

学术探讨

髌骨骨折生物力学研究及治疗方法的评价

同济医科大学附属协和医院 (430022)

杨述华 杜靖远 罗怀灿

摘要 本文分析了髌骨及髌骨骨折采用改良强力带钢丝固定法的生物力学。对采用改良张力带钢丝固定治疗髌骨骨折 64 例进行观察。根据生物力学的原理和临床观察结果显示,此术式具有骨折愈合快,关节功能恢复好等明显优越于其它诸多方法之特点。同时还介绍了用 2 枚空心螺丝钉加钢丝固定治疗髌骨横形骨折的新方法。

关键词 髌骨骨折 生物力学 张力钢丝

髌骨骨折在临床上较为常见,其手术方法颇多,正确选择手术方法甚为重要。作者根据生物力学原理,并通过多种方法比较,自 1985 年起选用改良张力带钢丝固定法治疗 64 例髌骨骨折获得极好疗效。

髌骨生物力学

髌骨有 2 个重要的生物力学功能,其一、传送股四头肌力量在髌韧带,其二、在膝关节伸直时起着重要距臂作用。在股四头肌收缩时可以加强其伸膝功能,在膝完全伸直时,髌骨受力最大,而髌股关节受力确最小(见图 1)。

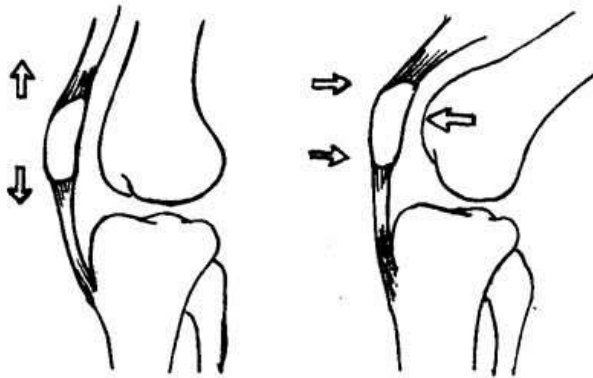


图 1

图 2

髌骨受力大小根据膝关节位置不同而不同。据 Goldstein^[1]研究证实膝关节屈曲 45°时髌骨受力最大。屈曲时三点受力情况(见图 2)。Goings^[2]研究后得出结论,在年轻人中当髌骨完全伸直和屈曲时受力由 3000 牛顿上升至 6000 牛顿。

髌骨骨折分类

髌骨骨折分类是根据损伤力学和形态学进行的。损伤有 2 种主要力学、既间接和直接 2 种。直接外伤常常移位较小,但很少见。大多数为间接外伤,其机理是在膝关节完全屈曲的情况下股四头肌强烈收缩而致,

常伴随较大的移位且多为横形骨折。关节软骨损伤较直接损伤为少。相当一部分病人的骨折是由 2 种力量同时发生而致。为了便于治疗,将髌骨骨折分 7 类(见图 3)

