

SPECT/CT淋巴结显像与碘摄取率预测DTC首次¹³¹I治疗反应的价值

Value of SPECT/CT lymph node imaging and iodine uptake rate in predicting the response of DTC to the first ¹³¹I treatment

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·临床研究·

SPECT/CT 淋巴结显像与碘摄取率预测 DTC 首次¹³¹I 治疗反应的价值

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【摘要】目的 探究 SPECT/CT 与碘摄取率预测分化型甲状腺癌(DTC)首次¹³¹I 治疗反应的价值。**方法** 回顾性分析 2021 年 1 月至 2022 年 1 月于湖北医药学院附属随州医院首次接受¹³¹I 治疗的 138 例 DTC 术后患者的临床资料及影像资料, 其中男性 36 例、女性 102 例, 年龄(47.8±9.8)岁。所有患者均行¹³¹I 全身显像和 SPECT/CT 显像, 测定碘摄取率。患者在¹³¹I 治疗后随访至少 6 个月进行疗效反应评价, 将患者分为疗效满意(ER)组和非 ER 组。2 组间临床资料的比较采用独立样本 *t* 检验、Mann-Whitney *U* 检验和 χ^2 检验, 采用 Logistic 回归分析明确 DTC 首次¹³¹I 治疗疗效反应不满意的预测因素, 采用受试者工作特征(ROC)曲线获得最佳临界值, 以曲线下面积(AUC)判断预测因素对治疗反应的预测价值。**结果** 非 ER 组患者腺外浸润占比(63.89%对 36.27%)、肿瘤、淋巴结、转移(TNM)分期 III~IV 期占比(69.44%对 44.12%), 复发风险分层中/高风险占比(91.67%对 68.63%)、治疗前刺激性甲状腺球蛋白(psTg)水平 [1.65(0.90, 1.87) μ g/L 对 1.32(0.65, 1.66) μ g/L] 和淋巴结短径 [(6.33±2.01) mm 对 (4.52±1.43) mm] 均高于 ER 组, 治疗前促甲状腺激素(TSH)水平 [59.10(35.32, 118.33) mU/L 对 65.33(42.41, 120.33) mU/L] 与碘摄取率 [(5.63±1.50)% 对 (8.65±2.33)%] 均低于 ER 组, 差异均有统计学意义($t=5.314, 5.837, \chi^2=6.829-8.257, Z=4.683, 6.861$; 均 $P<0.05$)。多因素 Logistic 回归分析结果显示, DTC 患者术后首次¹³¹I 疗效反应不满意预测因素为治疗前 TSH 水平、腺外浸润占比、TNM 分期 III~IV 期占比、复发风险分层中/高风险、psTg 水平、淋巴结短径、碘摄取率($OR=1.941-4.545$, 均 $P<0.01$)。ROC 曲线分析结果显示, SPECT/CT 淋巴结短径最大约登指数对应的临界值为 5.52 mm, 预测 DTC 首次¹³¹I 疗效反应不满意的 AUC 为 0.766(95%CI: 0.687~0.834); 碘摄取率最大约登指数对应的临界值为 7.47%, AUC 为 0.749(95%CI: 0.669~0.819), 二者联合的 AUC 为 0.911(95%CI: 0.850~0.953); 二者预测 DTC 首次¹³¹I 治疗反应的 AUC 均高于单独预测的 AUC, 且差异均有统计学意义(均 $P<0.001$)。**结论** SPECT/CT 显像淋巴结短径与碘摄取率对于预测 DTC 首次¹³¹I 治疗效果均有一定的价值, 二者联合使用的预测价值更优。

【关键词】 体层摄影术, 发射型计算机, 单光子; 体层摄影术, X 线计算机; 分化型甲状腺癌; 碘摄取率; 碘放射性同位素; 淋巴结

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Value of SPECT/CT lymph node imaging and iodine uptake rate in predicting the response of DTC to the first ¹³¹I treatment

