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Case report

Takotsubo syndrome in a stroke patient with carotid artery stenosis

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ABSTRACT

Takotsubo syndrome (TTS) is a transient transient left ventricular dysfunction, predominantly affecting elderly women and often preceded by emotional or physical stress. TTS may be the cause as well as the consequence of stroke. We report a 82-years old female with a history of long-standing untreated arterial hypertension who was hospitalized because of a left-sided tongue paralysis and dysarthria. Cerebral magnetic resonance imaging showed ischemic lesions in the territory of the right middle cerebral artery affecting the capsula interna and gyrus praecentralis. The carotid and cerebral arteries showed extensive atherosclerotic wall irregularities, a high-grade stenosis of the M1-segment of the right middle cerebral artery and a 60% stenosis of the internal carotid artery at its origin. Elevated creatine-kinase and Pro-brain-natriuretic peptide levels and development of new ischemic signs in the electrocardiogram suggested myocardial infarction, although the patient did not complain about cardiac symptoms. Echocardiography showed apical ballooning which resolved during the following days. The patient refused coronary angiography why the diagnosis of TTS was not completely established. However, normalization of echocardiogram and ECG were indicative for TTS.

TTS has to be considered in stroke patients, irrespective of their etiology. Since patients often do not report typical symptoms or may even be asymptomatic, TTS can be overlooked. If the ECG in stroke patients shows signs of myocardial ischemia, troponin and BNP levels should be measured whose ratio may even help to differentiate between TTS and myocardial infarction. Echocardiography, coronary angiography and follow-up investigations are needed to confirm the diagnosis of TTS.

1. Introduction

Takotsubo syndrome (TTS) is a transient transient left ventricular dysfunction, predominantly affecting elderly women and often preceded by emotional or physical stress [1]. TTS may be the cause as well as the consequence of stroke: Stroke may be the triggering event or be due to cardioembolism from the hypokinetic left ventricle [2–5]. Stroke due to carotid artery stenosis complicated by TTS has, to our knowledge, only been described rarely [5,6]. We recently observed a patient with stroke-associated TTS.

2. Case report

An 82-years old female attended the emergency unit of the hospital 6 h after onset of dysarthria. She had a history of arterial hypertension for many years, had refused any antihypertensive therapy and avoided contact with physicians. Her history was uneventful except for a left radial fracture 9 years previously. At clinical examination she was 154 cm, 60 kg, blood pressure was bilaterally 160/90 mm Hg, and no further abnormalities were found. She was on no medication. The ECG showed sinustachycardia and ST depressions in leads I, II, V_5 and V_6.

Clinical neurologic examination revealed a left-sided central tongue paralysis and dysarthria. Cerebral magnetic resonance imaging showed multiple ischemic lesions in the territory of the right middle cerebral artery affecting the capsula interna and gyrus praecentralis. Additionally a cerebral microangiopathy with microbleeding in the right thalamus was detected. The carotid and cerebral arteries showed extensive atherosclerotic wall irregularities, a high-grade stenosis of the M1-segment of the right middle cerebral artery and a 60% stenosis of the internal carotid artery at its origin (Fig. 1). Acetylsalicylic acid (ASS), clopidogrel, ramipril and doxazosin were initiated. No arrhythmias were detected during cardiac monitoring. The patient did not complain about any cardiac symptoms, however she experienced the atmosphere in the hospital as stressful. The laboratory findings 12 h after admission disclosed elevated creatine-kinase and Pro-brain-natriuretic peptide (Pro-BNP) levels (Table). Because of combined hyperlipidemia, hyperuricemia and an elevated hemoglobin A_1c metformin and atorvastatin were initiated. Since the ECG 40 h after admission showed negative T waves and troponin T levels increased, an echocardiogram was carried out which showed apical ballooning, why

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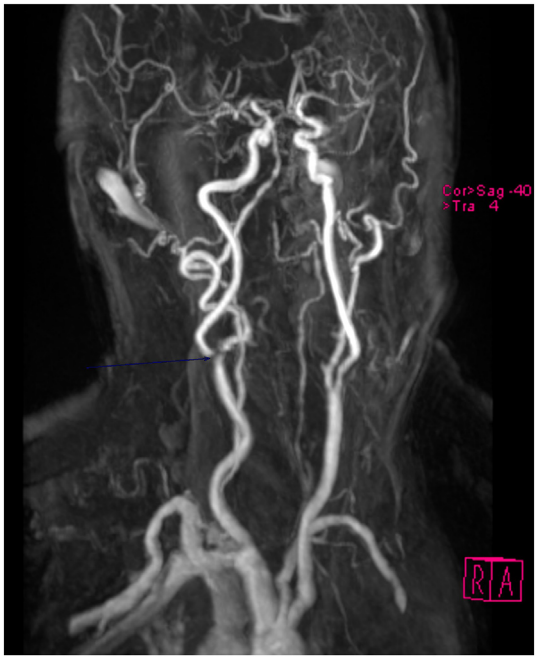

Fig. 1. Magnetic resonance imaging of the carotid and cerebral arteries showing extensive atherosclerotic wall irregularities, a high-grade stenosis of the M1-segment of the right middle cerebral artery and a 60% stenosis of the internal carotid artery at its origin.

bisoprolol was added. The patient remained hemodynamically stable and a further echocardiogram after 3 days showed a regression of the hypokinetic area. The T waves and prolonged QT interval regressed. The patient refused coronary angiography as well as thrombendarterectomy of the carotid artery. She was discharged after 13 days with improved dysarthria and a medication comprising ASS (100 mg/d), clopidogrel (75 mg/d for 3 months), atorvastatin (80 mg/d), ramipril (10 mg/d), metformin (500 mg/d), bisoprolol (5 mg) and doxazosin (4 mg).

