

关节镜自体骨软骨移植治疗复发性肩关节前脱位早期疗效

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【摘要】 目的:探讨关节镜自体骨软骨移植治疗复发性肩关节前脱位的早期疗效。方法:选取 2019 年 1 月至 2021 年 1 月行关节镜自体骨软骨移植治疗复发性肩关节前脱位的患者 17 例,其中男 12 例,女 5 例,年龄 17~55 (32.88±12.33)岁。比较术前、术后 6 个月、末次随访时 Rowe 肩关节不稳评分(Rowes rating system for Bankart repair, Rowe),牛津大学肩关节不稳评分(Oxford Shoulder Instability Score, OSIS)及简便肩关节功能测试评分(Simple Shoulder Test, SST)评价肩关节功能,并记录术前、末次随访时肩关节活动度及术中、术后并发症。结果:17 例患者术后均获得随访,时间 7~25 (18.4±5.4)个月。随访期间患者未出现血管、神经损伤及再脱位发生情况。Rowe 评分由术前的(26.2±6.0)分增至术后 6 个月、末次随访的(74.4±4.0)、(82.4±3.1)分,术后不同时间点与术前比较,差异有统计学意义($P<0.05$);OSIS 评分由术前的(37.0±3.6)分增至术后 6 个月、末次随访的(47.4±2.6)、(52.7±2.6)分,术后不同时间点与术前比较,差异有统计学意义($P<0.05$);SST 评分由术前的(6.8±0.7)分增至术后 6 个月、末次随访的(9.8±0.8)、(11.6±2.6)分,术后不同时间点与术前比较,差异有统计学意义($P<0.05$)。末次随访时患者主动体侧外旋和外展外旋活动度较术前明显改善。结论:关节镜自体骨软骨移植治疗关节盂骨折缺损<20%的复发性肩关节前脱位患者可取得令人满意的早期临床疗效及稳定性,是一种可靠且有效的手术。

【关键词】 肩脱位; 移植,自体; 骨移植; 关节镜

中图分类号:R684.7

DOI:10.12200/j.issn.1003-0034.2022.03.007

开放科学(资源服务)标识码(OSID):



Early efficacy analysis on arthroscopic autologous osteochondral grafting in the treatment of recurrent anterior shoulder dislocation ZHANG Ming-tao, LIU Jia-xin, YANG Zhi-tao, LIU Tao, ZHANG Bo-rong, AN Li-ping, and YUN Xiang-dong*. *Department of Orthopaedics, the Second Hospital of Lanzhou University, Lanzhou 730030, Gansu, China

ABSTRACT Objective: To investigate the early efficacy of arthroscopic autologous osteochondral grafting in the treatment of recurrent anterior shoulder dislocation. **Methods:** From January 2019 to January 2021, 17 patients with recurrent anterior dislocation of shoulder who underwent arthroscopic autologous osteochondral grafting were selected, including 12 males and 5 females, ranging in age from 17 to 55 years old, with a mean of (32.88±12.33) years old. Rowes rating system for Bankart repair (Rowe), Oxford Shoulder Instability Score (OSIS) and Simple Shoulder Test (SST) were compared before operation, 6 months after operation and at the latest follow-up. OSIS and SST used to evaluate shoulder function were recorded before surgery and at the latest follow-up. The shoulder mobility and intraoperative and postoperative complications were also recorded. **Results:** All 17 patients were followed up, and the duration ranged from 7 to 25 months, with a mean of (18.4±5.4) months. During the follow-up period, there was no re-dislocation, no vascular or nerve injury. Rowe score increased from 26.2±6.0 before operation to 74.4±4.0 and 82.4±3.1 after 6 months and the latest follow-up. There was significant difference in Rowe score between different time points after operation and before operation ($P<0.05$). The OSIS increased from 37.0±3.6 before operation to 47.4±2.6 and 52.7±2.6 after 6 months and the latest follow-up. There was significant difference in OSIS between different time points after operation and before operation ($P<0.05$). The SST score increased from 6.8±0.7 before operation to 9.8±0.8, 11.6±2.6 after 6 months and the latest follow-up. There was significant difference in SST score between different time points after operation and before operation ($P<0.05$). At the latest follow-up, the lateral external rotation and abduction external rotation activities of the patient were significantly improved compared with those before operation. **Conclusion:** This study

