

# 血栓溶解，血栓吸引，血管形成術の組み合わせ治療を施行した血栓性上腸間膜動脈虚血の1例

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## 要 旨

**目的：**上腸間膜動脈閉塞は，急性期に適切な診断治療が行われない場合，一般に予後不良である．病態により様々な治療法が選択されるが，血栓塞栓性閉塞の場合，内科的にはカテーテルを用いた血行再建術が行われる．しかし，その際に少なからず末梢塞栓が生じると考えられ，これを予防できれば合併症も軽減でき，治療に資する点も大きいと考えられる．今回われわれは，急性冠症候群で行われる末梢塞栓予防を，上記疾患の治療に用いた症例を経験したので報告する．

**症例と画像所見：**79歳の男性が，胃がんの外科的治療の目的で入院した．本患者は僧帽弁置換術と永久ペースメーカー植え込みの既往があり，クマディン投与中であった．術前待機中に突然腹痛をおこし，造影CTで上腸間膜動脈の閉塞が認められ，心房細動にともなう血栓塞栓症と診断された．経カテーテル的に血栓溶解薬を投与したが閉塞動脈は再開通せず，バルーンによる血管形成術を組み合わせ，再開通を得たが，末梢塞栓のため術後に下血を生じた．14日後に再度腹痛発作をおこし，造影CTにて初回発作と同様に上腸間膜動脈の閉塞が認められた．初回治療時の結果を考慮し，血栓溶解薬，血管形成術に血栓吸引療法を組み合わせた結果，末梢塞栓をごく少量にとどめることができ，術後の下血も生じなかった．

**考察：**上腸間膜動脈閉塞は，高齢で基礎疾患を有する患者に多いことから，外科治療の予後も不良である．代替的にカテーテル治療が行われるが，血栓溶解薬単独では残存狭窄が，血管形成術では解離や末梢塞栓が問題となる．今回われわれは冠動脈形成術で行われる末梢塞栓予防法を血栓溶解療法と血管形成術に併用することで，末梢塞栓を低減することができた．

**結論：**経カテーテル的な組み合わせ治療による早期の血行再建術は，上腸間膜動脈閉塞の不良な予後の改善のために，有用な治療法の1つとなると考えられた．

キーワード 血栓溶解療法，血栓吸引，血管形成術

## Introduction

Acute mesenteric ischemia (AMI) is one of the

emergent diseases. Early diagnosis is difficult without specific features and laboratory markers<sup>1)</sup>. It is most common in elderly people with various

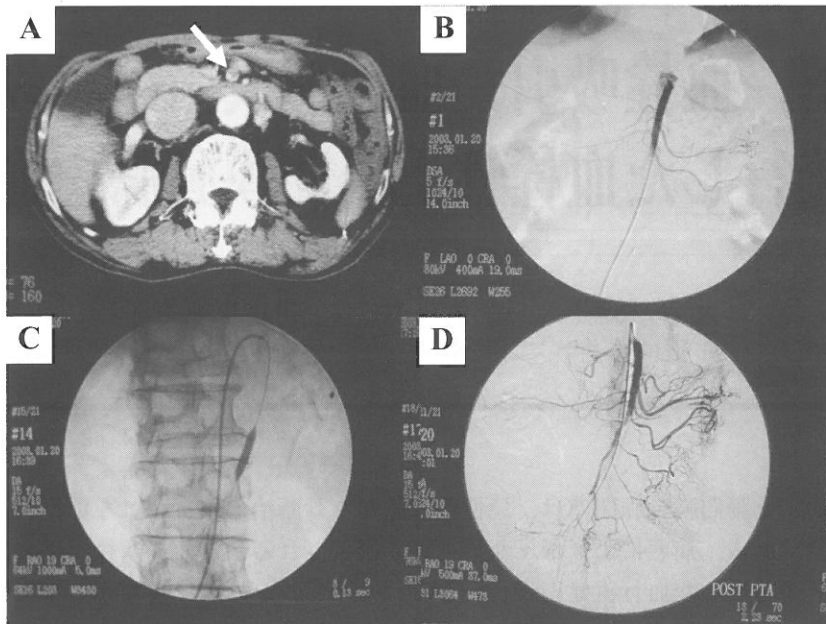
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A Case of Acute Embolic Superior Mesenteric Ischemia Treated with a Combination of Thrombolysis, Thromboaspiration and Angioplasty

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Key Words: percutaneous angioplasty, thromboaspiration, thrombolysis



**Fig. 1** Contrast-enhanced computed tomography (CE-CT) and selective arteriography of the superior mesenteric artery (SMA) in the first attack.