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【Abstract】Objective To analyze the value of SPECT/CT and iodine uptake rate in predicting response to the first ¹³¹I treatment of patients with differentiated thyroid carcinoma (DTC). **Methods** From January 2021 to January 2022, 138 postoperative patients with DTC who received

¹³¹I treatment for the first time in Suizhou Hospital, Hubei University of Medicine were retrospectively analyzed, including 36 males and 102 females aged (47.8±9.8) years. All patients underwent ¹³¹I whole-body scan and SPECT/CT imaging, determine the iodine uptake rate. After ¹³¹I treatment, the patients were followed up for at least 6 months to evaluate efficacy and response. The patients were divided into the excellent response (ER) group and non-ER group. Comparison of clinical data between the two groups select independent sample *t*-test, Mann Whitney *U* test, χ^2 conduct analysis, and Logistic regression analysis were used to identify the predictors of the unsatisfactory response to the first ¹³¹I therapy in patients with DTC. In addition, the receiver operating characteristic (ROC) curve was used to obtain the best critical value, and the area under curve (AUC) was used to determine the predictive value of predictive factors on treatment response. **Results** The proportion of extraglandular invasion (63.89% vs. 36.27%); the proportion of tumor, node, metastasis (TNM) stages III–IV (69.44% vs. 44.12%); the proportion of recurrence risk stratification medium/high risk (91.67% vs. 68.63%); preablation stimulated thyroglobulin (psTg) level before treatment (1.65 (0.90, 1.87) μ g/L vs. 1.32 (0.65, 1.66) μ g/L); and lymph node short diameter in the non-ER group ((6.33±2.01) mm vs. (4.52±1.43) mm) were higher than those in the ER group, and the thyroid-stimulating hormone (TSH) level (59.10 (35.32, 118.33) mU/L vs. 65.33 (42.41, 120.33) mU/L), and iodine uptake rate before treatment ((5.63±1.50)% vs. (8.65±2.33)%) were lower than those in the ER group, with statistically significant differences (*t*=5.314, 5.837; χ^2 =6.829–8.257; *Z*=4.683, 6.861; all *P*<0.05). Multivariate Logistic regression analysis showed the following predictive factors of the unsatisfactory response to the first ¹³¹I treatment after DTC operation: the level of TSH before treatment, the proportion of extraglandular invasion, the proportion of TNM stages III–IV, the proportion of middle/high risk of recurrence risk stratification, the level of psTg, the short diameter of lymph nodes, and the iodine uptake rate (*OR*=1.941–4.545, all *P*<0.01). The ROC curve analysis results showed that the critical value of the maximum Yodon index of the short diameter of lymph nodes displayed by SPECT/CT was 5.52 mm, and the AUC that predicted the unsatisfactory response to the first ¹³¹I treatment of DTC was 0.766 (95%*CI*: 0.687–0.834). The critical value corresponding to the maximum Yodon index of the iodine uptake rate was 7.47%, with an AUC of 0.749 (95%*CI*: 0.669–0.819), and the AUC of the combination of the two is 0.911 (95%*CI*: 0.850–0.953). The AUC predicted by the two methods for the first ¹³¹I treatment response of DTC was higher than that predicted by the two methods alone, and the difference was statistically significant (*P*<0.001). **Conclusion** The short diameter of lymph nodes of SPECT/CT imaging and the iodine uptake rate are considered as predictors of dissatisfaction with the first ¹³¹I treatment effect to DTC, and such predictors are of great importance in predicting the response of ¹³¹I treatment. Furthermore, the combination of the two methods has a better predictive value.

