

Answering reviewers

Thank you very much for your valuable suggestions. I have revised the full text and references according to the review comments. Since there are three references without PMID or DOI, I provide the first page of the corresponding paper.

RESEARCH ARTICLE

Risk of Spermatic Cord Injury During Anterior Pelvic Ring and Acetabular Surgery: An Anatomical Study

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Abstract

Background: Anterior pelvic ring surgery includes a variety of plating techniques and insertion of retrograde superior pubic ramus screws. Anterior acetabular surgery also includes fixation through an ilioinguinal or Stoppa approach. These exposures risk injury to the spermatic cord and accompanying genital branch of the genitofemoral nerve. The primary aim of this study was to identify the distance between the midline and the spermatic cords in adult male cadaveric specimens. The secondary aim was to determine spermatic cord diameters and measure the distance between the spermatic cord and implant during instrumentation of a retrograde superior pubic ramus medullary screw.

Methods: Extended Pfannenstiel and Stoppa approaches were performed on 18 embalmed male cadavers bilaterally. Spermatic cord characteristics were recorded and a number of measurements were performed to determine the distance of implants and the midline from the spermatic cord.

Results: The average distance between the midline and spermatic cords was 34.2 mm. The average distance between the spermatic cord and implant was 18.2 mm. Eleven of the thirty-six dissections had abnormalities including cord lipomas and inguinal hernias. The average cord diameter was 18.6 mm. The average cord diameter in those with abnormalities was 24.9 mm and 16 mm in those without abnormalities, this difference was statistically significant.

Discussion: Due to the proximity of the spermatic cord, the surgeon should either formally expose the cord or limit lateral dissection from the midline during Pfannenstiel and Stoppa exposures. Similarly, the surgeon should use soft-tissue sleeves and oscillating drills to avoid injury to the contralateral spermatic cord during the insertion of retrograde superior pubic ramus medullary screws.

Key Words: Acetabular surgery, Ilioinguinal approach, Retrograde ramus screw, Spermatic cord, Stoppa

Introduction

Anterior pelvic ring fracture surgery includes a variety of fixation techniques including plating, external fixation, and insertion of retrograde superior pubic ramus medullary screws (1-4). Anterior acetabular surgery also includes reduction and fixation through an ilioinguinal or Stoppa approach (5-8). These exposures risk injury to the spermatic cord and accompanying genital branch of the genitofemoral nerve as they pass anterior to the superior pubic ramus [Figure 1].

Both the Pfannenstiel and Stoppa approaches access

the anterior pelvic ring through the central raphe of the rectus abdominus muscle (5, 9, 10). Identification of this interval requires dissection anterior to the external oblique aponeurosis and medial to the spermatic cords. Because neither approach requires direct identification of the spermatic cord, the cord may be injured inadvertently when dissection, retraction, or other maneuvers extend too lateral from the midline. However to our knowledge, the average distance from the pubic symphysis to the spermatic cord has not been previously reported. The spermatic cord may also be injured during

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3D 导航技术下经皮骶髂关节螺钉内固定治疗骶髂关节复合体损伤



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【摘要】 目的 探讨 3D 导航技术下经皮骶髂关节螺钉内固定治疗骶髂关节复合体损伤的临床疗效。方法 回顾性分析 2015 年 3 月至 2016 年 1 月收治且获得随访的 30 例骶髂关节复合体损伤患者资料。男 22 例,女 8 例;年龄为 25~63 岁,平均 44.2 岁。骨折按 Tile 分型:B 型 14 例,其中 B1 型 6 例,B2 型 6 例,B3 型 2 例;C 型 16 例,其中 C1 型 9 例,C2 型 5 例,C3 型 2 例。3 例术前合并腰骶干损伤患者采用前路钢板联合 3D 导航技术下经皮骶髂关节螺钉内固定,其余 27 例患者采用 3D 导航技术下经皮骶髂关节螺钉内固定。记录每枚螺钉置入时间、X 线暴露时间,术后应用 Matta 放射学标准评定骨折复位质量,末次随访时采用 Majeed 评分标准评定骨盆功能。结果 30 例患者在 3D 导航系统辅助下共置入 36 枚骶髂关节螺钉。术中每枚螺钉置入时间为 28~40 min(平均 33.2 min),术中 X 线暴露时间为 1.2~2.5 min(平均 1.4 min)。置钉处手术切口均未发生感染。术后骨折复位质量依据 Matta 评分标准评定:优 16 例,良 11 例,可 3 例,优良率为 90.0%。术后 X 线片、CT 三维重建示内固定均稳定,置入螺钉无断裂、松动及脱出。30 例患者术后获 6~12 个月(平均 10.6 个月)随访。末次随访时根据 Majeed 评分标准评定骨盆功能:优 17 例,良 8 例,可 4 例,差 1 例,优良率为 83.3%。结论 3D 导航技术下经皮骶髂关节螺钉内固定治疗骶髂关节复合体损伤的疗效良好,具有手术创伤小、简便、快速等优点。

【关键词】 骶髂关节; 创伤和损伤; 骨折固定术,内; 骨钉; 外科手术,计算机辅助

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Three-dimensional navigation for placement of percutaneous sacroiliac joint screws in internal fixation of sacroiliac complex injury Wang Xiaozhen, Meng Chengfei, Wang Guodong, Wu Gang, Wang Feng, Liu Ximing, Cai Xianhua

