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论 著

侧卧位与俯卧位椎板间入路椎间孔镜治疗 单纯L₅/S₁椎间盘突出症的对比研究*

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摘要: **目的** 对比侧卧位(LDP)与俯卧位(PP)椎板间入路椎间孔镜治疗单纯L₅/S₁椎间盘突出症(LDH)的有效性及安全性。**方法** 回顾性分析2017年1月—2018年1月该院51例行椎间孔镜手术治疗的单纯L₅/S₁ LDH患者的临床资料。根据术中体位不同分为LDP组和PP组。LDP组($n=20$)男12例,女8例,年龄33~78岁,平均(54.33±9.13)岁;PP组($n=31$)男18例,女13例,年龄30~68岁,平均(52.31±6.54)岁。记录术中两组患者手术时间、术中透视次数、术中因体位所致不适感、颈痛发生率等情况,通过Likert评分评价患者术中不适感,比较两组患者手术前后腰腿痛视觉模拟评分(VAS)和Oswestry功能障碍指数(ODI)评分,最终依据改良MacNab标准评估末次随访的疗效。**结果** LDP组手术时间40~100 min,平均(61.59±14.27) min;透视次数2~6次,平均(3.32±0.22)次,Likert评分(3.93±0.73)分,术中仅1例发生轻微颈痛症状;PP组手术时间45~90 min,平均(60.38±15.42) min;透视次数2~4次,平均(3.23±0.14)次,Likert评分(3.49±0.65)分,5例出现颈痛症状;两组患者手术时间和透视次数比较,差异均无统计学意义($P>0.05$)。两组患者术后腰腿痛VAS和ODI评分与术前比较,差异均有统计学意义($P<0.05$);两组患者间腰腿痛VAS、ODI评分和末次MacNab评分比较,差异均无统计学意义($P>0.05$)。LDP组术中Likert评分较PP组高,且颈痛发生率低($P<0.05$);PP组术后1例患者出现足跖屈肌麻痹,予保守治疗后肌力恢复至4级;两组患者均未发生脑脊液漏、节段错误和椎间隙感染等并发症。**结论** LDP与PP椎板间入路椎间孔镜治疗单纯L₅/S₁ LDH均可获得良好疗效,但前者舒适性高,患者更易配合和接受,可在临床推广应用。

关键词: 侧卧位; 俯卧位; 经皮椎间孔镜; 腰椎间盘突出症; 微创

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Comparative study of treatment of simple L₅/S₁ disc herniation with interlaminar approach in lateral decubitus position and prone position*

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Abstract: Objective To compare the efficacy and safety of percutaneous endoscopic interlaminar discectomy by the lateral decubitus position (LDP) and prone position (PP) in treatment of simple L₅/S₁ disc herniation (LDH).

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Methods Clinical data of 51 patients with simple L₅/S₁ LDH underwent percutaneous endoscopic interlaminar discectomy from January 2017 to January 2018 were retrospectively analyzed. They were divided into LDP group and PP group according to different intraoperative position. LDP group ($n = 20$) had 12 males and 8 females, the average age was (54.33 ± 9.13) years from 33 to 78 years; PP group ($n = 31$) had 18 males and 13 females, the average age was (52.31 ± 6.54) years from 30 to 68 years. The operative time, the times of intraoperative fluoroscopy, the discomfort caused by body position and the incidence of neck pain were recorded. The intraoperative discomfort was evaluated by Likert score, and the VAS and ODI scores of lumbar and legs pain before and after the operation were compared between the two groups. Finally, the efficacy of the last follow-up was evaluated according to the modified MacNab. **Results** In LDP group, the operation time was 40 ~ 100 min, with an average of (61.59 ± 14.27) min, the average number of fluoroscopy was 2 ~ 6 times, with an average of (3.32 ± 0.22) times, and the Likert score was (3.93 ± 0.73) , only one patient had mild neck pain during the whole operation. In the PP group, the operation time was 45 ~ 90 min, with an average of (60.38 ± 15.42) min, the number of fluoroscopy was 2~4 times, with an average of (3.23 ± 0.14) times, the Likert score was (3.49 ± 0.65) , 5 patients suffered neck pain. There were no significant difference in the time of operation and the times of fluoroscopy between the two groups ($P > 0.05$). The VAS and ODI scores of the two groups after surgery were significantly different from those before surgery ($P < 0.05$); There were no significant differences in VAS, ODI scores and last MacNAB scores between the two groups ($P > 0.05$). The Likert score in the LDP group was higher than that in the PP group, and the incidence of neck pain was lower than that in the PP group ($P < 0.05$). One patient in the PP group developed plantar flexor paralysis, and the muscle strength recovered to level 4 after conservative treatment. There were no complications such as cerebrospinal fluid leakage, segmental errors, and intervertebral space infection. **Conclusion** Both LDP and PP percutaneous endoscopic interlaminar discectomy in treatment of simple L₅/S₁ LDH, but the former has high comfort and easier to cooperate and be accepted, it can be popularized and applied in clinic.

