doi: 10.13241/j.cnki.pmb.2015.08.025

人工半肩关节置换治疗肱骨近端粉粹骨折的疗效及影响因素分析

王 洋 梁 炜 陆思伟 邱学勇 杨显春

（四川省成都市第三人民医院骨科 四川 成都 610000）

摘要 目的:探讨人工半肩关节置换治疗肱骨近端粉粹骨折的疗效及其影响因素。**方法:**选择 2010 年 1 月 -2013 年 12 月间我院收治的肱骨近端粉粹骨折患者 80 例,随机分为研究组和对照组,每组 40 例,研究组应用人工半肩关节置换治疗,对照组应用切开复位内固定治疗。对比两组的术中情况、术后疼痛强度以及不良情况发生情况,术后应用 Constant-Murlay 评分评价两组肩关节功能。应用多因素 Logistic 回归分析分析疗效影响因素。**结果:**研究组手术时间、术中出血量均显著低于对照组 (P<0.05);研究组 Constant-Murlay 中疼痛、ADL、ROM 和总分评分显著优于对照组 (P<0.05);手术前,两组患者 VAS 评分无统计学差异(P＞0.05),手术后两组患者 VAS 评分显著降低,术后 5 d、15 d、30 d 和 60 d,研究组 VAS 评分显著低于对照组(P＜0.05);对照组患者肌力不足、异位骨化等不良反应发生率显著高于对照组(P＜0.05)。以 Constant-Murlay 总分为因变量,以年龄、性别、是否合并内科疾病、受伤原因、骨折分型、受伤时间为自变量,经 Logistic 分析显示,年龄、合并内科疾病、骨折分型、受伤时间是肱骨近端粉碎性骨折疗效的影响因素(P<0.05)。**结论:** 人工半肩关节置换治疗肱骨近端粉粹骨折安全有效,具有很高的临床价值,值得临床推广,同时在手术中应对影响疗效的因素予以注意,提高治疗效果。

关键词:人工半肩关节;肱骨近端;粉粹骨折;疗效

中图分类号:R683 **文献标识码:**A **文章编号:**1673-6273(2015)08-1501-04

Analysis on the Effects and Influencing Factors of Hemiarthroplasty for Proximal Humeral Splintered Fracture

WANG Yang, LIANG Wei, LU Si-wei, QIU Xue-yong, YANG Xian-chun

(Department of orthopedics, the third People's Hospital of Chengdu of Sichuan Province, Chengdu, Sichuan, 610000, China)

ABSTRACT Objective: To explore the effects and the influencing factors of hemiarthroplasty for proximal humeral splintered fracture. **Methods:** 80 cases of proximal humeral splintered fracture patients administered in our hospital between January 2010 and December 2013 were selected and randomly divided into the study group and the control group, 40 cases were in each group. The study group used artificial semi shoulder joint replacement therapy, while the control group was treated with open reduction and internal fixation. Degree of pain, postoperative adverse circumstances were compared. Constant-Murlay score was used to evaluate the postoperative shoulder joint function. Multiple factor Logistic regression analysis was used to evaluate the factors influencing the efficacy. **Results:** The amount of bleeding, operation time of study group were significantly lower and shorter than those of the control group (P<0.05). According to the Constant-Murlay scores, ADL, ROM and pain scores of the study group were significantly better than those of the control group (P<0.05). Before operation, the VAS scores of the two groups showed no significant difference (P>0.05), Afrer operation, VAS score decreased significantly, after 5 d, 15 d, 30 d and 60 d, VAS scores of the study group were significantly lower than those of the control group (P<0.05). More adverse reactions, including insufficient muscle strength and heterotopic ossification, were observed in the study group than in the control group (P<0.05). With Constant-Murlay score as the dependent variable, age, sex, complicated internal medicine diseases, cause of injury, fracture type, injured time as variables, the Logistic analysis showed that such items as age, internal medicine diseases, fracture type and injury time were the influencing factors of proximal comminuted fracture of humerus (P<0.05). **Conclusion:** Hemiarthroplasty for proximal humeral splintered is safety and effective, and is of high clinical value, which worth the clinical promotion. At the same time, for improving the therapeutic effect, the influencing factors should be paid attention to.

