

超声造影技术在 HIFU 治疗子宫肌瘤中的应用

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【摘要】 目的 探讨超声造影技术在高强度聚焦超声(HIFU)治疗子宫肌瘤中的应用效果。方法 选取 2021 年 5-12 月在盘锦辽油宝石花医院渤海院区就诊的 113 例子宫肌瘤患者为研究对象, 将所有患者采用随机数表法分为 A 组 57 例和 B 组 56 例, A 组患者采用常规 HIFU 消融治疗, B 组患者则在术前进行静脉推注超声造影剂探查, 待造影剂行至靶向部位, 再进行 HIFU 消融治疗。比较两组患者术中 HIFU 治疗参数, 术中及术后不良反应发生率; 随访 3 个月后, 比较两组患者的子宫肌瘤消融率, 包括术后吸收率及累计消融率。**结果** B 组患者在治疗过程中功率、持续时间、总能量、能效因子、消融后体积明显低于 A 组, 差异均有统计学意义($P < 0.05$); B 组患者的消融率与完全灭活率分别为(76.12±9.73)%和 87.50%, 明显高于 A 组的(71.93±9.34)%和 82.46%, 差异均有统计学意义($P < 0.05$); 两组患者术中骶骨痛、手术部位痛、腹股沟痛、放射性痛、烫伤、肛门坠胀的发生率比较差异均无统计学意义($P > 0.05$); 随访 3 个月后, 两组患者子宫肌瘤术后吸收率比较差异无统计学意义($P > 0.05$), 而 B 组患者的累计消融率为(89.47±10.27)%, 明显高于 A 组的(83.42±9.61)%, 差异有统计学意义($P < 0.05$)。**结论** 超声造影技术能明显降低和减少子宫肌瘤应用 HIFU 治疗过程中功率与持续时间, 提高消融率, 帮助患者减少手术时间, 具有临床推广价值。

【关键词】 超声造影; 子宫肌瘤; 高强度聚焦超声; 疗效; 安全性

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Application of contrast-enhanced ultrasound in the treatment of hysteromyoma with high intensity focused ultrasound. LI Ji, HUI Shi-de, HUANG Zhen. Department of Function, Panjin Liaoyou Baobaohua Hospital Bohai Hospital, Panjin 124009, Liaoning, CHINA

【Abstract】 Objective To investigate the effect of contrast-enhanced ultrasound in the treatment of uterine leiomyoma with high intensity focused ultrasound (HIFU). **Methods** A total of 113 patients with hysteromyoma who came

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to Panjin Liaoyou Baobaohua Hospital Bohai Hospital from May 2021 to December 2021 were selected and divided into group A (57 cases) and group B (56 cases) according the random number table method. Patients in group A were treated with conventional HIFU ablation, while those in group B were treated with intravenous injection of ultrasound contrast agent before operation. The therapeutic parameters of HIFU during operation and the incidence of adverse reactions during and after operation were compared between the two groups. After 3 months of treatment, the ablation rate of hystero-myoma, including postoperative absorption rate and cumulative ablation rate, was compared between the two groups.

Results The power, duration, total energy, energy efficiency factor, and volume after ablation in group B were significantly lower than those in group A ($P < 0.05$). The ablation rate and complete inactivation rate in group B were $(76.12 \pm 9.73)\%$ and 87.50% , which were significantly higher than $(71.93 \pm 9.34)\%$ and 82.46% in group A ($P < 0.05$). There was no significant difference between the two groups in the rate of intraoperative sacral pain, surgical site pain, groin pain, radiation pain, scald and anal distension ($P > 0.05$). There was no significant difference in the postoperative absorption rate of hystero-myoma between the two groups ($P > 0.05$). The cumulative ablation rate in group B was $(89.47 \pm 10.27)\%$, which was significantly higher than $(83.42 \pm 9.61)\%$ in group A ($P < 0.05$). **Conclusion** Contrast-enhanced ultrasound can significantly reduce the power and duration of HIFU in the treatment of hystero-myoma, improve the ablation rate, and reduce the operation time, which is worthy of great promotion in clinic.

[Key words] Contrast-enhanced ultrasound; Hystero-myoma; High intensity focused ultrasound; Efficacy; Security

子宫肌瘤是育龄期妇女常见的疾病之一,临床认为具体发病机制尚不明确,有学者认为其可能与环境、遗传等相关,该病对女性的健康有着深远影响,治疗的效果也直接影响着患者的生存质量^[1-2]。随着临床技术的更新换代,多数患者在经过治疗均可取得良好的效果。目前,临床上多应用高强度聚焦超声(HIFU)对患处进行切割,常规治疗中多在术前进行核磁共振(MRI)检查定位,然后进行HIFU治疗,但在治疗过程中会诱发患者不同程度的正常软组织损伤,从而造成一系列不良反应,因此临床上需在保证疗效的前提下尽量降低HIFU功率、时长等参数^[3]。超声造影技术是临床上常用的影像学检查,可对患者进行快速、精确地评价子宫肌瘤的灌注和治疗效果,其具有简便、灵活等特点^[4-5]。本次研究主要分析讨论了超声造影技术在HIFU治疗子宫肌瘤中的应用效果,现将结果报道如下:

