

自发性孤立性肠系膜上动脉夹层腔内介入治疗的临床疗效

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【摘要】 目的 探讨自发性孤立性肠系膜上动脉夹层(SISMAD)腔内介入治疗的临床疗效。方法 采用回顾性队列研究方法。收集 2012 年 3 月至 2023 年 3 月陆军军医大学第一附属医院收治的 87 例 SISMAD 患者的临床资料;男 80 例,女 7 例;年龄为 54(49, 61)岁。87 例患者中,行保守治疗 55 例,设为保守治疗组;行腔内介入治疗 32 例,设为腔内介入治疗组。观察指标:(1)临床特征。(2)治疗情况。(3)随访情况。正态分布的计量资料以 $\bar{x} \pm s$ 表示,组间比较采用 t 检验。偏态分布的计量资料以 $M(Q_1, Q_3)$ 表示,组间比较采用秩和检验。计数资料以绝对数表示,组间比较采用 χ^2 检验或 Fisher 确切概率法。**结果** (1)临床特征。两组患者有症状、中性粒细胞百分比比较,差异均有统计学意义($P < 0.05$)。两组患者 Yun 分型构成比比较,差异无统计学意义($P > 0.05$)。(2)治疗情况。两组患者血管完全重塑、住院时间、总费用比较,差异均有统计学意义($\chi^2 = 23.752, t = -4.213, -16.421, P < 0.05$);腹痛缓解分别为 34 例和 24 例,两组比较,差异无统计学意义($P > 0.05$)。保守治疗组有症状患者出院时腹痛、恶心呕吐、腹泻、便血等症状均缓解或消失,无肠缺血或肠破裂者。腔内介入治疗组中,成功行支架植入术 30 例,手术时间为 115(86, 155)min,术中出血量为 5(5, 10)mL,造影剂用量为(200±51)mL,造影剂使用碘克沙醇、碘普罗胺、碘海醇分别为 23、8、1 例,手术方式为单个裸支架植入、裸支架辅助弹簧圈栓塞、多个裸支架、覆膜支架、单纯血管造影分别为 14、3、10、3、2 例,支架类型为自膨式金属裸支架、自膨式覆膜支架分别为 39、3 枚,支架直径为(6.5±1.0)mm,支架长度为(69±23)mm。2 例无症状患者,腔内介入治疗未成功,均行肠系膜上动脉造影术。腔内介入治疗组中,92.3%(24/26)的患者术后腹痛缓解;2 例术后腹痛患者经对症治疗后腹痛均好转。(3)随访情况。87 例患者均获得随访,随访时间为 12(4, 24)个月,均无腹痛复发及二次干预。随访期间,82 例患者行 CT 血管成像或超声检查,5 例 CT 血管成像或超声检查结果未能获得,无 SISMAD 相关死亡或肠系膜上动脉破裂者。保守治疗组和腔内介入治疗组达到血管完全重塑分别为 8 例和 21 例,两组比较,差异有统计学意义($\chi^2 = 23.752, P < 0.05$)。**结论** 与保守治疗比较,行腔内介入治疗 SISMAD 患者住院时间更长、总费用更高,血管完全重塑率更高,两者均无腹痛复发。

【关键词】 自发性孤立性肠系膜上动脉夹层; 腔内介入治疗; 保守治疗; 血管重塑

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Clinical efficacy of endovascular interventional therapy for spontaneous isolated superior mesenteric artery dissection

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[Abstract] Objective To investigate the clinical efficacy of endovascular interventional therapy for spontaneous isolated superior mesenteric artery dissection(SISMAD). **Methods** The retrospective cohort study was conducted. The clinical data of 87 patients with SISMAD who were admitted to The First Affiliated Hospital of Army Medical University from March 2012 to March 2023 were collected. There were 80 males and 7 females, aged 54(49,61)years. Of 87 patients, 55 cases undergoing conservative therapy were allocated into conservative therapy group and 32 cases undergoing endovascular interventional therapy were allocated into endovascular interventional therapy group. Observation indicators: (1) clinical characteristics; (2) treatment; (3) follow-up. Measurement data with normal distribution were represented as $Mean \pm SD$, and comparison between groups was conducted using the t test. Measurement data with skewed distribution were represented as $M(Q_1, Q_3)$, and comparison between groups was conducted using the rank sum test. Count data were represented as absolute numbers and comparison between groups was conducted using the chi-square test or Fisher exact probability. **Results** (1) clinical characteristics. There were significant differences in the cases with symptoms, percentage of neutrophils between the conservative therapy group and the endovascular interventional therapy group ($P < 0.05$). There was no significant difference in the proportion of Yun classification between the two groups ($P > 0.05$). (2) Treatment. There were significant differences in the complete vascular remodeling, duration of hospital stay, and total expenses between the conservative therapy group and the endovascular interventional therapy group ($\chi^2 = 23.752, t = -4.213, -16.421, P < 0.05$). There were 34 patients in the conservative therapy group and 24 patients in the endovascular interventional therapy group with relieved abdominal pain, respectively, showing no significant difference between the two groups ($P > 0.05$). For symptomatic patients in the conservative therapy group, symptoms including abdominal pain, nausea, vomiting, diarrhea, hematochezia were relieved or disappeared, and no intestinal ischemia or rupture occurred. For patients in the endovascular interventional therapy group, 30 cases were implanted stents, the operation time was 115(86,155)minutes, volume of intraoperative blood loss was 5(5,10)mL, dose of contrast media was (200 ± 51) mL. There were 23, 8 and 1 cases with the contrast medium as Iodoxanol, Ioprosamide, Iodohehexanol, respectively. About the surgical methods, 14 patients received single bare stent implantation, 3 cases received bare stent-assisted coil embolization, 10 cases received multiple bare stent implantation, 3 cases received covered stent implantation, 2 cases received angiography alone. A total of 39 self-expandable bare metal stents and 3 self-expandable covered stents were implanted. The diameter and length of the stents were (6.5 ± 1.0) mm and (69 ± 23) mm, respectively. Two asymptomatic patients had failure in endovascular interventional therapy and underwent superior mesenteric artery angiography. For the endovascular interventional therapy group, 92.3% (24/26) of patients were relieved abdominal pain and 2 patients with abdominal pain were improved after symptomatic treatment. (3) Follow-up. All the 87 patients were followed up for 12(4,24)months, without recurrent abdominal pain or secondary intervention. During the follow-up, 82 patients underwent computed tomography angiography or ultrasonography, and 5 patients had no available results. There was no SISMAD related death or superior mesenteric artery rupture. Eight patients in the conservative therapy group achieved complete vascular remodeling, versus 21 cases in the endovascular interventional therapy group, showing a significant difference between the two groups ($\chi^2 = 23.752, P < 0.05$). **Conclusions** Compared with conservative therapy, patients undergoing endovascular interventional therapy for SISMAD has loner hospital stay, higher total costs, higher complete vascular remodeling rate. There is no recurrent abdominal pain in two methods.