Key woeds: Hemiarthroplasty; Proximal humerus; Splintered fracture; Effect

Chinese Library Classification(CLC): R683 Document code: A

Article ID:1673-6273(2015)08-1501-04

肱骨近端骨折是临床上一种常见的骨折,包括肱骨外科颈在内及其以上部位的骨折,约占全身骨折的 4~5%,且大多为复杂、移位和不稳定的骨折[1,2]。尤其是肱骨近端粉碎性骨折,患者关节功能基本丧失,传统内固定手术治疗后患者关节功能恢复较差,部分患者可出现肱骨头缺血性坏死等严重并发症,给临床治疗带来了困难[3]。人工关节置换技术是近年来广泛应用的外科技术,随着该技术的日益成熟,越来越多的学者倾向于采用人工关节置换技术治疗肱骨近端粉碎性骨折,但相关报道较

作者简介:王洋(1968-),男,本科,主治医师,从事关节及运动医学方面的研究,E-mail:1112078@qq.com

(收稿日期:2014-06-17 接受日期:2014-07-15)

少[4]。我院近年来应用人工半肩关节置换治疗肱骨近端粉碎性骨折,取得了满意疗效,先报道如下。

1 资料与方法

1.1 一般资料

选择 2010 年 1 月 -2013 年 12 月间我院治疗肱骨近端粉粹骨折的患者共 80 例, 所有患者均术前均行肩关节 X 线检查、CT 扫描诊断为肱骨近端粉碎性骨折,Neer 分型:三部分骨折 20 例,三部分骨折并伴有肩关节脱位 14 例,四部分骨折 36 例,四部分骨折并伴有肩关节脱位 10 例。男性 24 例,女性 56 例,年龄为 47-85,平均(64.2± 2.7)岁。80 例患者随机分为研究组和对照组。研究组 40 例,男性 11 例,女性 29 例,年龄 49-85 岁,平均年龄(64.9± 3.2)岁,Neer 分型:三部分骨折 10 例,三部分骨折并伴有肩关节脱位 7 例,四部分骨折 18 例,四部分骨折并伴有肩关节脱位 5 例。对照组 40 例,男性 13 例,女性 27 例,年龄 47~83 岁,平均年龄(63.7± 2.5)岁,Neer 分型:三部分骨折 10 例,三部分骨折并伴有肩关节脱位 7 例,四部分骨折 18 例,四部分骨折并伴有肩关节脱位 5 例。两组患者性别、年龄、骨折分型等无统计学差异(P>0.05),具有可比性。

1.2 方法

研究组应用人工半肩关节置换治疗,患者全身麻醉,仰卧位,采用三角肌胸大肌入路,注意保护血管、神经及肩袖周围组织。沿肱骨解剖镜切开关节囊,暴露肱骨头,肱骨大小结节。尽量保护肌肉附着点,不要随意切除粉碎的骨片,取出粉粹的肱骨头,测量肱骨头大小,根据骨髓腔大小扩髓,并安装合适大小的肱骨试模,检查肱骨头和肱二头肌张力,确定肱骨颈干角和后倾角,充填骨水泥,植入假体,冲洗手术部位后放置引流管,逐层缝合伤口。对照组应用切开复位内固定治疗,患者行臂丛神经阻滞或全麻,仰卧位,选择三角肌与胸大肌间沟入路,注意保护血管、神经及肩袖周围组织,向外侧牵开三角肌,向内侧牵开胸大肌,仔细辨认肱二头肌及大小结节位置,并以长头腱为标志钝性分离三角肌滑囊,确定肩袖是否损伤,根据对位对线原则行骨折复位, 克氏针固定, 在 C 臂 X 线机下检查复位情况,选择合适锁定钢板,安装导向器,拧入锁定螺针,再次在 C 臂 X 线机下检查内固定情况,修复关节囊,放置引流管后逐层缝合。

手术后对比两组患者的治疗效果(Constant-Murlay 评分)、疼痛强度(VAS 评分)以及不良情况的发生情况。

1.3 疗效评分

(1)Constant-Murlay 评分[5]:满分 100 分,疼痛占 15 分,生活能力(ADL)占 20 分,活动度(ROM)占 40 分,手法肌力评定三角肌肌力占 25 分, 总分 90~100 分为优,80~89 分为良,70~79 分为可,70 分以下为差。(2)VAS 评分[6]:在纸上划一条长度为 10 cm 的线,为 0 的一端表示无痛;为 10 的一端表示剧痛;程度不同的疼痛用中间部分来表示。

