧肩袖损伤且拟行关节镜手术治疗的212例老年患者为观察对象,以肩关节镜探查为肩袖损伤诊断金标准,将老年患者分为损伤组与未损伤组,比较两组Hug-up试验等体格检查及X线平片检查情况差异。采用*Kappa*一致性检验评估体格检查及X线平片对肩袖损伤的诊断价值。采用SPSS 23.0软件进行数据分析。根据数据类型,组间比较分别采用*t*检验及χ^2检验。**结果** 剔除4例资料不可用病例,最终入组208例老年患者,关节镜检查显示有181例(87.02%)诊断为肩袖损伤,其中172例(95.03%,172/181)为冈上肌腱损伤。损伤组Hug-up试验阳性率及改良Hug-up试验阳性率、X线平片阳性率均显著高于未损伤组,差异均有统计学意义[159(87.85%)和15(55.56%),158(87.29%)和13(48.15%),162(89.50%)和7(25.93%);均$P<0.05$]。*Kappa*一致性检验显示,Hug-up试验、改良Hug-up试验及X线平片对肩袖损伤的诊断*Kappa*系数为0.286、0.291、0.535(均$P<0.05$),3项联合检查(串联)与金标准的一致性良好(*Kappa*系数为0.621,$P<0.05$),准确率为88.46%(184/208),灵敏度为87.29%(158/181),特异度为96.30%(26/27)。**结论** Hug-up试验、改良Hug-up试验及X线平片联合检查诊断老年肩袖损伤的准确性良好,应用价值较高。

【关键词】 老年人;肩袖损伤;体格检查;X线平片;Hug-up试验;改良Hug-up试验
【中图分类号】 R685.4; R592 **【文献标志码】** A **【DOI】** 10.11915/j.issn.1671-5403.2026.02.030

Application of physical examination combined with plain X-ray filming in diagnosis of rotator cuff injury in elderly patients

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【Abstract】 Objective To analyze the clinical application of physical examination combined with plain X-ray filming in the diagnosis of rotator cuff injury in the elderly. **Methods** A total of 212 elderly patients with suspected unilateral rotator cuff injury who were scheduled to receive arthroscopic surgery in our hospital from January 2022 to January 2024 were enrolled as the observation subjects. Shoulder arthroscopy exploration was used as the gold standard for the diagnosis of rotator cuff injury, and then, the patients were divided into an injury group and a non-injury group. The differences in the results of physical examination such as Hug-up test and findings of plain X-ray film were compared between the two groups. *Kappa* consistency test was adopted to evaluate the diagnostic value of physical examination results and X-ray plain film for rotator cuff injury. SPSS statistics 23.0 was used for statistical analysis. Data comparison between two groups was performed using *t* test or χ^2 test depending on data type. **Results** After four cases were excluded due to unavailable data, 208 elderly patients were finally enrolled. Arthroscopy revealed that 181 cases were diagnosed as rotator cuff injury (87.02%, 181/208), including 172 cases of supraspinatus tendon injury (95.03%, 172/181). The injury group exhibited significantly higher positive rates of Hug-up test, modified Hug-up test and plain X-ray film than the non-injury group [159 (87.85%) *vs* 15 (55.56%), 158 (87.29%) *vs* 13 (48.15%), 162 (89.50%) *vs* 7 (25.93%); all $P<0.05$]. *Kappa* consistency test revealed that the *Kappa* coefficients of Hug-up test, modified Hug-up test and plain X-ray film in the diagnosis of rotator cuff injury were 0.286, 0.291 and 0.535 respectively (all $P<0.05$). The combination of three examination methods in series had good consistency with the gold standard (*Kappa*=0.621, $P<0.05$), with an accuracy rate of 88.46% (184/208), a sensitivity of 87.29% (158/181) and a specificity of 96.30% (26/27). **Conclusion** Combination of Hug-up test, modified Hug-up test and plain X-ray film has good accuracy in the diagnosis of elderly rotator cuff injury, and shows good application value.