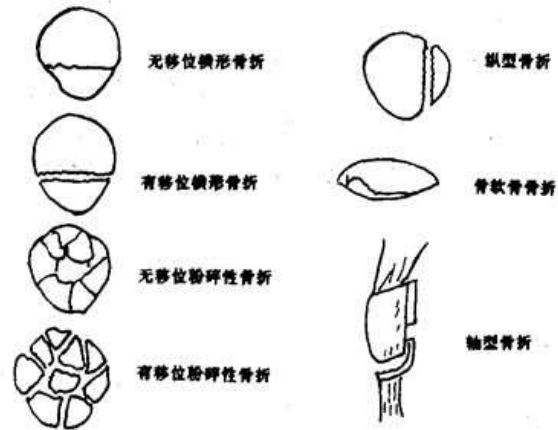


图 3 髌骨骨折分类

I: 无移位横形骨折,骨折线通常位于髌骨中心或远 1/3; II: 骨折端分离大于 3mm 的有移位横形骨折; III: 无移位的粉碎性骨折; IV: 有移位的粉碎性骨折; V: 纵形骨折多位于髌骨边缘,又名髌骨边缘骨折,临床上很少见; VI: 骨软骨骨折,多为直接暴力造成同时伴有髌骨脱位,此形骨折易发生移位,并可能形成机械性的游离体,Excision 建议此形骨折应早期复位并用螺丝钉固定; VII: 轴形骨折,为软骨骨折另一种类型,常发生于小孩和年轻人,X 线拍片不易被发现,临床体征通常为痛,压痛以及膝伸直时不稳而确立诊断。

改良张力带固定方法

手术可采用髌前弧形切口,髌内侧纵形切口。但作者主张采用髌前正中纵形切口,此切口损伤小,且暴露骨折端很容易。暴露骨折端后,清除其间及关节腔内的凝血块,将骨折复位后分别用 2 把巾钳在髌骨内、外侧

缘固定。膝关节屈曲 20~30°位, 2.0mm 克氏针分别自远折端进入、近折端穿出。2 针水平间距以 2cm 为宜。上、下针尾各露出 0.5cm, 太长易影响术后功能锻炼。剪断针尾后用一根钢丝穿过克氏针尾端下面交叉绕过髌骨前面, 在髌骨下极扭紧打结 (见图 4)。



图 4

钢丝固定后, 在手术台上屈膝 90°左右检查骨折部位是否稳定, 达到预期效果则结束手术。此术式适用于 1~4 型骨折。

临床资料

64 例中, 男性 48 例, 女性 16 例, 年龄 19~65 岁。右侧 42 例, 左侧 22 例。无移位横形骨折 19 例, 有移位横形骨折 32 例, 下极粉碎性骨折 12 例, 轴形骨折 1 例, 随访时间为 3~32 个月。骨折愈合时间 5~11 周。

治疗结果

1. 膝关节功能、优: 无痛, 功能正常 58 例。良: 偶痛, 功能稍差 5 例。中: 经常轻度痛 1 例。

2. 膝关节活动范围、优: 正常 141°~150°, 56 例。良: 121°~140°, 6 例, 中 91°~120°, 2 例。

3. 骨折复位, 以关节面为准, 优: 解剖复位 60 例, 良: 关节面错位 1mm 以内 4 例。

讨论

髌骨骨折是关节内骨折, 在治疗骨折时必须达到解剖复位, 减少创伤性关节痛的发生, 使其功能不受影响。从生物力学分析, 髌骨必须尽量保留, 即使是粉碎性骨折、特别是髌骨下极粉碎性骨折应尽量保留。U 形钢丝固定法, 根据一些作者力学研究, 由于固定后不能限制上下骨块之间在受力时的水平移位, 术后仍需坚强的石膏外固定、极易影响膝关节功能, 优良率极低。作者亦认为不易采用。

髌骨部分切除术、由于去除一部分髌骨, 弯曲力臂必然减少, 而髌股关节接触力又必然增大。此术式应尽量少用。

髌骨全切除术, 髌骨全切后力臂明显缩短, Watkins⁽³⁾试验证实, 髌骨切除后, 膝关节完全伸直时, 股四头肌力量要增加 15%。当试验速度每秒 30 次时, 股四头肌最大力矩值, 平均减少 54%。由于力矩缩短,

从而扩大了关节受压力, 髌骨关节面阻力将成倍增大, 股骨髌必然受到肌腱的摩擦, 继之会造成创伤性关节炎。因而作者主张、如髌骨粉碎严重无法保留者, 应采用人工髌骨替代之。