- A. CE-CT showed filling defect in the proximal portion of SMA, suggesting thromboembolic obstruction
- B. Selective SMA angiography 3.5 hours after a bolus injection of t-PA revealed persistent complete obstruction.
- C. Balloon inflation was repeated in the occluded SMA.
- D. Antegrade flow was obtained after adjunctive bolus injection of t-PA and balloon inflation. Distal embolization was observed in the peripheral branch (arrow head)

complications<sup>2</sup>). Mal-absorption syndrome occurs after successful surgical treatment<sup>3</sup>). For these reasons, once bowel necrosis has occurred, the mortality rate has remained high<sup>3</sup>). Recently, non-surgical transcatheter revascularization of thromboembolic occlusion of superior mesenteric artery (SMA) has been reported to preserve the digestive function of intestine<sup>1)-10)</sup>. We describe a case of AMI revascularized with a combination therapy of thrombolysis, thromboaspiration and percutaneous transluminal angioplasty (PTA).

### Case report

A 79-year-old man was admitted to our hospital for surgical treatment of early gastric cancer on January 14, 2003. He had been implanted with a permanent pacemaker, with a history of diabetes mellitus and anticoagulation after mitral valve replacement. Physical examination showed no signifi-

cant symptoms except for the mechanical heart sound, slight hepatomegaly and pedal edema. A chest radiograph disclosed cardiomegaly without congestion and an electrocardiogram revealed pace maker rhythm. Laboratory data were within normal limits except for mild normocytic and normochromic anemia and mild elevation of creatine kinase. International normalized ratio (INR) of prothrombin time (PT) was approximately 1.7 with oral coumadine administration (1mg/day) including bucolome.

Transthoracic echocardiography demonstrated moderate tricuspid regurgitation, mild left ventricular hypertrophy with normal contractility, and severe left atrial dilatation without thrombus. Sudden abdominal pain and nausea occurred before the scheduled replacement of oral coumadine to intravenous heparin for subtotal gastrectomy. Contrast-enhanced computed tomography (CE-CT) revealed filling defect of contrast media in

