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CT 引导下腰椎间盘突出靶点射频消融与经皮椎间孔镜髓核摘除术 对腰椎间盘突出症的效果对比 *

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摘要 目的:对比 CT 引导下腰椎间盘突出靶点射频消融与经皮椎间孔镜髓核摘除术对腰椎间盘突出症的效果。**方法:**选取 2020 年 10 月到 2021 年 10 月收治的 120 例腰椎间盘突出症患者进行回顾性分析,依照其手术方式差异进行分组,其中 60 例患者采取 CT 引导下腰椎间盘突出靶点射频消融术治疗将其分为射频消融组,将 60 例采取经皮椎间孔镜髓核摘除术治疗的患者分为经皮椎间孔镜组。对比两组患者临床治疗效果,手术时间、术中出血量、首次下床时间和住院时间,分别在两组患者手术前、术后 1 个月、3 个月及 6 个月采用视觉模拟疼痛量表(VAS)、日本骨科协会评估治疗(JOA)、Osweatry 功能障碍指数(ODI)评价其近远期疼痛程度、腰椎功能及下肢功能障碍情况,最后对比两组患者术后并发症发生率。**结果:**射频消融组与经皮椎间孔镜组患者治疗优良率对比无明显差异($P>0.05$);射频消融组手术时间高于经皮椎间孔镜组,射频消融组术中出血量、首次下床时间和住院时间低于经皮椎间孔镜组($P<0.05$);手术后 1 个月、3 个月、6 个月两组患者 JOA 评分升高,经皮椎间孔镜组术后 6 个月 JOA 评分高于射频消融组,手术后 1 个月、3 个月、6 个月两组患者 VAS 评分、ODI 指数均降低,经皮椎间孔镜组术后 6 个月 VAS 评分低于射频消融组($P<0.05$);射频消融组与经皮椎间孔镜组患者神经损伤、腰大肌旁血肿、腰椎不稳、术后感染等并发症发生率对比无明显差异($P>0.05$)。**结论:**CT 引导下腰椎间盘突出靶点射频消融与经皮椎间孔镜髓核摘除术治疗腰椎间盘突出症的临床疗效及安全性并无显著差异,CT 引导下腰椎间盘突出靶点射频消融手术创伤性小,术中出血量低,可促进患者术后早期康复,而经皮椎间孔镜髓核摘除术可进一步减轻患者术后远期疼痛程度,促进腰椎功能恢复,改善下肢功能障碍情况。

关键词:腰椎间盘突出;射频消融;经皮椎间孔镜髓核摘除术;腰椎间盘突出症

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Comparison of the Effects of CT Guided Radiofrequency Ablation of Lumbar Disc Targets and Percutaneous Foraminal Endoscopic Nucleus Pulposus Removal on Lumbar Disc Herniation*

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ABSTRACT Objective: To compare the effects of CT guided radiofrequency ablation of lumbar intervertebral disc targets and percutaneous foraminal endoscopic nucleus pulposotomy on lumbar disc herniation. **Methods:** A retrospective analysis was conducted on 120 patients with lumbar disc herniation from October 2020 to October 2021. They were divided into groups according to the differences in surgical methods. Among them, 60 patients were treated with CT guided lumbar disc target radiofrequency ablation and were divided into the radiofrequency ablation group. The remaining 60 patients were treated with percutaneous foramen endoscopic nucleus pulposotomy and were divided into the percutaneous foramen endoscopic group. Compare the clinical treatment outcomes of two groups of patients, including surgical time, intraoperative blood loss, first time out of bed, and length of hospital stay. Visual Analog Pain Scale (VAS), Japanese Orthopaedic Association Scores (JOA) were used before surgery, 1 month, 3 months, and 6 months after surgery, respectively. The Oswestry Dysfunction Index (ODI) evaluates the degree of pain, lumbar spine function, and lower limb dysfunction in the near and long term, and finally compares the incidence of postoperative complications between the two groups of patients. **Results:** There was no significant difference in the excellent and good treatment rates between the radiofrequency ablation group and the percutaneous foraminal endoscopy group ($P>0.05$); The surgical time in the radiofrequency ablation group was higher than that in the percutaneous foraminal mirror group, while the intraoperative blood loss, first time out of bed, and hospital stay in the radiofrequency ablation group were lower than those in the percutaneous foraminal mirror group ($P<0.05$); After 1 month, 3 months, and 6 months of surgery, the JOA score of the two groups of patients increased. The JOA score of the percutaneous foramen mirror group was higher than that of the radiofrequency ablation group at 6 months after surgery, while the VAS score and ODI index of the two groups decreased at 1 month, 3 months, and 6 months after surgery. The VAS score of the percutaneous foramen mirror group was lower than that of the radiofrequency

