

• 临床研究 •

新诊断2型糖尿病患者亚临床颈动脉粥样硬化的影响因素及综合治疗后的转归情况

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[摘要] 目的: 探讨新诊断2型糖尿病(type 2 diabetes mellitus, T2DM)患者亚临床颈动脉粥样硬化(subclinical carotid atherosclerosis, SCAS)的相关影响因素及综合治疗后的转归情况。方法: 收集402例新诊断T2DM患者的资料, 根据有无SCAS进行分组, 比较两组间各项指标的差异。采用二元Logistic回归分析新诊断T2DM合并SCAS的影响因素, 利用受试者工作特征(receiver operating characteristic, ROC)曲线分析危险因素的截断值。对其中72例患者进行随访, 比较综合治疗前后代谢指标达标情况及SCAS检出率。结果: 402例新诊断T2DM住院患者中SCAS检出率为57.0%(229/402)。SCAS组与无SCAS组比较, 糖尿病周围神经病变(diabetic peripheral neuropathy, DPN)、糖尿病视网膜病变(diabetic retinopathy, DR)、估算的肾小球滤过率(estimated glomerular filtration rate, eGFR)、甘油三酯(triglyceride, TG)、体重指数(body mass index, BMI)、心率的差异均有统计学意义($P < 0.05$)。二元Logistic回归分析结果显示, 新诊断T2DM合并SCAS的独立影响因素包括DPN、DR、eGFR、BMI ($P < 0.05$)。ROC曲线分析显示, eGFR截断值为 $103.50 \text{ mL}/(\text{min} \cdot 1.73 \text{ m}^2)$, BMI截断值为 $27.32 \text{ kg}/\text{m}^2$ 。与基线相比, 干预1年后患者的颈动脉内-中膜厚度(carotid intima-media thickness, CIMT)、SCAS检出率及代谢指标有明显改善, 两组之间差异有统计学意义($P < 0.05$)。结论: 新诊断T2DM住院患者SCAS检出率高, DPN、DR与新诊断T2DM合并SCAS风险呈正相关, BMI升高、eGFR下降是新诊断T2DM合并SCAS的独立危险因素。综合治疗可改善新诊断T2DM患者的代谢指标、缓解CIMT增厚、降低SCAS检出率, 但颈动脉斑块未得到明显改善。

[关键词] 新诊断2型糖尿病; 慢性微血管并发症; 亚临床颈动脉粥样硬化

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Factors influencing subclinical carotid atherosclerosis in patients with newly diagnosed type 2 diabetes mellitus and regression after comprehensive treatments

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[Abstract] **Objective:** To investigate the influencing factors associated with subclinical carotid atherosclerosis (SCAS) in patients with newly diagnosed type 2 diabetes mellitus (T2DM) and regression after comprehensive treatments. **Methods:** Data were collected from 402 patients with newly diagnosed T2DM, grouped according to the presence or absence of SCAS, and the differences in the indicators between the two groups were compared. Using binary logistic regression to analyze factors influencing newly diagnosed T2DM combined with SCAS. Cut-off values for risk factors were analyzed using receiver operating characteristic (ROC) curves. Seventy-two of these patients were followed up to compare the target accomplishment rates of metabolic index and SCAS detection rate before

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and after the comprehensive treatment. **Results:** The SCAS detection rate among 402 newly diagnosed T2DM hospitalized patients was 57.0% (229/402). The differences in diabetic peripheral neuropathy (DPN), diabetic retinopathy (DR), estimated glomerular filtration rate (eGFR), triglycerides (TG), body mass index (BMI), and heart rate were statistically significant ($P < 0.05$) when the SCAS group was compared with the non-SCAS group. Binary logistic regression analysis showed that the independent influences of newly diagnosed T2DM combined with SCAS included DPN, DR, eGFR, and BMI ($P < 0.05$). ROC curve analysis showed an eGFR cut-off value of 103.50 mL/(min \cdot 1.73 m 2) and a BMI cut-off value of 27.32 kg/m 2 . Compared with baseline, patients' carotid intima-media thickness (CIMT), SCAS detection rate and metabolic indexes were significantly improved after one year of intervention, and the difference between the two groups was statistically significant ($P < 0.05$). **Conclusion:** The SCAS detection rate in hospitalized patients with newly diagnosed T2DM is high. DPN and DR are positively associated with the risk of newly diagnosed T2DM combined with SCAS. Elevated BMI and decreased eGFR are independent risk factors for newly diagnosed T2DM combined with SCAS. Combination therapy improves metabolic indexes, relieves CIMT thickening, and reduces SCAS detection rate in patients with newly diagnosed T2DM, but carotid artery plaque is not significantly improved.