[Key words] Spontaneous isolated superior mesenteric artery dissection; Endovascular interventional therapy; Conservative therapy; Vascular remodeling

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自发性孤立性肠系膜上动脉夹层(spontaneous isolated superior mesenteric artery dissection, SISMAD)发病率低,曾被认为是一种罕见病。SISMAD患者中,男性占比更高(84.2%),平均年龄为55岁,多数报道来自中国、日本、韩国等东亚国家^[1]。SISMAD患者临床表现各异,轻者可表现为无症状,重者可发生肠缺血坏死。由于其缺乏特异性实验室检查,

诊断主要依靠CT血管成像和DSA。保守治疗被认为是SISMAD的一线治疗方式^[2-4]。但腹痛无法控制或有肠坏死、肠破裂迹象的患者需行腔内介入手术或开放手术^[5]。本研究回顾性分析2012年3月至2023年3月我科收治的87例SISMAD患者的临床资料,探讨SISMAD腔内介入治疗的临床疗效。

资料与方法

一、一般资料

采用回顾性队列研究方法。收集 87 例 SISMA D 患者的临床资料;男 80 例,女 7 例;年龄为 54(49, 61)岁;BMI 为(23.4±2.0)kg/m²。87 例患者中,有吸烟史 52 例,合并症为原发性高血压、糖尿病、慢性肾功能不全、冠心病分别为 40、8、6、4 例;有症状 62 例,其中腹痛、恶心呕吐、腹泻、便血分别为 60、15、5、4 例。同一患者可有≥2 项症状。实验室检查 WBC、RBC、PLT、Hb、中性粒细胞百分比、AST、Cr、K⁺、PT、部分凝血活酶时间、D-二聚体分别为 6.2(5.6, 6.7)×10⁹/L、4.5(4.2, 4.7)×10¹²/L、195(163, 207)×10⁹/L、138(132, 145)g/L、61%(52%, 69%)、27(21, 33)U/L、80(68, 81)μmol/L、3.9(3.8, 4.0)mmol/L、11.3(10.7, 11.5)s、27.2(25.3, 29.6)s、0.8(0.3, 1.2)mg/L,假腔直径为(9±3)mm,夹层长度为 29(19, 42)mm,肠系膜上动脉与主动脉夹角为(68±20)°。87 例患者中,行保守治疗 55 例,设为保守治疗组;行腔内介入治疗 32 例,设为腔内介入治疗组。本研究通过我院医学伦理委员会审批,批号为 KY2023112。免除患者知情同意。

二、纳入标准和排除标准

纳入标准:(1)年龄为 18~90 岁。(2)经影像学检查确诊为 SISMA D。(3)腔内介入治疗行肠系膜上动脉造影术、肠系膜上动脉支架植入术、支架辅助弹簧圈栓塞术。(4)保守治疗为禁食水、补液、抗凝、控制血压等治疗。(5)临床资料完整。

排除标准:(1)合并其他动脉夹层,如主动脉或髂动脉等。(2)临床资料缺失。

三、治疗方法

患者均通过 CT 血管成像检查明确 SISMA D 诊断,确诊后行禁食、控制血压、抑酸、补液等对症支持治疗,抗凝和抗 PLT 治疗由临床医师根据具体情况决定。若患者腹痛无法控制或肠系膜上动脉动脉瘤进行性扩张,在患者一般情况稳定的情况下行腔内介入治疗(肠系膜上动脉造影术、肠系膜上动脉支架植入术或支架辅助弹簧圈栓塞术),支架类型为自膨式金属裸支架(COOK 公司,美国;Biotronik 公司,瑞士;InVatec 公司,意大利)或自膨式覆膜支架(Gore 公司,美国;美敦力公司,美国)。若患者发生肠坏死或肠系膜上动脉假性动脉瘤破裂则行开放手术。