基金项目:甘肃省科技厅自然科学基金项目(编号:20JR10RA723);兰州大学第二医院“萃英科技创新”计划临床拔尖技术研究项目(编号:CY2019-BJ04)

Fund program: Gansu Provincial Department of Science and Technology, Natural Science Foundation Project (No. 20JR10RA723)

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provides preliminary evidence that arthroscopic autologous osteochondral grafting can achieve satisfactory early clinical outcomes and stability in patients with recurrent anterior shoulder dislocation with glenoid fracture and defect less than <20%, which is a reliable and effective procedure.

KEYWORDS Shoulder dislocation; Transplantation, autologous; Bone transplantation Arthroscopes

据统计^[1],约 90%的肩关节脱位为前侧脱位。首次脱位复位后肩关节受到轻微外力发生再脱位成为复发性肩关节脱位,在青壮年且活动量较大的人群中尤为多见。肩关节盂骨性缺损是复发性肩关节脱位的主要原因,其缺损大小是决定是否仅行单纯 Bankart 术的关键因素,最近研究报道该临界值在 13.7%~20%^[2-3]。对于关节盂骨性缺损<20%且活动量较大的患者,单纯 Bankart 修补术后再脱位的发生率仍然较高^[4]。而 Bristow-Latarjet 术虽能通过骨性阻挡作用及联合腱的 Sling 机制稳定肩关节,但对肩关节及周围组织损伤较大,改变了肩关节周围肌腱原有的解剖走行特点,对术后肩关节功能存在一定影响,并且有长期随访研究表明该术式存在肩关节退行性改变及移植骨溶解的风险^[5-6]。为了进一步降低该类患者术后复发率及对肩关节生理结构的破坏,2019 年 1 月至 2021 年 1 月采用关节镜自体骨软骨移植方法重建肩关节前方稳定性,并取得了较好的早期疗效,现报告如下。

1 临床资料

1.1 病例选择

纳入标准:(1)复发性肩关节前脱位病史(脱位次数>3 次)。(2)影像学评估肩关节盂骨性缺损<20%。排除标准:(1)影像学评估肩关节盂骨性缺损>20%或 Hill-Sachs 损伤范围>12.5%。(2)合并其他疾病,如肩袖损伤、肱骨近端骨折等。(3)合并严重内科疾病无法耐受手术者。

1.2 一般资料

本组 17 例,男 12 例,女 5 例;年龄 17~55 (32.88±12.33)岁;左侧 5 例,右侧 12 例。术前肩关节脱位 5~51 次。肩关节盂骨折缺损 11.2%~19.2%,平均(16.32±2.20)%。术前根据病史、症状、查体及影像学检查,诊断为复发性肩关节前脱位。

2 治疗方法

全身麻醉成功后,将患者置于俯卧位,健侧下肢处于可屈曲 90°位置,常规消毒,铺手术单巾。常规置入关节镜,检查膝关节内外侧半月板前后交叉韧带完整。于健侧膝髌骨内上缘处取纵行切口约 3 cm,依次分离软组织并显露股骨滑车内上边缘部,用软骨移植器取出 1 枚直径 6 mm,长度 15 mm 骨软骨柱备用。大量生理盐水冲洗并彻底止血,清点手术器械,纱布无误后逐层缝合各切口并敷料包扎。改变患者体位为健侧卧位,患侧上肢 6 kg 拉力牵引,常规