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ablation group at 6 months after surgery ($P<0.05$); There was no significant difference in the incidence of complications such as nerve injury, parasoas major hematoma, lumbar instability, and postoperative infection between the radiofrequency ablation group and the percutaneous foraminal endoscopy group ($P>0.05$). **Conclusion:** CT guided lumbar disc target radiofrequency ablation and percutaneous intervertebral foramen lens nucleus pullosa treatment of lumbar disc herniation clinical curative effect and safety and no significant difference, CT guided lumbar disc target radiofrequency ablation trauma, low intraoperative bleeding, can promote early postoperative rehabilitation, and percutaneous interforaminal lens nucleus pullosa can further reduce postoperative future pain degree, promote lumbar function recovery, improve lower limb dysfunction.

Key words: Lumbar intervertebral disc; Radiofrequency ablation; Percutaneous intervertebral foramen endoscopic removal of nucleus pulposus; Lumbar disc herniation

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前言

腰椎间盘突出症(lumbar disc herniation, LDH)为当前骨科常见疾病,患者多表现为腰腿疼痛,为日常生活带来严重影响^[1]。随着 LDH 进展病情加剧,髓核不断压迫马尾神经与神经根,对神经产生过度牵引力,增加化学性神经炎发生率,且易引发各类神经功能障碍^[2]。目前主要采取手术治疗、保守治疗两大类,一般提倡针对保守治疗无效的患者进行手术治疗,进一步改善患者腰椎及下肢疼痛情况^[3]。开放式手术作为以往 LDH 常见手术方式,其具有费用高、风险大、创伤大等缺点,患者接受程度较差^[4]。随着临床医疗技术发展,微创手术治疗 LDH 获得广大医学学者及患者认可,其中腰椎间盘靶点射频消融与经皮椎间孔镜髓核摘除术为最常见的两种术式。研究发现^[5,6],腰椎间盘靶点射频消融与经皮椎间孔镜髓核摘除术两种手术方式分别于与开放式手术相比疗效并无显著差异,但安全性较高,

术后感染等并发症发生率较低,成为当前治疗 LDH 的热门手术方式。然而,当前对于上述两种手术方法的对比研究较少,且对于其优劣尚未形成统一意见。因此,本研究对比 CT 引导下腰椎间盘靶点射频消融与经皮椎间孔镜髓核摘除术对腰椎间盘突出症的效果。

1 资料与方法

1.1 一般资料

选取 2020 年 10 月到 2021 年 10 月收治的腰椎间盘突出症患者 120 例,依照其手术方式差异进行分组,其中 60 例患者采取 CT 引导下腰椎间盘靶点射频消融术治疗将其分为射频消融组,将 60 例采取经皮椎间孔镜髓核摘除术治疗的患者分为经皮椎间孔镜组。两组患者一般资料对比无差异($P>0.05$),见表 1。

表 1 一般资料
Table 1 General Information

Groups	n	Gender (male/female)	Average age (years)	BIM(kg/m ²)	Disease course (year)	Intervertebral disc herniation segment(n)		
						L4-5-S1	L5-S1	L4-5
Radiofrequency ablation group	60	35/25	38.22± 2.55	21.46± 3.61	3.48± 1.21	5	37	18
Percutaneous intervertebral foramen endoscopy group	60	37/23	38.53± 2.61	21.55± 3.74	3.54± 1.09	7	36	17
χ^2/t	-	0.003	0.416	0.938	0.368		0.630	
P	-	0.958	0.679	0.349	0.713		0.729	

1.2 纳排标准

纳入标准:确诊为腰椎间盘突出症,符合手术治疗指征^[7];临床资料完整;知情同意。

排除标准:以往有腰椎间盘手术史者合并椎体骨折者;合并椎体滑脱或节段型不稳者。

1.3 方法

射频消融组:采取 CT 引导下腰椎间盘靶点射频消融术:患者取俯卧位,用垫枕抬高腹部以利于 CT 扫描和穿刺,应用 CT 精准确定穿刺路径和目标椎间盘位置,并根据 CT 图像结果,在患者体表做出穿刺点标记,铺巾消毒,在病变间隙水平患