【Key words】 Tomography, emission-computed, single-photon; Tomography, X-ray computed; Differentiated thyroid carcinoma; Iodine uptake rate; Iodine radioisotopes; Lymph nodes

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目前,手术切除联合¹³¹I及甲状腺激素抑制剂的综合治疗对DTC有较好的治疗效果,但因颈部淋巴结分布较为广泛,DTC的淋巴结转移率较高^[1]。中国临床肿瘤学会(CSCO)持续/复发及转移性分化型甲状腺癌诊疗指南-2019^[2]指出,对于存在淋巴结转移的DTC患者,需进一步实施清灶治疗,因此明确是否存在淋巴结转移灶具有重要意义。¹³¹I是DTC患者术后清除残余甲状腺组织(简

称清甲)的重要手段,由于碘是甲状腺激素合成的原料,因此通过测定甲状腺的碘摄取率,可判断甲状腺功能,确定给药剂量^[3]。目前国内医师普遍认为固定大剂量¹³¹I是获得良好清甲效果的有效手段,但碘摄取率受甲状腺残余情况、患者年龄等多个因素的影响,其是否可对DTC患者术后首次¹³¹I治疗反应进行有效预测有待进一步探究^[4-5]。SPECT/CT是一种多模态显像技术,可在CT图像

的基础上提供病理生理信息,对于DTC患者术后可疑淋巴结转移病灶的判断有较高的灵敏度^[6-7]。本研究旨在评价SPECT/CT淋巴结显像与碘摄取率在预测DTC首次¹³¹I治疗反应中的价值。

1 资料与方法

1.1 临床资料

回顾性分析2021年1月至2022年1月于湖北医药学院附属随州医院首次接受¹³¹I治疗的138例DTC术后患者的临床资料及影像资料,其中男性36例、女性102例,年龄(47.8±9.8)岁。纳入标准:符合中国临床肿瘤学会(CSCO)持续/复发及转移性分化型甲状腺癌诊疗指南-2019^[2]对甲状腺癌的诊断;接受甲状腺根治术,术后组织病理学结果为DTC;术后首次行¹³¹I治疗。排除标准:妊娠期与哺乳期女性;合并其他部位肿瘤;甲状腺癌术后创面未愈合者。138例患者中,甲状腺乳头状癌、滤泡状癌分别为128例、10例,术中甲状腺全切、近全切者分别为98例、40例。所有患者均在检查前签署了知情同意书。本研究符合《赫尔辛基宣言》的原则。

1.2 方法

1.2.1 治疗情况

患者于¹³¹I治疗前4周禁碘,停止服用甲状腺激素类药物,血清TSH水平>30 mU/L,并检测游离甲状腺原氨酸(free triiodothyronine, FT₃)、游离甲状腺素(free thyroxine, FT₄)、治疗前刺激性甲状腺球蛋白(preablation stimulated thyroglobulin, psTg)水平,行甲状腺彩超(美国GE公司LOGIQ E9型)观察残余甲状腺情况及局部淋巴结转移情况。给予患者¹³¹I治疗剂量3.70~7.40 GBq,空腹一次性口服,存在周围软组织侵犯、肺或淋巴结转移等情况的患者的治疗剂量为5.55 GBq,骨转移患者的治疗剂量为7.40 GBq,行甲状腺切除后残余甲状腺组织较多的患者的治疗剂量可减少至2.96 GBq^[8]。

1.2.2 SPECT/CT检测

患者服用¹³¹I后5~10 d内行¹³¹I全身显像(whole body scan, WBS)、SPECT/CT(德国西门子公司Symbia T16型)扫描,使用高能平行孔准直器,能峰360 keV,窗宽10%,扫描速度15 cm/min,范围自鼻咽部至主动脉弓,矩阵128×128,CT层厚

1.25 mm,管电流100 mA,管电压120 keV,在后台工作站勾画ROI并完成图像融合,结合CT图像测量扫描范围内最大淋巴结短径并记录。由1名具有5年以上工作经验的核医学科医师和1名中级以上职称的放射科医师共同阅片,意见不一致时由主任医师阅片判定。

1.2.3 碘摄取率的测定

患者服用¹³¹I 24 h后使用甲状腺功能仪(安徽中科中佳科学仪器有限公司NM-6110型)测定碘摄取率。测定碘摄取率前先测定室内本底计数率和颈模内标准源计数率,使甲状腺位于中心视野,测量3次取平均值,使用公式(1)计算碘摄取率:

$$\text{碘摄取率} = \frac{\text{甲状腺部位计数} - \text{本底计数}}{\text{标准源计数} - \text{本底计数}} \times 100\% \quad (1)$$

