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超声造影在甲状腺结节鉴别诊断及良性结节微波消融治疗中的应用价值*

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摘要 目的:研究超声造影在甲状腺结节鉴别诊断及良性结节微波消融治疗中的应用价值。**方法:**选取2015年1月~2018年2月我院收治的甲状腺结节患者100例作为研究对象,所有纳入对象均进行超声造影检查,分析甲状腺结节的超声造影特征,并与病理诊断结果进行对照。此外,将甲状腺良性结节患者以随机抽签法分成超声造影组31例和常规超声组30例。超声造影组微波消融治疗前后均予以超声造影配合,常规超声组微波消融治疗前后均予以常规超声配合。比较两组治疗前后甲状腺结节造影情况以及术后1年结节复发情况。**结果:**甲状腺恶性结节增强强度为低增强、增强模式为不均匀、无环绕增强占比均高于良性结节(均 $P<0.05$)。以病理诊断为金标准,超声造影诊断恶性甲状腺结节的灵敏度为92.31%、特异度为78.69%、准确度为84.00%。治疗后超声造影组甲状腺结节最长径、体积均低于常规超声组(均 $P<0.05$)。超声造影组术后1年结节复发率为0.00%,低于常规超声组的16.67%($P<0.05$)。**结论:**超声造影应用于甲状腺结节鉴别诊断的价值较高,且结合微波消融治疗良性结节的效果明显,预后理想,值得临床推广应用。

关键词: 甲状腺结节; 超声造影; 微波消融; 应用价值

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The Application Value of Contrast-enhanced Ultrasound in Differential Diagnosis of Thyroid Nodules and Microwave Ablation of Benign Nodules*

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ABSTRACT Objective: To study the application value of contrast-enhanced ultrasound in the differential diagnosis of thyroid nodules and microwave ablation of benign nodules. **Methods:** 100 patients with thyroid nodule who were admitted to our hospital from January 2015 to February 2018 were included as study objects. All the subjects were examined by contrast-enhanced ultrasound, and the features of thyroid nodules were analyzed. The results were compared with pathological diagnosis. In addition, patients with benign thyroid nodules were randomly divided into 31 cases in the contrast-enhanced ultrasound group and 30 cases in the conventional ultrasound group. Contrast-enhanced ultrasound was performed before and after microwave ablation in the contrast-enhanced ultrasound group, and conventional ultrasound was performed before and after microwave ablation in the conventional ultrasound group. Thyroid nodule angiography before and after treatment and nodule recurrence 1 year after operation were compared between the two groups. **Results:** The enhancement intensity of malignant thyroid nodules was low enhancement, the enhancement pattern was uneven, and the proportion of non-circumferential enhancement were higher than those of benign thyroid nodules (all $P<0.05$). With pathological diagnosis as the gold standard, the sensitivity of contrast-enhanced ultrasound in the diagnosis of malignant thyroid nodules was 92.31%, the specificity was 78.69%, and the accuracy was 84.00%. After treatment, the longest diameter and volume of thyroid nodules in the contrast-enhanced ultrasound group were lower than those of the conventional ultrasound group (all $P<0.05$). The recurrence rate of nodules of contrast-enhanced ultrasound group at 1 year after operation was 0.00%, which was lower than 16.67% of conventional ultrasound group ($P<0.05$). **Conclusion:** Contrast-enhanced ultrasound is of high value in the differential diagnosis of thyroid nodules, and combined with microwave ablation for the treatment of benign nodules, the prognosis is ideal. It is worthy of clinical application.

Key words: Thyroid nodule; Contrast-enhanced ultrasound; Microwave ablation; Application value

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前言

甲状腺结节属于临床上较为常见的疾病之一,多见良性结

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节,其中约有 3%~5%的甲状腺良性结节会发生恶变^[1]。高频超声是目前临床上首选的诊断甲状腺结节的检查方式,然而常规超声在甲状腺良恶性结节的鉴别诊断方面存在一定的局限性^[2-4]。随着近年来医疗水平的不断提高以及影像学技术的逐渐完善,超声造影作为一种新型影像学检查方式,可较好地显示肿瘤内微循环血流灌注状况,特别是应用于肝脏占位性病变的定性诊断中价值较高,但该技术应用于浅表小器官肿瘤方面的研究尚未完全成熟^[5-7]。众所周知,甲状腺良性结节往往无需特殊治疗,定期随访即可,然而当结节增长过大造成压迫或对美观造成影响时,亦或是可能有恶变倾向时,需选择合理的方式进行治疗^[8-9]。其中甲状腺结节微创消融术具有创伤较小、术后恢复较快、并发症较少等特点,目前已在临床上得到广泛应用。该治疗术式主要是短时间内于病变组织中释放高能量,以提高结节内组织温度,促使肿瘤组织坏死,最后经由机体免疫吞噬吸收,安全性较好^[10,11]。鉴于此,本文通过研究超声造影在甲状腺结节鉴别诊断及良性结节微波消融治疗中的应用价值,旨在为甲状腺结节的诊疗提供参考依据,现作以下报道。

