Three-territory sign in Trousseau’s syndrome

Yuki Toda,1 Yasuhiro Kano

Department of Internal Medicine, Mito Kyodo General Hospital, Mito, Ibaraki, Japan
Department of General Internal Medicine, Tokyo Metropolitan Tama Medical Center, Fuchu, Tokyo, Japan

Correspondence to
Dr Yasuhiro Kano;
yasuhiro.kano.21@gmail.com

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DESCRIPTION
A man in his 60s with hypertension presented to the emergency department with neurological symptoms of 5 hours’ duration, including dysarthria, numbness and hemianopia. On presentation, his symptoms had already improved spontaneously, and a neurological examination found no deficits. Laboratory tests revealed elevated D-dimer at 7.4 µg/mL (reference range: < 1.1 µg/mL). Brain MRI revealed multiple, small infarctions in the right supramarginal gyrus (figure 1A), right superior parietal lobule (figure 1B), left middle frontal gyrus (figure 1C), left angular gyrus (figure 1D), left cuneus (figure 1D) and left cerebellar posterior lobe (figure 1E). CT of the trunk revealed a nodule in his right lung and lymphadenopathy in the right mediastinal and supraclavicular lymph nodes. Based on a biopsy of the mediastinal lymph node, stage IIIB lung adenocarcinoma was diagnosed. Additional investigation of the cause of the stroke, including transthoracic echocardiography, ECG monitoring and carotid duplex ultrasound, showed normal findings. Tests for protein C, protein S, antithrombin III and antiphospholipid antibody returned normal. Based on these findings, malignancy-related ischaemic stroke (Trousseau’s syndrome) was finally diagnosed. The patient received subcutaneous injections of unfractionated heparin and chemotherapy for his lung cancer.

Trousseau’s syndrome is a hypercoagulable state associated with advanced cancer and can present as an acute cerebral infarction, non-bacterial thrombotic endocarditis (NBTE) or migratory thrombophlebitis.1 Trousseau’s syndrome is an important cause of multiple cerebral infarctions as well as atrial fibrillation while the associated malignancy is frequently overlooked as a cause of ischaemic stroke and remains undiagnosed until a second event occurs.2 Several types of cancer reportedly cause malignancy-related ischaemic stroke, including lung, gastric, colorectal, gynaecological, hepatic, renal and prostate cancers and lymphoma. Of these, lung cancer is most frequently associated with malignancy-related ischaemic stroke.3 4 The precise pathophysiology of malignancy-related ischaemic stroke is still unknown and may be multifactorial. The main mechanism is thought to stem from NBTE or intravascular coagulation caused by hypercoagulability in the presence of a malignancy.5 Furthermore, elevated levels of circulating cytokines in patients with malignancies, including tumour necrosis factor and interleukin-1, may damage vascular endothelial cells and the heart valves, leading to the formation of NBTE-related vegetation.6

Although Trousseau’s syndrome can be readily recognised if a patient with a previously diagnosed malignancy presents with an ischaemic stroke, its diagnosis can be challenging or delayed if thrombotic episodes occur as the initial manifestation of an undiagnosed malignancy. The three-territory sign, defined as cerebral infarctions in three, cerebral, vascular territories of the bilateral anterior and posterior circulation,7 is a useful clue for diagnosing Trousseau’s syndrome. The three-territory sign is six times more frequently seen in Trousseau’s syndrome than in atrial fibrillation-related cerebral infarctions, which have a sensitivity and specificity of 23.4% and 96.4%, respectively.8

![Figure 1](https://example.com/figure1.png)

**Figure 1** Diffusion-weighted MRI of the brain showing multiple high intensity areas (arrows) in the right supramarginal gyrus (A), right superior parietal lobule (B), left middle frontal gyrus (C), left angular gyrus (D), left cuneus (D) and left cerebellar posterior lobe (E).

**Learning points**

- Malignancy-related ischaemic stroke (Trousseau’s syndrome) is an important cause of multiple cerebral infarctions, but diagnosing Trousseau’s syndrome can be challenging or delayed especially if thrombotic episodes develop as the initial manifestation of an underlying malignancy.
- The three-territory sign, defined as cerebral infarctions in three, cerebral, vascular territories of the bilateral anterior and posterior circulation, is a useful and characteristic MRI finding of Trousseau’s syndrome.
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Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

ORCID ID
Yasuhiro Kano http://orcid.org/0000-0003-1210-2859

REFERENCES