1.2.4 ¹³¹I治疗反应的判断及分组依据

患者首次¹³¹I治疗后至少随访6个月,根据¹³¹I治疗分化型甲状腺癌指南(2021版)^[9]进行疗效反应的评价。疗效满意(excellent response, ER):在甲状腺球蛋白抗体(TgAb)为阴性的情况下,刺激性甲状腺球蛋白水平<1 μg/L,抑制性甲状腺球蛋白水平<0.2 μg/L,且影像学检查未发现阳性病灶;疗效不确切(indeterminate response, IDR):在甲状腺球蛋白抗体(TgAb)水平较低或者持续下降的情况下,0.2 μg/L<抑制性甲状腺球蛋白水平<1 μg/L,1 μg/L<刺激性甲状腺球蛋白水平<10 μg/L,影像学检查未发现结构或功能性病变,¹³¹I治疗后¹³¹I全身显像示颈部甲状腺床区稍显影;生化疗效不佳(biochemical incomplete response, BIR):刺激性甲状腺球蛋白水平≥10 μg/L或抑制性甲状腺球蛋白水平≥1 μg/L或甲状腺球蛋白抗体(TgAb)水平持续上升,影像学检查未发现阳性病灶;结构性疗效不佳(structural incomplete response, SIR):影像学检查发现阳性病灶,存在结构或功能性病变。分组依据:符合ER标准的病例,治疗效果满意,归入ER组;符合IDR、BIR及SIR标准的病例治疗效果不满意,归入非ER组。

1.3 统计学处理

应用SPSS 25.0软件对数据进行统计学分析。符合正态分布的计量资料以 $\bar{x} \pm s$ 表示,组间比较采用独立样本 t 检验(方差齐),不符合正态分布的计量资料以 $M(Q_1, Q_3)$ 表示,组间比较采用Mann-

Whitney *U* 检验。计数资料以 % 表示, 组间比较采用 χ^2 检验。采用单因素 Logistic 回归分析筛选出有统计学意义的指标作为自变量, 采用多因素 Logistic 回归分析确定 DTC 首次 ^{131}I 疗效反应不满意的预测因素, 以 ROC 曲线获得 ^{131}I 疗效影响因素的最佳临界值, 以 AUC 判断预测因素对治疗反应的预测价值。 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 首次 ^{131}I 治疗反应结果及资料的单因素 Logistic 回归分析

138 例患者中有 102 例患者在首次 ^{131}I 治疗后达到 ER, 归入 ER 组, 36 例为 IDR、BIR 及 SIR, 归入非 ER 组。由表 1 可知, ER 组在患者性别、原发肿瘤长径、病理类型、手术切除方式、首次 ^{131}I 剂量与非 ER 组比较, 差异均无统计学意义(均 $P > 0.05$); 非 ER 组腺外浸润占比、TNM 分期 III~IV 期占比、复发风险分层中/高风险占比、psTg 水平和淋巴结短径均高于 ER 组, 治疗前 TSH 水平与碘摄取率均低于 ER 组, 差异均有统计学意义

(均 $P < 0.05$)。

2.2 多因素 Logistic 回归分析

以单因素 Logistic 回归分析有统计学意义的指标作为自变量, DTC 术后首次 ^{131}I 治疗反应不满意作为因变量, 经对连续变量(治疗前 TSH 水平、psTg 水平、淋巴结短径和碘摄取率)及二分类变量(腺外浸润、TNM 分期、复发风险分层)赋值后行多因素 Logistic 回归分析, 结果显示, 治疗前 TSH 水平、腺外浸润占比、TNM 分期 III~IV 期占比、复发风险分层中/高风险、psTg 水平、淋巴结短径、碘摄取率是 DTC 患者术后首次 ^{131}I 疗效反应不满意的预测因素(表 2)。

