

低分子肝素预防后路单节段腰椎固定融合术后下肢血栓形成的回顾性研究

赵永华¹, 罗昊¹, 西永明^{2*}

¹青岛大学第一临床医学院, 山东 青岛

²青岛大学附属医院脊柱外科, 山东 青岛

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摘要

目的: 探讨在后路单节段腰椎固定融合术后预防性应用低分子肝素疗效分析。方法: 回顾性分析2021年1月~2022年11月于青岛大学脊柱外科收治并实施后路单节段腰椎椎间融合术(Posterior lumbar interbody fusion, PLIF)手术的腰椎退变性疾病病人171例, 根据手术24小时后是否开始应用低分子肝素皮下注射分为实验组90例和对照组81例, 术前经双下肢血管彩色多普勒超声检查确认均无血栓形成; 实验组均自手术24小时后开始应用低分子肝素5000 IU皮下注射, 1次/日, 进行抗凝治疗, 至下地活动后停用。所有病人均于术后下地活动时复查血凝及部分进行双下肢血管超声评估有无DVT形成。观察两组病人术后DVT的发生率、术后切口引流量、伤口血肿情况及D-二聚体等情况。结果: 对照组病人中术后未发生DVT, 2例出现下肢肌间静脉血栓, 发生率约为2.5% (2/81); 实验组病人术后未发生DVT。实验组和对照组病人术后切口引流量分别为358.56 mL和354.32 mL, 实验组的术后引流略多于对照组, 差异没有统计学意义, 应用低分子肝素并不明显增加术后引流量, 实验组的D-二聚体的增长幅度为224.44, 对照组的D-二聚体的增长幅度为380.99, 差异有统计学意义($P < 0.05$), 实验组的D-二聚体增长幅度明显小于对照组, 均未见椎管内及切口血肿及无术后神经损伤症状。结论: 腰椎退变性疾病病人往往手术后存在下肢静脉血栓形成风险, 可常规预防性应用低分子肝素, 术后未出现切口引流量增多及血肿形成等明显并发症。

关键词

腰椎融合术, 深静脉血栓, 低分子肝素, 术中出血量, 术后引流量

*通讯作者。

A Retrospective Study of Low Molecular Heparin for the Prevention of Postoperative Lower Extremity Thrombosis after Posterior Single-Segment Lumbar Fixation and Fusion Surgery

Yonghua Zhao¹, Hao Luo¹, Yongming Xi^{2*}

¹The First Clinical Medical College of Qingdao University, Qingdao Shandong

²Department of Spine Surgery, The Affiliated Hospital of Qingdao University, Qingdao Shandong

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Abstract

Objective: To investigate the efficacy of postoperative prophylactic application of low molecular heparin in posterior single-segment lumbar interbody fusion. **Methods:** 171 patients with lumbar degenerative diseases who were admitted to the Department of Spine Surgery of Qingdao University and underwent posterior single-segment lumbar interbody fusion (PLIF) from January 2021 to November 2022 were retrospectively analyzed and divided into 90 cases in the experimental group and 81 cases in the control group according to whether or not they started to apply low-molecular heparin subcutaneously 24 hours after surgery. The experimental group consisted of 90 patients and the control group consisted of 81 patients, all of whom were confirmed to be free of thrombosis by color Doppler ultrasound examination of the blood vessels of both lower limbs before the operation; the experimental group was treated with anticoagulation by subcutaneous injections of 5000 IU of low molecular heparin once a day starting 24 hours after the operation, and then discontinued after going down to the ground for activities. All patients were rechecked for blood coagulation and some of them underwent bilateral lower extremity vascular ultrasound to evaluate the presence of DVT formation at the time of postoperative activities. The incidence of postoperative DVT, postoperative incisional drainage, wound hematoma and D-dimer were observed in both groups. **Results:** In the control group, no DVT occurred after surgery, but 2 cases of intermuscular vein thrombosis in the lower limbs occurred, and the incidence rate was about 2.5% (2/81); in the experimental group, no DVT occurred after surgery; the postoperative incisional drainage flow of the experimental group and the control group was 358.56 mL and 354.32 mL, respectively, and the postoperative drainage flow of the experimental group was slightly more than that of the control group, but the difference was not statistically significant, and the application of low molecular heparin did not significantly increase the postoperative drainage flow, and the application of low molecular heparin did not significantly increase the postoperative drainage flow. The application of low molecular heparin did not significantly increase the postoperative drainage flow. The increase of D-dimer in the experimental group was 224.44, and the increase of D-dimer in the control group was 380.99, and the difference was statistically significant ($P < 0.05$), and the increase of D-dimer in the experimental group was significantly smaller than that of the control group, and there were no intradural and incisional hematomas and no symptoms of postoperative neurological injury. **Conclusion:** Patients with lumbar degenerative diseases are often at risk of lower extremity venous thrombosis after surgery, and low molecular heparin can be applied routinely and prophylactically, and no obvious complications such as increased incisional drainage and hematoma formation were seen after surgery.

