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ECHOCARDIOGRAPHIC ASPECTS OF VENTRICULAR SEPTAL DEFECT WITH HIGH PULMONARY HYPERTENSION IN CHILDREN

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Abstract*. This article reviews the echocardiographic assessment of ventricular septal defect (VSD) in children, particularly focusing on cases complicated by high pulmonary hypertension (PH). Echocardiography is pivotal in diagnosing, monitoring, and managing these conditions, offering crucial insights into cardiac structure and function. The review highlights key echocardiographic markers, their clinical significance, and the role of advanced imaging techniques in optimizing patient outcomes.*

Keywords*: pediatric pulmonary hypertension, echocardiography, right heart, right ventricular function, Ventricular septal defect.*

Introduction

One of the most common congenital cardiac diseases, ventricular septal defect (VSD) affects 2-6 out of every 1000 live newborns worldwide. Spontaneous closure of a VSD is common, so only 20-50% of children with VSD have been reported to have the defect by the time he or she reaches school age. Blood can pass abnormally between the left and right ventricles due to a hole in the ventricular septum. If untreated, this abnormality may result in raised pulmonary artery pressures and increased pulmonary blood flow, which could lead to pulmonary hypertension(PH). (Heart BMJ)

Pulmonary hypertension associated with VSD poses significant clinical challenges. The increased blood flow through the pulmonary vasculature can cause endothelial damage, vascular remodeling, and increased pulmonary vascular resistance, ultimately leading to right ventricular overload and heart failure. Children with VSD and high PH are at a higher risk of developing Eisenmenger syndrome, a condition where long-standing left-to-right shunt caused by VSD reverses to a right-to-left shunt due to severe pulmonary vascular disease (Heart BMJ) (Frontiers).

Although there have been multiple publications in the last 10 years suggesting that surgical treatment of VSD is advantageous even in cases of substantial pulmonary hypertension, associated pulmonary hypertension with VSD has historically been seen as a contraindication for surgical repair. Nonetheless, there is an objective way to determine whether pulmonary hypertension is present and how severe it is. The initial imaging technique performed when a youngster appears with a cardiac murmur is radiography. Echocardiography plays a vital role in the care of this patients. It is the main non-invasive imaging techniques used to diagnose VSD, measure the shunt, determine the degree of PH, and track the result of treatment. Clinical decision-making requires precise knowledge of the heart's anatomy, hemodynamics, and ventricular function, all of which are provided by echocardiography. Advanced echocardiographic techniques, such as Doppler imaging and three-dimensional echocardiography, enhance the accuracy of these assessments, offering a comprehensive evaluation of the cardiac structure and function in children with VSD and PH.

This article will address the clinical implications of the key echocardiographic parameters utilized in the diagnosis and treatment of VSD with PH, as well as highlight recent developments and future initiatives in the field. Through this approach, the goal is to offer a thorough comprehension of the echocardiographic assessment of these intricate congenital cardiac abnormalities and the related consequences.

Echocardiography for medical Diagnosis

In order to diagnose VSD and determine the severity of PH, echocardiography is necessary. It allows for:

- Evaluation of VSD Size and Morphology
- Assessment of Right Ventricular Function
- Calculating pulmonary artery pressure

Echocardiographic Markers' significance in clinical Practice:

1. The relationship between pulmonary hypertension severity and VSD size: Severe PH is linked to larger VSDs. The amount of the left-to-right shunt and the subsequent pulmonary blood flow are influenced by the defect's magnitude.

2. Right Ventricular Function: Severe PH is associated with decreased right ventricular function, metrics including RVSP, TAPSE, and right ventricular fractional area change (RVFAC) are crucial.

3. Inter ventricular Septum Motion: Right ventricular pressure overload and severe PH are indicated by flattening or paradoxical movement of the inter ventricular septum.

Future Research Directions

Future research should focus on:

1. Standardizing Echocardiographic Protocols: Developing standardized protocols for echocardiographic evaluation of VSD and PH in children to ensure consistency and reliability across different clinical settings.

2. Investigating Molecular Biomarkers: Exploring molecular biomarkers that correlate with echocardiographic findings and disease progression, which could aid in early diagnosis and personalized treatment.

3. Conducting Multicenter Studies: Large, multicenter studies are needed to validate echocardiographic criteria and treatment outcomes, facilitating the development of evidence-based guidelines.

Conclusion

Echocardiography is indispensable in the diagnosis, management, and follow-up of children with VSD and high PH. By providing comprehensive information on cardiac structure and function, echocardiography guides clinical decision-making and helps improve patient outcomes. Continued advancements in echocardiographic technology and research are essential for optimizing the care of this complex patient population.