经不同方法比较以及从力学方面分析 (见图 5)。作者认为采用改良张力带钢丝固定法是一种值得推荐的最好方法之一。从图 5 力学可以看出, 2 根克氏针可以防止髌骨在受到复杂力时的水平方向移位。外边的钢丝是在髌骨的弧形表面上, ΔT 的垂直分力将使骨折线对合得更好, 当膝关节伸屈即 M_1 和 M_2 拉紧时, 骨折端将对合更紧密、受力更大。此法主要优点在于: 适应症较广、粉碎性骨折亦可采用, 尤其是下极粉碎性骨折应作为适应症选择。不可轻易切除部分髌骨。骨折愈合时间短、由于骨折断端持续较大的受力, 因而骨折愈合明显较其它方法快。膝关节活动功能恢复快而好是其突出的特点。多在术后两周能屈膝 90°或大于 90°。

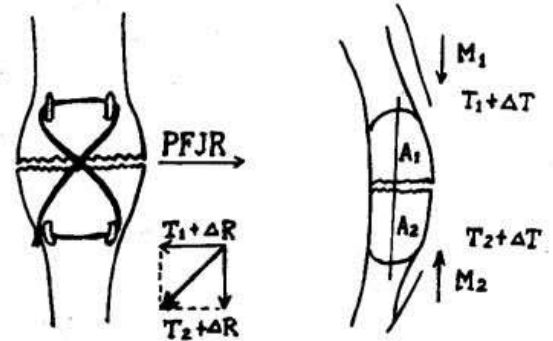


图 5

此外, James⁽⁴⁾等推荐采用 3.5mm 中空螺丝钉, 并用 2.0mm 钢丝穿过其中在髌前交叉固定的新方法。Benjamin⁽⁵⁾等通过生物力学研究证实, 此种方法结果最好, 尤其适于横形骨折。目前国内未见报告。

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Abstract of Original Articles

clinical study on break down of lumbar chondral plate Jiang Wei — zhuan et, al Institute of Orthopaedics and Traumatology, China Academy of TCM(100700)

Eighty one cases of break down of lumbar chondral plate were summerized. There were special manifestations on clinic, X—ray, CT etc. imaging changes and pathology as well. Bread down, dislocation and ossification of chondral plate were concluded andcorresponding therapeutic measures were suggested. Through analysis of clinical data, a comparative study of break down of chondral plate and annulus fibrosa were carried on.

Key words Lumbar Break down of chondral plate Imaging diagnosis

(Original article on page 3)

Clinical analysis of operative treatment of senile prolapse of lumbar intervertebral disc Zhou Zhang — wu et, al. Affiliated Hospital of Anhui College of TCM(230031)

Twenty eight cases of senile prolapse of lumbar intervertebral disc operated with total laminectomy, removal of the nucleus, cutting off the thickening ligamentum flavum etc. with satisfactory results. Operative technique, clinical characteristics and rehabilitation were discussed. Key words Prolapse of lumbar intervertebral disc

Key Words Operative treatment Senile person

(Original article on page 6)

Study on large amount of Schwann's cell obtained in the culture of scattered andlock implantation method Li Yi — kai, Shi Yin — yu, Shi Guan — tong Shu Guang Afiliated Hospital, Shanghai University of TCM(200021)

SD suckling rat sciatic nerve even paste was cultured separately, on the basis of differential adhesion stick wall, combined application of low concentration serum and anticlaveage agent to inhibit and diminish quick cleavage of the fibroblast in order to obtain pure Schwann's cell. Meanwhile suckling and clamp injured juvenile rat were used in repeatedly implantation cul-

ture. Through immunohistochemical stain (anti—S—100 protein) proved that the growing cell is Schwann's cell.

Key words Schwann's cell Sciatic nerve Immunohistochemical method

(Original article on page 8)

Prolapse of lumbar intervertebra disc treated by tridimensional multifunctional traction Bi Da — wei, Zheng Han — guang, Qian Ying Hangzhou Red Cross Hosqital(310004)

One hundred and fourteen cases of prolapse of lumbar inner vertebral disc were treated by tridimensional multifunctional traction and epidural space instillation, the total near efficiency being 91%. It is realized that lumbar intervertebral disc bears tridirectional axis of motion, thus according to biomechanical principle tridimensional joint traction could exert fully stress on the intervertebral disc and the prolapsed disc could be reduced through quick traction so long as protruded disc had not been adhered by surrounding tissues or didn't bear degenerative changes or break down. Based on chemical neuritis theory, epidural space continuous instillation of the nerve root. It is an effective supplementary therapy.

