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弹性髓内钉和钢板固定对儿童股骨干中段骨折的疗效比较

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摘要 目的:观察并比较弹性髓内钉(ESIN)与钢板固定(PF)治疗儿童股骨干中段骨折的临床疗效。**方法:**选择 2013 年 2 月至 2016 年 12 月我院收治的股骨干中段骨折患儿 90 例,依据治疗方法不同分为 ESIN 组和 PF 组。ESIN 组(n=45)采用弹性髓内钉固定,PF 组(n=45)采用钢板固定,比较两组患者手术时间、手术切口、术中失血量、术后切口引流量等手术指标,随访评估患者住院时间、完全负重时间、骨折愈合时间;按 Flynn 评定标准比较两组患者的最终治疗结果。**结果:**两组患者术中失血量、术后引流量比较差异无统计学意义(P>0.05),ESIN 组患者手术切口显著小于 PF 组(P<0.05),手术时间、透视时间、完全负重时间均显著短于 PF 组(P<0.05),临床疗效明显优于 PF 组(P<0.05)。**结论:**与钢板固定比较,弹性髓内钉在手术时间、透视时间显著短于钢板固定,临床疗效明显优于钢板固定,可作为儿童股骨干骨折内固定的首选材料。

关键词:弹性髓内钉;钢板;儿童股骨干骨折

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Comparison of the Clinical Efficacy of Plate Fixation and Elastic Stable Intramedullary Nailing in the Treatment of Femoral Shaft Fractures in Children

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ABSTRACT Objective: To observe and compare the clinical efficacy of plate fixation (PF) with elastic stable intramedullary nailing (ESIN) in the treatment of midshaft femoral fractures in children. **Methods:** 90 cases of pediatric midshaft femur fractures from February 2013 to December 2016 were selected and divided into two groups according to different treatment WITH45 cases in each group: elastic stable intramedullary nailing group (ESIN) and plate fixation group (PF) group. The indexes of operation time, surgical incision, intraoperative blood loss, postoperative wound drainage were compared between the two groups. The hospital stay, full weight bearing time, time of fracture healing; final functional outcomes were evaluated using Flynn's system. **Results:** There was no significant difference in the blood loss and postoperative drainage between the two groups (P>0.05). The surgical incision of ESIN group was significantly smaller than that of the PF group (P<0.05). The operation time and fluoroscopy time and time of total load-bearing were significantly shorter in ESIN group (P<0.05). The therapeutic effect of ESIN group was superior to that of the PF group (P<0.05). **Conclusions:** Compared with the plate fixation, the operation time and the fluoroscopic time were significantly shorter in the ESIN. The clinical curative effect of ESIN was also superior to the PF in the treatment of midshaft femoral fractures in children. The elastic intramedullary nail should be the fixation material for the femoral shaft fracture in children.

Key words: Midshaft femoral fractures; Elastic stable intramedullary nailing; Plate fixation

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前言

儿童天性喜动,骨折外伤较常发生,其中股骨干骨折是住院患儿最常见的肌肉骨骼损伤,约占儿童骨折的 1.6 %,并且股骨干骨折的发病率呈现上升趋势[1,2]。传统的保守治疗包括骨牵引复位、加压钢板固定、闭合复位外固定支架固定等,此类方法固定时间过长且恢复较慢[3,4],并在治疗过程中可能伴随出现患儿痛苦、关节僵硬、内外固定去除后再骨折等并发症[5]。

近些年,手术治疗逐渐应用于儿童股骨干骨折,其中包括顺行髓内钉、外固定器、钢板和螺钉固定、逆行弹性髓内钉等[6-8],但顺行髓内钉可导致股骨头骨坏死,外固定器可导致针孔感染和再次骨折[9,10],故弹性髓内钉的固定时间短、恢复较快等优势明显[11,12],因而广泛应用于儿童股骨干骨折的治疗。目前,临床内固定的材料很多,其中钢板固定和弹性髓内钉的疗效比较显著,基于钢板固定和弹性髓内钉的广泛应用,为比较两者的疗效, 本研究对 2013 年 2 月至 2016 年 12 月在本院收治的股骨干中段骨折患儿 90 例 5-11 岁儿童股骨干骨折患者的临