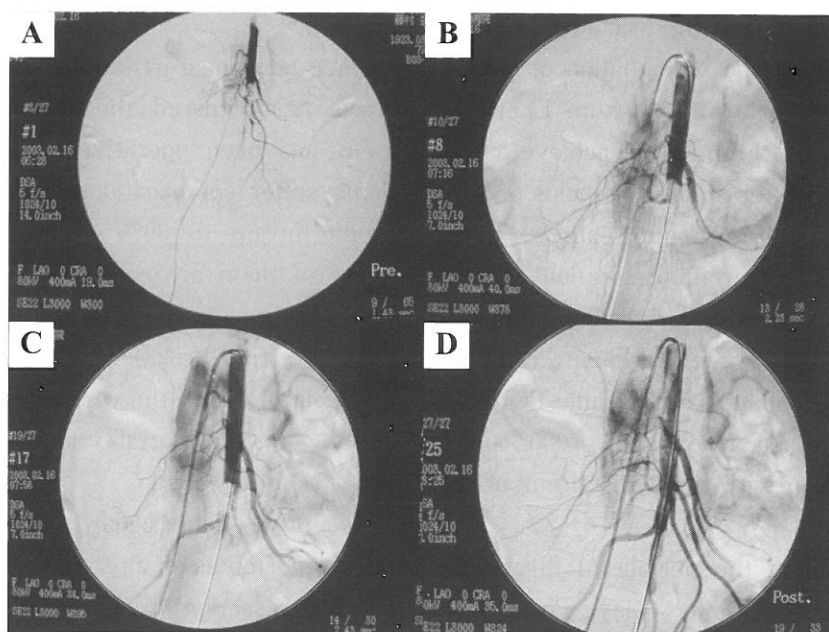


Fig. 2 Selective SMA angiography in the second attack

- A. Complete occlusion of the SMA was observed by the selective SMA angiography.
- B. Balloon inflation alone did not compress the thrombus of the occluded artery.
- C. Partial antegrade flow was obtained after the thromboaspiration with Thrombuster following urokinase administration.
- D. Adjunctive PTA and injection of t-PA recanalized occlusive SMA with a slight distal embolism

the proximal superior mesenteric artery (SMA), suggesting thromboembolic occlusion (Fig.1A). Selective SMA angiography using 5-French (Fr) Shepherd Hook catheter (Clinical Supply) showed total obstruction of the proximal SMA 4.5 hours after the onset (Fig.1B). A 6,000,000 U bolus of tissue plasminogen activator (t-PA) was injected through the catheter positioned at the ostium of SMA. Because of the persistent abdominal pain without peritoneal irritation, selective SMA angiography was repeated 8 hours after the onset. The SMA was completely occluded at the same position. Adjunctive PTA was performed with 7 Fr guiding catheter for internal mammary artery (Bright Tip, Johnson & Johnson) and 0.014 inch guide wire (High Torque Intermediate, Johnson & Johnson) for percutaneous coronary intervention (PCI). Although the guide wire alone did not penetrate the occluded artery, it was inserted easily with an over-the-wire balloon for PCI (3.5×25 mm, MAVERIC, Boston Scientific Japan). Although repeated balloon inflation with 14 atm for

one minute did not recanalize; transcatheter administration of t-PA (same dose as previously administered) followed by inflation of non-compliant balloon (5.0×15 mm, Maxum Energy, Boston Scientific Japan) revascularized the occluded artery to achieve stable antegrade flow (Fig.1C). However, residual thrombus occurred distal embolization, and repeated inflation of the previously used balloon (3.5×20 mm) could not fully compress the residual thrombus (Fig.1D). Post-PTA thrombolysis with a 360,000 U of Urokinase (UK) through a 2.8 Fr micro catheter inserted into the SMA was carried out for 3 days, and a 10,000 U of Heparin was administered for 7 days intravenously, followed by oral coumadine administration (1mg/day) with bucolome. Selective SMA angiography 2 days after showed no residual thrombus and stenosis in the SMA (Fig. 2A). INR of PT was approximately 1.4. Re-attack occurred 14 days after the first attack and CE-CT showed re-occlusion of the proximal SMA. PTA was performed with the same devices as for the first attack. Although

the guide wire penetrated the occluded artery without balloon assist, repeated inflation of a balloon for PCI (5 mm × 20 mm, Maxum Energy) did not fully compress thrombus to achieve antegrade flow (Fig. 2B). After a 60,000 U bolus of UK administration through the guiding catheter, several trials of adjunctive thromboaspiration with a catheter (6Fr Thrombuster, Kaneka) revealed more than 90% of stenosis with residual thrombus (Fig. 2C). Additional inflation of the same PCI balloon fully revascularized, following a 6,000,000 U bolus of t-PA infusion with slight distal embolization (Fig. 2D).

Further aspiration of the peripheral thrombus achieved stable flow without delay. Post-PTA thrombolysis was performed through the same microcatheter with an 18,000,000 U of t-PA for 1 day, followed by a 360,000 U of UK for 2 days. After termination of PTA, heparin was infused (10,000 U/day) intravenously for 10 days, followed by oral coumadine administration (1.5 mg/day, INR of PT was approximately<sup>2)</sup> with bucolome. Selective SMA angiography 4 days after showed no residual thrombus and stenosis in the SMA. Transesophageal echocardiography demonstrated foggy echo pattern in the left atrium and marked decrease of the flow velocity in the left atrial auricula (0.06–0.08m/sec) without thrombus. Although his abdominal pain was relieved immediately after PTA, slight melena occurred after the first attack. There were no signs of bowel stenosis after either attacks. Because of the high risk of thromboembolism with surgical treatment including coumadine termination, endoscopic coagulation was performed with Argon Plasma to achieve good results.

