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低温热塑板在儿童前臂骨折愈合中晚期的临床应用

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[摘　要]　**目的：**观察低温热塑板在儿童前臂骨折愈合中晚期应用的疗效。**方法：**选取无锡市儿童医院儿骨科自2016年1月至2017年5月收治的80例尺桡骨骨折患者，随机分成低温板材组与传统石膏组，每组40例。两组均早期予骨折手法整复，后予传统石膏固定治疗，3周后低温板材组拆除石膏，改予低温热塑板固定。6周后拆除外固定。拆除外固定后评估两组前臂功能。**结果：**根据Anderson评分系统，骨折后6周低温板材组评分情况为优37例(92.5%)，良3例(7.5%)，可0例(0%)，差0例(0%)；传统石膏组评分情况为优30例(75%)，良8例(20%)，可2例(5%)，差0例(0%)。两者比较差异有统计学意义(P<0.05)。**结论：**低温热塑板较传统石膏在儿童前臂骨折愈合中晚期的应用有明显的优势，值得推广应用。

[关键词]　儿童尺桡骨骨折；低温热塑板；外固定

Clinical application of low-temperature thermoplastic plates in middle-late healing in children with forearm fracture

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Abstract　**Objective:** To observe the curative effect of low temperature thermoplastic plate in children with forearm fracture middle-late healing. **Methods:** A total of 80 patients with ulna and radial fracture were recruited from pediatric orthopedics of Wuxi Children's Hospital from January 2016 to May 2017. The patients were randomly divided into a low-temperature thermoplastic group and a traditional gypsum group, with 40 cases in each group. All groups underwent manipulative reduction and Gypsum fixation. After 3 weeks, the gypsum of the low temperature plate group was removed and replaced with a low temperature thermoplastic plate. External fixations were all removed in the two groups after 6 weeks and evaluate the function of the forearm. **Results:** According to the Anderson scoring system, the score of low-temperature plate group was that the excellent had 37 cases (92.5%), the good 3 cases (7.5%), and the average and the poor none. Traditional gypsum score was that the excellent had 30 cases (75%), the good 8 cases (20%), the average 2 cases (5%), and the poor 0 case (0%). There is a significant

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difference between the two groups (P<0.05). **Conclusion:** The low temperature thermoplastic plate has obvious advantages over traditional gypsum in the middle and late stage of fracture healing of forearm, and it is worth popularizing and applying.

Keywords children's ulna and radial fracture; low temperature thermoplastic plate; external fixation

尺桡骨骨折是儿童前臂骨折中最常见的骨折，而其通常是在尺桡骨的下部分1/3或中间的1/3处发生骨折，骨折后骨折断端易发生旋转、成角、侧方或者重叠移位[1]，治疗难度加大，且因儿童处于生长发育期，如果治疗方法不正确，对患儿的发育成长将造成直接的影响。儿童尺桡骨骨折治疗方案大多以保守治疗[2]为主，即复位和固定，而骨折的愈合是一个极为复杂的生物学过程[3]。干扰损伤的骨质恢复的原因有很多，如本身损伤的严重程度、损伤部位等。骨折的固定方法是另一个重要因素，其中石膏绷带、小夹板和低温热塑板材等新型材料是最常用的骨折外固定器材[4]。

1 对象与方法

1.1 对象

选取研究无锡市儿童医院2016年1月至2017年5月收治的80例小儿尺桡骨双骨折患儿进行，男56例，女24例，年龄1.5~10.0(4.5±0.5)岁，均在伤后1 d内接受治疗，经X线片检查确诊，左侧49例，右侧31例；14例骨折断端在其上1/3段的有，38例在中间1/3处，28例在其下1/3段。骨折原因大多为受到直接或者间接的暴力。随机分成低温板材组与传统石膏组，每组40例。低温板材组男26例，女14例，年龄(6.5±1.2)岁；骨折按前臂双骨折AO分型：A3型35例，B3型5例。传统石膏组男30例，女10例，年龄(5.5±2.4)岁；骨折按前臂双骨折AO分型：A3型38例，B3型2例。两组间性别(P=0.655)、年龄(P=0.704)、损伤分型(P=0.935)方面差异无统计学意义。所有患儿家属签署知情同意书，并经无锡市儿童医院医学伦理委员会批准。

