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**Subarachnoid Hemorrhage and Diplopia as Initial Presentation of Polycythemia vera**

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*Introduction*

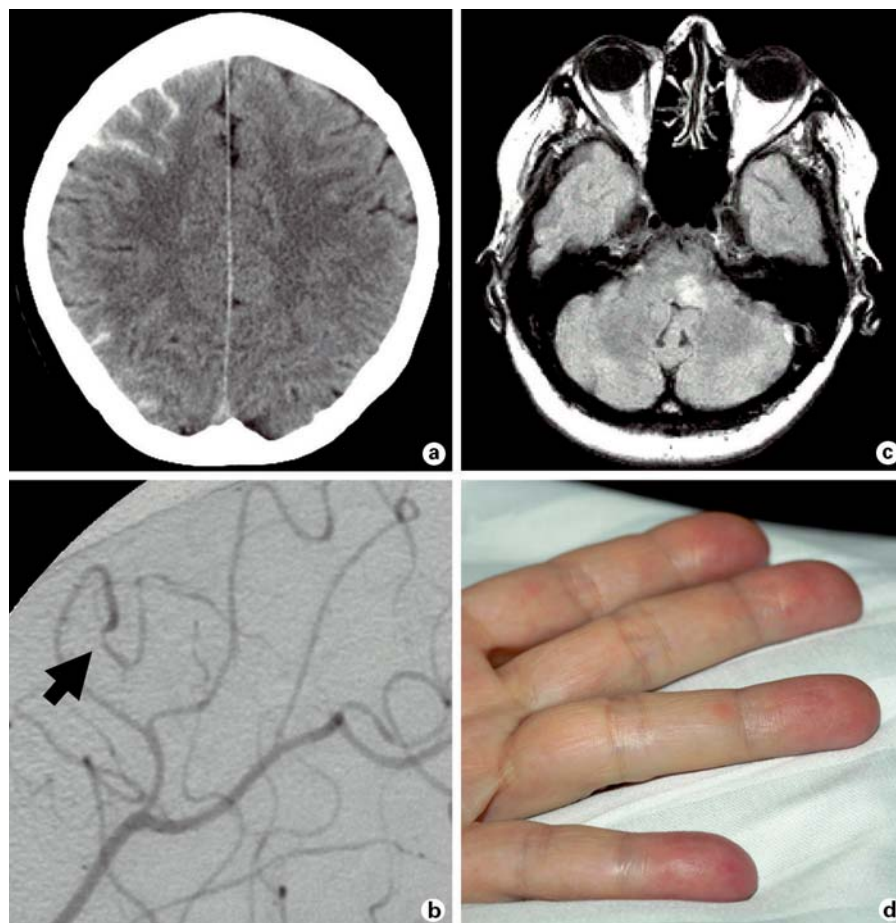
Polycythemia vera (PV) is a myeloproliferative disorder characterized by clonal proliferation of hematopoietic stem cells leading to an accumulation of erythrocytes, leukocytes and platelets within the circulation [1]. Thromboembolic and hemorrhagic complications are major causes of morbidity in PV [2]. We report a case of

PV initially presenting with subarachnoid hemorrhage, in which a concomitant brainstem infarction mimicked an ophthalmoplegic aneurysm.

*Case Report*

A 56-year-old right-handed woman presented to the emergency department with severe headache, dizziness, nausea and vomiting. The headache had started 6 h before admission and was characterized as occipital and throbbing in nature. One week before she had noticed binocular diplopia on left gaze, which had spontaneously improved. Past medical history was noncontributory, except for hypothyroidism treated with L-thyroxin. There was no history of acral cyanoses, cold-induced pallor or any skin abnormalities.

On neurologic examination, she had nuchal rigidity, left sixth nerve palsy and minimal facial palsy on the left side. General examination revealed a plethoric face and splenomegaly. Blood pressure on admission was 140/80 mm Hg. A cranial CT scan showed a right-hemispheric subarachnoid hemorrhage (fig. 1a) which was



**Fig. 1.** **a** Initial CT scan of the head revealing right hemispheric subarachnoid hemorrhage. **b** Digital subtraction angiography showing caliber irregularities (arrow) in arteries surrounding the area of hemorrhage, most likely reflecting local vasospasm. **c** Axial FLAIR-weighted MRI displaying a hyperintensity in the left pontomesencephalic area. **d** Photograph of the patient's hands during the episode of acroparesthesia and swelling of the fingers.

confirmed by CSF examination (4,208/3 erythrocytes/mm<sup>3</sup>). Conventional angiography revealed no intracranial aneurysms or vascular malformations but caliber irregularities in several branch arteries in the vicinity of the subarachnoid hemorrhage (fig. 1b). Cranial MRI showed a left pontomesencephalic hyper-intensity in T2- and FLAIR-weighted (fig. 1c) images as well as in diffusion-weighted images (not shown), representing a subacute infarction.