消毒、铺手术单巾。将加有肾上腺素的生理盐水注入关节腔内,自患侧肩峰后外侧角向下、向内各 2 cm 处及向外各切开 1 个长度为 1.0 cm 入口,分别为后入路及后上入路,于喙突外上约 2 cm 处切开 1 个长度为 1.0 cm 入口为前入路,于肩峰前外侧角前 1 cm 处切开 1 个长度为 1.0 cm 入口为前上入路,于肩峰外侧约 2 cm 处切开 1 个长度为 1.0 cm 入口为外侧入路。将 Trocar 直达关节腔,置入关节镜,依一定次序检查肩关节腔,清理增生滑膜组织。于肩关节 3~4 点钟位置,使用直径 6 mm 钻头钻取长度为 15 mm 骨隧道,将取出软骨植入隧道内。清理增生滑膜组织,充分松解粘连,然后分别于关节盂 5 点钟和 2 点钟方向植入 3.0 mm 带线锚钉 2 枚将撕裂的盂唇缝合,利用软组织将前植入的软骨柱覆盖固定,检查肩关节稳定且活动良好。大量生理盐水冲洗关节腔并彻底止血,清点手术器械、纱布无误后逐层缝合各切口并敷料包扎,患侧上肢外展中立位支具固定,术毕,术程顺利,经麻醉后监测治疗室(postanesthesia care unit, PACU)复苏后安返病房。

术后处理:患者术后以肩关节外展位固定 4~6 周,24 h 内使用抗生素预防感染,14 d 伤口拆线,第 2 天开始腕关节、肘关节及手部活动。第 2 周可在肩胛骨平面进行被动活动及钟摆活动,第 4 周可在辅助条件下进行主动活动,第 4~6 周可间断固定肩关节,第 6 周可进行轻微的肌力恢复训练,半年可进行肩关节的主动活动。

3 结果

3.1 疗效评定

分别于术前、术后 6 个月、末次随访时采用 Rowe 肩关节不稳评分^[7](Rowe rating system for Bankart repair, Rowe),牛津大学肩关节不稳评分^[8](Oxford Shoulder Instability Score, OSIS)及简便肩关节功能测试评分^[9](Simple Shoulder Test, SST)评价术前、术后肩关节功能。Rowe 评分满分 100 分,稳定性 50 分,活动度 20 分,功能 30 分,分数越高表明肩关节功能越好,可分为优(90~100 分),良(75~89 分),一般(51~74 分),差(≤50 分)。OSIS 采用问卷形式,从疼痛、功能及自我感觉等方面进行评价,根据时间从最近 4 周(8~12 题),3 个月(2~7 题)和 6 个月(1 题)来分类。SST 评分包含 12 个主观问题,分为疼痛和功能活动,每题回答“是(1 分)”或“否(0 分)”,总分 12 分,分数越高表示肩关节功能越好。除上述

功能评分外,记录术中、术后并发症。

3.2 治疗结果

本组 17 例术后均获得随访,时间 7~25 (18.4±5.4)个月。随访期间患者未出现血管、神经损伤及再脱位发生。Rowe 评分由术前的(26.2±6.0)分增至术后 6 个月、末次随访的(74.4±4.0)、(82.4±3.1)分,术后不同时间点与术前比较,差异有统计学意义(采用 SPSS 22.0 统计软件进行单因素重复测量方差分析, $P<0.05$)。OSIS 评分由术前的(37.0±3.6)分增至术后 6 个月、末次随访的(47.4±2.6)、(52.7±2.6)分,术后不同时间点与术前比较,差异有统计学意义 ($P<0.05$)。SST 评分由术前的(6.8±0.7)分,增至术后 6 个月、末次随访的(9.8±0.8)、(11.6±2.6)分,术后不同时间点与术前比较,差异有统计学意义($P<0.05$),结果见表 1。末次随访时患者主动体侧外旋和外展外旋活动度较术前明显改善。典型病例见图 1。

表 1 关节镜自体骨软骨移植治疗复发性肩关节前脱位患者 17 例(17 肩)手术前后肩关节功能评分比较($\bar{x}\pm s$,分)

Tab.1 Comparison of shoulder function scores before and after surgery in patients with recurrent anterior shoulder dislocation treated with arthroscopic autologous osteochondral graft ($\bar{x}\pm s$, score)