收稿日期: 2025-02-10; **接受日期**: 2025-04-09
基金项目: 河北省医学科学研究课题计划(20201453);河北省科技成果推广课题(20220966)
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【Key words】 aged; rotator cuff injury; physical exam; X-ray plain film; Hug-up test; modified Hug-up test
This work was supported by the Project of Medical Science Research Plan of Hebei Province (20201453) *and the Promotion Project for Scientific and Technological Achievements of Hebei Province* (20220966).
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肩袖损伤引起患者肩关节疼痛及活动受限,其中冈上肌腱损伤占肩袖损伤 90% 以上,是骨科常见疾病[1]。肌腱退行性改变是导致肩袖损伤的重要病因,中老年人群为肩袖损伤的好发人群,其中 60 岁及以上老年人的肩袖损伤发生率高达 30%~40%[2]。关节镜是肩袖损伤的重要诊疗工具,也是诊断肩袖损伤的金标准,但作为有创手段,对疑似肩袖损伤但实际未损伤者可能造成过度诊疗,磁共振成像(magnetic resonance imaging,MRI)诊断准确率较高,但费用昂贵、预约时间长,费效比较低,可能并不适合作为常规筛查手段[3]。Neer 征、Hawkins 征等肩关节体格检查作为肩袖损伤患者入院常规检查方法,存在特异性较差等缺陷,且需要特殊体位检查,部分老年患者配合度不高,临床实际操作难度较大[4]。Hug-up 试验体位相对固定,操作较为简便,但不适合用于冻结肩等无法上臂内旋内收者,改良 Hug-up 试验则克服了该缺点,使患者在肩袖拉伸状态下完成试验,但无论是哪种体格检查方式,均存在假阳性与假阴性,需联合影像学综合判断[5]。X 线平片是肩袖损伤的传统影像学检查手段,在各基层医疗机构普遍应用,可辅助诊断肩袖全层撕裂,但无法评估肌腱肿胀等病变,准确性有限[6]。基于此,本研究分析 Hug-up 等体格检查联合 X 线平片检查在老年肩袖损伤诊断中的应用价值,为临床诊疗提供参考数据。

1 对象与方法

1.1 研究对象

选取 2022 年 1 月至 2024 年 1 月河北燕达医院收治的疑似单侧肩袖损伤且拟行关节镜检查或治疗的 212 例老年患者为观察对象,根据关节镜检查分为损伤组与未损伤组。纳入标准:(1)单侧肩痛伴活动障碍;(2)年龄≥60 岁;(3)关节镜诊疗符合《美国骨科医师协会肩袖损伤临床指南(2019)》[7],存在典型症状体征(单侧肩痛伴活动障碍),影像学检查提示肩袖撕裂伤;(4)术前行肩关节体格检查及 X 线平片检查;(5)术前 MRI 检查显示肌腱外形及肌腱内信号强度、肌腱连续性 Zlatkin 分级为 1~3 级;(6)意识清醒、认知功能正常,配合度良好;(7)健侧近 6 个月内无肩部疼痛或肩部疾病史;(8)对影像学检查、关节镜诊治等知情并签署纸质版知情同意书。排除标准:(1)肩关节先天性畸形;(2)既往肩关节脱位、骨折、手术史;(3)既往肩关节肿瘤史;(4)既往肩关节放疗史;(5)合并肩关节骨质破坏或其他部位损伤;(6)肩盂肱关节不稳;(7)合并传染性疾病、肩关节感染。剔除标准:(1)体格检查、影像学检查不完全或资料不可用;(2)围术期死亡。本研究 212 例老年患者中有 2 例患者未完成所有体格检查,有 2 例患者 X 线平片出现伪影不可用,予以剔除,最终入组 208 例老年患者。