On routine laboratory testing, an elevated hematocrit (61.5%), leukocytosis (22.5 G/l) and thrombocytosis (990 G/l) were noted. Vasculitis (C3, C4, antinuclear antibodies, anti-DNA antibodies) and hypercoagulability (antithrombin, cardiolipin antibodies, lupus anticoagulant, protein C, protein S, factor V Leiden screening) markers were within normal limits. A hematologic evaluation, including bone marrow biopsy and cytology, confirmed PV. Phlebotomy was performed repeatedly until hematocrit decreased to 45%.

On the 4th day after admission the patient developed acroparesthesia involving both hands, as well as erythema, swelling and tenderness of her fingers (fig. 1d). Erythromelalgia, a frequent thrombotic complication in PV, was suspected. One day later, anisocoria and a new extensor plantar response on the left side were noted and spontaneously resolved. This episode was followed by transient paresthesia of the left arm and periorally. A repeated CT scan of the head and transcranial ultrasound examinations were within normal limits. Since hematocrit was already below 45% and platelet count was >800 G/l, treatment with low-dose (100 mg) aspirin and anagrelide (12 days after the hemorrhage) was started. Under this regimen no further ischemic episodes occurred. The swelling of the fingers resolved within a few days.

#### Discussion

We describe a patient with PV initially presenting with subarachnoid hemorrhage and diplopia. The history and clinical examination were compatible with a ruptured ophthalmoplegic aneurysm. However, the location of the hemorrhage was not typical for an aneurysmatic origin. Therefore a dural fistula and an arteriovenous malformation also had to be ruled out. Cerebral angiography was within normal limits, except for caliber irregularities in several peripheral arteries. A vasculitic cause seemed unlikely because systemic vasculitis markers were normal and pathologic vessels were confined to the area around the hemorrhage, therefore most likely representing local vasospasms. Evaluation revealed a subacute pontomesencephalic infarct as the cause of abducens and facial nerve palsies. Initial laboratory tests were suggestive of PV, which was confirmed in a further hematologic evaluation.

Ischemic and hemorrhagic events that occurred simultaneously in our patient are the most common complications of PV, and oc-

cur in 30–50% of PV patients [3]. Thirty to forty percent of ischemic events in PV involve the brain arteries [4]. Hemorrhages are located predominantly on mucocutaneous sites but cerebral hemorrhages including subarachnoid hemorrhage have also been described [4]. The pathogenesis of thrombotic and hemorrhagic complications in PV is poorly understood. High blood viscosity due to elevated red cell mass and/or elevated plasma viscosity, qualitative platelet abnormalities, endothelial factors as well as post-capillary venous stasis might be responsible [3]. In our patient, a causal relationship between PV and the new neurological symptoms seems plausible since diagnostic evaluation revealed no other condition leading to simultaneous hemorrhage and ischemia.

Despite repeated phlebotomies and well-controlled hematocrit (<45%), the patient developed possible erythromelalgia and new transient neurologic deficits on two occasions, most likely representing transient ischemic attacks involving the brainstem. Therefore, low-dose aspirin and platelet-reductive therapy with anagrelide were started. Low-dose aspirin has been shown to prevent thrombotic complications in patients with PV without increasing major bleeding complications [5]. In erythromelalgia low-dose aspirin is the drug of choice [6]. In our patient, under aspirin/anagrelide treatment no further ischemic episodes or hemorrhages occurred in 3 months of follow-up.

#### References

- 1 Spivak JL: Polycythemia vera: Myths, mechanisms, and management. *Blood* 2002;100:4272–4290.
- 2 Polycythemia vera: The natural history of 1,213 patients followed for 20 years. Gruppo Italiano Studio Policitemia. *Ann Intern Med* 1995;123:656–664.
- 3 Pearson TC: Hemorheologic considerations in the pathogenesis of vascular occlusive events in polycythemia vera. *Semin Thromb Hemost* 1997;23:433–439.
- 4 Landolfi R, Marchioli R, Patrono C: Mechanisms of bleeding and thrombosis in myeloproliferative disorders. *Thromb Haemost* 1997;78:617–621.
- 5 Landolfi R, Marchioli R, Kutti J, Gisslinger H, Tognoni G, Patrono C, Barbui T: Efficacy and safety of low-dose aspirin in polycythemia vera. *N Engl J Med* 2004;350:114–124.
- 6 Michiels JJ: Platelet-mediated microvascular inflammation and thrombosis in thrombocythemia vera: A distinct aspirin-responsive arterial thrombophilia, which transforms into a bleeding diathesis at increasing platelet counts. *Pathol Biol (Paris)* 2003;51:167–175.

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