

大段同种异体骨单髁置换术治疗膝关节周围骨肿瘤疗效观察



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【摘要】 目的 探讨应用大段同种异体骨单髁置换重建膝关节周围骨肿瘤切除后骨缺损的临床疗效。方法 回顾分析 2007 年 1 月—2014 年 1 月采用大段同种异体骨单髁置换术治疗的 9 例膝关节周围骨肿瘤患者临床资料。其中男 6 例, 女 3 例; 年龄 17~38 岁, 平均 25.8 岁。骨巨细胞瘤 7 例(其中 1 例为骨巨细胞瘤术后复发), 软骨黏液样纤维瘤 2 例。肿瘤位于股骨远端 7 例, 胫骨近端 2 例; 肿瘤部位均偏外侧。症状持续时间 2~5 个月, 平均 3.2 个月。术前均行 X 线片和 MRI 检查确定肿瘤范围 6 cm×2 cm~9 cm×4 cm; CT 检查排除肺部转移。术中置换的单髁同种异体骨长度为 8.0~9.2 cm, 平均 8.6 cm。结果 患者术中出血量为 400~550 mL, 平均 480 mL; 术后输注红细胞 0~3 U。1 例患者拔除引流管后出现切口处持续渗液, 3 个月后愈合; 其余患者术后 2 周切口均 I 期愈合。9 例患者均获随访, 随访时间 3~10 年, 平均 6 年。随访期间无术区感染发生, 无同种异体骨愈合不良和断裂发生。术后 1 年膝关节活动度为 90~110°, 平均 100°; 肌肉骨骼肿瘤学会(MSTS)评分为 24~29 分, 平均 26 分。X 线片示同种异体骨内有密度减低区(骨溶解)6 例; 无关节面塌陷、骨裂或骨折发生; 同种异体骨与宿主骨接触面之间均有骨痂形成, 皮质骨连续性良好。结论 骨肿瘤切除后采用大段同种异体骨单髁置换重建, 可提供良好支撑和功能, 获得满意临床疗效。

【关键词】 骨肿瘤; 保肢术; 同种异体骨; 单髁置换术; 重建

Effectiveness of unicompartament allografts replacement for bone tumor around the knee

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【Abstract】 Objective To analyze the effectiveness of unicompartament allografts replacement for reconstructing bone defect after bone tumor resection around knee. **Methods** Between January 2007 and January 2014, a total of 9 patients received unicompartament allografts replacement to treat bone tumor around the knee, including 6 males and 3 females, with an average age of 25.8 years (range, 17-38 years). There were 7 patients with bone giant cell tumor (1 was postoperative recurrence of giant cell tumor of bone) and 2 patients with chondromyxoid fibroma. The tumors were located at the distal femur in 7 cases and proximal tibia in 2 cases, and the tumors were almost at the lateral limbs. The symptom duration was 2-5 months (mean, 3.2 months). The size of lesion was from 6 cm×2 cm to 9 cm×4 cm by X-ray film and MRI examination; and the metastasis was excluded by CT. The length of the allograft was 8.0-9.2 cm (mean, 8.6 cm). **Results** The intraoperative blood loss was 400-550 mL (mean, 480 mL); and 0-3 U of erythrocyte was infused after operation. The continuous exudate of incision happened in 1 patient, and cure after 3 months; the other incisions healed primarily at 2 weeks after operation. All patients were followed up 3-10 years (mean, 6 years). No operation area infection, allograft bone poor healing and rupture. At 1 year after operation, the knee range of motion was 90-110° (mean, 100°), the Musculoskeletal Tumor Society score was 24-29 (mean, 26). Low density area (osteolysis) was found in 6 allografts; no articular surface collapse, hairline fracture, or fracture were found in patients; callus formation was observed in the contact surface between the allograft and the host bone, and the cortical bone showed good continuity.

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Conclusion Unicompartment allografts replacement provide good support and function in terms of bone tumor resection, and can achieve good effectiveness by biological reconstruction.

【Key words】 Bone tumor; limb salvage; allografts; unicompartmental arthroplasty; reconstruction

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随着骨肿瘤的早期诊断和辅助治疗的完善,患者保肢率不断提升^[1-2]。在保证生存率的前提下,患肢功能的重建受到越来越多的关注。人工假体重建是最常用方式,但受材料和工艺的限制,无法避免长期假体磨损带来的各种并发症,以及导致的重建失败^[3-5]。青少年患者活动需求较高,随着生存率的提高、生存期的延长,生物性重建能够更趋于重塑原有解剖结构,提供长期良好的功能^[6]。