1.2 方法

1.2.1 体格检查 参考《美国骨科医师学会肩肘外科学》[8],实施 0° 位外展抗阻试验、落臂试验、Jobe 试验、Neer 征、Hawkins 征、疼痛弧检查、Hug-up 试验及改良 Hug-up 试验;其中 Hug-up 试验是患肢手掌置放于对侧肩部,肘关节位于身体前方,检查者将手放置于受检者肘部,并在嘱受检者抵抗时施加向下的压力,若患侧力弱较对侧>20% 为阳性;改良 Hug-up 试验是嘱受检者双手握拳相对,双肘关节置放于身体前外侧,检查者将手放置于受检者肘部,并在嘱受检者抵抗时施加向下的压力,以患侧力弱或患者主诉疼痛为阳性。

1.2.2 X 线平片检查 使用Ⅴ型双板数字化医用 X 射线摄影系统(美国 GE 公司,Definium 6000),以冈上肌出口位检查,设置参数 65~70 kV,20~25 mAs,曝光时间 0.02 s,测量肩峰与肱骨头间的距离,<7 mm提示存在肩袖撕裂[9]。每例患者均由 2 名肩关节诊断经验丰富的放射科医师独立阅片诊断,意见不一致时由上级医师辅助诊断。

1.2.3 关节镜检查 由运动医学副主任职称医师或主治医师使用美国 Stryker 肩关节镜观察,所有老年患者均采用气管内插管的全身麻醉联合长效臂丛神经阻滞;先探查肩胛盂及肱骨头软骨情况,接着观察肌腱关节面,随后观察肩峰下间隙,逐一观察各组织充血、毛躁及撕裂情况。以关节镜下所见为金标准,将老年患者分为损伤组(肩袖部分撕裂+肩袖全层撕裂)与未损伤组(无肩袖撕裂)。

1.2.4 资料收集 获得患者知情同意后,由医院电子病历系统获取包括一般人口学资料、既往史等资料。

1.3 统计学处理

采用SPSS 23.0统计软件进行数据分析。计量资料用均数±标准差($\bar{x}\pm s$)表示,采用t检验;计数资料用例数(百分率)表示,采用χ^2检验。诊断价值采用*Kappa*一致性检验,*Kappa*系数越高,诊断价值越高。$P<0.05$为差异有统计学意义。

2 结 果

2.1 两组患者一般资料

关节镜检查显示,208例老年患者中有181例(87.02%)患者诊断为肩袖损伤,其中172例(95.03%,172/181)为冈上肌腱损伤。损伤组与未损伤组一般资料比较,差异无统计学意义(均$P>0.05$;表1)。

2.2 两组体格检查及X线平片检查

损伤组Hug-up试验阳性率、改良Hug-up试验阳性率及X线平片阳性率均显著高于未损伤组,差异均有统计学意义($P<0.05$;表2)。

2.3 体格检查及X线平片检查对肩袖损伤的诊断价值分析

Hug-up试验、改良Hug-up试验及X线平片对肩袖损伤的诊断*Kappa*系数为0.286、0.291、0.535($P<0.05$;表3,4)。

2.4 体格检查联合X线平片检查的诊断价值分析

3项单一检查的特异性偏低,故采用串联的方式,即Hug-up试验阳性且改良Hug-up试验阳性且X线平片检查阳性者判断为肩袖损伤,发现3项联合检查与金标准的一致性良好(*Kappa*系数为0.621,$P<0.05$;表5),准确率为88.46%,灵敏度为87.29%,特异度为96.30%,阳性预测值为99.37%,阴性预测值为53.06%。

3 讨 论

据文献报道,超过90%的肩袖损伤发生于冈上肌腱,即冈上肌腱撕裂,关节镜下修补术是常用治疗手段,关节镜也是诊断肩袖损伤的金标准[10]。临床实际工作中,部分患者术前判断为肩袖损伤,关节镜下可能仅见肌腱黏液样变性、肌腱炎,即出现误诊,导致患者创伤增加,影响医疗服务质量[11]。如何提升关节镜术前诊断准确性,仍是待以解决的难题。