1 资料与方法

1.1 一般资料

选取 2015 年 1 月~2018 年 12 月我院收治的甲状腺结节患者 100 例作为研究对象。纳入标准:(1)所有纳入对象均经影像学检查以及病理组织活检确诊;(2)年龄 ≥ 18 周岁;(3)所有甲状腺良性结节患者均拟行微波消融治疗;(4)入院前均未接受任何相关治疗。排除标准:(1)超声造影禁忌症者;(2)交流沟通障碍或伴有精神疾病者;(3)心、肝、肾等重要脏器发生病变者;(4)正参与其他研究者;(5)研究过程中因各种原因退出者。其中男 23 例,女 77 例,年龄 20~71 岁,平均年龄 (48.92 ± 10.73) 岁;结节性质:良性结节 61 例,恶性结节 39 例;文化程度:初中及以下 43 例,高中及以上 57 例。将甲状腺良性结节患者以随机抽签法分成超声造影组 31 例,常规超声组 30 例。其中超声造影组男 7 例,女 24 例,年龄 21~70 岁,平均年龄 (48.28 ± 10.75) 岁;文化程度:初中及以下 13 例,高中及以上 18 例。常规超声组男 5 例,女 25 例,年龄 22~71 岁,平均年龄 (48.36 ± 10.78) 岁;文化程度:初中及以下 11 例,高中及以上 19 例。两组上述指标比较无统计学差异($P>0.05$)。本研究已获得纳入对象同意,并得到我院伦理委员会批准。

1.2 研究方法

(1)诊断方式:使用仪器为 Philips iU-Elite 彩色多普勒超声诊断仪,常规扫描采用 L12-9 探头,频率为 9.0~12.0 MHz,超声造影则采用 L9-3 探头,频率为 3.0~10.0 MHz,辅以实时超声造影匹配成像技术以及 Qlab 分析软件,机械指数为 0.06~0.08,超声造影剂选用声诺维冻干粉剂(购自意大利 Bracco 公司),使用前加入 5 mL 生理盐水充分混合。造影时通过肘静脉团注 2.4 mL,然后快速给予 5 mL 生理盐水灌注冲管。首先进行常规超声检查,患者均取仰卧位,充分暴露甲状腺区域,发现甲状腺结节后,对其部位、大小、形状、内部回声、边界、钙化以及周围淋巴结情况进行观察、记录,进行初步诊断。随后切换探头为 L9-3,选择显示目标结节的最佳切面,保证甲状腺结节显示最大或血流最丰富,周围存在正常腺体组织行常规超声。保持切面不变,进入超声造影模式。告知患者平静呼吸,避免吞咽动作,通过肘静脉快速推注造影剂 2.4 mL 后开始计时,并存储动态图像到仪器硬盘内,将探头固定,持续观察 90 s 后结束图像存储。然后于造影模式下扫查甲状腺其他切面。针对双侧均存在可疑结节或多发可疑结节的患者,可予以多次造影。检查结束后由我院两名影像科专业医师采用双盲法对检查结果予以分析。(2)治疗方式:超声造影组微波消融治疗前后均予以超声造影配合,即在术后待高回声稍有消退后进行超声造影,若目标区域无造影剂灌注表示消融彻底,结束治疗。常规超声组微波消融治疗前后均予以常规超声配合,术后进行常规超声,若彩色多普勒显示目标区域不存在血流信号,结束治疗。

1.3 观察指标

比较甲状腺良恶性结节的超声影像特征,超声造影诊断甲状腺结节与病理结果比较,分析治疗前后超声造影组与常规超声组的甲状腺结节造影情况以及结节复发情况。复发判定标准如下^[12]:术后进行为期 12 个月的随访,若于原消融的区域内再次发现与原结节回声相似,且病理结果一致的结节,记为复发。

1.4 统计学方法

采用 SPSS24.0 软件进行数据处理,计量资料用 $(\bar{x} \pm s)$ 表示,采用 t 检验,计数资料用[n(%)]表示,采用 χ^2 检验, $\alpha=0.05$ 设置为检验标准。

2 结果

2.1 甲状腺结节的超声造影特征对比

甲状腺恶性结节增强强度为低增强、增强模式为不均匀、无环绕增强占比均高于良性结节(均 $P<0.05$)。见表 1。

表 1 甲状腺结节的超声造影特征对比 [例(%)]
Table 1 Comparison of contrast-enhanced ultrasound features of thyroid nodules [n(%)]

Groups	n	Enhancement intensity			Enhancement pattern		Circumferential enhancement	
		No enhancement	Low enhancement	Equal or high enhancement	Even	Uneven	Yes	No
Malignant	39	0(0.00)	35(89.74)*	4(10.26)	2(5.13)	37(94.87)	1(2.56)	38(97.44)
Benign	61	6(9.84)	9(14.75)	46(75.41)	32(52.46)	29(47.54)	17(27.87)	44(72.13)
χ^2	-		62.356			23.750		10.321
P	-		0.000			0.000		0.001

Note: Compared with benign nodules, * $P<0.05$.