侧棘突旁 8~10 cm 位置作为穿刺点,进针须臾与皮肤呈 45° 角,若患处为 L5、S1 间隙需与髂嵴平面向下倾斜 30~45° 角。在整个过程中利用 CT 实时监控,观察穿刺针情况,确认进入至髓核后取出针芯,经通道将等离子刀头穿入髓核进行消融,起点为侧纤维环内层,以纤维环内层为终点,对椎间盘内的病变组织进行精确的热凝消融,治疗强度为 2~4 挡,手术完毕后在穿刺口敷贴无菌敷料。

经皮椎间孔镜组:采取经皮椎间孔镜髓核摘除术:患者采取仰卧位,应用 C 型 X 线机透视,确定责任椎体间隙水平,并确定责任椎体间隙后缘,标记穿刺点。随后进行常规消毒铺巾,

并进行局部麻醉。对 L5S1 椎间盘突出症患者脊柱正中线旁开约 12~16 cm, 在 L4 和 L5 椎间盘突出症患者开 11~14 cm 左右, 使用 4 号~8 号螺旋骨钻扩孔, 椎间盘孔成形后放入工作套管。穿刺成功后处理切口, 长约 0.7 cm, 抽取穿刺针芯并将导丝植入, 顺着导丝将导棒植入, 随后放置套筒, 拔出导棒、导丝, 将套筒与上关节突腹侧紧贴, 应用外径为 7.5 mm 环锯将套筒植入, 建立人工通道, 连接并筒和生理盐水, 使用抓钳取出突出椎间盘。双极电凝血止血, 常规缝合切口。

所有患者术后 1 周卧床休息, 2 周后逐渐适当运动进行腰背肌功能锻炼。

1.4 观察指标与疗效判定标准

(1) 疗效判定标准: 评价术后 1 个月的疗效, 其中优: 术后疼痛感消失, 可正常生活、工作; 良: 术后主要症状减轻, 疼痛缓解, 较小程度影响正常生活、工作; 中: 功能有所改善, 一定程度影响工作、生活; 差: 仍存在神经根症状, 症状加重或术后复发为差。优良率 = 优率 + 良率。

(2) 观察并记录术中出血量、手术时间、首次下床时间及住

院时间。

(3) 分别在两组患者手术前、术后 1 个月、3 个月及 6 个月采用视觉模拟疼痛量表(VAS)评价患者的疼痛程度, 满分 10 分, 分数与疼痛感成正比^[8]。应用 JOA 量表评估腰椎功能障碍, 0-29 分, 分数与功能障碍成正比^[9]。应用 ODI 评价术后下肢功能障碍, 每项评分 0~5 分, 分数与下肢功能障碍成反比^[10]。

(4) 观察并记录两组患者神经损伤、腰大肌旁血肿、腰椎不稳、术后感染等并发症发生情况。

1.5 统计学方法

SPSS 23.0, 计数资料以(n/%)表示, χ^2 检验; 计量资料用($\bar{x} \pm s$)表示, t 检验; 以 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 临床疗效对比

射频消融组与经皮椎间孔镜组患者治疗优良率比较无差异($P > 0.05$), 见表 2。

表 2 临床疗效对比(n, %)
Table 2 Clinical efficacy comparison(n, %)

Groups	n	MacNab efficacy evaluation				
		Excellent	Good people	Centre	Differ from	Excellent rate
Radiofrequency ablation group	60	34(56.67%)	23(38.33%)	2(3.33%)	1(1.67%)	57(95.00%)
Percutaneous intervertebral foramen endoscopy group	60	30(50.00%)	25(41.67%)	3(5.00%)	2(3.33%)	55(91.67%)
χ^2						0.540
P						0.464

2.2 围术期相关指标对比

射频消融组手术时间高于经皮椎间孔镜组, 射频消融组术

中出血量、首次下床时间和住院时间低于经皮椎间孔镜组($P < 0.05$), 见表 3。

表 3 围术期相关指标对比($\bar{x} \pm s$)
Table 3 Comparison of perioperative related indicators($\bar{x} \pm s$)