Keywords

Lumbar Fusion, Deep Vein Thrombosis, Low Molecular Heparin, Intraoperative Bleeding, Postoperative Drainage

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1. 引言

随着全球进入老龄化社会, 脊柱退变性疾病发病率逐年上升, 其中以腰椎退行性疾病最为常见。目前, 后路腰椎椎间融合术(Posterior lumbar interbody fusion, PLIF)仍然是脊柱外科最经典的腰椎融合术式之一[1], 该术式通过后入路切除双侧椎板和关节突内侧部分, 向中线牵开硬膜囊和行走神经根, 显露并切除椎间盘, 椎间隙植入植骨材料, 完成椎体间融合, 达到恢复椎间高度、神经减压、重建腰椎稳定的目的, PLIF 能提供稳定的三维矫形, 可更好地恢复腰椎正常生理曲度, 充分减压神经根[2]。PLIF 术后患者一般需要严格卧床休息 3~5 天, 容易导致坠积性肺炎、泌尿系感染、深静脉血栓(DVT)形成等一系列并发症[3], 如果不能有效的预防并发症的发生, 极大可能会导致住院周期延长, 甚至有生命危险, 给患者及其家属带来严重后果。研究发现, 深静脉血栓形成(DVT)是一种潜在的致命并发症, 是手术后常见的并发症, 发生率为 0.2%~31.2% [4], 骨科患者发生 VTE 的风险很高。脊柱手术后静脉血栓的发生率从 0.2%到 13.6%不等[5]。目前, 不同作者报道腰椎融合术后 DVT 的发生率差异性较大, 术后下肢 DVT 的发生率为 0.7%~15.5% [6] [7] [8], 针对 PLIF 手术, 围手术期的抗凝是一大注意要点。目前, 针对脊柱手术国内外尚无公认的脊柱术后 DVT 的预防指南及标准的临床预防方案, 以经验治疗为主。研究表明, 有效的抗凝预防措施可降低 VTE 的发生率及死亡率[9], 低分子肝素因其具有抗凝效果好、半衰期长、患者抗凝剂量差异小的特点, 在临床中得到广泛应用[10], 同时低分子肝素在与抗凝血酶 III 结合后对抗凝血酶 Xa 的选择较高, 可选择性抑制抗凝血酶 Xa 的活性, 对其他凝血因子影响较小, 因此低分子肝素的抗血栓作用较强, 降低血液粘度, 加速血液流动[11], 在预防外科手术术后 DVT 方面具有良好作用, 但由于可能存在的椎管内出血、血肿形成等风险, 对于术后是否需抗凝治疗也存在较多争议。本研究探讨低分子肝素预防腰椎单节段融合术术后下肢 DVT 的临床疗效, 为临床应用提供临床指导。