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床资料进行分析,结果报道如下。

1 资料与方法

1.1 病例资料

纳入 2013 年 2 月到 2016 年 12 月我院收治的股骨干中段骨折患儿 90 例，依据治疗方法不同分为 ESIN 组和 PF 组。ESIN 组(n=45)采用弹性髓内钉固定,其中男 25 例,女 20 例,平均年龄(8.7± 2.0)岁;PF 组(n=45)采用钢板固定。其中,男 27 例,女 18 例,平均年龄(8.4± 1.8)岁。排除病理性骨折,再次骨折和Ⅲ级开放性骨折的患儿。ESIN 组和 PF 组患儿在年龄、性别、骨折类型等方面均无显著性差异(P>0.05),具有可比性。本研究经由我院伦理委员会批准,所有患儿均由其监护人签署了知情同意书。

表 1 两组患儿一般临床资料的比较

Table 1 Comparison of the general clianical information between two groups

	ESIN	PF
Age(year)	8.7± 2.0	8.4± 1.8
Number(male/female)	45(25/20)	45(27/18)
BMI(kg/m^2)	18.2± 3.5	17.4± 2.2
Weight		
Mean	31.2± 4.3	30.6± 5.4
Over 50 kg	2	3
Stability of fracture		
Length stable	23	25
Length unstable	22	20
Open fracture	2(Ⅰ-Ⅱ)	1(Ⅰ)

1.2 治疗方法

患儿均在连续硬膜外麻醉下手术,复位和固定在 C 臂机透视下进行。ESIN 手术操作参照 Ligier 等方法;PF 手术操作参照楚宇鹏等方法。术后指导患者进行功能锻炼,密切观察并发症,必要时给予对症治疗。

1.3 观察指标

手术时间、手术切口、术中出血量、透视时间等手术指标,术后的骨性愈合时间,完全负重时间,并按 Flynn 评定标准进行功能评价。

1.4 统计学方法

采用 SPSS19.0 软件分析处理，两组患者手术指标或术后指标的比较采用独立样本 t 检验,Flynn 功能评定结果比较采用 x^2 检验,以 P<0.05 表示差异有统计学意义。

2 结果

2.1 两组患儿手术指标的比较

两组患者术中失血量、术后引流量比较差异无统计学意义(P>0.05),ESIN 组患者手术切口显著小于 PF 组(P<0.05),手术时间和透视时间也显著短于 PF 组(P<0.05),见表 2。

2.2 两组患儿术后指标的比较

ESIN 组患者完全住院时间和骨折愈合时间显著短于 PF 组(P<0.05)。末次随访中,所有患者都能够正常行走,无跛行,双侧髋膝关节活动范围均正常,ESIN 组患者完全负重时间显著短于 PF 组(P<0.05)。

2.3 两组 Flynn 功能评定结果的比较

ESIN 组优 23 例,良 20 例,优良率 95.6%;PF 组优 25 例,良 12 例,差 8 例,优良率 87.2%。ESIN 组优良率明显高于 PF 组(P<0.05) 。

3 讨论

股骨是全身最长的管状骨,生物力学、外在原因等诸多因素使得股骨干骨折在临床中比较常见[13]。股骨干骨折是指股骨小粗隆至股骨髁以上部分的骨折，是临床最常见骨折之一[14],约占有全身骨折 6 %左右[15],加之儿童自主行为能力差,儿童股骨干骨折问题显得尤为突出。儿童股骨干骨折的治疗方式与患儿的年龄、骨折的位置和类型、设备可用性、医生的知识、患儿的经济状况有关[16]。股骨是体内最长、最大的骨骼,且是下肢主

表 2 两组患者手术指标比较($\bar{x}\pm s$)

Table 2 Comparison of the operation indicators between the two groups($\bar{x}\pm s$)

Group	Operation time (min)	Bleeding amount (mL)	Drainage flow (mL)	Radiation exposure (s)	Incision length (cm)
ESIN	94.3± 36.2	40.95± 4.00	18.23± 3.45	58.2± 6.1	4.62± 0.82
PF	110.5± 42.3	42.3± 4.2	19.56± 4.65	109.6± 3.3	10.26± 1.40
P	0.027	0.063	0.063	0.001	0.000