REFERENCES

1. "Diagnostics, monitoring and outpatient care in children with suspected pulmonary hypertension" - Heart, 2023
2. "Predictive Scoring System for Spontaneous Closure of Infant Ventricular Septal Defect" - Springer, 2023

3. "Recent Advances in Pediatric Pulmonary Hypertension: Implications for Management" - ScienceDirect, 2023
4. Юсупалиева, Г. А., Юлдашев, Т. А., Абзалова, М. Я., & Улугмуродова, К. Б. (2023). ОСОБЕННОСТИ ДОППЛЕРОГРАФИЧЕСКИХ ИССЛЕДОВАНИЙ В ДИАГНОСТИКЕ ХРОНИЧЕСКОЙ БОЛЕЗНИ ПОЧЕК. *Евразийский журнал медицинских и естественных наук*, *3*(11), 41-44.
5. Юсупалиева, Г. А., Манашова, А. Р., Абзалова, М. Я., Ахралов, Ш. Ф., & Султанова, Л. Р. (2022). УЛЬТРАЗВУКОВАЯ ДИАГНОСТИКА ОСТРОЙ СПАЕЧНОЙ КИШЕЧНОЙ НЕПРОХОДИМОСТИ У ДЕТЕЙ. *Достижения науки и образования*, (7 (87)), 48-52.
6. Усманова, Г. М., Нурмухамедов, Х. К., Юсупалиева, Г. А., Маматкулов, И. Б., & Ишонходжаев, Н. А. (2013). Задачи экстренной анестезиологии в педиатрии. *Вестник экстренной медицины*, (3), 284-284.
7. Давидходжаева, А. А., & Юсупалиева, Г. А. (2015). Состояние центральной гемодинамики у детей с хроническими гепатитами. *Молодой ученый*, (4), 90-91.
8. Юсупалиева, Г. А., Абзалова, М. Я., Бобохонова, Т. Т., Ахмедов, Э. А., & Толипова, С. М. (2019). Комплексная лучевая диагностика различных форм острого аппендицита и его осложнений у детей. *Новый день в медицине*, (2), 345-348.
9. Юсупалиева, Г. А., & Абзалова, М. Я. (2017). Возможности лучевых методов в диагностике острого аппендицита и его осложнений у детей. *Авиценна*, (12), 4-9.
10. Юсупалиева, Г. А. (2009). Ультразвуковая диагностика пневмоний и их осложнений у детей. *Автореферат. Ташкент*.
11. Иноятова, Ф. И., & Юсупалиева, Г. А. (2016). Значение комплексных эхографических исследований в диагностике хронических вирусных гепатитов у детей. *Вопросы детской диетологии*, *14*(1), 21-25.
12. Шанасирова, Р. С., Давидхожаева, А. А., Абзалова, М. Я., & Болтаева, Н. Н. (2016). Допплерография сосудов печени и головного мозга у детей с хроническими диффузными заболеваниями печени. *Молодой ученый*, (3), 341-344.
13. Yusupaliyeva, G. A., Turayeva, N. N., Turebaev, B. A., & Abzalova, M. Y. (2018). THE ROLE OF COMPLEX ECHOGRAPHY IN THE DIAGNOSIS OF ACUTE APPENDICITIS IN CHILDREN. *Spirit Time*, (7), 15-17.
14. Inoyatova, F. I., Yusupalieva, G. A., & Inogamova, G. Z. (2015). Doppler Examination Informativity in Children with Chronic Viral Hepatitis. *Detskie Infekcii (Moskva)*, *14*(3), 60-64.
15. Юсупалиева, Г. А. (2014). Современнные ультразвуковые методики в комплексной клинико-эхографической диагностике хронических вирусных гепатитов у детей. *Актуальные проблемы гуманитарных и естественных наук*, (12-2), 160-162.
16. Махкамова, О. Д., Вахидова, Н. Т., Юсупалиева, Г. А., & Абзалова, М. Я. (2017). Комплексная лучевая диагностика пневмоний и их осложнений у детей. *Журнал теоретической и клинической медицины*, (1), 105-107.
17. Шанасирова, Р. С., Абзалова, М. Я., Манашова, А. Р., Болтаева, Н. Н., Ортикбоева, Ш. О., & Давидхожаева, А. А. (2015). Возможности ультразвуковой диагностики при внепеченочной портальной гипертензии у детей. *Молодой ученый*, (16), 100-101.

18. ЮСУПАЛИЕВА, Г. А., РАШИДОВ, З. Р., НИЯЗОВ, А. Н. У., & АХМЕДОВ, Э. А. (2019). Информативность мультиспиральной компьютерной томографии в диагностике нефротуберкулеза. *Наука среди нас*, (3), 84-90.
19. Рашидов, З., Кутумов, Х., Юсупалиева, Г., & Манашова, А. (2017). Состояние кровотока по данным ультразвуковой ангиографии при туберкулезе почек. *Журнал проблемы биологии и медицины*, (2 (94)), 76-78.
20. Ёкубова, М. А., Мамадалиева, Я. М., & Юсупалиева, Г. А. (2016). Значение ультразвуковой эластографии в диагностике образований молочной железы. *Молодой ученый*, (3), 261-265.