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### Discussion

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AMI, a rare cause of acute abdomen, is most commonly caused by embolism<sup>1)</sup>. The lack of specific clinical presentation causes delay in diagnosis and treatment. No collateral circulation with complete occlusion at the origin of SMA indicates that the time limit for recanalization is within 12

hours<sup>11)</sup>.

Once peritoneal irritation, the sign of bowel necrosis, has occurred, the gold standard for treatment has been operative repair<sup>3)</sup>. However, patients suffer complications with short bowel syndrome in up to 30% of post-operative cases<sup>3)</sup>. Many of them are compromised elderly patients who had a coexisting disease, for example hypertension, atrial fibrillation, atherosclerosis or diabetes mellitus<sup>2)</sup>. For these reasons, the prognosis is not as good and mortality has been reported as 40–60%<sup>3)</sup>.

Recently, endovascular treatment of AMI has been reported as an alternative treatment to avoid surgical resection<sup>1)–10)</sup>. Transcatheter treatment was applied to our case immediately after the diagnostic angiogram without peritoneal irritation for both attacks. Non-surgical endovascular treatment involves chemical and mechanical thrombolysis, thromboaspiration and PTA with stent implantation which are performed alone or in combination with each other. Chemical thrombolysis alone is well known to leave considerable residual stenosis and take a considerable time. Rapid recanalization of mechanical thrombolysis with AngioJet requires special devices and skill to use<sup>9)</sup>. PTA alone may create dissection and have risk of catastrophic peripheral embolization as in PCI. Thromboaspiration has previously been performed not only in the field of PCI to avoid distal embolization but also in AMI<sup>10)</sup>.

We performed a combination therapy with chemical thrombolysis, thromboaspiration and PTA because there was 1) no effect from chemical thrombolysis alone, 2) distal embolization which may have attributed to the melena in the first attack and 3) no usually available thromboaspiration device for PCI. Because the other thromboaspiration devices were not available, we chose Thrombuster, usually used for distal protection in PCI, as the thromboaspiration device. Stent has been described recently for the management of AMI as well as in chronic mesenteric ischemia with good short-term results, which would be safer without distal embolization and arterial dis-

section<sup>5)8)</sup>. In our case, adjunctive stent implantation was not performed because of its obscure long-term prognosis and the result of sufficient recanalization without dissection. Early diagnosis is essential for the endovascular treatment in order to avoid surgical bowel resection. Recently, CE-CT, described in our case, makes it possible to detect the occlusion of SMA<sup>10)</sup>.

No definite origin for the suspected SMA embolus was found in our case. Increased blood viscosity after dehydration caused by diarrhea, including fasting for the preparation of preoperative examination, and poor anticoagulation with coumadine may have caused the acute SMA thromboembolism.

We did not perform colonoscopy and barium-contrasted rentogenography of small intestine to evaluate mucosal lesion and intestinal stenosis. This patient's clinical outcome without bowel resection suggests that the successful revascularization was completed. Therefore, endovascular combination therapy may be an attractive alternative to surgical treatment in early diagnosed patients.

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**Abstract** A 79-year-old man with coumadine administration, who had mitral valve replacement and pacemaker implantation, was admitted for the treatment of gastric cancer. Sudden abdominal pain developed and contrast-enhanced computed tomography (CE-CT) showed superior mesenteric artery (SMA) occlusion. Although transcatheter administration of tissue plasminogen activator (t-PA) did not recanalize the occluded artery, we revascularized with a combination of thrombolysis and percutaneous transluminal angioplasty (PTA), which caused peripheral embolization with melena. The second attack occurred 14 days after the first attack and we performed a combination therapy of thrombolysis, thromboaspiration, and PTA to achieve sufficient recanalization with little peripheral embolism. Early recanalization with a transcatheter combination therapy may be an attractive treatment for the improvement of superior mesenteric ischemia with poor prognosis to minimize distal embolism .