Keywords: lateral position; prone position; percutaneous endoscopic; lumbar discectomy; minimally invasive

经皮椎间孔镜技术 (percutaneous transforaminal endoscopic discectomy, PTED) 治疗腰椎退行性疾病 (lumbar degeneration disease, LDD) 对患者肌肉软组织和骨性结构损伤小, 且出血少、恢复迅速, 已广泛应用于临床^[1-2]。由于 L₅/S₁ 椎间盘突出症 (lumbar disc herniation, LDH) 患者解剖结构的特异性, PTED 常面临关节突增生肥大、椎间孔狭窄、高髂嵴和 L₅ 横突阻挡的问题, 而 L₅/S₁ 椎板间隙较大, 椎板间入路 (percutaneous endoscopic interlaminar discectomy, PEID) 较 PTED 具有优势^[3-4]。目前, 实施 PEID 手术的患者大多采用俯卧位 (prone position, PP), 也有医生选择给患者行侧卧位 (lateral decubitus position, LDP), 两种体位的利弊尚存在争议^[5]。关于 LDP 下行 PEID 治疗 LDH 的研究较为少见, 笔者回顾性分析 2017 年 1 月—2018 年 1 月本院 20 例在 LDP 下行 PEID 治疗单纯 L₅/S₁ LDH 患者的临床资料。现报道如下:

1 资料和方法

1.1 一般资料

本研究共纳入 51 例单纯 L₅/S₁ LDH 患者。根据术中体位不同分为 LDP 组 ($n = 20$) 和 PP 组 ($n = 31$), 两组均行 PEID。LDP 组男 12 例, 女 8 例, 年龄 33 ~ 78 岁, 平均 (54.33 ± 9.13) 岁; PP 组男 18 例, 女 13 例, 年龄 30 ~ 68 岁, 平均 (52.31 ± 6.54) 岁。两组患者术前均通过腰椎功能位 X 片证实无明显腰椎失稳或滑脱, 术前腰椎 CT 扫描和 MRI 均诊断为 L₅/S₁ 节段突出, 均以患肢放射痛和麻木为主诉, 或伴腰痛入院, 典型症状为患侧坐骨神经支配区域感觉、肌力和腱反射下降, 患侧直腿抬高试验阳性。两组患者一般资料比较, 差异均无统计学意义 ($P > 0.05$), 具有可比性。见表 1。

1.2 纳入标准

①主诉为单侧下肢放射痛或伴腰痛者; ②CT、MRI 明确为 L₅/S₁ LDH 者; ③腰椎 X 片示高髂嵴或 L₅

表 1 两组患者一般资料比较

Table 1 Comparison of general data between the two groups

| 组别 | 性别/例 | | 年龄/岁 |
|---------------------------|-------|----|------------|
| | 男 | 女 | |
| LDP组(<i>n</i> = 20) | 12 | 8 | 54.33±9.13 |
| PP组(<i>n</i> = 31) | 18 | 13 | 52.31±6.54 |
| <i>t/χ</i> ² 值 | 0.02 | | 0.92† |
| <i>P</i> 值 | 0.891 | | 0.362 |