体格检查作为入院检查的常规且必备项目,肩袖损伤相关的肩关节体格检查项目众多,各项体格检查的诊断价值目前结论不一,有学者认为Jobe试验等检查虽然能辅助诊断肩袖损伤,但特异性差,且需要依赖患者的肢体配合,实际应用价值有限[12,13]。Hug-up试验通过冈上肌腱拉伸状态下的抗阻力收缩,诱发患者疼痛或力弱,对判断冈上肌腱撕裂具有较高敏感性与特异性,但不适合用于上臂内旋内收障碍者[14]。改良Hug-up试验则优化Hug-up试验的缺陷,利用冈上肌腱拉伸状态下的抗阻测试,诱发力弱与疼痛,对上臂内旋内收障碍者同样适用[15]。本研究结果显示,损伤组Hug-up试验阳性率及改良Hug-up试验阳性率均显著高于未损伤组(87.85%和55.56%,87.29%和48.15%),提示两种体格检查方法对辅助判断肩袖损伤有积极作用。分析其原因为Hug-up与改良Hug-up试验均在冈上肌腱拉伸状态下完成测试,测试时冈上肌与冈下肌拉长,增加组织灵敏性,该体位也使胸大肌、三角肌前

表1 两组患者一般资料比较

Table 1 Comparison of general data between two groups

Group	n	Gender[n(%)]		Age (years, $\bar{x}\pm s$)	Disease course (months, $\bar{x}\pm s$)	Affected side[n(%)]		Hypertension [n(%)]	Diabetes mellitus [n(%)]
		Male	female			Left	Righ		
Injury	181	99(54.70)	82(45.30)	66.89±3.98	16.45±3.48	56(30.94)	125(69.06)	52(28.73)	18(9.94)
Non-injury	27	14(51.85)	13(48.15)	66.45±3.57	16.27±3.34	9(33.33)	18(66.67)	8(29.63)	3(11.11)
χ^2/t		0.077		0.543	0.252	0.063		0.009	0.035
P value		0.782		0.588	0.801	0.802		0.923	0.851

表2 两组患者体格检查及X线平片检查比较

Table 2 Comparison of physical examination and X-ray plain film examination between two groups [n(%)]

Group	n	Positive 0° abduction resistance test	Positive arm drop test	Positive Jobe test	Positive Neer sign	Positive Hawkins sign	Positive pain arc examination	Positive Hug-up test	Positive modified Hug-up test	Positive X-ray plain film
Injury	181	99(54.70)	110(60.77)	112(61.88)	96(53.04)	98(54.14)	105(58.01)	159(87.85)	158(87.29)	162(89.50)
Non-injury	27	11(40.74)	12(44.44)	12(44.44)	10(37.04)	10(37.04)	11(40.74)	15(55.56)	13(48.15)	7(25.93)
χ^2		1.836	2.583	2.966	2.407	2.754	2.841	17.915	24.618	62.338
P value		0.175	0.108	0.085	0.121	0.097	0.092	<0.001	<0.001	<0.001

表 3 3 种检查方式与金标准的四格表分析

Table 3 Fourfold table analysis of three examination methods and gold standard (*n*)

Examination method		Arthroscopy		Total
		Positive	Negative	
Hug-up test	Positive	159	15	174
	Negative	22	12	34
Modified Hug-up test	Positive	158	13	171
	Negative	23	14	37
X-ray plain film	Positive	162	7	169
	Negative	19	20	39
Total		181	27	208

表 4 3 种检查方式的诊断效能分析

Table 4 Analysis of diagnostic efficiency of three examination methods

Examination method	Sensitivity (%)	Specificity (%)	Accuracy (%)	Positive predictive value(%)	Negative predictive value(%)
Hug-up test	87.85	44.44	82.21	91.38	35.29
Modified Hug-up test	87.29	51.85	82.69	92.40	37.84
X-ray plain film	89.50	74.07	87.50	95.86	51.28

