

学术探讨

B 超直方图检测骨愈合初步研究

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本研究旨在以 B 超直方图量化检查骨愈合过程,现将初步研究结果报告如下。

资料与方法

本院门诊及病房收治的 20 例病人,33 处骨折,共检测 90 余次。男 17 例,女 3 例,年龄 20~57 岁;骨折部位:胫腓骨 7 例,股骨 6 例,其余为下颌骨、肱骨、尺桡骨、腕骨等部位;检测方法:骨折复位固定后 1 周开始检查,每周 1 次;观察内容:骨皮质中断的间隙大小,水肿大小及骨折周围情况,骨折断端修复情况及形态学变化;直方图检测:在骨折部位选择一固定采样区域,检测其内的灰阶参数。

使用 EUB-400 超声波仪,选用 5.0MHZ 探头。为了使检测准确,每次检测均使用同一条件(总、近、远增益)、亮度、深度及采样部位,由专人操作记录。每次检测均同时以身体健侧作对照比较。

表 1 直方图检测不同周数股骨骨折愈合值
(平均值±标准差)

周数	例数	平均灰阶值(db)	最大频数(db)
1	5	7.400±2.408	5.400±2.792
2	5	13.00±3.162	11.400±4.669
4	6	16.333±4.320	14.833±7.521
6	3	20.333±2.309	21.000±1.000

总体方差: $F=2.7950(P<0.01)$;第 1 周与第 2 周比较: $F=3.79(P<0.0323)$ 第 1 周与第 4 周比较: $F=8.89(P<0.0014)$ 第 1 周与第 6 周比较: $F=10.53(P<0.0007)$

表 2 直方图检测不同周数胫骨骨折愈合值
(平均值±标准差)

周数	例数	平均灰阶值(db)	最大频数(db)
1	6	8.833±4.020	7.166±3.544
2	7	13.142±1.573	12.285±2.288
4	5	17.400±1.816	14.600±3.286
6	5	18.400±1.516	18.200±3.30

总体方差: $F=4.4471(P<0.0001)$ 第 1 周与第 2 周比较: $F=3.37(P<0.0349)$ 第 1 周与第 4 周比较: $F=6.85(P<0.0021)$ 第 1 周与第 6 周比较: $F=11.83(P<0.0001)$

结 果

B 型超声在骨愈合早期可见到明显的骨皮质连续性中断、移位及碎骨回声反射,可测量骨折间隙,血肿

大小、观察骨折断端复位情况,不同周次观察,可见到骨折部位的不同的回声变化和局部骨痂形成的范围、形态改变,回声的改变可由直方图灰阶量的变化而数字化显示,该项直方图值统计学分析结果见表 1 和表 2。

讨 论

通常判断骨折是依靠 X 线检查。但在骨愈合早期及骨痂形成初期,X 线不能显示骨愈合情况,即使到了 X 线可显示时期,X 线对骨的愈合情况也难以数字化。临床上许多骨不连或延迟愈合的问题出现在骨愈合的早期,等到发现已为时太晚^[1]。B 超直方图检测可填补骨愈合早期缺乏客观检查指标的空白。

直方图对超声图像采样区内各不同强度回声进行灰阶数量化。B 超观察骨折部位的回声改变,限于人们目力对灰阶的分辨能力,缺乏客观标准,基本上仍处于凭借经验对图像进行主观分析的阶段^[2]。为使图像中的微观信息可视化,采用直方图对局部回声进行定量检测,提高了超声显像的诊断能力和精确度^[3]。日本学者伊东统一等^[3]对超声图像的直方图诊断进行了一系列研究证明,这是一种有效的方法,具有定量的意义,为图像的观察、对比和统计提供了客观的数据。本研究检测的数据经国际著名通用统计分析软件 SAS 系统进行了多元方差分析,主因子分析,结果可靠。从中可以看出骨愈合各不同周次灰阶值的变化趋势,总体及各周比较均有显著性差异。直方图各灰阶参数中平均值相关矩阵的特征值为 56%,最大频数为 26%,二者已包括总信息量的 82%。

骨愈合早期行 B 超直方图检测,可使临床医生及患者随时了解骨愈合的动态变化,其精确度较高,提供了量化指标,尤其对于骨愈合早期的检测更显示出其实用价值,解决了一个临床早已期待解决的问题。