注:†为 *t* 值

横突肥大或椎间孔狭窄,椎板窗正常者;④经严格保守治疗或观察期6周以上无效者。

1.3 排除标准

①腰椎不稳定或存在峡部裂和滑脱者;②多节段LDH者;③凝血功能异常者;④有手术禁忌证者。

1.4 手术方法

1.4.1 PP组PEID操作技术 患者实施硬膜外麻醉后,取PP于可折叠脊柱床上,尽量增大椎板间隙。定位责任节段后,后正中线上旁开1 cm为皮肤进针点,透视确认穿刺针投影位于L₅/S₁椎板间隙内缘,用尖刀切开皮肤8 mm,沿导针放置扩张套筒,最后置入工作套筒,透视确认其位于椎板间隙内缘,置入内镜系统,从关节突关节内侧缘处开始用射频消融刀头清理暴露的黄韧带,用篮钳破黄后咬除部分黄韧带,再向内继续扩大盘黄间隙,于镜下分离粘连,并轻柔旋转工作通道,分离暴露出的椎间盘,注意保护硬膜囊和神经根,推开S₁神经根后,用髓核钳抓取取出破裂的髓核组织,射频消融对纤维环破口进行成形,可见神经根搏动明显,手术结束。

1.4.2 LDP组PEID操作方法 硬膜外麻醉时,取患肢在下屈髋屈膝位,麻醉成功后,顺势于LDP下固

定。余下操作同PP下PEID。

1.5 术后处理

术后嘱患者卧床24 h,可在腰围保护下进行下地活动,术后各时间点反馈资料,视情况复查腰椎CT或MRI。

1.6 术中和术后指标评估

术中记录指标包括:手术时间、术中透视次数、Likert评分(评价术中不适感)及颈痛发生情况。术中Likert评分^[6]为5分制:1分非常差,5分非常好。术后评估指标:采用视觉模拟评分(visual analogue scale, VAS)评估腰腿痛、Oswestry功能障碍指数(Oswestry disability index, ODI)问卷表评估功能障碍、改良MacNab^[7]标准评估末次随访的疗效。

1.7 术后随访

LDP组术后随访(15.76±2.15)个月;PP组术后随访(15.52±3.61)个月。

1.8 统计学方法

选用SPSS 21.0统计软件分析数据,计量资料(腰腿痛VAS、ODI评分、手术时间、透视次数、Likert评分)以均数±标准差($\bar{x} \pm s$)表示,组间比较行两样本均数 *t* 检验,组内比较行配对样本 *t* 检验,组内各时间点比较采用方差分析;计数资料以例或百分率(%)表示,行 χ^2 检验;等级资料比较行秩和检验。*P* < 0.05为差异有统计学意义。

2 结果

2.1 两组患者术中情况比较

51例患者术中均无硬膜囊破裂和马尾神经损伤等并发症发生;两组患者手术时间和透视次数比较,差异均无统计学意义(*P* > 0.05);LDP组术中Likert评分明显较PP组高,且颈痛发生率明显较PP低(*P* < 0.05)。见表2。

表 2 两组患者术中情况比较

Table 2 Comparison of intraoperation conditions between the two groups

| 组别 | 手术时间/min | 透视次数/次 | Likert评分/分 | 颈痛发生率/% |
|---------------------------|-------------|-----------|------------|---------|
| LDP组(<i>n</i> = 20) | 61.59±14.27 | 3.32±0.22 | 3.93±0.73 | 5.00 |
| PP组(<i>n</i> = 31) | 60.38±15.42 | 3.23±0.14 | 3.49±0.65 | 16.13 |
| <i>t/χ</i> ² 值 | 0.28 | 1.79 | 2.25 | 7.04† |
| <i>P</i> 值 | 0.780 | 0.080 | 0.029 | 0.008 |

注:†为 χ^2 值

2.2 两组患者腰腿痛VAS和ODI评分比较

两组患者术后VAS和ODI评分与术前比较,差异均有统计学意义($P < 0.05$);组间VAS和ODI评分比较,差异均无统计学意义($P > 0.05$)。见表3和4。

2.3 两组患者术后疗效比较

采用改良MacNab标准评估末次随访的疗效。LDP组优16例、良2例、可2例,优良率为90.00%;PP组优25例、良4例、可2例,优良率为93.55%。两组患者疗效情况比较,差异无统计学意义($Z = 0.11, P > 0.05$)。见表5。