1.4 统计学方法

采用 SPSS13.0 统计软件分析, 数据比较采用 X^2 检验,计量数据以($\bar{x}\pm s$)表示,计量资料采用 t 检验,P< 0.05 为差异具有统计学意义。应用多因素 Logistic 回归分析分析疗效影响因素。

2 结果

2.1 两组术中情况比较

研究组手术时间为 (85.4± 9.2) min、术中出血量为 (258.7± 22.5) mL 均显著少于对照组的 (100.2± 9.8) min, (285.4± 27.8) mL, 数据间差异有统计学意义(t=2.763,2.765, P=0.028,0.022)。

2.2 两组 Constant-Murlay 评分对比

研究组 Constant-Murlay 中疼痛、ADL、ROM 和总分评分显著优于对照组,数据间差异有统计学意义(P<0.05),见表 1。

表 1 两组 Constant-Murlay 评分对比 (分)

Table 1 Comparison of Constant-Murlay score in two groups(score)

组别 Groups	n	疼痛 Pain	生活能力 ADL	活动度 ROM	肌力 Muscle force	总分 Total score
研究组 Study group	40	11.9± 3.2	14.3± 2.4	29.5± 4.8	16.6± 2.2	72.3± 11.8
对照组 Control group	40	9.6± 3.7	12.6± 2.7	25.4± 3.9	15.0± 3.7	62.6± 11.7
t 值 t value		2.406	2.673	2.682	1.483	2.732
P 值 P value		0.031	0.026	0.024	0.172	0.022

2.3 两组的疼痛强度对比

手术前,两组患者 VAS 评分无统计学差异(P> 0.05),手术两组患者 VAS 评分显著降低,术后 5 d、15 d、30 d 和 60 d 研究组 VAS 评分显著低于对照组, 数据间差异有统计学意义(P< 0.05),见表 2。

2.4 两组不良反应对比

研究组患者肌力不足、异位骨化等不良反应发生率显著小于对照组(P< 0.05),见表 3。

2.5 肱骨近端骨折疗效影响因素

以 Constant-Murlay 总分为因变量,以年龄、性别、是否合并内科疾病、受伤原因、骨折分型、受伤时间为自变量,经 Logistic 分析显示,年龄、合并内科疾病、骨折分型、受伤时间是肱骨近端粉碎性骨折疗效的影响因素(P<0.05),见表 4。

3 讨论

表 2 两组手术前后 VAS 评分对比(分)

Table 2 Comparison of VAS score before and after operation in two groups (score)

组别 Groups	n	术前 Before operation	术后 5d 5d post operation	术后 15d 15d post operation	术后 30d 30d post operation	术后 60d 60d post operation
研究组 Study group	40	7.42± 0.65	4.39± 0.37	2.35± 0.26	2.35± 0.26	2.26± 0.32
对照组 Control group	40	7.61± 0.62	4.53± 0.43	3.89± 0.27	3.05± 0.21	2.47± 0.36
t 值 t value		0.964	0.753	2.507	2.463	0.856
P 值 P value		0.242	0.341	0.032	0.035	0.288

表 3 两组不良反应对比[n(%)]

Tbale 3 Comparison of adverse reaction between two groups[n(%)]

组别 Groups	n	肌力不足 Insufficient muscle strength	异位骨化 Heterotopic ossification	感染 Infection
对照组 Control group	40	12(30.00)	10(25.00)	6(15.00)
研究组 Study group	40	2(5.00)	0(0)	0(0)
X^2 值 X^2 value		4.329	5.714	3.243
P 值 P value		0.037	0.016	0.071

表 4 肱骨近端骨折疗效影响因素的多因素 Logistic 回归分析

Table 4 The multivariate Logistic regression analysis of effect of proximal humeral splintered fracture

因素 Factor	β 值 β value	标准误 SE	Wald 值 Wald value	P 值 P value	OR 值 OR value	95%置信区间 95% confidence interval
年龄 Age	0.463	0.121	7.235	0.032	1.022	0.432, 1.887
合并内科疾病 With internal diseases	0.732	0.134	10.375	0.006	1.765	1.232, 2.965
骨折分型 Fracture type	0.556	0.108	11.853	0.003	2.076	0.785, 3.293
受伤时间 Injury time	0.832	0.086	16.843	0.000	2.543	1.123, 2.986