时间	Rowe 评分	OSIS	SST 评分
术前	26.2±6.0	37.0±3.6	6.8±0.7
术后 6 个月	74.4±4.0	47.4±2.6	9.8±0.8
末次随访	82.4±3.1	52.7±2.6	11.6±2.6
F 值	37.54	18.01	45.21
P 值	<0.01	<0.01	<0.01

4 讨论

4.1 复发性肩关节前脱位的手术治疗选择

根据重建后稳定机制不同,手术方式可分为两大类,以骨阻滞稳定为主的 Bristow-Latarjet 术及不同骨移植术,以软组织稳定为主的 Bankart 术,Remplissage 术,肩胛下肌强化缝合术(arthroscopic subscapularis augmentation, ASA)及“Sling”术。不同手术的选择主要考虑肩关节孟骨质缺损情况,对于该值临界值目前仍存在争议。较早的诸多学者^[10-11]认为当肩关节孟骨质缺损>25%时,应该考虑选择以 Latarjet 术为主的骨阻滞手术重建肩关节稳定性,否则行单纯软组织手术的失败率很高。然而,最近的一项研究^[12]发现当肩关节孟骨质缺损>17.3%时,单纯行 Bankart 术后再脱位率会明显上升。另有学者的研究将该临界值定义在 13.5%~20%^[13]。虽然具体的临界值尚未确定,但根据目前文献报道,发现该临界值

有降低的趋势。

据多项研究报道,对于肩关节孟骨质缺损<20%,尤其活动量较大的人群,单纯行 Bankart 术复发率较高^[4,14-15],需要骨阻滞手术来重建肩关节稳定性,从而降低术后复发率。骨阻滞手术中最为主要的是 Latarjet 术,通过将所截取的喙突和连有联合腱的骨块固定于关节孟缺损处,一方面增加了关节孟骨性阻挡作用,另一方面还增加了联合腱的悬吊稳定作用^[16]。然而,该术式并非解剖重建,破坏了正常的肩关节结构,不但影响了肩关节上方的稳定性,而且术后存在固定失败、骨块移位、吸收以及继发骨关节炎等各种并发症。另外一种治疗思路是选择骨移植术,主要包括自体髂骨移植、自体锁骨远端骨软骨移植、胫骨远端同种异体移植及自体肩胛冈骨块移植。Boehm 等^[17]在关节镜下利用自体髂骨移植治疗复发性肩关节前脱位,至少 5 年的随访结果发现该术式在临床及影像学上均取得令人满意的效果。然而,另外一项骨移植术后影像学观察研究中,发现髂骨移植于肩关节孟后,随着时间的推移经过关节孟骨重塑过程后,移植骨溶解程度较大且影响到肩关节稳定性^[18]。Nacca 等^[19]进行了一项胫骨远端同种异体移植与自体肩胛冈骨块移植对比性研究,结果发现两种技术均能恢复肩关节孟骨性缺损且早期稳定性方面无明显差异,但是远期的效果仍未知且该研究是在尸体肩关节上进行的,与临床中有一定差异。此外,另有学者^[20]报道了利用自体锁骨远端骨软骨移植修复关节孟缺损,结果发现该移植骨可重建约 22%的肩关节孟骨性缺损,其中方形或梯形形态的锁骨远端最适用于关节孟重建。同样的不足之处是该研究也是基于尸体研究,结果有待临床证实,此外,锁骨远端解剖解构破坏后的并发症尚不清楚。

4.2 自体骨软骨移植术的有效性

自体骨软骨取材于膝关节非负重区且其具有透明软骨组织,可能更利于关节孟重塑。Akgun 等^[21]利用自体骨软骨移植 (autologous osteochondral transplantation, AOT) 技术修复了 14 例有髌骨软骨缺损的病例,发现术后视觉模拟评分 (visual analogue scale, VAS), Lysholm 评分较术前均明显改善,术后第 1 年 MRI 显示,所有患者的自体骨组织充分融入了受体部位,形成了一个均匀的关节面。最近一项关于距骨缺损 AOT 手术的荟萃分析表明,在平均随访 62.8 个月后,术后美国骨科足踝学会 (American Orthopaedic Foot and Ankle Society, AOFAS) 评分有显著提高,术前 (55.1±6.1)分,术后 (86.2±4.5)分,87.4%的患者临床效果满意^[22]。笔者之前一项研究