排除标准：1)开放性骨折者；2)自身的身体素质不佳，没有办法进行复位，或预计复位后作用不大；3)有明显移位的粉碎性骨折或者已造成关节面损伤的骨折[5]；4)无法坚持外固定者。

1.2 方法

1.2.1 手法整复方法

嘱患儿取仰卧位，患肢置于旋前位，一助手握手部，另一助手握肘上，以顺势的方式持续拔伸几分钟，从而矫正骨折的成角和重叠畸形[6]。对不同骨折形态需采用不同的方法。部分损伤部位是采用提按法，部分损伤的部位采用折顶法[7]，具体方法需结合患者的实际损伤骨折的原因、骨折部位的角度及周围骨块的情况。两骨折端靠拢交错患儿可采用挤分骨手法实施分骨，让骨间膜处于紧张情况，牵动桡尺骨的骨间嵴，使其处于正常的互峙位置[8]。另外，对有明显青枝骨折的患儿，向凹侧按压骨折成角凸起处，同时向凸侧方向扳拉凹侧骨折远端，纠正成角。

1.2.2 固定的方式

在复查患者骨折复位情况前，需用石膏固定患肢，将石膏往返折叠12层，放于水中浸泡，取出后由两边向中间挤干石膏中的水分，抹平后将石膏放置于患肢，近端的长度需超过肘关节8~10 cm，远端需超过腕关节8~10 cm，用纱布绷带缠绕石膏2~3层，松紧适度，待石膏硬化后，将患肢悬吊于胸前[9]。

两组均由同一组医师与手法复位操作治疗，复位后均予传统石膏固定治疗，两组固定后均行X射线检查，以了解复位情况。所有患儿1 d后进行复诊，而后1周内则再复诊1次[10]，复诊时需注意患肢末梢血运情况、石膏松紧度及外固定固定情况。恢复前期可以尝试轻微运动，以感知这些部位的情况，之后根据恢复情况适当地增加运动力度[11]。3周后低温板材组拆除石膏，用低温板材替换。同时指导两组进行相同的功能锻炼，6周后拆除外固定。比较两组拆除外固定后的前臂功能，评价新型材料的效果。

1.3 疗效标准

根据Anderson评分系统[12]判定前臂功能的治疗效果。优：骨折愈合，失去肘腕关节活动<

10%，丢失前臂活动<20%。良：骨折愈合，失去肘腕关节活动<20%，丢失前臂活动<50%。可：骨折愈合，失去肘腕关节活动>30%，丢失前臂活动>50%。差：骨折不愈合或畸形愈合，慢性骨髓炎。

1.4 统计学处理

应用SPSS 19.0统计软件进行分析，计数资料以频数表示，两组间的比较采用χ^2检验，检验水准α=0.05，P<0.05为差异有统计学意义。

2 结果

本组80例全部获得随访，随访时间1.5~3.0(平均2.2)个月。根据Anderson评分系统，骨折后6周低温板材组评分：优37例(92.5%)，良3例(7.5%)，可0例(0%)，差0例(0%)；传统石膏组评分：优30例(75%)，良8例(20%)，可2例(5%)，差0例(0%)。典型病例见图1和图2。

图1 患儿，男，6岁，尺桡骨双骨折，经手法复位患肢予传统石膏固定3周，发现传统石膏不利于血液的流通，透气性差，且容易出现压疮，不利于功能锻炼

Figure 1 A 6-year-old male patient, ulna and radial fracture, the fracture was restored by manipulation and was fixed by the traditional plaster for 3 weeks, the traditional gypsum was not conducive to the circulation of blood, the shortcoming of breathability, and was prone to pressure sore, which was not conducive to functional exercise

图2 上述患儿传统石膏固定满3周后拆除石膏改予低温热塑板固定，因低温热塑板材可塑性好，透气性、携带性、可拆卸性明显优于传统石膏，故患儿接受度明显增高且功能锻炼配合度明显增高