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【Abstract】 **Objective** To investigate the clinical results of three-dimensional navigation for placement of percutaneous sacroiliac joint screws in the internal fixation of sacroiliac complex injury. **Methods** A retrospective study was conducted of the 30 patients who had been treated for sacroiliac complex injury from March 2015 to January 2016 and fully followed up. They were 22 males and 8 females, aged from 25 to 63 years (average, 44.2 years). According to Tile classification for pelvic fractures, there were 14 cases of type B (type B1 in 6, type B2 in 6 and type B3 in 2), and 16 cases of type C (type C1 in 9, type C2 in 5, and type C3 in 2). Three cases complicated with preoperative injury to lumbosacral trunk were treated with anterior plate and percutaneous sacroiliac joint screws; the other 27 cases with internal fixation with percutaneous sacroiliac joint screws. The placement of screws was aided by three-dimensional navigation. The time for each screw placement and X-ray exposure was recorded intraoperatively. Postoperative reduction quality was assessed using Matta radiological criteria and Majeed criteria was used at the final follow-ups to evaluate the pelvic function. **Results** Altogether 36 sacroiliac joint screws were inserted in the 30 patients under three-dimensional navigation. The time for each screw placement ranged from 28 to 40 minutes (average, 33.2 minutes); the intraoperative X-ray exposure time ranged from 1.2 to 2.5 minutes (average, 1.4 minutes). No infection occurred at either incision or placement site. According to Matta radiological criteria,

计算机导航辅助下髋臼骨折的微创治疗

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【摘要】 目的 探讨计算机导航辅助下对髋臼骨折采用经皮或有限切开复位微创治疗的疗效。
方法 2006 年 6 月至 2009 年 10 月对 17 例髋臼骨折患者根据骨折类型和患者一般情况采取闭合或有限切开复位,髋臼前后柱螺钉固定。其中男 12 例,女 5 例;年龄 19~66 岁,平均 45.6 岁。所有固定柱的空心螺钉均在导航系统指导下置入。术后第 2 天开始下肢功能锻炼。计算平均置入 1 枚髋臼前后柱螺钉所需时间、透视次数及新鲜髋臼骨折手术出血量。**结果** 本组患者共置入 29 枚螺钉,平均置入 1 枚螺钉所需时间为 34 min,透视次数为 29 次。新鲜骨折中未切开复位患者出血量低于 50 mL,有限切开复位患者出血量平均为 350 mL。所有患者术后随访 6~60 个月,平均 30 个月。按照 Matta 功能评分平均为 16.1 分,优良率为 82.4%。按照 Matta 放射评分优良率为 94.1%。无神经、血管损伤并发症发生。**结论** 计算机导航辅助下对髋臼骨折实施闭合复位或者有限切开复位,空心螺钉固定的微创治疗,疗效满意,同时大大减少手术相关并发症。

【关键词】 髋臼; 骨折; 外科手术; 计算机辅助; 外科手术,微创性

Image-based computer navigation in minimally invasive treatment of acetabular fractures ZHAO Chun-peng, WANG Jun-qiang, SU Yong-gang, et al. Department of Orthopaedics and Traumatology, Beijing Jishuitan Hospital, Beijing 100035, China
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【Abstract】 Objective To explore the efficacy of minimally invasive treatment of acetabular fractures assisted by image-based computer guidance system. **Methods** From June 2006 to October 2009, closed or limited open reduction and screw fixation of the anterior and posterior acetabular columns were performed in 17 cases of acetabular fracture depending on their fracture type and general condition. They were 12 men and 5 women, aged from 19 to 66 years (average, 45.6 years). All cannulated screws were inserted under the guidance of image-based computer navigation system. Rehabilitation program started on day 2 postoperation. Time for each screw insertion, radiation exposure and intraoperative blood loss were documented. **Results**

In this series, altogether 29 screws were inserted. On average each insertion required 34 minutes and 29 radiation exposures. The mean intraoperative blood loss was less than 50 mL for patients undergoing closed reduction and 350 mL for patients undergoing limited open reduction. All the patients were followed for an average of 30 months (from 6 to 60 months). By Matta system, this series had a mean functional score of 16.1, a good to excellent function rate of 82.4% and a good to excellent radiological rate of 94.1%.

Conclusion In treatment of acetabular fractures, percutaneous or limited open reduction aided by computer navigation system can largely reduce complications and radiation exposure and thus improve clinical efficacy.

【Key words】 Acetabulum; Fractures; Surgery, computer-assisted; Surgical procedures, minimally

对于骨科医生而言,手术治疗髋臼骨折是一项巨大挑战。对于有移位的、涉及髋臼顶部的伴有关节内骨块的髋臼骨折,切开复位内固定术是治疗的金标准^[1-2]。经典的髋臼内固定手术操作产生的并发症往往并非来源于骨折本身,而主要来源于手术操作。

另外,对于多系统创伤、烧伤、皮肤剥脱、同侧肢体损伤、简单骨折类型、高龄或合并其他一些疾患的患者,不适于采用传统的手术治疗,可能需要另外一种治疗方法。同时,长时间的卧床牵引经常是这些患者的禁忌证。对于某些相对复杂的涉及髋臼前后柱骨折患者,以往往往需要采用前后联合入路完成骨折复位与固定。目前为减少手术创伤,很多医生希望能够通过单一髂腹股沟入路对髋臼前后柱骨折同时进行固定,

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