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Recent progress in patent foramen ovale and related neurological diseases: A narrative review

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Patent foramen ovale (PFO) is a common congenital cardiac abnormality when the opening of the interatrial septum is not closed in adulthood. This abnormality affects 25% of the general population. With the development of precision medicine, an increasing number of clinical studies have reported that PFO is closely related to various neurological diseases such as stroke, migraine, obstructive sleep apnea, and decompression syndrome. It has also been suggested that PFO closure could be effective for preventing and treating these neurological diseases. Therefore, increasing attention has been given to the prevention, diagnosis, and treatment of PFO-related neurological diseases. By reviewing existing literature, this article focuses on the pathogenesis, epidemiology, and clinical characteristics of PFO-related neurological diseases, as well as the prevention and treatment of different neurological diseases to discuss, and aims to provide current progress for this field and decision-making evidence for clinical practice.

KEYWORDS

patent foramen ovale, stroke, migraine, obstructive sleep apnea, dementia, decompression sickness

Introduction

The foramen ovale is an opening in the interatrial septum in the fetal heart. After the fetus is born, with the establishment of pulmonary circulation, the left atrial pressure increases, pushing the primary septum to fuse with the secondary septum and then prompting the foramen ovale to close. Foramen ovale closes before the age of 2 years in most people, and approximately 25% fail to close in adulthood, resulting in the formation of congenital heart abnormalities—patent foramen ovale (PFO) (1).

An increasing number of studies have reported that PFO is closely related to many neurological diseases, such as stroke, migraine, obstructive sleep apnea (OSA), and decompression sickness (DCS) (2). For stroke, large-scale clinical studies have suggested that PFO could be a novel risk factor for cryptogenic stroke, especially for younger adults. Three randomized controlled trials (RCTs) from the *New England Journal of Medicine* also indicated that PFO closure was effective in preventing stroke recurrence (3–5). Based on these, the concept of “PFO-related stroke” was separately proposed in the U.S. SCAI

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Table of Contents Recent Neurological Research

1. Understanding the eBook Recent Neurological Research
 - The Rise of Digital Reading Recent Neurological Research
 - Advantages of eBooks Over Traditional Books
2. Identifying Recent Neurological Research
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Recent Neurological Research
 - User-Friendly Interface
4. Exploring eBook Recommendations from Recent Neurological Research

- Personalized Recommendations
- Recent Neurological Research User Reviews and Ratings
- Recent Neurological Research and Bestseller Lists
- 5. Accessing Recent Neurological Research Free and Paid eBooks
 - Recent Neurological Research Public Domain eBooks
 - Recent Neurological Research eBook Subscription Services
 - Recent Neurological Research Budget-Friendly Options
- 6. Navigating Recent Neurological Research eBook Formats
 - ePub, PDF, MOBI, and More
 - Recent Neurological Research Compatibility with Devices
 - Recent Neurological Research Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Recent Neurological Research
 - Highlighting and Note-Taking Recent Neurological Research
 - Interactive Elements Recent Neurological Research
- 8. Staying Engaged with Recent Neurological Research
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Recent Neurological Research
- 9. Balancing eBooks and Physical Books Recent Neurological Research
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Recent Neurological Research
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Recent Neurological Research
 - Setting Reading Goals Recent Neurological Research
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Recent Neurological Research

- Fact-Checking eBook Content of Recent Neurological Research
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
- Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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