肱骨近端粉粹骨折是常见的骨折类型之一,近年来患病人数与日俱增并且伴随各种并发症。肩关节在人体活动中起着极为重要的作用,而胧骨近端粉碎骨折会对患者肩关节的活动造成极大的影响。国内外对于肱骨近端粉粹骨折的治疗有多种方法,主要包括锁定钢板治疗和人工半肩关节置管两种常用的方法[7,8]。目前,国内外学者对于肱骨近端粉碎性骨折选择内固定系统还是人工半肩关节置换仍存在争议[9]。本研究对两种方法进行了比较。

从两组术中情况来看,人工半肩关节置换术手术时间更短,术中出血量更少,对患者创伤更小。而两组患者术后 Constant-Murlay 评分来看,研究组 Constant-Murlay 中疼痛、ADL、ROM 和总分评分显著优于对照组,表明人工半肩关节置换治疗的疗效明显优于切开复位内固定治疗。这说明用人工半肩关节来置换原有的骨折关节,可以有效地将患者的骨折部位进行复位,从而使其可以稳定地固定,以获得良好的治疗效果[10,11]。但是研究发现进行人工肩关节置换术首先要掌握好手术的适应症,包括严重三部分骨折伴有骨质疏松、四部分骨折伴或不伴脱位、胧骨头压缩塌陷超过 40%及解剖颈骨折及胧骨头劈裂骨折[12-14]。而患者自身大小节点与肩袖的愈合也是手术中的一大难点,肩袖止点重建必须要尽可能的解剖复位,牢固的重建大、小结节是手术后肩关节功能恢复的关键所在。此外,陈旧性的胧骨近端粉碎骨折采用人工半肩关节置换术治疗,常常会形成 x 痕,造成患者的大小结节难以识别,从而加大患者的肩袖重建难度[15-17]。因此严格掌握适应症,大小结节重建的质量能够影响治疗的效果,不仅如此患者的年龄,手术技巧也会对手术效果和疗效造成一定的影响。年龄越轻,越早进行人工半肩关节置换手术,术后恢复的效果越好。另外,人工半肩关节置换治疗相对于切开复位内固定治疗的 VAS 评分更低,这表明了人

工半肩关节置换手术能够缓解患者手术后所产生的局部疼痛感，并且治疗组不良情况发生的几率也相对更低，手术后能够积极配合康复锻炼，不仅可以控制手术后的感染，还能够促进伤口的愈合，可安全有效地避免手术后骨不连和骨髓炎等不良症状的发生[18,19]，这更便于让患者接受。掌握正确的手术技巧，并且在术后进行系统正确的康复计划才能更好的保证人工置换肩关节手术的成功。

本研究还对肱骨近端骨折疗效影响因素进行了分析，结果显示年龄、合并内科疾病、骨折分型、受伤时间是肱骨近端粉碎性骨折疗效的影响因素。因此在手术过程中，对于高龄患者，合并内科疾病患者应特别注意，另外必须正确的把握手术的指征，选择合适的假体重建胧骨的长度，提高治疗效果[20]。

综上所述，人工半肩关节置换治疗肱骨近端粉粹骨折可靠、安全有效并且一定程度上减轻了患者痛苦，减少了骨折愈合时间，降低了医疗费用，患者容易接受，具有较高的临床价值，值得临床推广。

参 考 文 献(References)

[1] 吴春辉,李建赤,邓洁瑜,等.肩关节置换术中肱骨假体低置的疗效分析[J].中华关节外科杂志(电子版), 2012, 06(01): 34-38
Wu Chun-hui, Li Jian-chi, Deng Jie-yu, et al. The efficacy analysis of lower humerus and shoulder arthroplasty prosthesis [J]. Chinese Journal of joint surgery (Electronic Edition), 2012, 06 (01): 34-38

[2] 刘杰,李少华,蔡郑东,等.人工半肩关节置换治疗肱骨近端粉碎骨折的疗效及影响因素分析[J].中华创伤骨科杂志, 2010, 12(10):906-910
Liu Jie, Li Shao-hua, Cai Zheng-dong, et al. Analysis of influence factors of hmiarthroplasty for proximal humeral comminuted fracture [J]. Chinese Journal of trauma department of orthopedics, 2010, 12 (10): 906-910