四、观察指标和评价标准

观察指标:(1)临床特征。(2)治疗情况。(3)随访情况。

评价标准:Yun 分型参照文献[6]。血管完全重塑定义为肠系膜上动脉形态恢复,夹层完全消失,无假性动脉瘤形成。

五、随访

采用门诊或电话方式进行随访。了解患者症状缓解、复发和二次干预情况,通过 CT 血管成像检查判断血管是否完全重塑。随访时间截至 2023 年 11 月。

六、统计学分析

应用 SPSS 26.0 统计软件进行分析。正态分布的计量资料以 $\bar{x}\pm s$ 表示,组间比较采用 *t* 检验。偏态分布的计量资料以 $M(Q_1, Q_3)$ 表示,组间比较采用秩和检验。计数资料以绝对数表示,组间比较采用 χ^2 检验或 Fisher 确切概率法。 $P<0.05$ 为差异有统计学意义。

结 果

一、临床特征

两组患者有症状、中性粒细胞百分比比较,差异均有统计学意义($P<0.05$);性别、年龄、BMI、吸烟史、原发性高血压、糖尿病、冠心病、慢性肾功能不全、腹痛、恶心呕吐、腹泻、便血、WBC、RBC、PLT、Hb、AST、Cr、血钾、PT、部分凝血活酶时间、D-二聚体、假腔直径、夹层长度、肠系膜上动脉与主动脉夹角比较,差异均无统计学意义($P>0.05$)。见表 1。

保守治疗组 Yun 分型为 I 型、II a 型、II b 型、III 型分别为 35、14、6、0 例,腔内介入治疗组上述指标分别为 16、7、8、1 例,两组患者 Yun 分型构成比比较,差异无统计学意义($\chi^2=4.77, P=0.160$)。

二、治疗情况

保守治疗组和腔内介入治疗组患者血管完全重塑、住院时间、总费用分别为 8 例、(4.3±1.8)d、(4 260±2 580)元和 21 例、(6.6±3.3)d、(36 672±14 301)元,两组上述指标比较,差异均有统计学意义($\chi^2=23.752, t=-4.213, -16.421, P<0.001, <0.001, <0.001$)。保守治疗组和腔内介入治疗组分别有 34 例和 26 例腹痛患者,腹痛缓解分别为 34 例和 24 例,两组比较,差异无统计学意义($P=0.184$)。

保守治疗组有症状患者出院时腹痛、恶心呕吐、腹泻、便血等症状均缓解或消失,无肠缺血或肠

表 1 保守治疗组和腔内介入治疗组自发性孤立性肠系膜上动脉夹层患者临床特征比较

Table 1 Comparison of clinical characteristics of patients with spontaneous isolated superior mesenteric artery dissection between conservative therapy group and endovascular interventional therapy group

组别	例数	性别(例)		年龄	体质量指数	吸烟史	原发性	糖尿病	冠心病	慢性肾功能不全(例)	有症状(例)
		男	女	[M(Q ₁ , Q ₃), 岁]	($\bar{x} \pm s$, kg/m ²)	(例)	高血压(例)	(例)	(例)		
保守治疗组	55	49	6	54(47, 61)	24±2	35	26	6	2	2	35
腔内介入治疗组	32	31	1	55(49, 58)	23±2	17	14	2	2	4	27
统计量值		$\chi^2=0.772$		$Z=-0.181$	$t=0.985$	$\chi^2=0.930$	$\chi^2=0.101$	$\chi^2=0.116$	$\chi^2=0.001$	$\chi^2=1.287$	$\chi^2=4.249$
P 值		0.380 ^a		0.857	0.113	0.335	0.751	0.733 ^a	0.976 ^a	0.257 ^a	0.039
组别	例数	腹痛	恶心呕	腹泻	便血	白细胞	红细胞	血小板			
		(例)	吐(例)	(例)	(例)	[M(Q ₁ , Q ₃), ×10 ⁹ /L]	[M(Q ₁ , Q ₃), ×10 ¹² /L]	[M(Q ₁ , Q ₃), ×10 ⁹ /L]			
保守治疗组	55	34	7	2	2	6.2(5.8, 6.2)	4.5(4.5, 4.6)	195(189, 199)			
腔内介入治疗组	32	26	8	3	2	6.4(5.3, 9.0)	4.5(4.0, 4.7)	183(161, 215)			
统计量值		$\chi^2=3.569$	$\chi^2=2.135$	$\chi^2=0.399$	$\chi^2=0.001$	$Z=-1.228$	$Z=-1.686$	$Z=-0.280$			
P 值		0.059	0.144	0.528 ^a	0.976 ^a	0.220	0.092	0.779			
临床资料	例数	血红蛋白	中性粒细胞百分比	谷草转氨酶	肌酐	血钾					
		[M(Q ₁ , Q ₃), g/L]	[M(Q ₁ , Q ₃), %]	[M(Q ₁ , Q ₃), U/L]	[M(Q ₁ , Q ₃), μmol/L]	[M(Q ₁ , Q ₃), mmol/L]					
保守治疗组	55	138(138, 145)	57(46, 66)	29(23, 34)	81(70, 81)	3.9(3.9, 3.9)					
腔内介入治疗组	32	137(129, 146)	68(61, 73)	25(17, 32)	75(66, 85)	4.0(3.7, 4.3)					
统计量值		$Z=-1.442$	$Z=-4.023$	$Z=-1.730$	$Z=-1.044$	$Z=-0.862$					
P 值		0.149	0.001	0.084	0.297	0.388					
临床资料	例数	凝血酶原时间	部分凝血活酶时间	D-二聚体	假腔直径	夹层长度	SMA 与主动脉				
		[M(Q ₁ , Q ₃), s]	[M(Q ₁ , Q ₃), s]	[M(Q ₁ , Q ₃), mg/L]	[M(Q ₁ , Q ₃), mm]	[M(Q ₁ , Q ₃), mm]	夹角($\bar{x} \pm s$, °)				
保守治疗组	55	11.3(11.1, 11.4)	27.2(25.3, 29.6)	1.2(0.3, 1.2)	8(7, 10)	28(21, 43)	68±20				
腔内介入治疗组	32	11.1(10.6, 11.5)	26.9(25.5, 30.7)	0.5(0.2, 1.0)	9(7, 11)	29(18, 42)	67±21				
统计量值		$Z=-1.605$	$Z=-0.251$	$Z=-1.767$	$Z=-1.734$	$Z=-0.106$	$t=0.046$				
P 值		0.109	0.802	0.077	0.083	0.916	0.793				