2.4 两组患者术后并发症发生情况

PP组术后1例患者出现足跖屈肌麻痹,予针刺、营养神经、主被动功能锻炼等对症治疗后,肌力恢复至4级。两组患者均未发生脑脊液漏、节段错误和椎

间隙感染等并发症。

2.5 典型病例

患者男,77岁。因“右下肢麻木疼痛1年余,加重半个月”入院,外院多次保守治疗(具体不详),半个月前下肢疼痛症状加重,严重影响患者日常生活。入院后腰椎X片检查,提示L₅/S₁节段无失稳,高髂嵴、椎间孔骨质增生明显变窄,腰椎CT和MRI显示为L₅/S₁椎间盘突出(右侧脱垂型)。结合患者病史、症状和体征,明确诊断为LDH(L₅/S₁)。虽然L_{4/5}稳定性欠佳。考虑患者腰痛症状不明显,处理责任节段,排除手术禁忌后,顺利实施LDP下PEID。术后2d复查CT和MRI,提示突出髓核组织已被完全摘除,神经根无压迫;术后1个月复查MRI,提示髓核组织摘除,无复发。见附图。

表3 两组患者VAS评分比较(分, $\bar{x} \pm s$)

Table 3 Comparison of VAS between the two groups (score, $\bar{x} \pm s$)

| 组别 | 术前 | 出院时 | 术后1个月 | 末次随访 | F值 | P值 |
|------------|-----------|-----------|-----------|-----------|--------|-------|
| LDP组(n=20) | 7.25±2.67 | 2.44±1.45 | 1.38±0.41 | 1.26±0.29 | 62.47 | 0.000 |
| PP组(n=31) | 7.19±2.56 | 2.36±1.38 | 1.35±0.40 | 1.24±0.18 | 105.13 | 0.000 |
| t值 | 0.08 | 0.20 | 0.26 | 0.30 | | |
| P值 | 0.936 | 0.844 | 0.797 | 0.762 | | |

表4 两组患者ODI评分比较(分, $\bar{x} \pm s$)

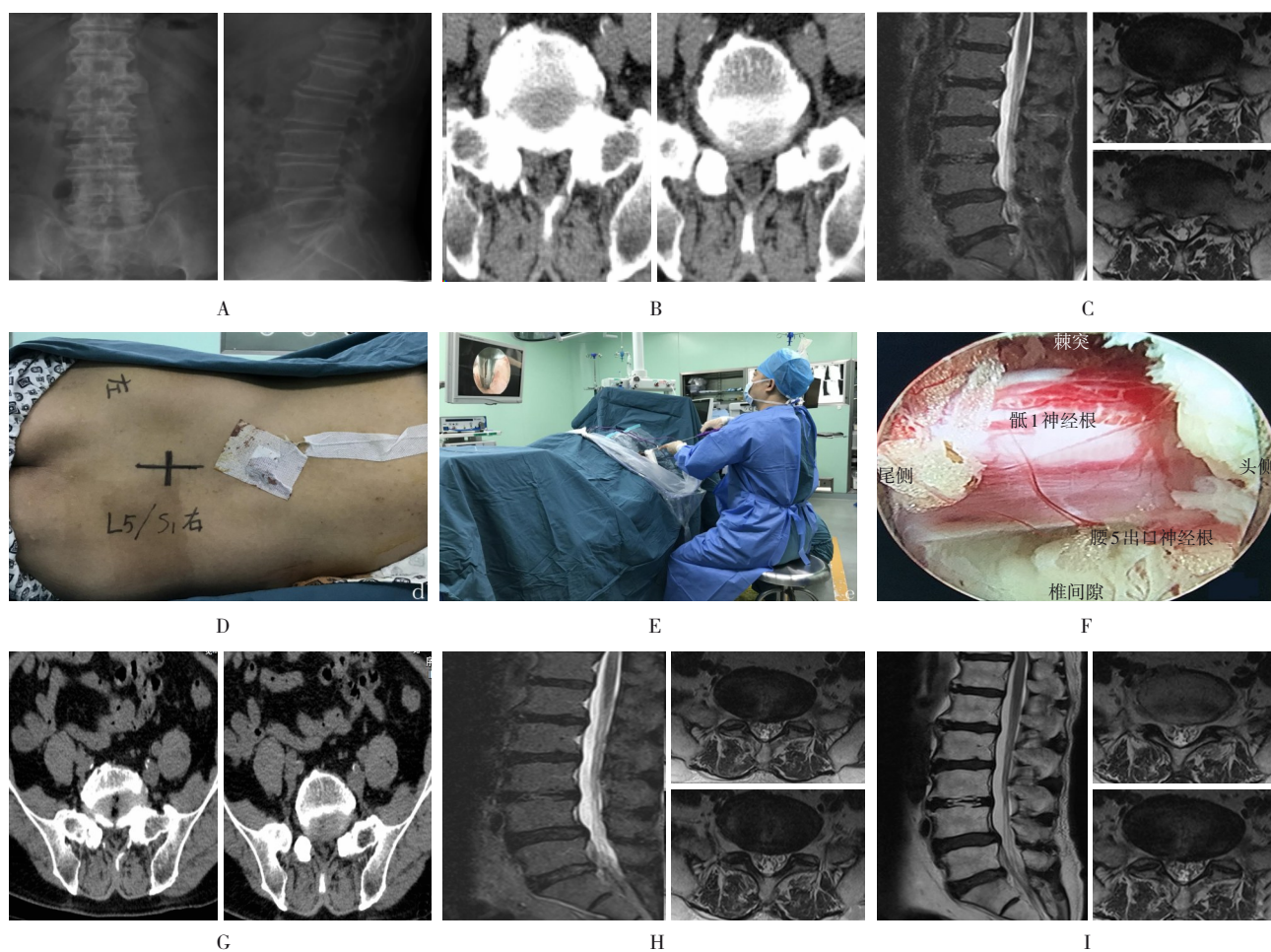
Table 4 Comparison of ODI between the two groups (score, $\bar{x} \pm s$)