[3] 张鹏举.老年肱骨近端骨折闭合复位内固定的治疗观察[J].医学综述, 2014, 20(3): 542-544
Zhang Peng-ju. Senile proximal humeral internal fixation treatment of fractures [J]. Medical review, 2014, 20 (3): 542-544

[4] 谭学智,韦钢.不同方法治疗肱骨近端骨折的临床疗效比较[J].医学信息, 2014, 9(2): 355-256
Tan Xue-zhi, Wei Gang. Comparison and clinical effect of therapeutic effects of different methods in the treatment of proximal humerus fractures[J]. Medical information, 2014, 9 (2): 355-256

[5] Holmgren T, Oberg B, Adolfsson L, et al. Minimal important changes in the Constant-Murley score in patients with subacromial pain [J].J Shoulder Elbow Surg, 2014, 13(14): S1058-2746

[6] Moeller AD, Thorsen RR, Torabi TP, et al. The Danish version of the modified Constant-Murley shoulder score: reliability, agreement, and construct validity[J]. J Orthop Sports Phys Ther, 2014 ,44(5):336-40

[7] 黄永军,郑丽,刘昱江.肱骨近端骨折 Neer 分型系统临床应用分析[J].宁夏医科大学学报, 2014, 36(02): 211-214
Huang Yong-jun, Zheng Li, Liu Yu-jiang. The proximal humerus fracture analysis of Neer system [J]. Journal of Ningxia Medical University, 2014, 36 (02): 211-214

[8] Wan Qing, Lu Qing-tian, Xiang Hong-guang, et al. Limb preservation surgery combined with perioperative rehabilitation for the treatment of 7 patients with stage II to III giant cell tumor of bone in the proximal humerus [J]. China journal of orthopaedics and traumatology, 2011, 24(12): 1032-1035

[9] 李钟奇,孔荣.半肩置换术治疗肱骨近端粉碎性骨折的关键技术及疗效评估[J].安徽医学, 2013, 34(05): 557-560
Li Zhong-qi, Kong Rong. Evaluation of half shoulder arthroplasty for the treatment of proximal humerus comminuted fracture [J]. Anhui Medical Journal, 2013, 34 (05): 557-560

[10] 刘晓东,刘亮,杨安礼,等.半肩关节置换术治疗复杂性肱骨近端骨折的疗效分析[J].中国矫形外科杂志, 2012, 20(06): 499-501
Liu Xiao-dong, Liu Liang, Yang An-li, et al. Semi shoulder joint replacement in the treatment of complex proximal humeral fractures [J]. Orthopedic Journal of China, 2012, 20(06): 499-501

[11] 王汝娜.人工半肩关节置换术的手术配合[J].西南国防医药,2012, 22(08): 903-904
Wang Ru-na. Artificial semi shoulder joint replacement operation with[J]. Southwest national defense medicine, 2012, 22 (08): 903-904

[12] 牛素玲,宁凡友,夏凯,等.半肩关节置换术治疗老年肱骨近端四部分骨折[J].中医正骨, 2011, 23(10): 37-38
Niu Su-ling, Ning Fan-you, Xia Kai, et al. Semi shoulder joint replacement in the treatment of four part fracture of the proximal humerus [J]. The Journal of Traditional Chinese Orthopedics and Traumatology, 2011, 23 (10): 37-38

[13] Yong Xian, Wan Li-li, Xu Xiao-bo, et al. Effectiveness analysis of artificial humeral head replacement for 18 cases of complicated fractures of the proximal humerus [J].Chinese journal of reparative and reconstructive surgery, 2012, 26(02): 205-207

[14] 李杰文,肖立军,陈文贵,等.肱骨近端粉碎骨折人工半肩关节置换的临床研究[J].河北医学, 2013, 19(4): 576-578
Li Jie-wen, Xiao Li-jun, Chen Wen-gui, et al. The proximal humerus comminuted fractures of shoulder hemiarthroplasty [J]. Hebei Medical Journal, 2013, 19(04): 576-578