1 资料与方法

1.1 一般资料 选取2021年5月至2021年12月在盘锦辽油宝石花医院渤海院区就诊的113例子宫肌瘤患者进行研究。纳入标准:(1)经诊断确诊为子宫肌瘤且;(2)具有保留子宫意愿且接受HIFU治疗;(3)可与医护人员进行正常交流,积极配合医护人员。排除标准:(1)伴其他恶性肿瘤患者;(2)对检查中使用的造影剂存在禁忌证;(3)未对高血压进行控制。将所有患者按随机数表法分为A组57例和B组56例。A组患者年龄31~48岁,子宫肌瘤直径4.76~6.39 cm,肌瘤体积59.63~119.38 cm³;B组患者年龄32~49岁,子宫肌瘤直径4.64~5.98 cm,肌瘤体积60.13~118.42 cm³。两组患者的基线资料比较差异均无统计学意义($P > 0.05$),具有可比性,见表1。本研究经医院医学伦理委员会批准,所有患者及其家属均知情并签署同意书。

表1 两组患者的一般情况比较($\bar{x} \pm s$, 例(%))

Table 1 Comparison of general conditions of two groups [$\bar{x} \pm s$, n (%)]

组别	例数	年龄(岁)	子宫肌瘤部位			肌瘤直径(cm)	肌瘤体积(cm ³)
			前部	后部	侧部		
A组	57	38.25±5.36	28 (49.12)	16 (28.07)	13 (22.81)	5.76±0.79	86.57±29.63
B组	56	39.82±6.27	26 (46.43)	15 (26.79)	15 (26.79)	5.62±0.82	87.59±28.71
t/ χ^2 值		1.432		0.184		0.924	0.186
P值		0.155		0.932		0.3573	0.853

1.2 治疗方法 A组患者于HIFU治疗前进行MRI序列采集,包括横断面、矢状面、冠状面T1WI和T2WI并加压脂相。增强扫描则采用三维快速容积扫描(VIBE),对比剂为钆喷替酸葡甲胺剂量0.1 mmol/kg,采用静脉注射后动态MRI灌注扫描。然后进行HIFU治疗,患者于术前进行常规准备,如备皮、排便、尿管处理等。设备采用HIFU2001型高强度聚焦超声仪(上海新地有限责任公司),患者取仰卧姿势,通过计算机操作治疗头向上下、左右、头足方向进行移动,术中进行

超声定位,术中进行镇痛处理,在超声监控下进行HIFU治疗。术后进行常规护理,且再次进行超声造影技术观察术后肌瘤消融程度,1 d后采用MRI复查。B组患者于HIFU治疗前进行超声造影技术检查,设备采用腹部电子凸阵探头,频率3~8 MHz。造影剂采用声诺维(25 mg,意大利米兰Bracco公司),静脉滴注后观察肌瘤情况,在超声仪的监测下,发现微泡进入靶目标即开始HIFU治疗,手术过程与术后治疗与A组患者完全一致。两组患者均随访3个月。

1.3 观察指标 (1) HIFU 治疗参数:比较两组患者术中 HIFU 治疗参数,包括功率、持续时间、总能量、能效因子、消融后体积、消融率及完全灭活率;(2)不良反应:比较两组患者术中及术后不良反应发生情况,术中不良反应包括骶骨痛、手术部位痛、腹股沟痛、放射性痛、烫伤、肛门坠胀。术后不良反应包括骶骨痛、腹部痛、感觉异常、体温升高、烫伤、阴道排液;(3)子宫肌瘤消融率:随访 3 个月后,比较两组患者的子宫肌瘤术后吸收率及累计消融率。

1.4 统计学方法 应用 SPSS18.0 统计软件进行数据分析。计量资料以均数±标准差($\bar{x}\pm s$)表示,组间比较采用 t 检验,计数资料比较采用 χ^2 检验。以 $P<0.05$ 为差异有统计学意义。

表 2 两组患者术中 HIFU 治疗参数比较($\bar{x}\pm s$)Table 2 Comparison of intraoperative HIFU treatment parameters between the two groups ($\bar{x}\pm s$)

组别	例数	功率(W)	持续时间(min)	总能量(kJ)	能效因子(J/mm ²)	消融后体积(mm ³)	消融率(%)	完全灭活率(%)
A 组	57	440.84±23.85	150.37±9.37	1268.37±58.36	10.87±1.63	83.69±10.87	71.93±9.34	82.46
B 组	56	392.73±24.64	68.46±8.61	287.38±48.17	3.32±0.98	63.57±9.18	76.12±9.73	87.50
t/χ^2 值		25.718	43.642	524.398	31.037	11.236	2.340	0.562
P 值		0.001	0.001	0.001	0.001	0.001	0.021	0.453

表 3 两组患者不良反应比较[例(%)]