Groups	n	Operative time(min)	Intraoperative bleeding volume(mL)	First time getting out of bed(d)	Hospital stay(d)
Radiofrequency ablation group	60	73.46 \pm 10.37	4.27 \pm 0.82	1.31 \pm 0.27	6.75 \pm 1.43
Percutaneous intervertebral foramen endoscopy group	60	65.36 \pm 8.12	43.25 \pm 6.12	2.27 \pm 0.18	7.57 \pm 1.52
t	-	2.674	31.634	7.622	4.636
P	-	0.008	0.001	0.001	0.001

2.3 近远期疼痛情况及腰椎功能对比

两组患者手术后 1 个月、3 个月、6 个月 JOA 评分升高, 经皮椎间孔镜组术后 6 个月 JOA 评分高于射频消融组, 手术后 1 个月、3 个月、6 个月两组患者 VAS 评分、ODI 指数均降低, 经皮椎间孔镜组术后 6 个月 VAS 评分低于射频消融组($P < 0.05$), 见表 4。

2.4 并发症发生率对比

射频消融组与经皮椎间孔镜组患者神经损伤、腰大肌旁血肿、腰椎不稳、术后感染等并发症发生率对比无明显差异($P >$

0.05), 见表 5。

3 讨论

LDH 的发病会导致患者丧失劳动能力, 会影响患者自身及家庭。该疾病发病机制较为复杂, 但大量报道显示与髓核突出对神经根造成的压迫有关^[11,12]。据报道^[13], 早期接受手术治疗与保守治疗相比, 患者功能恢复与疼痛缓解等具有较好的效果。以往临床上针对腰椎间盘突出症除了传统开放手术治疗之外, 经皮椎间孔镜技术、射频消融等微创手术以其创伤小、患者

表 4 近远期疼痛情况及腰椎功能对比($\bar{x} \pm s$, 分)

Table 4 Comparison of pain and lumbar spine function in the near and long term($\bar{x} \pm s$, divide)

Groups	n	JOA			VAS			ODI					
		Preoperative	One month after surgery	3 months after surgery	6 months after surgery	Preoperative	One month after surgery	3 months after surgery	6 months after surgery	Preoperative	One month after surgery	3 months after surgery	6 months after surgery
Radiofrequency ablation group	60	13.32±3.36	18.36±3.44*	22.32±3.08*	23.12±3.64*	6.58±2.15	3.34±0.49*	2.58±0.22*	1.90±0.19*	25.83±6.38	17.60±3.35*	13.37±3.22*	8.37±1.15*
Percutaneous intervertebral foramen endoscopy group	60	13.28±2.23	18.67±4.68*	23.26±4.31*	26.59±2.24*	6.36±2.52	3.32±0.31*	2.26±0.35*	1.21±0.12*	25.26±5.11	17.83±4.27*	13.77±3.47*	5.27±1.47*
t	-	0.580	0.146	1.611	2.661	0.195	0.724	0.175	6.556	0.468	0.284	0.567	11.142
P	-	0.563	0.884	0.113	0.009	0.846	0.471	0.861	0.001	0.641	0.777	0.572	0.001

Note: * indicates $P < 0.05$ compared to before surgery.

表 5 并发症发生率对比(n,%)

Table 5 Comparison of incidence of complications(n, %)

Groups	n	Nerve injury	Parapsoas hematoma	Lumbar instability	Postoperative infection	Total
Radiofrequency ablation group	60	1(1.67%)	0(0.00%)	2(3.33%)	0(0.00%)	3(5.00%)
Percutaneous intervertebral foramen endoscopy group	60	2(3.33%)	1(1.67%)	1(1.67%)	1(1.67%)	5(8.33%)
χ^2	-	-	-	-	-	0.536
P	-	-	-	-	-	0.464