2. 资料与方法

2.1. 一般资料

收集 2021 年 1 月至 2022 年 11 月青岛大学附属医院行腰椎单节段融合的患者临床资料。纳入标准: (1) 采用经后路腰椎管减压、植骨融合内固定术治疗的腰椎退行性疾病; (2) 术前筛检无下肢 DVT; (3) 既往无凝血功能障碍; (4) 术前未使用影响凝血系统的药物。排除标准: (1) 大于 80 岁患者; (2) 术前双下肢不能活动; (3) 腿部有严重的下肢血管性疾病。根据纳入与排除标准, 最终纳入 171 例患者。根据干预方式不同进行分组, 分为术后应用低分子肝素(n = 90)、术后未应用低分子肝素(n = 81), 见图 1。两组患者临床特征比较, 差异无统计学意义($P > 0.05$), 具有可比性。

2.2. 方法

实验组及对照组均实行后路腰椎管减压、植骨融合内固定术, 实验组患者于术后 24 小时给予低分子

肝素 5000 IU, 1 次/日, 术后连续使用至下地活动, 对照组患者围手术期未给予低分子肝素治疗。

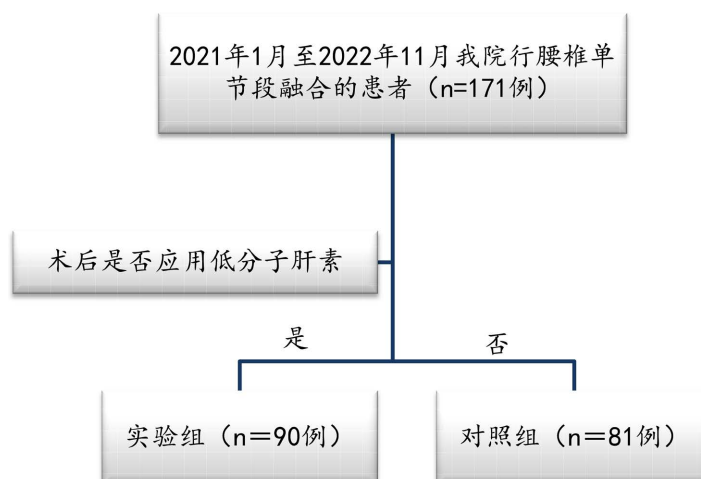


Figure 1. Flowchart of experimental groups
图 1. 实验分组流程图

记录手术时间、手术出血量及术后引流量, 两组患者分别于术前, 术后下地时空腹采集静脉血, 定量检测 D-二聚体(D-dimer, D-D)。每天观察患者术后双下肢是否肿胀, 是否有沉重、疼痛感, 对伴有下肢疼痛, 尤其活动后加重者行体格检查, 观察皮肤的色泽、压痛、足背动脉搏动、末梢毛细血管反应, 患者是否有呼吸困难、胸痛、晕厥、咯血等, 有症状者及时复查 D-二聚体、双下肢静脉超声, 必要时复查下肢静脉造影。

2.3. 统计学方法

应用 SPSS 软件对数据进行分析, 计量资料以 $(\bar{x} \pm s)$ 表示, 组间比较采用卡方检验; 计数资料以 n 表示, 组间比较采用独立样本 t 检验; 以 $P < 0.05$ 为差异有统计学意义。

3. 结果

3.1. 患者一般资料

收集 2021 年 1 月至 2022 年 11 月青岛大学附属医院行腰椎单节段融合的纳入 171 例患者临床资料, 两组患者临床特征比较, 见表 1, 差异无统计学意义($P > 0.05$), 具有可比性。

Table 1. Comparison of patients' clinical data

表 1. 患者临床资料比较

临床特征	实验组(n = 90)	对照组(n = 81)	t/χ^2	P
性别				
男性	37	34		
女性	53	47	0.013	0.909
年龄(岁, $\bar{x} \pm s$)	57.92 ± 9.92	60.56 ± 9.64	-1.765	0.079
体重指数(kg/m ² , $\bar{x} \pm s$)	25.93 ± 3.17	25.98 ± 3.60	-0.090	0.928
高血压病史				
是	17	25		
否	73	56	3.3	0.069

续表

糖尿病病史				
是	8	6		
否	82	75	0.124	0.724
高血脂病史				
是	11	6		
否	79	75	1.104	0.293
心血管疾病病史				
是	8	3		
否	82	78	1.904	0.168
手术时间(min)	117.51	115.49	0.671	0.503
术中出血量(mL)	156.11	142.04	1.482	0.141