[Key words] newly diagnosed type 2 diabetes mellitus; chronic microvascular complications; subclinical carotid atherosclerosis

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心血管疾病是2型糖尿病(type 2 diabetes mellitus, T2DM)患者死亡的主要原因之一^[1],高血糖可以促进动脉粥样硬化的发生发展,因此《中国成人2型糖尿病及糖尿病前期患者动脉粥样硬化性心血管疾病预防与管理专家共识(2023)》提出对这两种疾病进行共病管理^[2]。动脉粥样硬化诱导期较长,因此针对亚临床疾病的研究,更有助于达到预防的目的。颈动脉为动脉粥样硬化好发部位,采用颈动脉超声这种非侵入性检查方法可以测量颈动脉内膜-中膜厚度(carotid intima-media thickness, CIMT),并用来评估亚临床颈动脉粥样硬化(subclinical carotid atherosclerosis, SCAS)^[3]。现有研究已针对SCAS与糖尿病、糖尿病微血管并发症、糖代谢异常的相关性进行探讨^[4]。但由于新诊断T2DM患者通常被认为是低危人群,以上研究较少关注这些患者。调查显示在20世纪90年代T2DM未确诊的阶段最长可达10年^[5],在疾病未被诊断期间,高血糖可对大血管和/或微血管产生功能和结构损伤。因此,本研究通过分析新诊断T2DM患者SCAS的发生情况、相关影响因素及综合治疗后的转归情况,旨在为新诊断T2DM患者心血管疾病的早期诊断、早期干预治疗及共病管理策略的制定提供临床依据。

1 对象和方法

1.1 对象

选取2020年1月—2022年12月浙江省人民医院内分泌科新诊断T2DM的402例住院患者作为研究对象。纳入标准:①初次明确诊断T2DM;②资料

完整,能够按照标准操作流程采集和报告颈动脉超声检查结果。排除标准:①目前接受抗糖尿病药物、使用抗血小板药物及他汀类药物治疗;②1型糖尿病、妊娠糖尿病、特殊类型糖尿病等;③感染性疾病、肝肾功能严重低下、心力衰竭、恶性肿瘤、颈动脉病、自身免疫病、神经系统疾病等其他重大疾病患者;④糖尿病急性并发症的患者。最终共纳入符合上述标准的T2DM患者402例,并对其中72例患者进行随访。本研究经浙江省人民医院伦理委员会批准(批准文号:QT2023354),所有患者均知情同意。

1.2 方法

1.2.1 资料收集

①一般资料:体重指数(body mass index, BMI)、性别、年龄、吸烟史、饮酒史、高血压病史、用药情况等。②临床指标:糖化血红蛋白(glycosylated hemoglobin, HbA1c)、空腹血糖(fasting plasma glucose, FPG)、总胆固醇(total cholesterol, TC)、甘油三酯(triglyceride, TG)、低密度脂蛋白胆固醇(low-density lipoprotein-cholesterol, LDL-C)、高密度脂蛋白胆固醇(high-density lipoprotein-cholesterol, HDL-C)、同型半胱氨酸(homocysteine, Hcy)、超敏C反应蛋白(high-sensitivity C-reactive protein, hsCRP)、纤维蛋白原(fibrinogen, Fg)、D-二聚体(D-dimer, DD)。③慢性并发症筛查:尿微量白蛋白与肌酐的比值(urine albumin creatine ratio, UACR)、估算的肾小球滤过率(estimated glomerular filtration rate, eGFR)、颈动脉内膜-中膜厚度(carotid intima-media thick-

ness, CIMT)、颈动脉斑块(carotid artery plaque, CAP)、颈动脉狭窄(carotid artery stenosis, CAS)发生情况。

1.2.2 相关标准

慢性肾脏病(chronic kidney disease, CKD)诊断参照《糖尿病肾脏疾病临床诊疗中国指南》^[6]。糖尿病视网膜病变(diabetic retinopathy, DR)、糖尿病周围神经病变(diabetic peripheral neuropathy, DPN)诊断参照中国T2DM防治指南^[7]。SCAS包括CIMT增厚和/或CAP形成^[3], CIMT增厚定义为颈总动脉最大CIMT ≥ 1.0 mm,或颈动脉窦处最大CIMT ≥ 1.2 mm, CAP定义为CIMT ≥ 1.5 mm^[8]。本研究中综合治疗包括:控制血糖、控制血压、控制血脂,根据患者年龄、胰岛功能等制定个体化治疗方案。依据《国家标准化代谢性疾病管理中心建设规范及管理指南》^[9],代谢指标达标定义为HbA1c $< 7\%$ 、LDL-C < 2.6 mmol/L、收缩压 < 140 mmHg、舒张压 < 90 mmHg,综合达标指血糖、血脂、血压指标均达标。