2.3 SPECT/CT 淋巴结显像及碘摄取率对首次 ^{131}I 治疗反应的预测结果

ROC 曲线分析结果显示, SPECT/CT 显像的淋巴结短径最大约登指数对应的临界值为 5.52 mm, 预测 DTC 患者首次 ^{131}I 疗效反应不满意的 AUC 为 0.766; 碘摄取率最大约登指数对应的临界值为 7.47%, AUC 为 0.749, 二者联合预测的 AUC 为 0.911; 二者联合预测 DTC 患者首次 ^{131}I 治疗反应

表 1 138 例分化型甲状腺癌患者首次 ^{131}I 治疗的反应结果及临床资料的单因素 Logistic 回归分析

Table 1 Results and clinical data univariate Logistic regression analysis of 138 patients with differentiated thyroid carcinoma treated with ^{131}I for the first time

临床资料	疗效满意组($n=102$)	非疗效满意组($n=36$)	检验值	P 值
性别			$\chi^2=1.984$	0.159
男(例, %)	25(24.51)	11(30.56)		
女(例, %)	77(75.49)	25(69.44)		
原发肿瘤长径(cm, $\bar{x} \pm s$)	1.41 \pm 0.30	1.52 \pm 0.35	$t=-1.809$	0.073
病理类型			$\chi^2=0.030$	0.861
乳头状癌(例, %)	93(91.18)	35(97.22)		
滤泡状癌(例, %)	9(8.82)	1(2.78)		
治疗前TSH水平[mU/L, $M(Q_1, Q_3)$]	65.33(42.41, 120.33)	59.10(35.32, 118.33)	$Z=6.861$	<0.001
腺外浸润			$\chi^2=8.257$	0.004
有(例, %)	37(36.27)	23(63.89)		
无(例, %)	65(63.73)	13(36.11)		
TNM分期			$\chi^2=6.829$	0.009
I~II(例, %)	57(55.88)	11(30.56)		
III~IV(例, %)	45(44.12)	25(69.44)		
复发风险分层			$\chi^2=7.461$	0.006
低风险(例, %)	32(31.37)	3(8.33)		
中/高风险(例, %)	70(68.63)	33(91.67)		
手术切除方式			$\chi^2=1.422$	0.233
全切(例, %)	68(66.67)	30(83.33)		
近全切(例, %)	34(33.33)	6(16.67)		
psTg水平 [$\mu\text{g/L}$, $M(Q_1, Q_3)$]	1.32(0.65, 1.66)	1.65(0.90, 1.87)	$Z=4.683$	<0.001
首次 ^{131}I 治疗剂量(GBq, $\bar{x} \pm s$)	5.35 \pm 1.43	5.88 \pm 0.61	$t=1.888$	0.061
淋巴结短径(mm, $\bar{x} \pm s$)	4.52 \pm 1.43	6.33 \pm 2.01	$t=5.837$	<0.001
碘摄取率(% , $\bar{x} \pm s$)	8.65 \pm 2.33	5.63 \pm 1.50	$t=5.314$	<0.001

注: TSH为促甲状腺激素; TNM为肿瘤、淋巴结、转移; psTg为治疗前刺激性甲状腺球蛋白

表 2 138 例分化型甲状腺癌患者首次¹³¹I 治疗疗效反应不满意预测因素的多因素 Logistic 回归分析**Table 2** Multivariate Logistic regression analysis of predictors of unsatisfactory response to ¹³¹I treatment for the first time in 138 patients with differentiated thyroid carcinoma