注:保守治疗组患者行保守治疗;腔内介入治疗组患者行腔内介入治疗;^a采用连续性修正;SMA 为肠系膜上动脉

破裂者。

腔内介入治疗组中,成功行支架植入术 30 例,手术时间为 115(86, 155)min,术中出血量为 5(5, 10)mL,造影剂用量为(200±51)mL,造影剂使用碘克沙醇、碘普罗胺、碘海醇分别为 23、8、1 例,手术方式为单个裸支架植入、裸支架辅助弹簧圈栓塞、多个裸支架、覆膜支架、单纯血管造影分别为 14、3、10、3、2 例,支架类型为自膨式金属裸支架、自膨式覆膜支架分别为 39、3 枚,支架直径为(6.5±1.0)mm,支架长度为(69±23)mm。2 例无症状患者,腔内介入治疗未成功,均行肠系膜上动脉造影术,其中 1 例因肠系膜上动脉扭曲,血管内造影导管难以进入,造影检查结果显示:肠系膜上动脉开口处呈局部瘤样扩张,肠系膜上动脉血流通畅;1 例造影检查结果显示:肠系膜上动脉距腹主动脉开口处 3 cm 夹层形成,远端分支血管供血良好,真假腔同时向远端供血,考虑支架植入可能导致假腔闭塞引起肠道缺血,故放弃支架植入。

腔内介入治疗组中,92.3%(24/26)的患者术后腹痛缓解;2 例术后腹痛患者中,1 例腹痛伴恶心呕吐,术后行对症支持治疗后,恶心呕吐等症状消失,仍诉上腹部隐痛,复查 CT 血管成像提示支架下方及右侧回结肠动脉周围见环状无强化稍高密度影,考虑血肿可能,血管远端显影良好,住院时间为 11 d,2 个月后复查 CT 血管成像显示支架下方血管及右侧回结肠动脉周围血肿吸收;1 例因中下腹部间断性疼痛入院,CT 血管成像提示肠系膜上动脉夹层伴远端栓塞,各分支血管显影尚好,行支架植入术后仍感上腹部轻微疼痛,复查 CT 血管成像提示支架在位且通畅,远端血管显影良好,考虑急性胃炎,住院时间为 7 d,出院继续行抑酸治疗后腹痛好转。

三、随访情况

87 例患者均获得随访,随访时间为 12(4, 24)个月,均无腹痛复发及二次干预。随访期间,82 例患者行 CT 血管成像或超声检查,5 例 CT 血管成像或超声检查结果未能获得,无 SISMA 相关死亡或肠系

膜上动脉破裂者。保守治疗组中,1例54岁女性患者,入院CT血管成像检查肠系膜上动脉可见双腔征,6个月后复查假腔强化范围较前缩小,假腔部分血栓化,18个月后复查肠系膜上动脉假腔和血栓范围进一步缩小(图1)。腔内介入治疗组中,1例54岁男性患者,假腔较大,破口约2.9 mm,假腔周围见壁间血肿,穿透性溃疡形成,保守治疗1个月后复查CT血管成像,肠系膜上动脉假性动脉瘤合并血栓形成,较前增大,行支架植入术,术后1个月复查,支架内血流通畅,假性动脉瘤内未见造影剂填充;术后18个月,假性动脉瘤消失(图2)。保守治疗组和腔内介入治疗组达到血管完全重塑分别为8例和21例,两组比较,差异有统计学意义($\chi^2=23.752, P<0.001$)。

讨 论

本研究结果显示:保守治疗和腔内介入治疗对于SISMAD患者的腹痛缓解率均较好,住院期间和随访期间均未出现肠坏死、肠系膜上动脉破裂等严重并发症,无腹痛复发及二次干预,无SISMAD相关死亡。结合CT血管成像影像和Yun分型结果显示:两组患者不同Yun分型治疗方式比较,差异无统计学意义。随访结果显示:腔内介入治疗组较