1.3 统计学方法

用SPSS 24.0统计软件进行数据分析。正态分布的计量资料以均数 \pm 标准差($\bar{x} \pm s$)表示,两组间符合正态分布且满足方差齐性的数据采用 t 检验,方差不齐的数据采用 t' 检验。非正态分布的计量资料以中位数(四分位数)[$M(P_{25}, P_{75})$]表示,两组间比较采用秩和检验。计数资料以例数和构成比表示,两组间比较采用卡方检验。采用二元Logistic回归分析法分析影响因素,利用受试者工作特征(receiver operating characteristic, ROC)曲线分析危险因素的截断值。 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 新诊断T2DM患者基本特征

本研究共纳入402例新诊断T2DM住院患者,男299例(74.4%),女103例(25.6%),中位年龄为47(40,55)岁,中位BMI为25.62(23.22,28.06)kg/m²,中位HbA1c为10.40%(8.77%,11.62%),42.0%(169/402)的受试者合并CAP,2.7%(11/402)的受试者合并CAS,57.0%(229/402)的受试者合并SCAS,16.7%(67/402)的受试者合并DPN,19.2%(77/402)的受试者合并DR,2.0%(8/402)的受试者eGFR < 60 mL/(min $\cdot 1.73$ m²),23.6%(95/402)的受试者UACR ≥ 30 mg/g,24.6%(99/402)的受试者合并CKD。

2.2 SCAS组与无SCAS组T2DM患者临床资料的比较

根据CIMT值分为无SCAS组[43.0%(173/402)]

和SCAS组[57.0%(229/402)]。DPN、DR、eGFR、TG、BMI、心率差异有统计学意义($P < 0.05$)。性别、CKD、高血压史、吸烟史、饮酒史、年龄、UACR、FPG、舒张压、收缩压、TC、HDL-C、LDL-C、HbA1c、Hcy、hsCRP、Fg、DD差异无统计学意义($P > 0.05$,表1)。

2.3 新诊断T2DM患者SCAS影响因素分析

将单因素分析中有统计学差异的指标DPN、DR、eGFR、TG、BMI、心率作为自变量纳入多因素Logistic回归分析中,并校正性别、年龄。结果显示,性别、年龄、TG、心率与SCAS无关,新诊断T2DM合并SCAS的影响因素包括:DPN(OR=2.167,95%CI:1.089~4.312, $P < 0.05$)、DR(OR=3.069,95%CI:1.629~5.779, $P < 0.05$)、eGFR(OR=0.982,95%CI:0.971~0.993, $P < 0.05$)、BMI(OR=1.101,95%CI:1.039~1.168, $P < 0.05$,表2)。ROC曲线分析显示,eGFR的曲线下面积和95%CI为0.635(0.579~0.690),截断值为103.50 mL/(min $\cdot 1.73$ m²)(约登指数为0.261,灵敏度为0.595,特异性为0.667)、BMI的曲线下面积和95%CI为0.592(0.537~0.648),截断值为27.32 kg/m²(约登指数为0.167,灵敏度为0.383,特异度为0.784)。

2.4 72例新诊断T2DM患者干预1年组与基线组临床指标比较

干预1年组与基线组相比,代谢指标有明显改善,IMT得到缓解,SCAS检出率降低,CAP未得到明显改善。结果显示:舒张压、TC、HDL-C、LDL-C、血脂达标情况、HbA1c、血糖达标情况、右侧IMT、SCAS检出率、高血压知晓率、血脂异常知晓率、高血糖知晓率、钠-葡萄糖共转运蛋白2(sodium glucose transporter 2 inhibitor, SGLT-2)抑制剂的使用差异有统计学意义($P < 0.05$)。eGFR、UACR、收缩压、TG、左侧IMT、胰高血糖素样肽-1(glucagon like peptide-1, GLP-1)激动剂的使用、CAP差异无统计学意义($P > 0.05$,表3)。