[15] 曾浪清,陈云丰,唐三元,等.不同内侧柱支撑重建对锁定钢板固定治疗肱骨近端骨折的影响[J].中华创伤骨科杂志, 2014, 16(1): 6-11
Zeng Lang-qing, Chen Yun-feng, Tang San-yuan, et al. Effects of different department of orthopedics magazine medial column support reconstruction of locking plate fixation of proximal humerus fractures [J]. Chinese Journal of Orthopaedic Trauma, 2014, 16 (1): 6-11

[16] 赵弟庆,张丽娜,杨广忠, 等.MIPPO 技术结合 PHILOS 治疗老年骨质疏松性肱骨近端骨折[J].中国矫形外科杂志, 2014, 22(6): 508-511
Zhao Di-qing, Zhang Li-na, Yang Guang-zhong, et al. MIPPO technology combined with PHILOS in the treatment of senile osteoporotic fractures of the proximal humerus [J]. Orthopedic Journal of China, 2014, 22(6): 508-511

[17] 金峥,张云庆,周枫.MIPO 结合肱骨近端锁定钢板治疗老年肱骨近端骨折的疗效[J].江苏医药, 2013, 39(22): 2750-2751
Jin Zheng, Zhang Yun-qing, Zhou Feng. MIPO combined with proximal humerus in senile proximal humeral fracture treated with locking plate treatment [J]. Jiangsu Medical Journal, 2013, 39 (22): 2750-2751

[18] 曾浪清,陈云丰,李元超,等.内侧支撑螺钉在锁定钢板治疗肱骨近端骨折中的生物力学优势[J].医用生物力学, 2013, 28(3): 338-343

(下转第 1546 页)

国有着丰富的药用植物资源和海洋生物资源，要充分利用我国的资源优势，加大创新力度，提高我国在药物研发领域的地位。

参 考 文 献(References)

[1] 王霞, 马洪涛, 温瑞兴. 抗 H IV 药物及其靶点的研究进展 [J]. 中国中药杂志, 2009, 34(11): 1454-1459
Wang Xia, Ma Hong-tao, Wen Rui-xing. Advance on targets and drugs for anti-HIV [J]. China Journal of Chinese Materia Medica, 2009, 34(11): 1454-1459

[2] Celia FO, Marta D, Yudith R, et al. Non-induced leukocyte extract reduces HIV replication and TNF secretion[J]. Biochem Biophys Res Comm, 2004, 325(3): 1075-1081

[3] 毕毅, 徐进宜, 吴晓明. 抗艾滋病药物的研究进展[J].中国现代应用药学杂志, 2005, 22(6): 461-465
Bi Yi, Xu Jin-yi, Wu Xiao-ming. The advances of anti-HIV-1 drugs [J]. Chinese Journal of Modern Applied Pharmacy, 2005, 22 (6): 461-465

[4] 仇玉芹.利用德温特创新索引数据库分析研究行业专利[J].情报杂志, 2009, 28(6): 35-36
Qiu Yu-qin. Analysing industry patents based on Derwent Innovation Index database[J]. Journal of Intelligence, 2009, 28(6): 35-36

[5] Vidal V, Potterat O, Louvel S, et al. Library-based discovery and characterization of daphnane diterpenes as potent and selective HIV inhibitors in Daphne gnidium [J]. Journal of Natural Products, 2012, 75(3): 414-419

[6] Duan HQ, Takaishi Y, Imakura Y, et al. Sesquiterpene alkaloids from Tripterygium hypoglaucum and Tripterygium wilfordii: anew class of potent anti-HIV agents [J]. Journal of Natural Products, 2000, 63(3): 357-361

[7] Yang SS, Cragg GM, Newman DJ, et al. Natural product-based anti-HIV drug discovery and development facilitated by the NCI developmental therapeutics program [J]. Journal of Natural Products, 2001, 64(4): 554-554

[8] Singh SB, Ondeyka JG, SchleifWA, et al. Chemistry and structure-activity relationship of HIV-1 integrase inhibitor integracide B and related natural products [J]. Journal of Natural Products,2003, 66(10): 1338-1344

[9] Lu ZY, Harper MK, Pond CD, et al. Thiazoline peptides and a tris-phenethyl urea from Didemnum molle with anti-HIV activity[J]. Journal of Natural Products, 2012, 75(8): 1436-1440