保守治疗组血管完全重塑率更高。本研究结果显示:SISMAD患者多数为男性(92.0%,80/87),69.0%(60/87)伴有腹痛,59.8%(52/87)有吸烟史,46.0%(40/87)合并原发性高血压,与之前报道相符^[3,7-9]。有研究结果显示:SISMAD可能与肌纤维发育不良和结缔组织疾病有关^[10]。本研究中未发现合并肌纤维发育不良或结缔组织疾病者。Jia等^[11]的研究结果显示:肠系膜上动脉与主动脉夹角的增大可导致血流动力学的异常改变,是SISMAD形成的危险因素。最近1项纳入210例SISMAD患者的研究结果也显示:SISMAD的患病风险和肠系膜上动脉与主动脉夹角呈正相关^[12]。本研究中两组患者肠系膜上动脉与主动脉夹角比较,差异无统计学意义。这提示肠系膜上动脉与主动脉夹角的大小对治疗方式的选择暂无明确指示意义。临床上无症状SISMAD患者约占26%^[7]。因缺乏特异的检测手段,SISMAD的诊断主要依靠CT血管成像。研究者推荐使用Yun分型指导临床治疗:如不伴有肠坏死或肠系膜上动脉假性动脉瘤破裂,除了假腔直径>2 cm的II a型患者应采取腔内介入治疗,其余分型均可采取保守治疗^[6,13-18]。

SISMAD治疗尚未达成共识^[19]。患者均可初始行保守治疗,是否进行抗凝和抗PLT治疗仍存在争议。Morgan等^[3]认为:大部分患者可以进行短期的



图1 自发性孤立性肠系膜上动脉夹层Yun分型I型患者保守治疗前后CT血管成像三维重建影像检查情况 1A:入院时CT血管成像检查结果示肠系膜上动脉双腔征(←);1B:保守治疗6个月后复查结果示假腔部分血栓化,假腔强化范围缩小(←);1C:保守治疗18个月后复查结果示假腔和血栓范围进一步缩小(←),远端分支充盈良好

Figure 1 Computed tomography (CT) angiography and three-dimensional reconstruction images of spontaneous isolated superior mesenteric artery dissection of Yun type I before and after conservative therapy 1A: CT angiography image on admission showed double lumen sign of superior mesenteric artery (←); 1B: Reexamination after 6 months of conservative treatment showed partial thrombosis of the false lumen and reduction in the enhancement range of the false lumen (←); 1C: Reexamination after 18 months of conservative treatment showed further reduction in the false lumen and thrombosis range (←), and good distal branch filling