Table 3 Comparison of adverse reactions between the two groups [n (%)]

组别	例数	骶骨痛	手术部位痛	腹股沟痛	放射性痛	烫伤	肛门坠胀
A 组	57	12 (21.05)	12 (21.05)	1 (1.75)	2 (3.51)	3 (5.26)	3 (5.26)
B 组	56	7 (12.50)	11 (19.64)	2 (3.57)	1 (1.79)	3 (5.36)	2 (3.57)
χ^2 值		1.477	0.035	0.361	0.325	0.000	0.191
P 值		0.224	0.852	0.548	0.569	0.982	0.662

表 4 两组患者治疗三个月后子宫肌瘤消融率比较($\bar{x}\pm s$, %)Table 4 Comparison of uterine fibroid ablation rate between the two groups after three months of treatment ($\bar{x}\pm s$, %)

组别	例数	术后吸收率	累计消融率
A 组	57	12.67±8.29	83.42±9.61
B 组	56	12.54±8.31	89.47±10.27
t 值		0.083	3.234
P 值		0.934	0.002

3 讨论

子宫肌瘤是较为常见的女性肿瘤,主要是由子宫平滑肌出现变异导致,具体的发病机制目前尚不明确,但临床上常认为其与环境、遗传等原因有关,也可能与患者自身激素分泌有关^[6-7]。最新研究表明,子宫肌瘤的发病率呈逐年上升趋势,治疗手段也多以外科手术为主^[8]。随着医学技术的发展与进步,越来越多的先进技术被应用于外科手术中,为外科手术方式注入新的动力^[9]。HIFU 是一种将超声波聚焦于一点,作用于靶组织,利用超声波将靶组织杀死,使其达到变性、坏死的目,因此,可用于子宫肌瘤患者手术治疗^[10]。术前,需对子宫肌瘤患者的病情状况进行评估,超声造影检查结果尤为重要,其具有灵活便捷等特点。以往的超

2 结果

2.1 两组患者术中 HIFU 治疗参数比较 B 组患者在治疗过程中的功率、持续时间、总能量、能效因子、消融后体积明显低于 A 组,消融率与完全灭活率明显高于 A 组,差异均有统计学意义($P<0.05$),见表 2。

2.2 两组患者的不良反应比较 两组患者术中骶骨痛、手术部位痛、腹股沟痛、放射性痛、烫伤、肛门坠胀等不良反应发生率比较差异均无统计学意义($P>0.05$),见表 3。

2.3 两组患者治疗 3 个月后的子宫肌瘤消融率比较 随访 3 个月后,两组患者的子宫肌瘤术后吸收率比较差异无统计学意义($P>0.05$),但 B 组患者累计消融率明显高于 A 组,差异有统计学意义($P<0.05$),见表 4。

声造影检查由于设备不先进,成像质量较差,准确度与常规 MRI 相比尚存在一定差距,因此,在临床中还是以 MRI 检查结果为准^[11]。近年来,随着设备的更新换代,超声造影技术的准确度再次成为临床上讨论的热点。有研究表明,超声造影技术已应用于术后子宫肌瘤消融程度的预后及随访评价,但在术中使用情况尚无文献报道^[12]。常规 MRI 检查对人体组织有着极高的分辨率,能准确评价子宫肌瘤的大小及预后情况,是临床上常用的检查手段,但也具有花费高、检查不够简便灵活等缺点^[13]。因此,本次研究将着重探究超声造影技术对子宫肌瘤应用 HIFU 治疗疗效的评估价值,为临床基层医院经济、有效地检查手段提供理论依据。

HIFU 治疗参数是体现患者消融效果的客观数据^[14],本研究中,B 组患者在治疗过程中功率、持续时间、总能量、能效因子、消融后体积等参数明显低于 A 组,B 组患者消融率与完全灭活率明显高于 A 组,差异有统计学意义($P<0.05$)。说明超声造影技术确实可以增强 HIFU 的治疗效果,这一结论与以往文献结果一致^[15]。考虑原因是由于靶目标内的造影剂加速了空

化效应,在短时间内以低功率达到消融效果,同时,实时超声引导也有效提高了肌瘤的针对性,避免了正常组织的损伤^[16]。不良反应的发生直接影响患者的治疗体验与预后,本研究中,两组患者术中及术后不良反应发生率均无明显差异,提示超声造影技术的使用相较于常规治疗,并不会增加副反应出现的风险,分析原因可能是造影剂虽然使得肌瘤空化核增加,但HIFU的能量聚焦呈非均匀性,以焦点为中心,能量向四周逐渐降低,因此并不会损伤焦点外组织。随访3个月后发现,两组患者子宫肌瘤术后吸收率无明显差异,B组累计消融率明显高于A组,说明超声造影技术确实可以提高累计消融率,但术后吸收率未发现明显增强效果。

综上所述,超声造影技术能明显缩短子宫肌瘤应用HIFU治疗过程中功率与持续时间,提高消融率,值得临床推广应用。

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