[10] Plaza A, Garcia R, Bifulco G, et al. Aetheramides A and B, potent HIV-inhibitory depsipeptides from a Myxobacterium of the new genus "Aetherobacter"[J]. Organic Letters, 2012, 14(11): 2854-2857

[11] Deshmukh L, Schwieters CD, Grishaev A, et al. Structure and dynamics of full-length HIV-1 capsid protein in solution [J]. Journal of the American Chemical Society, 2013, 135(43): 16133-16147

[12] Herath KB, Jayasuriya H, Bills GF, et al. Isolation, structure, absolute stereochemistry, and HIV-1 integrase inhibitory activity of integrasone, a novel fungal polyketide[J]. Journal of Natural Products, 2004, 67(5): 872-874

[13] Ma XH, Li LT, Zhu TJ, et al. Phenylspirodrimanes with anti-HIV activity from the sponge-derived fungus Stachybotrys chartarum MXH-X73[J]. Journal of Natural Products, 2013, 76(12): 2298-2306

[14] 邢其毅, 裴伟伟, 徐瑞秋, 等. 基础有机化学 (第三版)[M]. 北京：高等教育出版社, 2005: 872-873
Xing Qi-yi, Pei Wei-wei, Xu Rui-qiu, et al. Basis of organic chemistry (The Third Edition) [M]. Beijing: Higher Education Press, 2005: 872-873

[15] Sadagopan R, Krishnaiah Vand Sridhar B. Asymmetric synthesis of the potent HIV-protease inhibitor, nelfinavir [J]. The Journal of Organic Chemistry, 2010, 75(2): 498-501

[16] Bonini C, Chiummiento L, Bonis MD, et al. Synthesis of new thienyl ring containing HIV-1 protease inhibitors: promising preliminary pharmacological evaluation against recombinant HIV-1 proteases[J]. Journal of Medicinal Chemistry, 2010, 53(4): 1451-1457

[17] Blacker AJ, Roy M, Hariharan S, et al. Convenient method for synthesis of N-protected α -amino epoxides: key intermediates for HIV protease inhibitors [J]. Organic Process Research & Development, 2011, 15(2): 331-338

[18] Lee WG, Gallardo-Macias R, Frey KM, et al. Picomolar inhibitors of HIV reverse transcriptase featuring bicyclic replacement of a cyanovinylphenyl group [J]. Journal of the American Chemical Society, 2013, 135(44): 16705-16713

[19] Pendri A, Troyer TL, Sofia MJ, et al. Solid phase synthesis of novel pyrrolidinedione analogs as potent HIV-1 integrase inhibitors[J]. ACS Combinatorial Science, 2010, 12(1): 84-90

[20] Santo RD, Costi R, Roux A, et al. Novel quinolinonyl diketo acid derivatives as HIV-1 integrase inhibitors: design, synthesis, and biological activities[J]. Journal of Medicinal Chemistry, 2008, 51(15): 4744-4750

[21] 郑伟. DerwentInnovations Index 数据库的主要特点及其检索方法 [J]. 中国索引, 2009, 7(1): 56-60
Zheng Wei. The main features and retrieval methods of DerwentInnovationsIndex database [J]. Journal of The China Society of Indexers, 2009, 7(1): 56-60

[22] 谢世平, 张 森, 李素香, 等. 艾滋病并发症的治疗现状 [J]. 中医研究, 2007, 20(3): 62-64
Xie Shi-ping, Zhang Miao, Li Su-xiang, et al. The treatment status of AIDS complications [J]. Traditional Chinese Medicinal Research, 2007, 20(3): 62-64

(上接第 1504 页)

Zeng Lang-qing, Chen Yun-feng, Li Yuan-chao, et al. The advantages of locking plate in treatment of proximal humerus fracture in the biomechanical [J]. Journal of Medical Biomechanics, 2013, 28 (3): 338-343

[19] Holtby R, Razmjou H. Relationship between clinical and surgical findings and reparability of large and massive rotator cuff tears: a longitudinal study[J]. BMC Musculoskelet Disord, 2014, 15(1): 180

[20] Bannuru RR, Flavin NE, Vaysbrot E. High-energy extracorporeal shock-wave therapy for treating chronic calcific tendinitis of the shoulder: a systematic review[J]. Ann Intern Med, 2014, 160(8): 542-549