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Abstract of Original Articles

Study on pathogenesis of derangement of lumbar posterior intervertebral facet joint and biomechanics of manipulative treatment

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A microsensor was embedded to detect the displacement and receiving forces from lumbar posterior intervertebral facet joints with various postures. The results indicates that the degree and direction of displacement is influenced by morphology of the articular process, during motion of the spine, the intra—pressure of facet joints is concentrated on the superior and inferior ends of the facet joint. During instability of certain segment of the joint, there will be an increasing of around 8 times of intra—pressure within the facet joints. Results of measurement of mimic rotatory manipulative reduction indicate that there are undulant changes within the intra—pressure of posterior facet joints. All—round direction movements of the inferior facet joint toward upward — forward — downward — backward have been found. Based on the viewpoint of bio—mechanics, the pathogenesis of derangement of lumbar posterior intervertebral facet joint and principle of manipulative treatment are explored by authors.

Key Words Derangement of lumbar posterior intervertebral facet joint Microsensor
Biomechanics Principle of manipulative treatment

(Original article on page 5)

A retrospective study on the fracture and dislocation of the thoracic and lumbar spine complicated with paraplegia

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Forty three cases of fracture and dislocation of the thoracic and lumbar spine complicated with paraplegia was studied retrospectively by authors. Among them, 15 were complete paraplegia; 28, incomplete paraplegia. The rate of improvement was 26.7% in the former, and 71.4% in the latter. A comment among the relationship of segment of spine, spinal cord and nerve root, determination the nature of spinal cord injury and reduction of internal fixation and route of decompression of the cord were discussed.

Key Words Fracture of thoracic and lumbar spine Dislocation of thoracic and lumbar spine
Paraplegia Integration of traditional Chinese and modern medicinal therapy

(Original article on page 9)

Experimental study and clinical observation on ankylosing spondylitis treated with Chinese drug Feng Shi Ling

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Animal experiments mimic as ankylosing spondylitis treated with Chinese drug Feng Shi Ling showed that there is an anti—anti-inflammatory action on edematous foot induced by Irish moss glue, and prominent inhibitory action of the allergic inflammatory reaction and inhibiting

hemolysin and reaction with increasing weight of the spleen and thymus produced by late allergic reaction as well. Among 38 cases of patients, the therapeutic results indicated that 10 were alleviated; 17, markedly improved; 9, improved; 2, in effective.

Key Words Feng Shi Ling Ankylosing spondylitis Traditional Chinese medicinal therapy

(Original article on page 12)

A study on stress adaptability of fracture healing

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A sliding mechanical loading controller with strong physiological adaptability was designed without stress shading of the fracture site. The muscle force and body weight exerted on the extremity thus were treated as the dynamic source of the mechanical loading. The force condition of the fracture site during functionally moving and over whole healing progress of the rabbits were recorded with force transducers and related amplifiers etc. The experiments indicated that the compressive force of the fracture site changed in relation with the muscle contraction and moving of the gait, the mean load increased along with the time prolonged, and the loading on the sliding mechanical loading controller gradually decreased from 2.4 kg in average on the day of operation to that of 0.78 kg till 5 weeks on the fractured tibia during healing process. On the other hand, under anatomical microscopic observation, the original fracture site is thoroughly enrolled by external callus, thus it is realized that the force changed on the fracture site indicating functional recovery of the extremity, and a reflection of compressive loading sustained by the callus on the fracture site. It is suggested that the muscle contract during functional training in time and body weight bearing after fixation of the fracture may offer an optimized mechanical environment, a physiological stress condition.

Key Words Fracture healing Biomechanics

(Original article on page 16)

Preliminary study of fracture healing detected by B ultrasonic histogram

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More than 90 tests of 33 places of fracture in 20 patients with B ultrasonic histogram were detected. Echo and morphological changes with various period of bone-healing could be revealed with B ultrasonic examination. Quantitative measurements were undertaken via histogram. The color parameter of early stage of bone healing is processed with international statistical analytical system(SAS) to analyze multivariate and principal component analysis. The results showed that the method provide a scientific quantitative index in bone healing clinically, and it is earlier than X ray and without radiating hazard. It widens B ultrasonic application in the field of orthopaedics.

Key Words B ultrasonic Histogram Bone healing

(Original article on page 37)