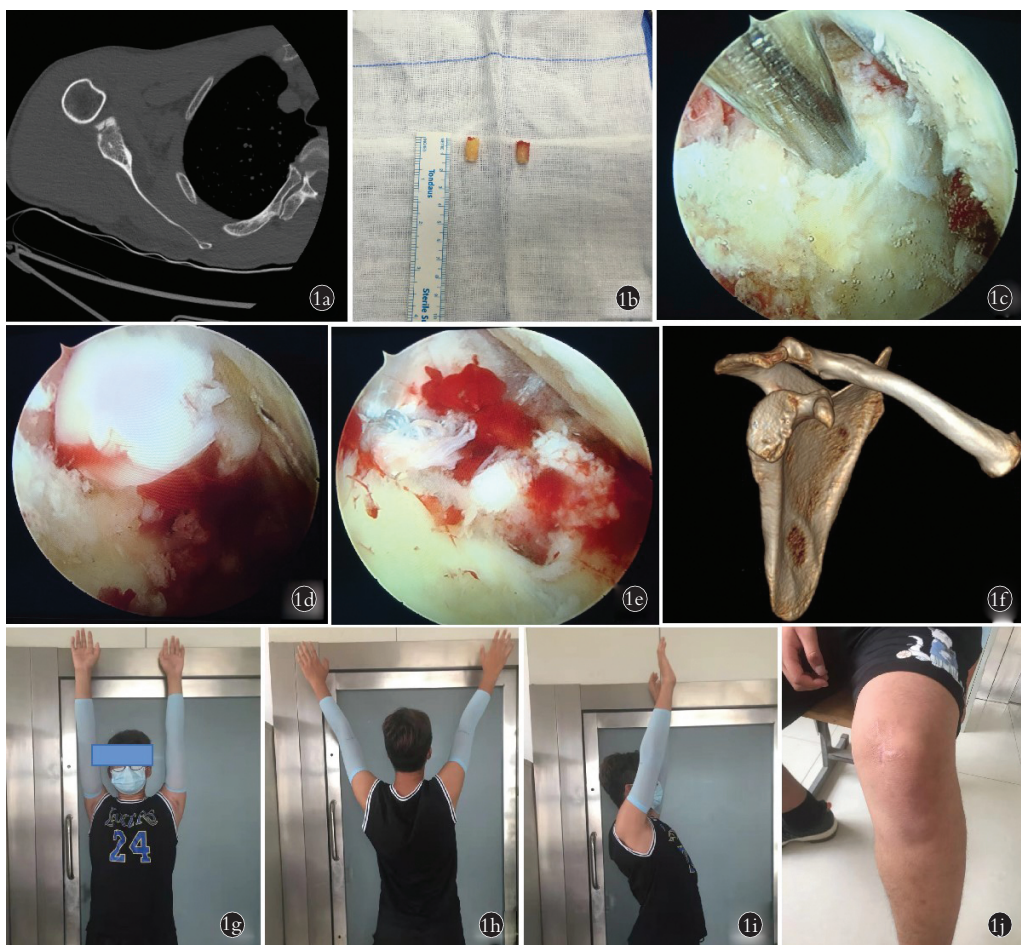


图 1 患者,男,17岁,复发性肩关节前脱位 **1a**.术前 CT 骨窗提示肩关节孟前下撕脱性骨折伴骨质缺损 **1b**.用自体骨软骨取材器(osteochondral autograft transfersystem,OATS)制备膝关节非负重区骨软骨柱(6 mm×15 mm) **1c**.镜下 5 点钟位置制备骨隧道 **1d**.镜下将骨软骨柱植入骨隧道 **1e**.镜下孟唇缝合 **1f**.术后 1 年肩关节盂 3D-CT **1g,1h,1i**.患者恢复后 1 年术侧肩关节活动度良好,与健侧活动度无明显差异 **1j**.术后 1 年左侧软骨柱供区膝关节活动度良好,无疼痛等不适