变量	回归系数	标准误	Wald值	OR值	95%CI	P值
治疗前TSH水平	1.544	0.272	30.982	4.545	2.251~6.354	<0.001
腺外浸润占比	0.887	0.263	11.375	3.012	1.526~4.857	<0.001
TNM分期Ⅲ~Ⅳ期占比	0.785	0.270	8.453	2.192	1.322~3.560	<0.001
复发风险分层中/高风险	0.663	0.288	5.300	1.941	0.948~3.251	0.001
psTg水平	0.912	0.252	13.098	2.489	1.653~5.012	<0.001
淋巴结短径	1.314	0.257	26.141	3.721	2.013~6.217	<0.001
碘摄取率	1.135	0.298	14.506	3.511	1.858~5.624	<0.001
常量	-10.325	1.245	71.852	0.000	-	-

注：-表示无此项数据。TSH为促甲状腺激素；TNM为肿瘤、淋巴结、转移；psTg为治疗前刺激性甲状腺球蛋白；CI为置信区间

的AUC均高于单独预测，差异均有统计学意义(均 $P<0.01$)(图1、表3)。

3 讨论

甲状腺癌是内分泌系统常见的恶性肿瘤，多起源于滤泡上皮细胞，根据其组织学分类分为DTC、甲状腺髓样癌和未分化型甲状腺癌，临床以DTC多见，约占全部甲状腺癌的90%^[10]。因DTC具有多病灶和淋巴结易转移的特点，单纯手术治疗往往无法彻底清除病灶，临床多采用¹³¹I治疗进行清甲^[11]。影响¹³¹I治疗反应的因素较多，其中治疗剂量是关键因素，碘摄取率作为中间变量是治疗剂量选择的重要参考依据^[12]。此外，在首次¹³¹I治疗后仍需明确具有摄碘功能的颈部淋巴结是否存在转移，以帮助患者进行复发风险分层，为后续的病灶清除或再次行¹³¹I治疗提供指导。

本研究结果显示，非ER组患者的腺外浸润占比、TNM分期Ⅲ~Ⅳ期占比、复发风险分层中/高风险占比、psTg水平、淋巴结短径均高于ER组，治疗前TSH水平和碘摄取率低于ER组，且以上因素均是首次¹³¹I疗效反应不满意的预测因素。这说明除治疗前TSH水平、腺外浸润占比、TNM分

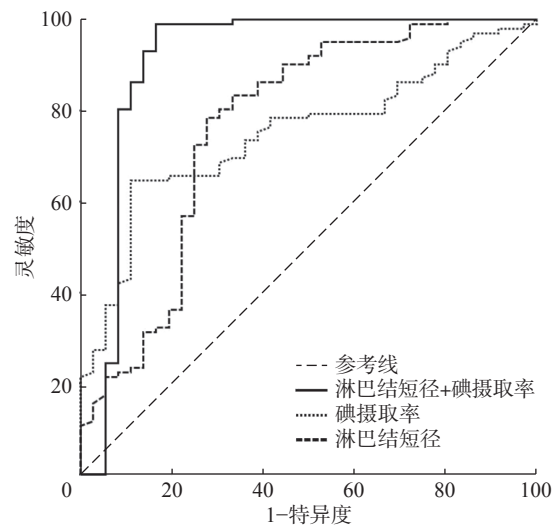


图 1 SPECT/CT 显像的淋巴结短径及碘摄取率对分化型甲状腺癌患者首次¹³¹I 疗效反应预测的受试者工作特征曲线 SPECT 为单光子发射计算机断层摄影术；CT 为计算机断层摄影术

Figure 1 Receiver operating characteristic curve of SPECT/CT developed lymph node diameter and iodine uptake rate for predicting the response to the first ¹³¹I curative effect in differentiated thyroid carcinoma patients

期Ⅲ~Ⅳ期占比、psTg水平等常规因素外，淋巴结短径较大及甲状腺碘摄取率低亦对预测DTC患者首次¹³¹I治疗疗效反应不满意有价值。甲状腺具有较强的摄碘能力，其摄取碘离子的数量和速度可

表 3 SPECT/CT 显像的淋巴结短径及碘摄取率对分化型甲状腺癌患者首次¹³¹I 治疗反应疗效不满意的预测结果**Table 3** Predictive results of SPECT/CT lymph node short diameter and iodine uptake rate on non-excellent response response to the first ¹³¹I treatment in differentiated thyroid carcinoma patients