大段同种异体骨是修复骨肿瘤瘤段切除后骨缺损的方法之一,可提供骨性结构和软组织附着^[7],在机械稳定性和生物相容性方面优于假体置换。但术后常发生感染、同种异体骨愈合不良、同种异体骨骨折等并发症^[8-9]。我们通过改良大段同种异体骨的全关节置换术,针对骨肿瘤局限于半侧宿主骨的患者保留部分宿主骨、周围软组织,采用单髁置换进行重建,为大段同种异体骨提供更佳的机械强度和生物愈合条件。现回顾分析 2007 年 1 月—2014 年 1 月,我们采用大段同种异体骨单髁置换术治疗的 9 例股骨远端、胫骨近端骨肿瘤患者临床资料,总结该术式临床疗效,分析术后长期功能和并发症发生情况。报告如下。

1 临床资料

1.1 患者纳入标准

① 影像学检查提示肿瘤未突破长骨中线,不累及下肢主要血管、神经;② 一侧骨皮质受累,缺失范围达长骨周径 1/4~1/2;③ 病理确诊为低度恶性或良性肿瘤;④ 未发现全身转移病灶;⑤ 行大段同种异体骨单髁置换手术;⑥ 随访 3 年以上。

1.2 一般资料

本组男 6 例,女 3 例;年龄 17~38 岁,平均 25.8 岁。左侧 4 例,右侧 5 例。骨巨细胞瘤 7 例,其中 1 例为骨巨细胞瘤术后复发;软骨黏液样纤维瘤 2 例。肿瘤位于股骨远端 7 例,胫骨近端 2 例;肿瘤部位均偏外侧。首发症状以疼痛为主 5 例,2 例因发现肢体肿块就诊,2 例同时伴有疼痛和肿块。症状持续时间 2~5 个月,平均 3.2 个月。术前均行 X 线片和 MRI 检查,确定肿瘤范围为 6 cm×2 cm~9 cm×4 cm;CT 检查排除肺部转移。

1.3 手术方法

患者于全麻下取平卧位,1 例骨巨细胞瘤术后复发患者以原手术切口入路,内翻髌骨显露;余 8 例常规采用膝前正中切口,髌旁内侧支持带入路,外翻髌骨。保留瘤段表面部分正常软组织覆盖。股骨远端患者切断关节外侧韧带。根据术前 MRI T1 成像,垂直于长骨方向上距肿瘤边缘 2 cm 截骨,再沿长骨中线纵向劈开。保留肿瘤表面正常软组织覆盖,完全取出病变组织。选择髓腔直径与健侧肢体差异<3 mm 的同种异体骨,长度较术前拟切除长度长 2 cm,便于术中修整。股骨远端同种异体骨直径测量选取内外侧髁连线、距关节面最远端平面;胫骨近端同种异体骨直径测量选取软骨下平面、距关节最远端平面。修整获得同等长度的单髁同种异体骨,与宿主剩余骨段相匹配,使松质骨、皮质骨之间最大范围接触(图 1)。胫骨近端患者于胫腓关节面切断,根据 MRI 进行截骨。取单髁同种异体骨进行重建,置换的单髁同种异体骨长度为 8.0~9.2 cm,平均 8.6 cm。5 例患者交叉韧带未受累,术中给予完整保留;1 例患者交叉韧带切除后应用螺钉重新固定;3 例患者未保留交叉韧带。同种异体骨均采用钢板螺钉固定,术后常规放置引流管。

1.4 术后处理

术后常规给予抗生素预防感染,保持引流通畅;4~6 d 后拔除引流管。所有患者术后第 2 天开始患肢被动屈伸活动和主动伸膝练习。术后 2 年内平均每 3 个月复查患肢 X 线片,2 年后每半年复查,评估患肢功能及并发症发生情况。

2 结果

本组患者术中出血量为 400~550 mL,平均 480 mL;术后输注红细胞 0~3 U,平均? U。1 例患者拔除引流管后出现切口处持续渗液,定期给予消毒、无菌敷料包扎;复查血常规、C 反应蛋白、红细胞沉降率均正常,切口无红肿,3 个月后愈合。其余患者术后 2 周切口均 I 期愈合。9 例患者均获随访,随访时间 3~10 年,平均 6 年。随访期间无术区感染发生,无同种异体骨愈合不良和断裂发生。术后 1 年膝关节活动度为 90~110°,平均

100°；肌肉骨骼肿瘤学会 (MSTS) 评分为 24 ~ 29 分, 平均 26 分。3 例患者主观感觉有关节不适, 但不影响行走和关节活动。X 线片示同种异体骨内有密度减低区 (骨溶解) 6 例; 无关节面塌陷、骨裂或骨折发生; 同种异体骨与宿主骨接触面之间均有骨痂形成, 皮质骨连续性良好。见图 2。