Fig.1 Patient male,17 years old,with recurrent anterior shoulder dislocation **1a**.Preoperative CT bone window suggested anterior inferior glenoid avulsion fracture of the shoulder with bone defect **1b**.Preparation of osteochondral bone in the non-weight-bearing area of the knee using the Osteochondral Autograft Transfer System (OATS) cartilage column (6 mm×15 mm) **1c**.Microscopic preparation of the bone tunnel at the 5 o'clock position **1d**.Microscopic implantation of the osteochondral column into the bone tunnel **1e**.Microscopic glenoid lip suture **1f**.3D-CT (three dimensional-computed tomography) of the shoulder glenoid 1 year after surgery **1g,1h,1i**.The patient had good mobility of the shoulder joint on the operated side 1 year after recovery,with no significant difference in the mobility compared with the healthy side **1j**.The knee joint mobility in the left cartilage column donor area was good 1 year after surgery,with no pain or other discomfort

中,通过 AOT 技术治疗膝关节软骨缺损,长达 10 年随访发现,该治疗方式能有效改善膝关节功能,减轻膝关节疼痛,是一种有效的修复膝关节软骨缺损的方法^[23]。基于在其他骨质缺损中的良好应用价值,本研究将 AOT 技术应用于重建肩关节盂骨质缺损,从而恢复其稳定性,术后短期内临床效果及肩关节稳定性均令人满意。考虑其有效性可能与以下因素有关:(1)自体骨软骨由骨和软骨两部分构成,可分别与关节盂缺损处的软骨组织及骨组织对接,利于关节盂缺损处的重建。(2)自体骨软骨的移植具有骨性阻挡作用,能有效改善肩关节的稳定性。(3)骨刺激作用,移植于骨缺损处的骨软骨在肩关节面塑性的

过程可能会释放相关生物因子,刺激局部骨髓间充质干细胞的分化,利于自体骨软骨与关节盂缺损处的愈合及周围软组织与盂的愈合。

4.3 自体骨软骨移植术中需注意的问题

(1)膝关节镜检查的必要性,为了准确定位自体骨软骨柱供区位置,可以使用膝关节镜检查,但其会增加血栓、下肢静脉血栓发生率及费用的增加,建议根据术前影像学检查结果,对于有韧带或半月板损伤患者可利用膝关节镜处理损伤同时定位供区,对于膝关节结构完好者可参考术前影像学资料定位。(2)为了提高关节镜下可操作性,笔者建议无须将供区所制备的软骨柱从取材器取下后移植,确定软骨

柱完整后可直接植入骨道,降低了镜下操作难度。(3)移植于关节盂的软骨柱可能存在脱落的风险,为解决这一难题,在手术中通过在关节盂 2 点及 5 点钟位置植入带线锚钉,紧缩软组织可进一步固定移植于 3 点至 4 点钟位置的软骨柱,术后随访未见软骨柱脱落。

综上所述,本研究通过对关节镜下自体骨软骨移植术的技术探索,结合短期临床、影像学随访,初步证实关节镜自体骨软骨移植治疗关节盂骨质缺损<20%的复发性肩关节前脱位患者可取得令人满意的早期临床疗效及稳定性,是一种可靠且有效的手术。本研究不足之处:(1)干预后仅为短期随访,对于远期效果及稳定性尚需进一步观察。(2)样本量小,入组患者仅 17 例,为证实该干预措施的有效性,及安全性还需要更大样本量的研究。(3)未设置对照组,未与单纯行 Bankart 术患者进行疗效对比。

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(收稿日期: 2021-10-29 本文编辑: 连智华)