满意度高等优势被逐渐应用到临床^[14,15]。因此,本研究将两种手术治疗方式进行对比,以期为临床提供参考意见。

本研究结果表明,射频消融组与经皮椎间孔镜组患者治疗优良率对比无明显差异($P > 0.05$),与 Gadraj PS 等^[16]、Arif S 等^[17]研究结果相符。Gadraj PS 等研究显示,经皮椎间孔镜髓核摘除术治疗 LDH 临床总有效率高达 90%以上。分析原因为,经皮椎间孔镜髓核摘除术治疗 LDH 可通过髓核及扩张隐窝、剔除骨赘以及椎间孔等方式对患者腰椎进行处理,不需要切开椎旁肌肉和椎板,创伤较小,能够维持脊柱正常解剖结构,将突出的髓核摘除。同时在术中可及时应用双拼电凝刀进行止血处理,降低术后血肿发生率的同时,能够保护硬膜囊及神经根损伤,提升腰椎间盘突出症的治疗效果^[18,19]。Arif S 等研究显示,CT 引导下腰椎间盘靶点射频消融治疗 LDH 疗效显著,且安全性较高。分析原因为,射频消融组手术时间高于经皮椎间孔镜组,T 引导下腰椎间盘靶点射频消融可直接作用在椎间盘病变髓核位置,直接达到突出物靶点处,对突出物进行射频消融,直接解除神经根刺激与压迫,快速缓解疼痛症状^[20,21]。另外,还可通过 CT 引导提升穿刺准确性,手术安全性较高。本研究结果显示,射频消融组术中出血量、首次下床时间和住院时间低于经皮椎间孔镜组($P < 0.05$)。证明,CT 引导下腰椎间盘靶点射

频消融术治疗 LDH 创伤性更低,可促进患者短期恢复,与赵秋鹤等^[22]研究结果相符。分析原因为,射频消融术能够利用 CT 进行引导穿刺,提升定位准确性,并且依照射频仪特点准确辨别神经位置,分辨出治疗部位与神经距离情况,并控制治疗温度,而且射频消融过程中同时可通过温度升高达到止血作用,因此创伤性更低,术后短期恢复更快^[23]。本研究结果表明,手术后 1 个月、3 个月、6 个月两组患者 JOA 评分升高,经皮椎间孔镜组术后 6 个月 JOA 评分高于射频消融组,手术后 1 个月、3 个月、6 个月两组患者 VAS 评分、ODI 指数均降低,经皮椎间孔镜组术后 6 个月 VAS 评分低于射频消融组($P < 0.05$),证明经皮椎间孔镜髓核摘除术远期疗效优于射频消融术,与 Zhao XM 等^[24]研究结果相似。Zhao XM 等研究表明,经皮椎间孔镜髓核摘除术患者远期腰椎功能水平与患病前并无显著差异。这主要是因为,经皮椎间孔镜髓核摘除术可将突出物彻底摘除,并清除骨性物质,达到彻底治疗 LDH 的目的,复发率低,远期疗效更优。射频消融组与经皮椎间孔镜组患者神经损伤、腰大肌旁血肿、腰椎不稳、术后感染等并发症发生率对比无明显差异($P > 0.05$)。CT 引导下腰椎间盘靶点射频消融与经皮椎间孔镜髓核摘除术治疗 LDH 各有优势,虽然后者适应范围较广,但对于患者组织损伤较大,术后恢复时间延长。但经皮椎间孔镜髓核摘

除术可进一步保留腰椎完整性,但可能会破坏腰椎固有力学稳定结构,提高腰椎失稳几率^[25]。另外,经皮椎间孔镜髓核摘除术技术学习曲线长,操作难度较大,需要操作者具有较高的熟练度,若对解剖结构认知不清、突出物摘除不彻底会导致疗效不佳,甚至需要进行二次手术^[26]。而CT引导下腰椎间盘靶点射频消融舒创伤性更小,术后恢复更快,可在减压基础上灭活长入纤维环裂隙的窦椎神经,因此在术后比单纯髓核摘除术安全性更高^[27]。但由于本研究数据样本量有限,研究可能存在一定局限,临床上针对LDH治疗过程中还需深入分析患者实际情况、疾病类型、间盘移位特征以及年龄等因素综合分析,选择更合适的治疗方式。

综上所述,CT引导下腰椎间盘靶点射频消融与经皮椎间孔镜髓核摘除术治疗LDH的临床疗效及安全性并无显著差异,CT引导下腰椎间盘靶点射频消融手术创伤性小,术中出血量低,可促进患者术后早期康复,而经皮椎间孔镜髓核摘除术可进一步减轻患者术后远期疼痛程度,促进腰椎功能恢复,改善下肢功能障碍情况。

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