3 讨论

完整切除是治疗骨肿瘤的主要方法^[10]。影像学

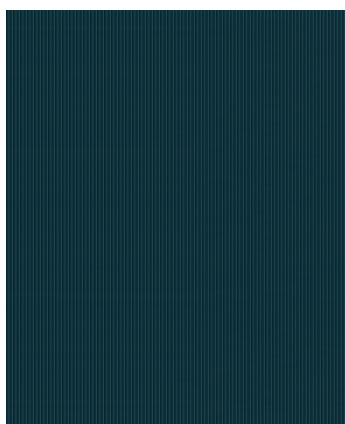


图 1 术中切除范围

Fig.1 The range of intraoperative resection

技术和综合治疗的发展极大地改善了患者生存、保肢现状^[11]。保肢手术的关键在于修复骨缺损, 恢复原有解剖结构, 尽可能重建患肢功能, 提升患者术后生活质量^[12]。随着肿瘤患者生存周期的延长, 重建方式的可持续性成为保肢手术的重要参考因素。虽然假体置换应用广泛, 但长期应力挤压、材料间磨损, 使其并发症和失败率显著增高^[13-15]。

基于假体材质本身的限制性, 大段同种异体骨重建对于肿瘤控制良好患者在远期疗效方面具有明显优势^[16]。一方面, 同种异体骨的大体形态符合肢体解剖特征, 与手术切除后骨缺损相匹配; 另一方面, 良好的生物相容性促进同种异体骨与宿主骨接触面之间的愈合, 达到生物性重建^[17]。利用大段同种异体骨骨性结构重新连接周围软组织断端, 可获得完整的软组织覆盖和活动功能^[18]。

限制大段同种异体骨重建的主要原因在于术后并发症较高。相关随访报道重建术后大段同种异体骨骨折发生率高达 38%^[19]。骨不连、骨溶解是造成同种异体骨骨折的主要原因^[20-22]。为了改善大段同种异体骨重建疗效, 降低骨不愈合、骨折等并发症风险, 我们在保证广泛性切除前提下保留了宿主骨半侧单髁结构。修整匹配的半侧大段同种异



图 2 患者, 男, 18 岁, 右股骨远端骨巨细胞瘤 a. 术前正侧位 X 线片; b. 术前冠状位 MRI T1、T2 加权像; c. 术后 1 周正侧位 X 线片; d. 术后 3 年正侧位 X 线片

Fig.2 A 18-year-old male patient with bone giant cell tumor of right distal femur a. Anteroposterior and lateral X-ray films before operation; b. Coronal T1/2-weighted sequences before operation; c. Anteroposterior and lateral X-ray films at 1 week after operation; d. Anteroposterior and lateral X-ray films at 3 years after operation

体骨进行对合,符合生物力线并尽可能最大化松质骨面的相互接触,利于宿主骨长入同种异体骨,避免同种异体骨-宿主骨接触面不足的问题^[23]。保留的半侧宿主骨能够克服传统大段同种异体骨置换面临的长期完全应力支撑,增加下肢骨性强度^[19];同时,止于宿主骨上的韧带、肌肉等结构得以保留,降低软组织重建的难度和术后发生关节不稳等并发症的风险。尤其是胫骨近端,传统大段同种异体骨或假体重建需要先分离伸膝装置再重新固定,术后常发生伸膝迟滞或韧带断裂^[24]。单髁重建未破坏伸膝装置止点,术后早期即可进行伸膝练习,术后肢体功能优于伸膝装置重建患者^[25]。本组通过对大段同种异体骨单髁置换患者随访发现,术后6例出现同种异体骨内骨溶解,但患者无特殊不适和功能影响;X线片均显示同种异体骨与宿主骨之间有骨痂形成,且无同种异体骨骨折发生。

感染是同种异体骨重建的常见并发症之一,各治疗中心关于感染发生率的报道存在一定差异^[26-27]。年龄、同种异体骨类型和大小因素与感染并无相关性^[28-29]。与假体置换相比,大段同种异体骨感染概率无差异性。本组无感染发生,原因可能有两方面:一方面,术中无菌操作、术后常规预防性给予抗生素、保持引流通畅;另一方面,单髁同种异体骨置换缩小了术中需显露的范围,减少手术创伤和出血,缩短手术时间。因此,术中保留了足够的软组织,使肌肉等组织能够完全覆盖于同种异体骨表面,降低了感染风险。

大段同种异体骨关节面由于缺乏血运易导致软骨退化^[30],尤其在下肢负重关节,压力可能会造成局部纤维化或应力切线方向上软骨分离^[19]。长期应力可造成同种异体骨关节面的骨关节炎,患者出现关节疼痛、活动受限的症状,可行表面膝关节假体置换。而肿瘤型假体置换术后发生磨损、松动时,只能选择假体翻修。因此,大段同种异体骨单髁置换争取以生物重建替代肿瘤型假体重建,减少组织破坏和加强功能保留。同时,同种异体骨表面长期因关节应力、磨损可能面临再次手术时,与肿瘤假体翻修相比,同种异体骨重建后表面膝关节假体置换的补救措施创伤较小、术后恢复较快、功能较好。

综上所述,大段同种异体骨单髁置换术利于患者早期功能恢复,降低传统大段同种异体骨置换术后并发症的风险。作为生物性重建方式之一,能为骨肿瘤的保肢提供新的思路和方法。

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