| 组别 | 术前 | 出院时 | 术后1个月 | 末次随访 | F值 | P值 |
|------------|-------------|------------|-----------|-----------|--------|-------|
| LDP组(n=20) | 73.85±14.87 | 19.17±6.76 | 9.65±3.62 | 8.47±2.54 | 257.30 | 0.000 |
| PP组(n=31) | 73.76±14.32 | 18.92±6.73 | 9.57±3.34 | 8.35±2.36 | 427.65 | 0.000 |
| t值 | 0.02 | 0.13 | 0.08 | 0.17 | | |
| P值 | 0.983 | 0.900 | 0.936 | 0.864 | | |

表5 两组患者术后疗效比较 例

Table 5 Comparison of postoperative efficacy between the two groups n

| 组别 | 优 | 良 | 可 | 差 |
|------------|----|---|-------|---|
| LDP组(n=20) | 16 | 2 | 2 | 0 |
| PP组(n=31) | 25 | 4 | 2 | 0 |
| Z值 | | | 0.11 | |
| P值 | | | 0.911 | |



A: 腰椎X片; B: 腰椎CT; C: 腰椎MRI; D: 患者取LDP (患侧在下), 术前体表定位及划线示意图; E: 术者坐位施术; F: 术中镜下解剖结构; G: 术后2 d复查CT; H: 术后2 d复查MRI; I: 术后1个月复查MRI

附图 典型病例

Attached fig. Typical case

3 讨论

PTED 依据手术入路可分为椎间孔入路与椎板间入路, 前者适应于大多数类型的LDH, 包括中央型、旁中央型和极外侧型突出等^[8]; L₅/S₁ LDH患者常伴有高髂嵴、关节突关节增生、椎间隙窄小、椎间孔骨性狭窄和L₅横突肥大等, 阻碍穿刺途径, 术者经验不足时可能导致医源性神经损伤。此外, 若上下脱垂超过椎弓根平面的突出, 侧后方入路施术较困难^[9]。PEID通过L₅/S₁天然椎板间隙到达硬膜囊背侧, 适当咬除黄韧带后, 即可到达靶点位置, 操作相对简便, 无需行椎间孔扩大成形, 且适应证更广, 可用于腰椎侧隐窝狭窄、黄韧带肥厚、盘源性腰痛和关节突关节囊肿等的治疗^[10]。有文献^[11-14]证明, PEID治疗LDH, 疗效