Figure 2 Children was dismantled and obtained low-temperature thermoplastic plate after fixed with the traditional gypsum for 3 weeks, because of the good sheet plasticity, breathability, portability, and detachability of low-temperature thermoplastic, compared with the traditional plaster, the children showed better acceptance and willingness of functional exercise

3 讨论

因骨折的外固定材料均需直接或间接接触患者身体[13]，故要求：1)让患者穿戴舒适，不能产生不适感，软硬要适度，以避免对患者再次造成伤害，这点很重要。2)使用的材料具有良好的弹性，能与损伤部位完美贴合，因为人体本身复杂且不规整，故对材料须有这点要求，以免患者出现不适[14]。3)携行方便、操作简便。

骨折固定使用的材料包括石膏和夹板等。石膏：1)因石膏本身的材质，尤其是管型状石膏，使用时易出现血液循环不通畅[15]。而儿童患者自我意识不全面，表述能力差，故更容易发生此问题。2)压疮，局部持续性疼痛为压疮的早期征象表现，出现压疮后需及时开窗检查[16]，但通常很难得到及时处理。3)石膏材质较硬，虽固定可靠，但也阻碍患者运动，不利于患者的恢复，且其重量对患儿的日常生活及功能锻炼[17]也会有较

大的影响。4)使用石膏专业性强，通常由医生护理，存在一定的限制。且石膏透气性差[18]，无法清洗皮肤，儿童代谢旺盛，更易受刺激造成瘙痒，严重影响其日常生活及保持静止态。

夹板：1)固定的时间有限，且因夹板固定不够贴合，被固定者在活动中易因各种原因导致夹板滑动或松动[19]，这些问题比较严重且需要被固定者特别注意，而儿童比较好动，这一现象更为突出。2)夹板作用力易使被固定的关节受到挤压而形成压疮，且难以避免。3)使用夹板固定时间过长，可能因长时间压迫骨骼与夹板之间的肌肉，而出现肌肉萎缩。4)类似石膏，夹板的操作需要操作者相当专业，对于使用者存在一定的限制。5)若夹板使用不当，使血管受到压迫而导致血液循环出现障碍时，可能会引起骨筋膜室综合征[20]。

低温热塑板材是一种新型的人工合成材料，其可达到临床上应用的要求。优点包括：1)这种人工合成材料对骨折部分贴合较好，很能适应不同骨折[21]的需求，且可利用一些锻炼方法帮助患者，有效地发挥出这种材质的优点。2)可以节省材料，对被固定者所需固定的范围比前两种所需面积小[22]。且因与人体的生理曲线[23]接近，方便早期的功能锻炼，帮助患儿恢复肌肉和功能。低温热塑板材可以合理构型[24]，且具有力学的优势，能使骨折的相对稳定性更持久，维持骨折功能活动的原则，故既可促进骨痂的形成[25]又能使骨痂得到良好的塑形。3)材料的可塑性更能贴合好动的儿童。4)低温热塑板材的透气性[26]好，最高可以达到50%的网眼，其解决了传统石膏的不透气的缺点，可避免出现皮肤红肿、瘙痒等并发症。其100%X线透射率[27]的特点便于患儿随时行放射检查。复形及调整操作简单。5)材质轻，一般只有石膏质量的1/8，方便患者的运动或起居，极大地改善了被固定者的日常生活[28]。

本研究发现：在儿童前臂骨折愈合中晚期应用低温热塑板组与传统石膏组在骨折后6周时两组Anderson评分差异显著，提示在儿童前臂骨折愈合中晚期应用低温热塑板效果优于传统的石膏固定，且患儿均自觉低温热塑板轻便、舒适，疼痛和过敏较少，可脱卸，不良反应明显减少。

因此，低温热塑板较传统石膏在儿童前臂骨折愈合中晚期的应用有明显的优势[29]，符合生物学基本规律，符合患者的需求，同时符合骨折治疗的最新趋势[30]，具有科学性及合理性，值得推广应用。

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