

The Intersection of Psychiatry and Neurology in Young Adults: The Hidden Link Between Patent Foramen Ovale and Stroke

Sukran Kaygisiz¹, Tuba Gul¹¹ Ordu University, Faculty of Medicine, Department of Neurology, Ordu, Türkiye

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Abstract

In young patients presenting with acute neurological symptoms, distinguishing between psychogenic and organic causes is crucial. Patent foramen ovale (PFO) is a significant factor that can lead to cardioembolic stroke in young individuals. This case report presents a patient who was initially misdiagnosed with a psychogenic disorder but was later found to have suffered a cardioembolic stroke. A 17-year-old female presented with speech disturbances (stuttering, difficulty in articulation) and became emotional during history taking. Her past medical history revealed recurrent similar episodes. Neurological examination was normal; thus, a psychogenic etiology was suspected, and she was discharged after benzodiazepine infusion. However, she returned in the evening with right-sided numbness in her arm and leg, was again diagnosed with a psychogenic disorder, and received another benzodiazepine infusion. Later that night, she fell while attempting to use the restroom and was brought to the emergency department with speech impairment and right-sided weakness. This time, a neurological evaluation revealed left central facial paralysis, right hemiparesis, dysarthria, and cerebellar dysfunction. Brain MRI showed bilateral lacunar ischemic infarcts. A cardiology evaluation suspected PFO, which was confirmed via transesophageal echocardiography. The patient was diagnosed with acute ischemic stroke, started on fractionated heparin therapy, and underwent PFO closure five days later.

Although psychogenic disorders are common in young patients, organic causes must be ruled out in cases of acute neurological deficits. PFO is a leading cause of cryptogenic strokes in young adults, often presenting with recurrent transient ischemic attacks (TIAs). Overlooking a cardioembolic etiology can lead to diagnostic and treatment delays, potentially worsening outcomes. Unexplained neurological symptoms in young patients should be thoroughly investigated before attributing them to psychogenic causes. Cardioembolic conditions such as PFO can be successfully managed with early diagnosis and appropriate intervention.

Key Words: Patent foramen ovale (PFO), Cardioembolic stroke, Stroke in young adults, Psychogenic speech disorder, Fractionated heparin.

Genç Yetişkinlerde Psikiyatri ve Nörolojinin Kesişimi: Patent Foramen Ovale'nin İnme ile Gizli Bağlantısı

Özet

Genç yaş grubunda akut nörolojik semptomlarla başvuran hastalarda psikojenik ve organik nedenlerin dikkatli şekilde ayırt edilmesi gerekmektedir. Patent foramen ovale (PFO), genç hastalarda kardiyembolik inmeye neden olabilen önemli bir faktördür. Bu olguda, başlangıçta psikojenik olarak değerlendirilen ancak sonrasında kardiyembolik inmeye bağlı olduğu anlaşılan bir hasta sunulmaktadır.

17 yaşındaki kız hasta, konuşma bozukluğu (kekeleme, hecelemede zorluk) ile başvurmuş, öykü alınırken ağlamaya başlamıştır. Öyküden, benzer atakların daha önce de olduğu anlaşılmıştır. Nörolojik muayene normal bulunduğu için psikojenik değerlendirilmiş, benzodiazepin infüzyonu sonrası taburcu edilmiştir. Aynı günün akşamı sağ kol ve bacadaki uyuşukluk şikayetiyle tekrar başvurmuş, yine psikojenik değerlendirilerek benzodiazepin infüzyonu uygulanmıştır. Gece tuvalete kalkarken düşen hasta, konuşmada güçlük ve sağ tarafında güçsüzlük ile üçüncü kez acile getirilmiştir. Bu kez nöroloji tarafından değerlendirilen hastada sol santral fasiyal paralizisi, sağ hemiparezi, dizartri ve serebellar test bozukluğu saptanmıştır. Beyin MRG'de bilateral laktüner iskemik infarktler tespit edilmiştir. Kardiyoloji değerlendirmesinde PFO şüphesi konulmuş ve transözofageal ekokardiyografi ile doğrulanmıştır. Hasta akut iskemik inme tanısı ile yatırılmış, fraksiyone heparin tedavisi başlanmış ve beş gün sonra PFO kapatılmıştır.

Genç hastalarda psikojenik bozukluklar sık görülse de, akut nörolojik defisitlerde altta yatan organik nedenler dışlanmalıdır. PFO, genç erişkinlerde kriptogenik inmelerin önemli bir nedenidir ve özellikle tekrarlayan geçici iskemik ataklar (GİA) ile kendini gösterebilir. Kardiyembolik etiolojinin gözden kaçırılması, tanı ve tedavi gecikmesine neden olabilir. Genç yaşta açıklanamayan nörolojik semptomlar, psikojenik olarak değerlendirilmenden önce dikkatlice incelenmelidir. PFO gibi kardiyembolik nedenler, erken tanı ve uygun yönetimle başarılı şekilde tedavi edilebilir.