3 讨论

SCAS是心血管疾病病理变化的共同基础。调查显示SCAS患病人数众多。2020年一项针对全球30~79岁一般人群颈动脉粥样硬化的荟萃分析中,SCAS的全球患病率估计为48.7%^[10]。在里约热内卢T2DM队列研究中,478名受试者参加研究,IMT > 1.0 mm占52.7%,有颈动脉斑块的占86.6%^[11]。一项新诊断T2DM SCAS队列研究中,约2/3的新诊

表1 SCAS组和无SCAS组新诊断T2DM患者临床资料的比较结果

Table 1 Comparative results of clinical data of newly diagnosed T2DM patients in the SCAS group and the non-SCAS group

Variable	SCAS group(n=229)	Non-SCAS group(n=173)	$\chi^2/t/t'/Z$	P
Male[n(%)]	175(76.4)	124(71.7)	1.163	0.281
DPN[n(%)]	51(22.8)	16(9.6)	11.551	0.001
DR[n(%)]	59(28.0)	18(11.5)	14.807	<0.001
CKD[n(%)]	62(31.6)	37(27.4)	0.681	0.409
Hypertension[n(%)]	62(27.1)	59(34.3)	2.436	0.119
Smoking[n(%)]	119(52.0)	78(45.1)	1.866	0.172
Alcohol consumption[n(%)]	116(50.7)	87(50.3)	0.005	0.942
Age(years, $\bar{x} \pm s$)	48.19 \pm 10.83	46.08 \pm 10.62	-1.960	0.051
UACR[mg/g, M(P ₂₅ , P ₇₅)]	14.74(7.50, 36.36)	12.14(6.86, 32.47)	-0.906	0.365
eGFR[mL/(min·1.73 m ²), $\bar{x} \pm s$]	101.37 \pm 22.25	111.00 \pm 22.73	4.222	<0.001
FPG[mmol/L, M(P ₂₅ , P ₇₅)]	8.30(6.80, 11.69)	7.66(6.80, 10.00)	-1.742	0.082
DBP(mmHg, $\bar{x} \pm s$)	79.40 \pm 11.35	80.98 \pm 10.03	1.476	0.141
SBP(mmHg, $\bar{x} \pm s$)	128.59 \pm 16.43	128.22 \pm 14.80	-0.239	0.811
TG[mmol/L, M(P ₂₅ , P ₇₅)]	1.44(1.03, 2.18)	1.69(1.23, 2.26)	-2.851	0.004
TC[mmol/L, M(P ₂₅ , P ₇₅)]	4.87(4.19, 5.51)	4.88(4.30, 5.59)	-0.689	0.491
HDL-C[mmol/L, M(P ₂₅ , P ₇₅)]	0.97(0.86, 1.14)	0.96(0.82, 1.12)	-1.371	0.170
LDL-C[mmol/L, $\bar{x} \pm s$]	2.94 \pm 0.85	3.04 \pm 0.84	1.138	0.256
BMI[kg/m ² , M(P ₂₅ , P ₇₅)]	25.84(23.51, 29.19)	25.00(22.83, 27.05)	-3.110	0.002
HR[beats/min, M(P ₂₅ , P ₇₅)]	80.00(74.00, 89.50)	84.00(76.00, 95.00)	-2.615	0.009
HbA1c[% , $\bar{x} \pm s$]	10.26 \pm 2.12	10.18 \pm 2.15	-0.362	0.718
Hcy[mol/L, M(P ₂₅ , P ₇₅)]	12.40(10.95, 14.30)	12.55(11.00, 14.45)	-0.142	0.887
hsCRP[mg/L, M(P ₂₅ , P ₇₅)]	1.90(1.30, 4.60)	2.00(1.30, 3.65)	-0.307	0.759
Fg[g/L, M(P ₂₅ , P ₇₅)]	2.57(2.26, 3.12)	2.50(2.19, 2.96)	-1.201	0.230
DD[μg/L, M(P ₂₅ , P ₇₅)]	180.00(120.00, 335.00)	210.00(120.00, 327.50)	-0.911	0.362

表2 新诊断T2DM患者SCAS影响因素的多因素Logistic回归分析结果

Table 2 Results of multivariate logistic regression analysis of factors influencing SCAS in newly diagnosed T2DM patients

Variable	Non-adjusted			Model 1		
	β	OR(95%CI)	P	β	OR(95%CI)	P
DPN	0.730	2.08(1.06-4.08)	0.035	0.774	2.18(1.09-4.31)	0.028
DR	1.034	2.81(1.52-5.21)	0.001	1.121	3.07(1.63-5.78)	0.001
eGFR	-0.017	0.98(0.97-0.99)	0.001	-0.018	0.98(0.97-0.99)	0.002
TG	0.004	1.00(0.92-1.10)	0.930	-0.001	1.00(0.91-1.09)	0.977
BMI	0.095	1.10(1.04-1.17)	0.001	0.097	1.10(1.04-1.17)	0.001
HR	-0.014	0.99(0.97-1.00)	0.123	-0.016	0.98(0.97-1.00)	0.098

Model 1 was adjusted for age and sex.