指标	AUC	95%CI	P值	临界值	灵敏度(%)	特异度(%)	约登指数
淋巴结短径(mm)	0.766	0.687~0.834	<0.001	5.52	78.43	72.22	0.507
碘摄取率(%)	0.749	0.669~0.819	<0.001	7.47	64.71	88.89	0.536
淋巴结短径+碘摄取率	0.911	0.850~0.953	<0.001	-	99.02	83.33	0.823

注：-表示无此项数据。SPECT为单光子发射计算机断层摄影术；CT为计算机断层摄影术；AUC为曲线下面积；CI为置信区间

反映甲状腺的功能,一般情况下患者摄碘率随着治疗后时间延长而升高,在24 h时达峰,通过测量甲状腺摄碘率可反应患者的甲状腺功能状态^[13-14]。碘摄取率较低患者的甲状腺功能较差,在首次¹³¹I治疗后对碘的吸收能力差,无法有效清除残余的恶性病灶组织。陈畅等^[15]认为,甲状腺碘摄取率能预测DTC患者¹³¹I治疗后体内残留活度,而¹³¹I体内残留活度对治疗效果有直接影响。因此,甲状腺碘摄取率可影响DTC患者对首次¹³¹I治疗后的反应情况。甲状腺癌病灶的转移率较高,DTC患者的转移灶同样有摄碘能力,可影响残余甲状腺组织对¹³¹I的摄取剂量,导致治疗效果降低^[16]。血清psTg水平与¹³¹I-WBS是DTC患者术后常用的评价是否存在淋巴结转移的手段,研究结果显示,约有10%~15%的患者存在psTg水平升高而¹³¹I-WBS阴性的情况^[17],因此需其他方法的辅助以进一步明确淋巴结的转移情况。SPECT/CT显像是一种多模态的功能显像,在CT图像的基础上,能从细胞、分子水平反映人体病理、生理变化,可清晰、直观地显示聚碘病灶的形态及位置,对转移淋巴结病灶的信息有更为准确的判断^[18]。部分失分化的转移淋巴结不能显像的现象并不少见,淋巴结短径增大是其存在转移可能的指征之一,当psTg水平升高SPECT显像颈部无摄碘淋巴结时,可借助同机CT和颈部B超寻找增大淋巴结。SPECT/CT显像淋巴结短径较大者,对¹³¹I治疗剂量的需求较大,因此可影响首次¹³¹I治疗的反应。中国临床肿瘤学会(CSCO)持续/复发及转移性分化型甲状腺癌诊疗指南-2019^[2]推荐:当发现确定转移性淋巴结时,手术切除仍然为其主要治疗手段。但是,本研究结果亦显示,较小转移性淋巴结未行手术经¹³¹I治疗后,随访阶段效果良好。在临床工作中,较多患者拒绝行二次手术,故将淋巴结短径作为指导其选择治疗方式的参考,这值得参考。

此外,本研究通过ROC曲线判断SPECT/CT淋巴结显像与碘摄取率对DTC患者首次¹³¹I治疗反应的预测价值,结果显示,SPECT/CT显像淋巴结短径与碘摄取率分别以5.52 mm和7.47%为临界值,预测DTC患者首次¹³¹I治疗反应的AUC分别为0.766和0.749,二者联合预测的AUC为0.911,这说明联合使用具有更好的疗效预测价值。SPECT/CT显像能从影像学方面判断DTC患

者术后的淋巴结是否存在转移,碘摄取率则直接反映了残余甲状腺的功能,二者联合使用可从不同方面反映DTC患者术后的病理、生理状态,因此联合使用对¹³¹I治疗反应有更好的预测价值。

综上所述,SPECT/CT显像淋巴结短径与碘摄取率均是DTC患者首次¹³¹I治疗疗效反应不满意的预测因素,且对于预测¹³¹I疗效反应有一定的价值,二者联合使用的预测价值更优。

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