Key words Traction therapy Epidural instillation Prolapse of lumbar intervertebral disc

(Original article on page 12)

Fracture of mid—lower segment of the humerus treated with over—joint splint fixation and hanging plaster of Paris Pu Xing — hai First Afiliated Hospital, Lanzhou College of Medical Science(730000)

Twenty seven cases of fracture of mid—lower segment of the humerus were treated with over—joint splint fixation plus hanging plaster of Paris. Follow—up study with X—ray and they were all healed within 6—8 weeks. No delayed union or non—union was found. It is realized that combination of the abovetwo methods bears the advantage of fixation and traction, maintaining the stability of the fracture, alleviation of local shear force and promoting healing.

Key words Fracture of mid—lower segment of the

humerus Over — joint splint fixation Hanging traction of plaster of Paris

(Origind article on page 29)

Biomechanical study and evaluation of therapeutic methods of patellar fracture Yang Shu — hua Du Jing — yuan Luo Huai — can Liu Ji — ren Xiehe Hospital of Tongji University of Medical Science(430022)

Patellar fracture usually occur under distraction, three point bending of the patellar and direct blows. Operative treatment is necessary in which displacement ex-

cessmore than 2mm and may include open reduction and internal fixation. We have presented a new technique for the stabilization of patellar fractures that has provided superior results of 64 cases in biomechanics and clinical study. Provisional stabilization of the fracture can usually be obtained with dirschner wires. Definitive fixation can be achieved with wires. The modified tension — band technique has provided the best stability and the tension — band technique is recommended.

Key words Fracture of patellar Biomechanics Tension — band technique

(Origind article on page 34)

胎盘填塞治疗跟骨骨髓炎皮肤溃疡一例

新疆维吾尔自治区人民医院 (830001) 陈文福

××, 女, 46岁。1963年因右足跟皮肤撕脱伤给予清创缝合, 伤口愈合。1979年在劳动中右足跟皮肤被磨破, 出现溃疡, 在它院行小腿交腿皮瓣, 2个月后愈合。1991年初右足跟肿痛, 皮肤溃疡, 有脓性分泌物, 来我院门诊拍片示:“右足跟骨骨髓炎, 皮肤溃疡”, 收住院。

查体: 一般情况好, 心肺正常, 右足轻度下垂, 足跟2×2cm 圆形皮瓣存活组织, 其周围及足底干性坏死组织高低不平, 散在糜烂组织, 脓性分泌物, 边缘纤维瘢痕组织约5×4cm。入院后一周行坏死组织切除, 跟骨钻孔术, 凡士林纱布填塞。3周后行扩创小腿带蒂筋膜皮瓣转移术, 术后皮瓣坏死, 经抗炎, 换药, 无肉芽组

织生长, 皮肤仍溃疡。8周后行清创, 利用无菌胎盘绒毛反复冲洗, 剪碎, 加入2g 菌必治填入创面, 外敷油纱布包扎。一周后换药, 大量肉芽组织生长, 颜色鲜红, 并有多处出血点, 经换药, 2周后肉芽组织长平, 行游离植皮术。10天后换药, 游离皮瓣存活, 观察一周出院, 随访三年皮肤正常。

体会 胎盘组织可刺激肉芽组织生长及新生毛细血管生长, 此法简单、易行, 病人易接受, 在没有显微外科技术的条件下, 利用此方法可能解除病人痛苦。作者曾采用胎盘填塞治疗其它部位骨髓炎, 均收到满意效果。