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Short Commentary

Balancing Maternal and Fetal Safety in Pregnant Women with Prosthetic Heart Valves: Insights for Chinese Clinical Practice

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Abstract

Pregnancy management in women with Prosthetic Heart Valves (PHVs) remains a high-risk clinical scenario, requiring careful anticoagulation strategies to protect both maternal cardiac function and fetal development. A recent single-center study from China, published in Medicine, provides valuable real-world data on this unique population, highlighting differences in maternal and fetal outcomes between Mechanical Heart Valves (MHVs) and Tissue Heart Valves (THVs), as well as the impact of various anticoagulation regimens. However, its clinical implications must be interpreted cautiously in the context of a key reality in Chinese healthcare: most hospitals do not routinely monitor anti-Xa activity during Low-Molecular-Weight Heparin (LMWH) use.

Key Findings: A Stark Contrast between Valve Types

The study included 138 pregnant women with PHVs, comprising 118 with MHVs and 20 with THVs. Fetal outcomes showed a striking discrepancy: while THV patients achieved a 100% live birth rate, only 66.9% of MHV patients had live births, with a significantly higher miscarriage rate (24.6% vs. 0%, P<.01). This difference underscores the unique risks MHVs pose to fetal survival, likely driven by the need for strict anticoagulation to prevent life-threatening Mechanical Valve Thrombosis (MVT).

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Maternal safety, however, showed fewer disparities. Maternal mortality in MHV patients was low (0.8%), and rates of valve thrombosis, heart failure, and hemorrhagic events were comparable between MHV and THV groups, though MHV patients trended toward higher complication rates. Notably, 91.3% of deliveries were cesarean sections, with MHV patients more likely to require urgent procedures, reflecting the need for meticulous perinatal management in this population.

Anticoagulation: Strategic Choices Amid Practical Constraints

Anticoagulation management emerged as the cornerstone of outcomes. The study compared three regimens: "warfarin only," "sequential therapy" (LMWH during the 1st trimester and warfarin during the 2nd and 3rd trimesters , warfarin will be bridged with LMWH 1 week before planned delivery, and LMWH is recommended until 12 hours or 24 hours before delivery), and "LMWH throughout gestation." However, in China's clinical context—where anti-Xa monitoring is not routine—regimen selection must prioritize feasibility and risk mitigation:

- Warfarin only carried the highest fetal risk, with a 49.2% fetal loss rate, primarily due to miscarriage (38.1%), especially early miscarriage (28.6%). While its teratogenic risk in the first trimester remains a concern, warfarin offers a critical advantage in settings lacking anti-Xa monitoring: its anticoagulant effect can be adjusted via INR testing, providing greater controllability. It appears that warfarin has a dose-dependent effect on fetal outcomes, with the highest risk associated with >5 mg daily warfarin doses [1]. However, there is insufficient evidence to recommend that lower doses of warfarin (e.g. less than 5mg) are safe in terms of adverse fetal outcome [2].
- LMWH throughout gestation showed alarmingly high MVT rates (33.3%) in the study, a finding with heightened relevance in China. Without anti-Xa activity monitoring, fixed-dose LMWH administration risks subtherapeutic anticoagulation, significantly increasing thrombotic risk. This makes it a high-risk choice for pregnant women with MHVs. But the reality is that the Xa factor test is difficult to implement in real clinical settings.

- Sequential therapy remained the relatively optimal option: zero MVT cases, a low fetal loss rate (6.9%), and a 93.1% live birth rate. By limiting LMWH use to the first trimester (reducing warfarin's teratogenic risk) and switching to monitorable warfarin in later pregnancy (avoiding unmonitored LMWH limitations), this regimen balances risks under real-world constraints. However, first-trimester LMWH use relies on empirical dosing, necessitating individualization based on patient weight, gestational age, and clinical factors. It is critical to note that several studies have found that these transition periods place individuals at high risk for thrombosis [3], so monitoring should be strengthened during this stage.

Clinical Implications and Practical Challenges

THVs is preferred for women of reproductive age, because of the increased maternal and fetal risks of mechanical heart valves in pregnancy, and eliminate the need for long-term anticoagulation—thus avoiding complications from inadequate monitoring [4,5].

For patients with pre-existing MHVs, sequential therapy remains the preferred strategy, but its implementation must address the challenge of unmonitored LMWH use:

- Develop empirically guided dosing protocols (e.g., weight-based initial dosing with mid-pregnancy adjustments).
- Strengthen clinical vigilance for thrombotic symptoms (e.g., palpitations, chest tightness, changes in valve murmurs) to compensate for limited laboratory monitoring, especially for patients with multipal high risks
- Promote anti-Xa testing capacity in eligible centers, particularly for high-risk patients (e.g., multi-valve replacements, history of thrombosis).
- For patients declining warfarin in the first trimester and If anti-Xa level monitoring is not available, continuous IV UFH (unfractionated heparin) is recommended in the first trimester to maintain adequate anticoagulation [4]. However, this is still difficult to implement clinically.

Additionally, the study's high cesarean section rate (91.3%) highlights the need for early integration of cardiac function assessment and anticoagulation planning into delivery protocols. In the absence of precise monitoring data, multidisciplinary collaboration (between cardiologists, obstetricians, and hematologists) becomes even more critical to optimize outcomes.

Conclusion

Currently, there is no optimal anticoagulation regimen with PHVs, and the most suitable one can only be chosen based on the balance between maternal and fetal risks. In China's clinical environment, sequential therapy offers the relatively better risk-benefit profile for MHV patients, provided empirical LMWH dosing and enhanced clinical monitoring are implemented. Expanding anti-Xa testing capacity and prioritizing THVs for reproductive-aged women will further improve care quality. Ultimately, personalized management and multidisciplinary teamwork remain the cornerstones of safe pregnancy outcomes in this high-risk population.

Conflict of Interest

The authors declare no conflict of interest.

Authorship Contribution

The authors equally contributed to the preparation and writing of the commentary. All authors approved the submitted version.

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