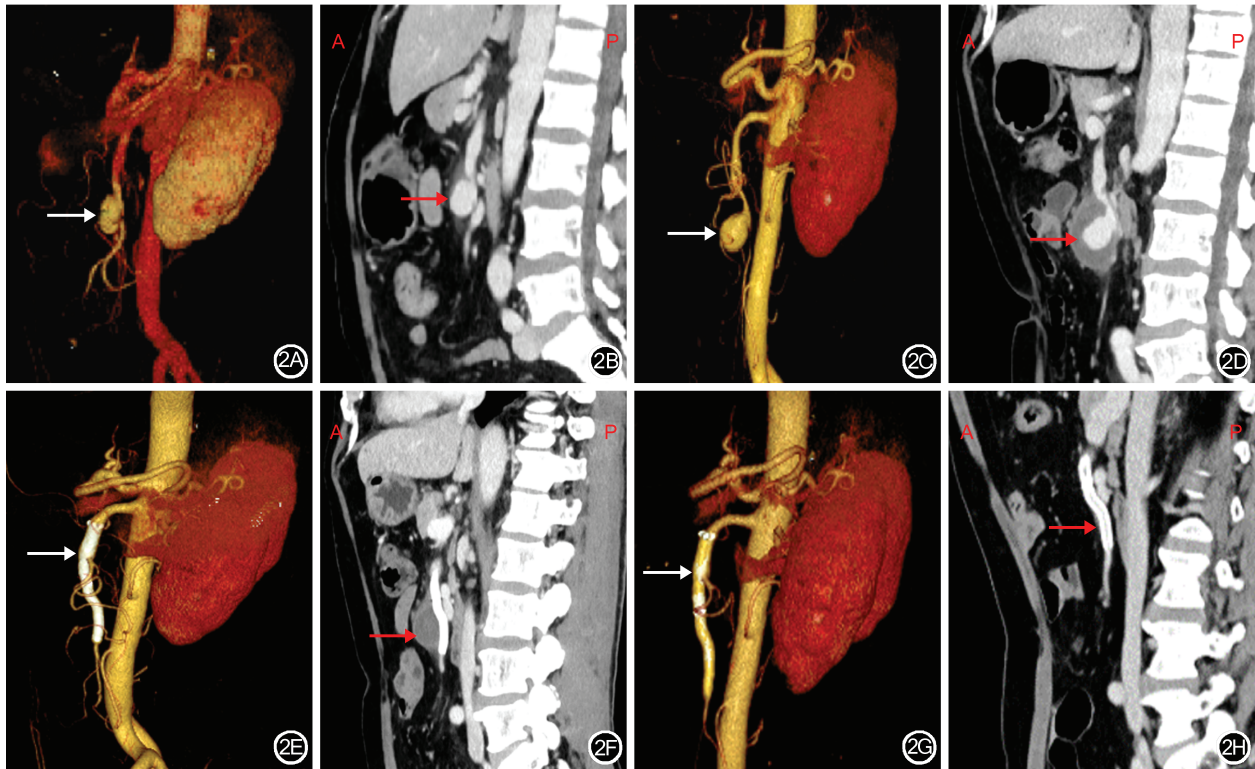


图2 自发性孤立性肠系膜上动脉夹层Yun分型IIb型患者肠系膜上动脉支架植入术前后CT血管成影像像检查情况 2A:首次入院时CT血管成像检查示假腔较大(→),周围见壁间血肿,穿透性溃疡形成;2B:入院时矢状位CT检查结果示假腔较大(→),周围见壁间血肿,穿透性溃疡形成;2C:保守治疗1个月后复查CT血管成像结果示肠系膜上动脉假性动脉瘤较前增大(→);2D:保守治疗1个月后矢状位CT检查结果示肠系膜上动脉假性动脉瘤合并血栓形成,较前增大(→),遂行肠系膜上动脉支架植入术;2E:术后1个月复查结果示支架通畅在位(→);2F:术后1个月矢状位CT检查结果示假性动脉瘤内未见造影剂填充(→);2G:术后18个月复查结果示支架内血流通畅(→),假性动脉瘤消失;2H:术后18个月矢状位CT检查结果示支架内血流通畅,假性动脉瘤消失(→)

Figure 2 Computed tomography (CT) angiography images of spontaneous isolated superior mesenteric artery dissection of Yun type IIb before and after placement of a stent in the superior mesenteric artery 2A: CT angiography on initial admission showed a large false lumen (→) with surrounding intramural hematoma and penetrating ulcer formation; 2B: CT sagittal view on admission showed a large false lumen (→) with surrounding intramural hematoma and penetrating ulcer formation; 2C: Reexamination of CT angiography after 1 month of conservative treatment showed an increase in the size of the pseudoaneurysm of the superior mesenteric artery compared to the previous scan (→); 2D: CT sagittal view after 1 month of conservative treatment showed an enlarged pseudoaneurysm of the superior mesenteric artery with thrombosis formation (→), leading to the placement of a stent in the superior mesenteric artery; 2E: Reexamination at 1 month after surgery showed patent stent in place (→); 2F: CT sagittal view at 1 month after surgery showed no contrast filling within the pseudoaneurysm (→); 2G: Reexamination at 18 months after surgery showed patent blood flow within the stent (→) with disappearance of the pseudoaneurysm; 2H: CT sagittal view at 18 months after surgery showed patent blood flow within the stent with disappearance of the pseudoaneurysm (→)

抗凝或抗PLT治疗,预防受累血管内血栓形成。另外部分学者认为:肠系膜上动脉侧支循环丰富,无需进行抗凝或抗PLT治疗^[2,20]。保守治疗过程中需要密切随访,如出现腹痛持续加重、夹层进展、肠缺血或肠系膜上动脉破裂时应采取腔内介入治疗或开放手术^[21-22]。根据Luan等^[7]的报道,我国SISMAD采取腔内介入治疗的比例约为34%。腔内介入治疗技术包括裸支架植入、裸支架辅助弹簧圈栓塞、多层裸支架、覆膜支架等^[23-24]。其中裸支架辅助弹簧圈栓塞相对于裸支架植入在中期随访中血管完

全重塑率更高(100%比46.3%, $P<0.0001$)^[25]。由于缺乏专门的肠系膜上动脉支架,通常采用外周动脉支架,尽管覆膜支架在恢复肠系膜上动脉的正常血流方面效率更高,但考虑到其有可能使肠系膜上动脉分支闭塞,且在急性期肠系膜上动脉破裂的风险较低^[26]。本研究腔内介入治疗组中,采用裸支架植入比例为92.9%(39/42)。腔内介入支架植入术具有微创、迅速恢复肠系膜上动脉血流、减小夹层进展的风险等优点,且技术成功率高,中期随访结果显示:血管完全重塑率和支架通畅率分别达到

88.3% 和 99.1%^[23,27-28]。本研究中,36.8%(32/87)的患者行腔内介入治疗,技术成功率达 93.8%(30/32),随访过程中,腔内介入治疗组的血管完全重塑率显著高于保守治疗组。这提示腔内介入治疗是 SISMAD 的一种安全、有效的治疗手段。