3.2. 术后引流量、DVT 发生率比较及 D-二聚体增长幅度比较

实验组和对照组病人术后引流量分别为 358.56 mL 和 354.32 mL, 实验组的术后引流量略多于对照组, 差异没有统计学意义, 所以, 术后常规应用低分子肝素并不明显增加术后引流量。实验组及对照组均未见椎管内及切口血肿及无术后神经损伤症状。

对照组病人中术后未发生 DVT, 2 例出现下肢肌间静脉血栓, 发生率约为 2.5% (2/81); 实验组病人术后未发生 DVT 和下肢肌间静脉血栓。D-二聚体是在 VTE 中具有重要意义的凝血指标。作为内源性纤维蛋白溶解的标志物, 反映人体高凝、纤溶亢进, 升高的 D-二聚体通常表明存在血栓形成。实验组的 D-二聚体的增长幅度为 224.44, 对照组的 D-二聚体的增长幅度为 380.99, 差异有统计学意义($P < 0.05$), 实验组的 D-二聚体增长幅度明显小于对照组。

4. 讨论

不同的骨科手术 VTE 发病率并不相同, 在髋关节或膝关节置换术发生 VTE 的风险较高, 约 2.4%~6.5% [12] [13], 在上肢骨折手术中 VTE 的发病率还是比较低的, 约 0.19% [14]。目前, 随着脊柱退行性疾病的发病率及手术率逐年增多, 关于脊柱术后 VTE 的研究越来越多, 但是现在目前脊柱手术后 DVT 的发生率尚不十分确切。预防性抗凝治疗已被证明可以最大限度地降低全髋、全膝关节置换术后 DVT 发生率[15] [16] [17], 但是考虑到脊柱解剖的特殊性, 抗凝可能存在椎管内出血风险及血肿形成, 进而出现脊髓及神经根功能障碍, 产生严重且难以修复的后果。所以, 脊柱手术术后是否进行抗凝治疗的争议仍然存在。

脊柱退变性手术往往创伤较大, 麻醉及手术时间长, 出血较多, 都有可能导导致术后的 DVT 和下肢肌间静脉血栓形成[18], 原因可能与血管内皮功能受损、凝血功能增加、血液粘度增加、静脉血流迟缓等因素密切相关[19] [20]。有研究发现, 使用阿司匹林、华法林或低分子肝素显著降低深静脉血栓的发生率 [21], 而不会增加术后脊髓硬膜外血肿的风险。还有人建议在高危患者术前放置下腔静脉滤器。然而目前预防性抗凝治疗尚未被脊柱外科医生广泛接受, 有研究发现在接受低分子肝素治疗的人群中, 硬膜外血肿的风险几乎是肺栓塞风险的八倍。因为脊柱手术范围可变性大, 患者临床特征多样性, 现在仍没有足够的证据支持或反对在常规择期脊柱手术中使用抗凝剂。所以很多脊柱外科医生不轻易使用抗凝药物进行常规预防, 仅使用机械方法预防 VTE [4]。

目前, 腰椎固定融合术后卧床及腰椎退变性疾病病人年龄往往较高合并高血压、糖尿病等多种基础疾病, 腰椎固定融合术后的抗凝治疗有其必要性和临床价值。我们根据术后是否使用低分子肝素将其分为实验组和对照组, 采用皮下注射的方式, 可以降低双下肢血栓形成的风险且病人术后切口引流量无

明显增加, 未见椎管内血肿及术后神经损伤等严重并发症。本研究表明, 对腰椎后路病人术后常规进行预防性低分子肝素抗凝治疗是有效和安全的。但是由于研究的回顾性设计、样本量相对较少、观察指标有限等缺点, 可能限制了统计分析的准确性, 希望这些数据可以作为进一步研究的基础, 接下来我们可以进行前瞻性研究来确认术后 DVT 危险因素并为接受择期脊柱手术的患者制定个性化预防静脉血栓栓塞性疾病的安全抗凝方案, 将围手术期 DVT 发生率降到最低。

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