表 3 两组患者术后指标的比较($\bar{x}\pm s$)

Table 3 Comparison of the postoperative indicators between the two groups($\bar{x}\pm s$)

Group	Length of stay (days)	Total WB (weeks)	Fracture healing (weeks)
ESIN	7.55± 0.96	5.51± 0.63	7.83± 0.84
PF	8.67± 0.83	6.83± 0.78	8.62± 0.72
P	0.000	0.000	0.001

表 4 两组 Flynn 功能评定结果的比较

Table 4 Comparison of the results of Flynn function assessment between two groups

Group	Number (n)	Excellent	Satisfactory	Poor	Total(%)	P
ESIN	45	23	20	2	43(95.6)	0.044
PF	45	25	12	8	37(82.2)	

要负重骨之一,如果治疗不当,将引起下肢畸形及功能障碍[17]。手术治疗恢复快,康复期短,对患儿的身心影响小,已成为儿童股骨干骨折的首选治疗方式[18]。PF 和 ESIN 的特点是软组织切除非常少,疤痕小,手术时间相对较短,允许早期活动[19,20],且主要并发症发生率也较低[21,22],故 PF 和 ESIN 法是儿童股骨干骨折最广泛的治疗方式。

股骨呈管状,有一曲率半径约为 120 cm 的前弓,内侧骨皮质承受压应力,外侧骨皮质承受牵张应力,股骨峡部是髓腔直径最狭窄的部位,髓内钉是治疗股骨干骨折的首选[23]。弹性髓内钉由钛合金制作,具有高弹性、低弹性模量的特点,已预弯的弹性髓内钉可通过进钉点、弧顶点及钉头部与髓腔壁接触产生的弹力对骨折进行固定,更符合骨折生物固定的理念。弹性髓内钉内固定为弹性固定,避免了应力遮挡,可防止内固定拆除后再骨折[24-26]。目前,临床应用较广泛的髓内钉有弹性内钉、交锁髓内钉、髓内扩张自锁钉三种[27]。本研究中,ESIN 组患者手术切口显著小于 PF 组, 手术时间和透视时间也显著短于 PF 组,这与 ESIN 在治疗股骨干骨折上的诸多优势有关:闭合复位不破坏骨端骨膜,有利于骨折愈合;骨折可获得良好的对位和立线;应力分享式力学传导,对患者生物力学的干扰小;患者术后能尽早进行康复锻炼, 降低关节僵硬的肌肉萎缩等并发症。同时,ESIN 组的完全负重时间,骨折愈合时间也短于 PF 组,弹性髓内钉内固定通过三点支撑原理固定骨折,弹性固定容许骨折端有轻微的活动,在患儿进行功能锻炼时,骨折两端重复加压,产生的应力促进骨痂形成和钙化,从而加速骨折愈合,因此术后患儿可早期活动患肢[28]。有研究报道不稳定的股骨骨折的情况下使用弹性髓内钉, 其术后早期角度偏差的风险更高[18]。本研究中,ESIN 组有 22 例不稳定骨折, 只有 2 例患儿出现并发症并且预后较差,表明骨折粉碎或不稳定骨折并不影响对齐问题, 这表明弹性髓内钉钉的刚度足够维持不稳定骨折的长度。与 ESIN 预后差相关的危险因素是长度不稳定骨折模式,较高的年龄和较高的体重[29]。本研究发现体重较重的患儿(体重 >50 kg),与髓内钉的弹性相比,变形力可能更大,因此引起更大振幅的运动,干扰纵向骨桥的形成和骨固定[30-32],导致患儿出现并发症的可能性增加和功能评分较差。因此,对于体重大于 50 kg 的患儿,发生并发症的可能性增加,应选用刚性固定系统进行治疗,即硬钉或外固定[33]。

总之,各种内固定器材有其各自的特点和适应范围,弹性髓内钉在手术时间,透视时间等方面显著短于钢板固定,临床疗效也明显优于钢板固定,应选作儿童股骨干骨折内固定的首选材料,但当患儿体重大于 50 kg 时应选用钢板固定。在具体的临床实践中,需要根据各种不同的骨折类型选择相应的最适合的内固定方式。

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