3. Discussion

The prevalence of stroke-induced TTS ranges from 0.5 to 12% [2,3,5,7]. Because TTS may be asymptomatic, and stroke patients may be unable to notify hospital staff of new symptoms they experience due to their neurologic injury, it remains possible that TTS after stroke may often go undetected. The typical symptoms of TTS like angina chest pain or dyspnea are only reported in a minority (13–29%) of stroke-associated TTS [2,3].

The pathogenesis of TTS is unknown. There are indications that catecholamines might play a role [1]. In stroke patients, autonomic dysregulation from the affected brain regions may additionally contribute to TTS. Brain regions such as the insula (particularly the right) and medulla have been reported to play an important role in cardiovascular autonomic function [8,9]. In a multicenter stroke registry database comprising 6278 patients, TTS was found in 23 of them, and ischemic lesions in the right anterior circulation were associated with TTS [2]. When ischemic lesions were divided into involved regions, the insula cortices and peri-insular areas (especially the right) were commonly detected [2]. Also our patient showed affection in these areas by old and new ischemic lesions.

Stroke due to carotid artery stenosis complicated by TTS has, to our knowledge, so far only been described in a 88 years old female patient who suffered from stroke of the right middle cerebral artery including the insula [5]. That patient underwent thrombolysis. TTS was asymptomatic and was detected by ECG and echocardiography 24 h after stroke onset [5]. A further case of TTS occurred during stenting of the right internal carotid artery in a 78-years old female with left-sided hemiparesis [6]. The time interval between stroke onset and carotid stenting is not reported. During the procedure, she became hypotensive and needed catecholamines. She did not complain of cardiac symptoms but the ECG showed ischemic signs which eventually led to the diagnosis of TTS [6]. A further case of TTS after endarterectomy has been reported [10]. So far, it is unknown why strokes resulting from carotid artery stenosis are less frequently described as a cause of TTS than cardioembolic strokes. Probably an underlying cardiovascular disease which is present in many patients with cardioembolic strokes may favor the development of TTS or patients with cardioembolic strokes are screened and monitored more intensively by cardiologists.

Table 1
Results of blood tests of the patient with seizure-associated Takotsubo syndrome.

Parameter (Normal range)	Admission	Day 1	Day 2	Day 5	Day 12
Leucocytes (4.0–9.0 g/L)	11.9	12.2	NM	8.6	7.5
Erythrocytes (4.00–5.20 T/L)	4.93	4.96	NM	4.41	3.91
Sodium (136–145 mmol/L)	138	140	NM	139	140
Potassium (3.4–4.5 mmol/l)	4.2	4.3	NM	4.4	4.0
Creatinine (0.50–0.90 mg/dL)	0.83	0.84	NM	0.76	0.79
Creatinin kinase (< 170 U/L)	77	355	111	69	42
Creatinin kinase-MB (< 25 U/L)	NM	67	NM	NM	NM
Troponin T-hs (< 14 ng/L)	20	NM	354	357	16
NT-pro-BNP (< 738 ng/L)	NM	2687	NM	763	666
Cholesterol (< 200 mg/dL)	NM	361	NM	300	135
HDL-cholesterol (> 65 mg/dL)	NM	40	NM	35	32
LDL-cholesterol (< 130 mg/L)	NM	NM	NM	219	77
Triglycerides (< 150 mg/dL)	NM	400	NM	231	131
Hemoglobin A_1C (4–6%)	NM	6.9	NM	NM	NM

NM = not measured.

Increased levels of troponin T as well as Pro-BNP led to suspicion of an acute coronary syndrome in our patient. Interestingly, the initial Pro-BNP level was highest and decreased during the next days, whereas an increase and delayed decrease of the troponin levels was observed (Table 1). The initial BNP/troponin ratio was 7.5 and the BNP/CKMB ratio 40.1. This pattern is assumed to be typical for TTS. It has been shown that TTS can be distinguished from an acute myocardial infarction with 95% specificity with a BNP/troponin ratio ≥ 1.272 (sensitivity 52%) and BNP/CKMB ratio ≥ 29.9 (sensitivity 50%) [11].

Limitation of the present case is that no coronary angiography was carried out, why the diagnosis of TTS is not completely established. However, normalization of echocardiogram and ECG are indicative for TTS.

We conclude that TTS has to be considered in stroke patients, irrespective of their etiology. Since patients often do not report typical symptoms or may even be asymptomatic, TTS can be overlooked. If the ECG in stroke patients shows signs of myocardial ischemia, troponin and BNP levels should be measured whose ratio may even help to differentiate between TTS and myocardial infarction [11]. Echocardiography, coronary angiography and follow-up investigations are needed to confirm the diagnosis of TTS.

Disclosure statement

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Author contributions

Claudia Stöllberger - drafting of the manuscript, literature research, corresponding author.

Lenka Gerencerova - radiologic investigation, drafting of the manuscript.

Josef Finsterer - drafting of the manuscript, literature research.

Declarations of interest

None.

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