Anahtar kelimeler: Patent foramen ovale (PFO), Kardiyembolik inme, Genç yaşta inme, Psikojenik konuşma bozukluğu, Fraksiyone heparin.

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Address for correspondence/reprints:

Sukran Kaygisiz

Telephone number: +90 (505) 925 39 04**E-mail:** krnkygsz52@gmail.com

INTRODUCTION

Stroke is commonly associated with older individuals; however, it is also a significant cause of morbidity and mortality in young adults. The etiology of ischemic strokes in younger populations is often cryptogenic, necessitating an investigation into potential cardioembolic sources (1). PFO is among the most critical contributors to cardioembolic stroke in young patients, as it facilitates paradoxical embolism, leading to recurrent TIA and ischemic strokes (2).

In evaluating young patients with acute neurological symptoms, it is essential to differentiate between psychogenic and organic neurological disorders (3). Misattributing neurological symptoms to stress, anxiety, or psychogenic factors can result in missed diagnoses of serious underlying conditions. Therefore, comprehensive neurological assessments and appropriate diagnostic testing are crucial in young stroke patients.

In this case, attributing the previous symptoms solely to recurrent TIAs caused by PFO may be

inaccurate, as they appeared as symptoms unnoticed by the patient and were frequently ascribed to psychogenic factors. There may be a concurrent psychogenic comorbidity that could be influencing the presentation of these symptoms.

This case report highlights the importance of a multidisciplinary approach in diagnosing a young patient initially misdiagnosed with a psychogenic disorder who was later found to have a PFO-related cardioembolic stroke. Early symptoms were overlooked, leading to a delay in diagnosis and treatment. This underscores the need for meticulous differential diagnosis and early intervention to improve long-term neurological outcomes.

CASE REPORT

A 17-year-old female presented to the emergency department (ED) in the morning with speech disturbances characterized by stuttering and difficulty in syllabification. The patient, who had an introverted personality, became emotional and started crying when asked questions during history taking. Due to communication difficulties, her mother provided the history. The mother reported: "She is behaving this way because we did not allow her to accompany her uncle, who arrived from abroad, to the airport and instead asked her to stay home and take care of her sibling. She has had similar speech

disturbances twice before when she was upset about something, but they resolved within a few days."

Based on this history and the normal findings on neurological examination performed by the ED physician, the condition was considered psychogenic. The patient received an intravenous infusion of 10 mg benzodiazepine. By the fourth hour after admission, her speech had improved; however, due to medication-induced drowsiness, she was discharged with a recommendation for psychiatric outpatient follow-up.

The same evening, the patient returned to the ED, now also complaining of numbness in her right arm and leg in addition to speech disturbances. The same physician reassessed the patient and again considered her symptoms to be psychogenic, attributing the inconsistent responses during a detailed examination to a conversion disorder. Another 10 mg intravenous infusion of benzodiazepine was administered over one hour. The patient, in a profoundly drowsy state, was taken home at the request of her family.

Approximately five hours later, around midnight, the patient attempted to use the restroom but collapsed near the sink. Her brother, awakened by the sound of the fall, found her lying on the floor, struggling to speak and unable to stand due to right-sided weakness. She was brought back to the ED for the third time. Upon arrival, her right

arm and leg strength had returned to normal; however, her speech disturbance persisted. This time, the ED specialist requested a neurology consultation, and the patient was evaluated accordingly.

Neurological Examination:

- *Inspection:* The patient was petite, had a very fair complexion compared to her family members, and exhibited an introverted demeanor.
- *Speech:* Dysarthria characterized by difficulty in word articulation and sentence formation.
- *Cranial Nerves:* Left central facial palsy.
- *Sensory System:* Hemihypoesthesia in the right upper and lower extremities, sparing the face.
- *Motor System:* Right-sided hemiparesis with a muscle strength of 4+/5 on the Mingazzini test.
- *Reflexes:* Deep tendon reflexes were normoactive in all four limbs, with bilaterally normal plantar responses. There were no pathological reflexes
- *Coordination:* Impaired cerebellar tests on the left side and a tendency to fall to the left when attempting to stand.

Imaging Studies: Diffusion-weighted magnetic resonance imaging (MRI) revealed multiple small diffusion-restricted areas suggestive of ischemic infarcts: Left centrum semiovale and internal capsule, right sylvian fissure adjacent

subcortical region and two millimetric diffusion-restricted areas in the left cerebellum.

Given the bilateral and multifocal involvement, including infratentorial lesions, the findings were suggestive of acute lacunar ischemic infarcts of cardioembolic origin. A transthoracic echocardiography (TTE) performed in the ED by the cardiology team indicated a suspected patent foramen ovale (PFO). The patient was admitted to the neurology service with a diagnosis of acute ischemic stroke.

Since the exact onset of symptoms was unclear and the patient had been asleep prior to the worsening of her condition, she did not meet the time criteria for thrombolytic therapy. Instead, the following treatment regimen was initiated intravenous hydration and fractionated Heparin (5,000 units administered over one hour in IV infusion, 25,000 units in 1,000 cc normal saline, infused over 24 hours).