断T2DM出现CAP^[12]。我国一项针对病程1年内T2DM的队列研究,SCAS占比75%^[13],但SCAS在新诊断T2DM患者中实际患病率尚未在大样本研究中确定,在不同人群中的研究结果存在差别。本研究根据CIMT和/或CAP形成判断是否存在SCAS,发现402例新诊断T2DM住院患者中SCAS有229例,占57.0%。本研究中SCAS患病率低于T2DM横断面调

查,这可能与选择人群的样本量及该人群的基线特点有关。

心血管疾病的危险因素相对复杂,本研究除了传统的心血管疾病危险因素BMI与SCAS之间的关系外,同时发现微血管并发症,即eGFR、DPN、DR也与SCAS独立相关。既往研究发现BMI是SCAS重要的危险因素^[14],BMI每增加1个百分点,将导致动

表3 72例新诊断T2DM患者基线组与综合治疗1年以上组临床指标比较结果

Table 3 Results of the comparison of clinical indicators between the baseline group and the group with more than 1 year of comprehensive treatment in 72 patients with newly diagnosed T2DM

Variable	Baseline group (n=72)	Intervention 1 year group (n=72)	$\chi^2/t/Z$	P
eGFR[mL/(min·1.73 m ²), M(P ₂₅ , P ₇₅)]	102.68(88.11, 116.04)	97.95(88.54, 107.05)	-1.441	0.149
UACR[mg/g, M(P ₂₅ , P ₇₅)]	12.93(7.21, 23.32)	10.01(4.78, 30.57)	-0.927	0.354
DBP[mmHg, $\bar{x} \pm s$]	80.24 ± 9.80	76.78 ± 7.98	2.322	0.022
SBP[mmHg, M(P ₂₅ , P ₇₅)]	123.00(117.00, 136.00)	124.00(117.00, 130.00)	-0.848	0.397
TG[mmol/L, M(P ₂₅ , P ₇₅)]	1.43(1.01, 2.21)	1.47(0.96, 2.01)	-0.631	0.528
TC[mmol/L, M(P ₂₅ , P ₇₅)]	5.00(4.44, 5.49)	4.38(3.72, 5.13)	-2.913	0.004
HDL-C[mmol/L, M(P ₂₅ , P ₇₅)]	1.00(0.82, 1.18)	1.07(0.95, 1.32)	-2.786	0.005
LDL-C[mmol/L, $\bar{x} \pm s$]	3.00 ± 0.80	2.60 ± 0.91	2.777	0.006
HbA1c[%, M(P ₂₅ , P ₇₅)]	9.90(8.50, 11.25)	6.10(5.70, 7.37)	-7.958	<0.001
Left CIMT[mm, M(P ₂₅ , P ₇₅)]	0.90(0.80, 1.00)	0.90(0.70, 1.00)	-1.222	0.222
Right CIMT[mm, M(P ₂₅ , P ₇₅)]	0.90(0.80, 1.00)	0.81(0.70, 1.00)	-2.190	0.029
CAP[n(%)]	22(31.9)	30(41.7)	1.448	0.229
Hypertension awareness rate[n(%)]	15(20.8)	31(43.1)	8.177	0.004
Treatment rates for hypertension[n(%)]	15(20.8)	31(43.1)	8.177	0.004
Dyslipidemia awareness rate[n(%)]	14(19.4)	54(75.0)	44.582	<0.001
Treatment rates for dyslipidemia[n(%)]	0(0)	54(75.0)	86.400	<0.001
Hyperglycemia awareness rate[n(%)]	18(25.0)	72(100.0)	86.400	<0.001
Treatment rates for hyperglycemia[n(%)]	0(0)	70(97.2)	136.216	<0.001
Use of GLP-1 agonists[n(%)]	0(0)	3(4.2)	3.064	0.080
Use of SGLT-2 inhibitors[n(%)]	0(0)	21(29.2)	24.585	<0.001
Accomplishment rate of the target blood glucose[n(%)]	6(8.3)	51(70.8)	58.802	<0.001
Accomplishment rate of the target blood lipids[n(%)]	18(25.0)	37(51.4)	10.620	0.001
Accomplishment rate of the target blood pressure[n(%)]	50(69.4)	60(83.3)	3.850	0.050
Accomplishment rate of consolidated target[n(%)]	7(9.7)	16(22.2)	4.191	0.041
SCAS detection rate[n(%)]	45(62.5)	33(45.8)	4.028	0.045