表 5 3 种联合检查与金标准的四格表分析

Table 5 Fourfold table analysis of combination of three examination methods in series and gold standard (*n*)

Examination method		Arthroscopy		Total
		Positive	Negative	
Combination of three examinations in series	Positive	158	1	159
	Negative	23	26	49
Total		181	27	208

束等组织回缩,避免周围组织代偿力影响测试结果,提高特异性,故两种检查方法可能较其他体格检查应用价值更高[16]。然而,与关节镜的一致性检验显示,Hug-up 试验与改良 Hug-up 试验对肩袖损伤的诊断价值并不高,且特异性有所欠缺,考虑与上述两种体格检查仍受组织炎症等的影响有关,若患者存在冈下肌小圆肌病变,或喙肩韧带炎症,易出现假阳性,造成特异性较低。此外,老年人群肌肉退行性改变严重,可能导致改良 Hug-up 试验的失败或假阴性,也可能是 Hug-up 试验及改良 Hug-up 试验在老年肩袖损伤诊断中应用价值不高的原因[17]。改良 Hug-up 试验时要求患者肩三角肌肌肉协同维持体位,老年疑似肩袖损伤者测试操作可能较为困难,导致试验结果出现错误,临床实际操作应注意观察老年患者体格检查受限情况,难度较大时应停止检查,并结合其他检查手段诊断。因此,在临床实际中,对于体格检查失败或疑似局部组织炎症较严重者,可借助 MRI 等影像学检查,观察肌腱形态、信号强度、肌腱连续性等,或借助实验室指标,观察炎症反应强度,综合评估肩袖损伤情况。

X 线平片虽然不能观察肌腱肿胀等病变,在组织分辨率上有所欠缺,但具有价格低廉、接受度高等优点,较 MRI 检查更快更便捷,是肩袖损伤辅助诊断应用最广泛的影像学检查工具[18]。一般认为,X 线平片上可根据肱骨大结节畸形及肱骨头上移特征判断肩袖损伤,阅片见构型肩峰,肩峰下骨赘形成,肩锁关节或肱骨大结节骨破坏及吸收改变,及肱骨头变形、肩峰与肱骨头间距缩短等均为肩袖损伤的重要特征[19]。本研究中,损伤组 X 线平片阳性率高于未损伤组(89.50%和 25.93%),X 线平片对肩袖损伤的诊断 *Kappa* 系数为 0.535,特异度为 74.07%,较上述体格检查的 44.44%及 51.85%有所提升,提示 X 线平片能通过直观评估肩关节结构改变降低肩袖损伤的假阳性率,减少误诊,与目前的报道一致[20]。虽然体格检查、X 线平片在肩袖损伤诊断中常用,但普遍认为存在准确性不高的缺陷,目前也并没有明确的联合诊断方式,难以提升诊断准确性。本研究结合 3 项单一检查项目的诊断效能特点,将 Hug-up 试验、改良 Hug-up 试验及 X 线平片串联诊断,发现其 *Kappa* 系数为 0.621,准确率为 88.46%,特异度提升至 96.30%,表明体格检查联合影像学检查有其必要性,综合评估对筛查肩袖损伤更为准确,在体格检查阳性的同时结合 X 线平片显示肩袖撕裂征象,能更为准确地筛查老年肩袖撕裂损伤患者,减少误诊,避免过度诊疗。然而,本研究为单中心小样本量研究,代表性及可靠性有所不足,未来还需联合其他医疗机构开展多中心大样本量研究,验证本研究结果,并增加与 MRI 检查、实验室指标等的联合应用观察,以期提升对老年肩袖损伤的诊断准确性。

综上,Hug-up 及改良 Hug-up 试验、X 线平片三者联合检查对老年肩袖损伤诊断价值较高,可为肩关节镜治疗提供术前指导意见。

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(编辑: 温玲玲)