本研究存在的局限性:(1)部分患者缺乏 CT 血管成像随访资料,可能影响结果的准确性。(2)研究设计为单中心回顾性研究。(3)纳入的患者例数较少。

综上,与保守治疗比较,行腔内介入治疗 SISMAD 患者住院时间更长、总费用更高,血管完全重塑率更高,两者均无腹痛复发。

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参 考 文 献

- [1] Luan JY, Li X, Li TR, et al. Vasodilator and endovascular therapy for isolated superior mesenteric artery dissection [J]. *J Vasc Surg*,2013,57(6):1612-1620. DOI:10.1016/j.jvs.2012.11.121.
- [2] Heo SH, Kim YW, Woo SY, et al. Treatment strategy based on the natural course for patients with spontaneous isolated superior mesenteric artery dissection[J]. *J Vasc Surg*,2017,65(4):1142-1151. DOI:10.1016/j.jvs.2016.10.109.
- [3] Morgan CE, Mansukhani NA, Eskandari MK, et al. Ten-year review of isolated spontaneous mesenteric arterial dissections[J]. *J Vasc Surg*,2018,67(4):1134-1142. DOI:10.1016/j.jvs.2017.08.071.
- [4] Sun J, Wang L, Que Y, et al. Management of patients with uncomplicated symptomatic isolated mesenteric artery dissection: a multicentre experience[J]. *Eur J Vasc Endovasc Surg*,2022,64(5):507-514. DOI:10.1016/j.ejvs.2022.08.023.
- [5] Zhu Y, Peng Y, Xu M, et al. Treatment strategies and outcomes of symptomatic spontaneous isolated superior mesenteric artery dissection: a systematic review and meta-analysis[J]. *J Endovasc Ther*,2018,25(5):640-648. DOI:10.1177/1526602818796537.
- [6] Yun WS, Kim YW, Park KB, et al. Clinical and angiographic follow-up of spontaneous isolated superior mesenteric artery dissection[J]. *Eur J Vasc Endovasc Surg*,2009,37(5):572-577. DOI:10.1016/j.ejvs.2008.12.010.
- [7] Luan JY, Guan X, Li X, et al. Isolated superior mesenteric artery dissection in China[J]. *J Vasc Surg*,2016,63(2):530-536. DOI:10.1016/j.jvs.2015.09.047.
- [8] Ullah W, Mukhtar M, Abdullah HM, et al. Diagnosis and management of isolated superior mesenteric artery dissection: a systematic review and meta-analysis[J]. *Korean Circ J*,2019,49(5):400-418. DOI:10.4070/kcj.2018.0429.
- [9] Tanaka Y, Yoshimuta T, Kimura K, et al. Clinical characteristics of spontaneous isolated visceral artery dissection [J]. *J Vasc Surg*,2018,67(4):1127-1133. DOI:10.1016/j.jvs.2017.08.054.
- [10] Picquet J, Abilez O, Pénard J, et al. Superficial femoral artery transposition repair for isolated superior mesenteric artery dissection[J]. *J Vasc Surg*,2005,42(4):788-791. DOI:10.1016/j.jvs.2005.05.048.
- [11] Jia Z, Mei J, Ding W, et al. The pathogenesis of superior mesenteric artery dissection: an in-depth study based on fluid-structure interaction and histology analysis[J]. *Comput Methods Programs Biomed*,2022,226:107187. DOI:10.1016/j.cmpb.2022.107187.
- [12] Shi Y, Zhou Y, Yuan Y, et al. A larger aortomesenteric angle is associated with the occurrence of spontaneous isolated superior mesenteric artery dissection[J]. *Eur J Vasc Endovasc Surg*,2024,67(1):169-170. DOI:10.1016/j.ejvs.2023.10.014.
- [13] Sakamoto I, Ogawa Y, Sueyoshi E, et al. Imaging appearances and management of isolated spontaneous dissection of the superior mesenteric artery[J]. *Eur J Radiol*,2007,64(1):103-110. DOI:10.1016/j.ejrad.2007.05.027.
- [14] Zerbib P, Perot C, Lambert M, et al. Management of isolated spontaneous dissection of superior mesenteric artery [J]. *Langenbecks Arch Surg*,2010,395(4):437-443. DOI:10.1007/s00423-009-0537-1.
- [15] Xiong J, Wu Z, Guo W, et al. The value of a new image classification system for planning treatment and prognosis of spontaneous isolated superior mesenteric artery dissection[J]. *Vascular*,2015,23(5):504-512. DOI:10.1177/1708538115589527.
- [16] Yoo J, Lee JB, Park HJ, et al. Classification of spontaneous isolated superior mesenteric artery dissection: correlation with multi-detector CT features and clinical presentation [J]. *Abdom Radiol (NY)*,2018,43(11):3157-3165. DOI:10.1007/s00261-018-1556-6.
- [17] 贾中芝.孤立性肠系膜动脉夹层的分型与治疗进展[J].*中华胸心血管外科杂志*,2019,35(8):509-512. DOI:10.3760/cma.j.issn.1001-4497.2019.08.016.
- [18] 中国医师协会介入医师分会外周血管介入专业委员会.孤立性肠系膜上动脉夹层诊治专家共识[J].*中华放射学杂志*,2021,55(4):352-358. DOI:10.3760/cma.j.cn112149-20200506-00649.
- [19] Björck M, Koelemay M, Acosta S, et al. Editor's choice-management of the diseases of mesenteric arteries and veins: clinical practice guidelines of the European Society of Vascular Surgery (ESVS) [J]. *Eur J Vasc Endovasc Surg*,2017,53(4):460-510. DOI:10.1016/j.ejvs.2017.01.010.
- [20] Kim H, Park H, Park SJ, et al. Outcomes of spontaneous isolated superior mesenteric artery dissection without anti-thrombotic use[J]. *Eur J Vasc Endovasc Surg*,2018,55(1):132-137. DOI:10.1016/j.ejvs.2017.11.002.
- [21] Jia Z, Chen W, Su H, et al. Factors associated with failed conservative management in symptomatic isolated mesenteric artery dissection[J]. *Eur J Vasc Endovasc Surg*,2019,58(3):393-399. DOI:10.1016/j.ejvs.2019.03.039.
- [22] Shi Y, Ni G, Zhao B, et al. Management of symptomatic spontaneous isolated superior mesenteric artery dissection: a single centre experience with mid term follow up [J]. *Eur J Vasc Endovasc Surg*,2020,60(6):863-871. DOI:10.1016/j.ejvs.2020.08.010.
- [23] Qiu C, He Y, Li D, et al. Mid-term results of endovascular