脉粥样硬化和冠心病的风险增加10%^[15]。在韩国进行的一项关于无传统心血管危险因素受试者SCAS的研究中发现, BMI与SCAS独立相关^[16]。一项针对我国218例T2DM的队列研究表明, 肥胖(BMI≥28 kg/m²)是T2DM合并动脉粥样硬化的独立危险因素并且有助于预测T2DM合并动脉粥样硬化的发生风险^[17]。本研究在新诊断T2DM人群中证实了BMI是SCAS的危险因素。既往研究表明eGFR低的糖尿病患者发生心血管事件的风险较高^[18], 日本一项针对338例T2DM患者的横断面研究表明CIMT与eGFR呈负相关^[19]。多项研究表明, T2DM患者DPN与动脉粥样硬化相关指标和心血管事件相关。一项针对292例T2DM男性患者的研究表明, 伴有DPN的患者IMT显著高于不伴有DPN的患者, 并且神经传导速度与IMT显著负相关^[20]。近期一项关于糖尿病患者动脉硬化和神经病变相关性

的荟萃分析发现, 在校正年龄、性别、糖尿病病程、收缩压后, DPN仍与至少一项动脉硬化指标呈正相关^[21]。中国一项针对2781例T2DM患者SCAS与DR发病率相关的前瞻性研究发现, SCAS与DR发生风险增加相关^[22]。本研究在新诊断的T2DM人群中证实了以上结果, 表明糖尿病微血管并发症与动脉粥样硬化的发生密切相关, 这可能与免疫介导的炎症反应、内皮细胞活化和氧化应激引起的慢性炎症有关^[23]。既往研究显示SCAS的传统影响因素还包括年龄、性别、血脂等, 但本研究未发现明显相关性, 可能的原因包括: ①研究人群不同; ②分组方法不同; ③尽管本研究在患者入组前排除了他汀类药物治疗的干扰, 单因素分析中也看到了血脂异常与心血管疾病风险之间的关系, 但多因素Logistic回归分析结果显示这种相关性不显著, 可能存在其他影响血脂的药物干扰。

本研究还对其中72例患者进行了综合治疗后的随访,发现干预1年组与基线组相比,代谢指标有明显改善,CIMT得到缓解,SCAS检出率降低。研究表明血压、血糖、血脂水平均与IMT有密切关系,甚至是其独立影响因素,因此积极进行降压、降糖、调脂对IMT有积极影响^[24-25]。本研究结果证实了综合治疗对缓解新诊断T2DM人群CIMT的积极影响。一项探讨多因素干预条件下新诊T2DM患者SCAS进展的研究表明,干预2年时SCAS的发生率为28.8%,明显高于干预1年时(11.5%),从而得出多因素干预并不能完全阻止SCAS的发生^[26]。但在本研究中干预1年后(45.8%)与基线(62.5%)相比,SCAS检出率明显降低,既往研究与本研究的差异可能是由于研究人群不同,干预方式不同,新型降糖药物SGLT-2抑制剂的使用。研究表明SGLT-2抑制剂除了具有降糖作用外,还能改善心血管疾病预后^[27],改善动脉僵硬度^[28]。

本研究尚存在一些局限性:首先,本研究虽然确定了糖尿病慢性微血管并发症与SCAS有关,但是两者之间的因果关系尚不能确定;其次,本研究选取的人群为新诊断住院的T2DM患者,可能存在选择人群的偏移;最后,本研究为单中心研究,研究结论仍需进一步通过多中心、大样本的前瞻性临床研究进行验证。

综上所述,本研究发现新诊断T2DM住院患者SCAS检出率高,其慢性微血管并发症与心血管疾病风险独立相关,这表明新诊断T2DM患者应注重慢性微血管并发症的筛查,合并微血管并发症的患者更应该重视心血管疾病的早期筛查和诊断。对新诊断T2DM患者进行1年的综合治疗,能显著改善相关代谢指标、提升综合达标率,同时可以缓解CIMT,降低SCAS的发生率。

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