确切, 患者术后腰椎功能改善明显, 患肢疼痛亦明显缓解。本研究中共51例患者, 无论是LDP组还是PP组, 术后腰腿痛VAS评分均较术前明显降低, ODI评分较术前有明显改善, 与文献^[11-14]报道基本一致。

PP下行PEID时, 少数患者术中会出现颈痛不适, 甚至难以顺利进行手术。有学者^[15]提议, 术中发生颈痛时, 术者更应仔细。有研究^[16]表明, 硬膜外腔压力与脑脊液压力高度关联, 颅内压与腰区脑脊液压力呈正相关。CHOI等^[17]报道, PTED术中患者发生颈痛合并癫痫, 可能是颅内压增高所致。JOH等^[18]认为, 颈痛是由颈椎硬膜外高压力和灌注水流较快所致, 亦可导致颅内压升高。PTED技术是以水为介质, 需要流水和足够的水压去除血液或渗出物, 以保证视野的清晰。有学者在局麻PP下行PEID手术^[19], 由于

术中疼痛的刺激,引起患者应激性血压升高,导致镜下视野出血模糊,术者通过加快水流灌注速度或升高盐水悬挂高度,达到了止血目的,但硬膜外压力也随着水流灌注速度及水压的增加而增大,导致颈痛发生,进而使血压升高,尤其是腹型肥胖的患者更为明显。本研究中31例PP患者,均采用硬膜外麻醉,术中达到无痛状态,但仍有5例出现颈痛症状,值得临床医生关注。

对于非全身麻醉患者,术中舒适度显得至关重要。本研究采用Likert评分对患者术中体位的舒适度进行评价,评分越高,则患者越满意,LDP组评分明显高于PP组,而颈痛发生率低于PP组,且LDP组的体位可大幅度降低患者腹腔内压力(尤其是对于腹型肥胖患者),从而减少术中出血。术中麻醉师辅助应用静脉止痛和镇静药物,均对患者呼吸有抑制作用,PP对患者呼吸影响较大,尤其是老年人,LDP便于处置呕吐等不良反应,有利于麻醉管理。患者在PP的体位时,麻醉医师辅助用药时顾虑较大,可能是引起术中Likert评分低于LDP组的原因之一。一项前瞻性研究^[20]将168例老年退变性LDH患者随机分为LDP组与PP组,于术前、术中和术后1h监测血氧分压、血二氧化碳分压、术中平均动脉压和Likert评分,以此寻找舒适性及安全性更高的体位。本研究中,LDP组均采取患肢在下的LDP,不利于即时检测拉塞格征,以验证神经根是否有效减压,但本组51例患者均予硬膜外麻醉,麻醉满意后术中患者下肢痛觉受到抑制,两组患者都无法检查拉塞格征。另有研究^[21-22]认为,患侧在上的LDP,硬膜囊在重力作用下会向对侧漂移,手术操作空间会随之变大,安全性更高,但在实际操作过程中并未发现这一现象,这可能与对侧黄韧带限制及水压的影响有关。

选择患侧在下的LDP,需在麻醉前摆好体位,麻醉满意后顺势固定,可避免再次更换或调整体位。笔者认为,LDP在操作过程中有以下优势:①行硬膜外麻醉的屈髋屈膝位,L₅/S₁的椎板窗上下距更大,无需处理L₅椎板下缘;②术者可以坐着操作,避免了长期站立位施术引起术者的肩臂肌群劳损,提高了术者的舒适感;③患侧在上的LDP,镜下视野12点钟不是硬膜囊方向,术者需要通过反手持镜进行操作,而患侧在下的LDP则免去了上述繁琐操作。LDP施术时需注意的是:保持身体与床面垂直,如果患者身体向术

侧或对侧偏斜,会对手术造成干扰,影响手术进程,初学者有一定的学习曲线。

综上所述,LDP与PP椎板间入路椎间孔镜治疗单纯L₅/S₁LDH,均可获得良好的疗效,但前者的舒适性高,患者更易配合和接受,值得临床推广应用。

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