treatment for spontaneous isolated dissection of the superior mesenteric artery[J]. Eur J Vasc Endovasc Surg,2019, 58(1):88-95. DOI:10.1016/j.ejvs.2018.11.013.

[24] Pang P, Jiang Z, Huang M, et al. Value of endovascular stent placement for symptomatic spontaneous isolated superior mesenteric artery dissection[J]. Eur J Radiol,2013,82(3): 490-496. DOI:10.1016/j.ejrad.2012.09.005.

[25] Qi X, Tang B, Zhang H, et al. Midterm results of the conservative, bare stent, and bare stent-assisted coiling treatments for symptomatic isolated superior mesenteric artery dissection[J]. Ann Vasc Surg,2023,96:232-240. DOI:10.1016/j.avsg.2023.04.034.

[26] Park YJ, Park KB, Kim DI, et al. Natural history of spontaneous isolated superior mesenteric artery dissection derived from follow-up after conservative treatment[J]. J Vasc Surg,2011,54(6):1727-1733. DOI:10.1016/j.jvs.2011.07.052.

[27] Jia Z, Su H, Chen W, et al. Endovascular treatment of patients with isolated mesenteric artery dissection aneurysm: bare stents alone versus stent assisted coiling[J]. Eur J Vasc Endovasc Surg,2019,57(3):400-406. DOI:10.1016/j.ejvs.2018.08.057.

[28] Gao P, Li G, Chen J, et al. The impact of endovascular treatment on clinical outcomes of stable symptomatic patients with spontaneous superior mesenteric artery dissection [J]. J Vasc Surg,2021,73(4):1269-1276. DOI:10.1016/j.jvs.2020.08.117.

读者·作者·编者

本刊可直接使用英文缩写词的常用词汇

本刊将允许作者对下列比较熟悉的常用词汇直接使用英文缩写词,即在论文中第1次出现时,可以不标注中文全称。

4G	第四代移动通信技术	Hb	血红蛋白	PaO ₂	动脉血氧分压
5G	第五代移动通信技术	HBV	乙型肝炎病毒	PCR	聚合酶链反应
AFP	甲胎蛋白	HBeAg	乙型肝炎 e 抗原	PD-1	程序性死亡受体 1
Alb	白蛋白	HBsAg	乙型肝炎表面抗原	PD-L1	程序性死亡受体配体 1
AJCC	美国癌症联合委员会	HCV	丙型肝炎病毒	PET	正电子发射断层显像
ALP	碱性磷酸酶	HE	苏木素-伊红	PLT	血小板
ALT	丙氨酸转氨酶	HEV	戊型肝炎病毒	PT	凝血酶原时间
ASA	美国麻醉医师协会	HIFU	高强度聚焦超声	PTC	经皮肝穿刺胆道造影
AST	天冬氨酸转氨酶	HR	风险比	PTCD	经皮经肝胆管引流
AMP	腺苷一磷酸	IBil	间接胆红素	RBC	红细胞
ADP	腺苷二磷酸	ICG R15	吲哚菁绿 15 min 滞留率	RCT	随机对照试验
ATP	腺苷三磷酸	ICU	重症监护室	RFA	射频消融术
ARDS	急性呼吸窘迫综合征	IFN	干扰素	RECIST	实体瘤反应评价标准
BCLC	巴塞罗那临床肝癌	Ig	免疫球蛋白	RR	相对危险度
BMI	体质量指数	IL	白细胞介素	RT-PCR	逆转录聚合酶链反应
BUN	血尿素氮	抗-HBc	乙型肝炎核心抗体	TACE	经导管动脉化疗栓塞术
CEA	癌胚抗原	抗-HBe	乙型肝炎 e 抗体	TBil	总胆红素
CI	可信区间	抗-HBs	乙型肝炎表面抗体	TC	总胆固醇
Cr	肌酐	LC	腹腔镜胆囊切除术	TG	甘油三酯
CT	X 射线计算机体层摄影	MRCP	磁共振胆胰管成像	TGF	转化生长因子
DBil	直接胆红素	MRI	磁共振成像	TNF	肿瘤坏死因子
DSA	数字减影血管造影术	MODS	多器官功能障碍综合征	TP	总蛋白
ERCP	经内镜逆行胰胆管成像	NCCN	美国国立综合癌症网络	UICC	国际抗癌联盟
EUS	内镜超声	NK 细胞	自然杀伤细胞	VEGF	血管内皮生长因子
GGT	谷氨酰转氨酶	OR	优势比	WBC	白细胞
HAV	甲型肝炎病毒	PaCO ₂	动脉血二氧化碳分压		