2.2 超声造影诊断甲状腺结节与病理结果对比

以病理诊断为金标准,超声造影诊断甲状腺恶性结节的灵

敏度为 92.31%(36/39)、特异度为 78.69%(48/61)、准确度为 84.00%(84/100)。见表 2。

表 2 超声造影诊断甲状腺结节与病理结果对比

Table 2 Comparison of contrast-enhanced ultrasound in the diagnosis of thyroid nodules and pathological results

Contrast-enhanced ultrasound	Pathological diagnosis		Total
	Malignant	Benign	
Malignant	36	13	49
Benign	3	48	51
Total	39	61	100

2.3 治疗前后两组甲状腺结节造影情况对比

治疗后两组结节最长径、体积均低于治疗前(均 $P < 0.05$);

治疗后超声造影组甲状腺结节最长径、体积均低于常规超声组(均 $P < 0.05$)。见表 3。

表 3 治疗前后两组甲状腺结节造影情况对比($\bar{x} \pm s$)Table 3 Comparison of thyroid nodule angiography between the two groups before and after treatment($\bar{x} \pm s$)

Groups	n	Longest diameter of nodules(cm)		Volume(cm^3)	
		Before treatment	After treatment	Before treatment	After treatment
Contrast-enhanced ultrasound group	31	2.34 $\pm$ 1.02	0.17 $\pm$ 0.06*	12.82 $\pm$ 4.95	0.64 $\pm$ 0.28*
Conventional ultrasound group	30	2.35 $\pm$ 1.03	0.31 $\pm$ 0.12*	12.77 $\pm$ 4.91	1.55 $\pm$ 0.41*
t	-	0.038	5.792	0.040	10.152
P	-	0.970	0.000	0.969	0.000

Note: Compared with before treatment, * $P < 0.05$.

2.4 两组结节复发情况对比

超声造影术后 1 年结节复发率为 0.00%(0/31), 低于常规超声组的 16.67%(5/30)($\chi^2=5.628, P=0.018$)。

3 讨论

迄今为止,超声是用于评价甲状腺结节的首选影像学手段,然而,由于部分甲状腺结节的超声表现较为复杂,图像存在一定的交叉以及重叠,单纯依靠常规超声诊断难度较高^[13-15]。病理组织活检是目前国内外所公认的诊断甲状腺结节的金标准,然而其属于有创性检查,且对操作技术水平要求较高,存在一定的潜在并发症风险,不利于推广应用^[16-18]。超声造影技术是近年来所发展起来的一种新型影像学方式,可实时反映组织器官微循环灌注状态,由微泡造影剂的显示以及分布状态,可对感兴趣区的血流灌注以及血流动力学变化进行反映^[19-21]。其中甲状腺结节形成后,其血管结构以及微血管灌注会随之出现改变,这为超声造影鉴别诊断甲状腺结节提供了依据。

本文结果显示,甲状腺恶性结节增强强度为低增强、增强模式为不均匀、无环绕增强占比均高于良性结节(均 $P < 0.05$)。说明了甲状腺恶性结节的超声造影表现特征以低增强、不均匀增强以及无环绕增强为主。究其原因,笔者认为可能与甲状腺乳头癌的乏血供性以及血管网络分布不均有关,癌组织内尽管有新生血管存在,但因其网管壁发育尚未成熟,走行不规则,加之恶性组织浸润引起血管变性、坏死以及血管缺血,从而引起血供分布不均匀,局部充盈缺损^[22]。此外,以病理诊断为金标准,超声造影诊断恶性甲状腺结节的灵敏度为 92.31%、特异度

为 78.69%、准确度为 84.00%。这和既往研究的结论保持一致^[23,24],提示了超声造影应用于甲状腺结节的鉴别诊断中价值较高。其中主要原因可能是:超声造影剂声诺维属于血池显示剂,可有效显示组织的微循环灌注状态,继而为超声定性诊断提供较多的信息^[25-27]。另外,治疗后超声造影组甲状腺结节最长径、体积均低于常规超声组(均 $P < 0.05$)。这提示了超声造影应用于良性结节微波消融治疗中效果显著。分析原因,笔者认为超声造影引导下进行微波消融存在以下几点优势:(1)治疗方式灵活;(2)术后超声造影可有效评估目标区域血供,判定消融是否完全,有利于对未灭活组织实时补充消融处理,从而提高临床治疗效果。本文结果还显示了超声造影组结节复发率为 0.00%,低于常规超声组的 16.67%($P < 0.05$)。这提示了超声造影应用于良性结节微波消融治疗中,可在一定程度上降低结节复发几率。其中主要原因可能在于:超声造影可有效确定治疗范围,从而为治疗方案的制定提供指导作用。与此同时,超声造影可有效评价微波消融的疗效,明确微循环破坏程度以及质地情况,清晰显示消融区血管情况,继而指导消融术的实施^[28-30]。

综上所述,超声造影应用于甲状腺结节鉴别诊断中具有较高的价值,且超声造影引导下的微波消融治疗良性结节的效果显著,预后理想,具有较高的临床推广价值。

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