The following day, transesophageal echocardiography (TEE) definitively confirmed the presence of a PFO. A percutaneous closure procedure was scheduled for five days later. During this period, daily activated partial thromboplastin time (aPTT) levels were monitored to guide heparin continuation.

On day five, with an aPTT level still below 70, the patient underwent the PFO closure procedure. Post-procedure, intravenous heparin infusion was continued. By the third postoperative day,

the aPTT level had risen to 110, prompting discontinuation of fractionated heparin. The anticoagulation regimen was switched to Enoxaparin: 0.6 IU twice Daily and acetyl salicylic acid: 150 mg once Daily.

At the time of discharge, the patient's neurological symptoms had improved but had not completely resolved. At the one-month follow-up, all pathological neurological findings except for hypoesthesia had resolved. Follow-up brain and diffusion-weighted MRI showed a subacute lacunar infarct persisting in the left internal capsule, while all other previously noted infarct areas had completely resolved.

DISCUSSION

Neurological disorders often present with symptoms that overlap with psychiatric conditions. Particularly in young patients with acute neurological symptoms, it is essential to consider not only psychogenic causes but also organic neurological diseases (3). Misdiagnosis and inadequate clinical evaluation can lead to delayed treatment, increasing the risk of long-term disability or mortality. Therefore, during differential diagnosis, a thorough assessment of symptoms and appropriate diagnostic testing should be conducted.

In this case, the patient's young age initially led to a diagnosis of psychogenic speech disorder. However, the subsequent development of motor symptoms suggested an underlying

cardiovascular and neurological etiology. Although stroke is traditionally considered rare in young individuals, PFO is a significant risk factor for cardioembolic stroke in this population (1). PFO is found in approximately 40% of young stroke patients and can frequently cause cerebral ischemia through a paradoxical embolism mechanism (2). Consequently, PFO should be actively investigated in young patients with unexplained stroke or TIA.

In this case, the recurrent TIAs caused by PFO manifested as symptoms that the patient did not recognize and were often attributed to psychogenic factors. However, many neurological disorders can be exacerbated by triggers such as stress or physical and mental exhaustion (4). Thus, while stress should be considered a triggering factor in patients with neurological and cardiovascular conditions, underlying organic pathology should not be overlooked.

Clinical clues used to differentiate between symptoms and findings of cerebrovascular disease and organic versus psychogenic pathologies play a critical role in the diagnostic process and shape therapeutic approaches. Organic pathologies are generally supported by distinct laboratory tests and imaging findings, whereas psychogenic pathologies are more often based on the patient's clinical history and the relationship of symptoms to psychological

factors, typically lacking accompanying radiological or laboratory findings. Furthermore, psychogenic cases usually extend over a longer period.

For instance, in cerebrovascular diseases, the sudden onset of specific symptoms, such as losses in particular neurological functions like motor skills or speech, indicates an organic cause. Conversely, symptoms usually beginning or worsening with stress and patients excessively dramatizing their symptoms can point to psychogenic factors.

Additionally, while symptoms in organic pathologies are expected to present a stable and consistent pattern, those in psychogenic conditions can be more variable and inconsistent. The reproducibility of findings obtained during clinical examinations supports the diagnosis of organic disorders, whereas variable findings may indicate psychological influences. Considering our case, the clinical scenario preceding the event can very likely be attributed to a thromboembolic process.

In the management of acute ischemic stroke, thrombolytic therapy (such as tissue plasminogen activator - tPA) is the gold standard for recanalization. However, it cannot be administered to all patients due to time constraints (5). In such cases, alternative anticoagulant strategies, such as fractionated heparin, may be considered. Fractionated heparin

is used as a recanalization-supporting agent, particularly in ischemic strokes of cardioembolic origin (6). While low-molecular-weight heparins (LMWH) have gained popularity in recent years, clinical experience suggests that fractionated heparin may provide more effective recanalization in cardioembolic strokes and help preserve the penumbra area. However, LMWH has been reported to be less effective in achieving similar outcomes (7).

This case demonstrates that PFO-related cardioembolic stroke can be successfully managed with early diagnosis and a multidisciplinary approach. PFO closure is an effective method for reducing the risk of recurrent strokes and should be considered, particularly in patients who are resistant to medical therapy (8). In our patient, significant neurological improvement was achieved following PFO closure.

CONCLUSION

In conclusion, diagnosing young patients with acute neurological symptoms as psychogenic without ruling out organic causes can lead to delays in treatment and management. A collaborative assessment by neurology, cardiology, and psychiatry specialists plays a crucial role in managing such cases. A comprehensive assessment of both organic and psychogenic factors is vital in managing cerebrovascular and similar neurological

conditions. However, interactions and potential overlaps between these two types of pathologies can complicate diagnostic and treatment strategies. This necessitates a multidisciplinary approach and individualized treatment plans.

Additionally, investigating underlying cardiovascular risk factors such as PFO and implementing early intervention in appropriate patients is essential for minimizing the risk of recurrent strokes.

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report.

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