GEORGIA PERINATAL QUALITY COLLABORATIVE

Cardiac Lecture #6: Valvular Heart Disease

March 7, 2023

Updates

- Next Maternal Webinar May 2nd
  Topic: Pulmonary Hypertension & Pregnancy | Speaker: Joel Hardin, MD

- Q3 & Q4 HTN Data Submission – Extended deadline March 31st

- Q1 2023 HTN and Cardiac Data Submission April 30th

- AIM TAP Webinar: The Importance of Trauma Informed Care
  https://vimeo.com/801774659

- GaPQC Annual Meeting - April 13th & 14th

Stay Informed.
Stay Covered.

Federal Public Health Emergency Medicaid Unwinding Partner Toolkit

dhs.georgia.gov/medicaidunwinding **OR** staycovered.ga.gov

SIMULATION AND DRILLS FOR PATIENT SAFETY

OBSTETRIC IN-SITU DRILL PROGRAM MANUAL ►

PRACTICING FOR PATIENTS SIMULATIONS PREPARATION CHECKLIST ►

SAMPLE CASE SCENARIOS

- HYPERTENSION CASE SCENARIO 1
- HYPERTENSION CASE SCENARIO 2
- HYPERTENSION CASE SCENARIO 3
- HEMMORHAGE CASE SCENARIO 1
- HEMMORHAGE CASE SCENARIO 2
- HEMMORHAGE CASE SCENARIO 3

- HYPERTENSION SCENARIO TRAINING AIDS
- FETAL HEART RATE TONES TRAINING AIDS
- HEMORRHAGE SCENARIOS VISUAL AIDS
- ADDITIONAL HEMORRHAGE CASE SCENARIOS

SAMPLE CASE VIDEOS

- SEVERE HYPERTENSION CASE 1
- SEVERE HYPERTENSION CASE 2
- SEVERE HYPERTENSION CASE 3
- OBSTERIC HEMORRHAGE - REQUIRING UTERINE TAMPONADE
- OBSTERIC HEMORRHAGE - REQUIRING UTEROTONICS
- OBSTERIC HEMORRHAGE WITH RETAINED PRODUCTS

TEAM REVIEW AND DEBRIEFING

- SEVERE HYPERTENSION FORM
- OBSTETRIC HEMORRHAGE FORM

TEAM BASED COMMUNICATION TRAINING

- TEAM STEPPS

PROTOCOL CHANGE FORM AND IMPLEMENTATION ACTION PLAN

- IN-SITU DRILLS FACILITY PROTOCOL CHANGE FORM
- PRACTICING FOR PATIENTS IMPLEMENTATION ACTION PLAN

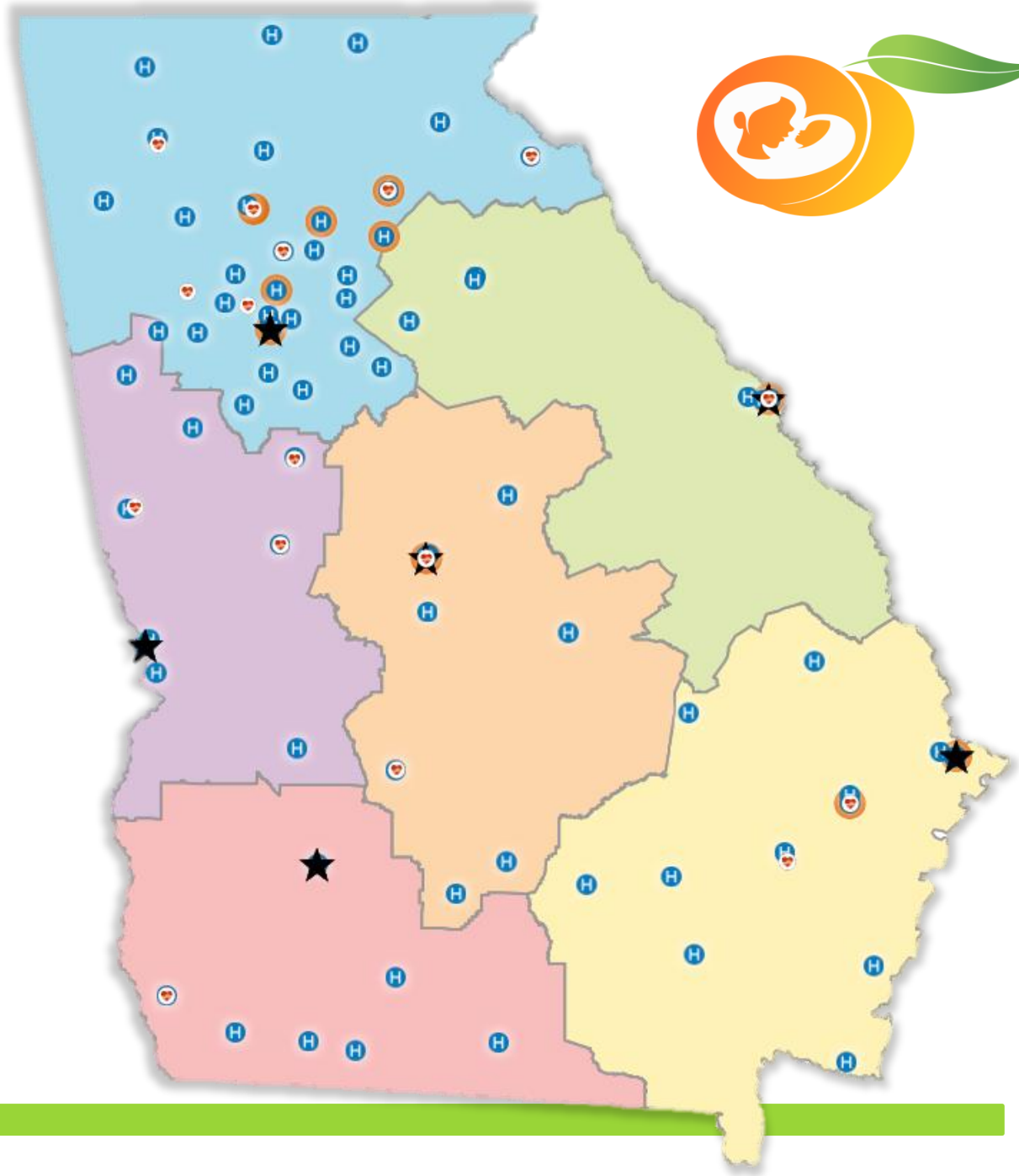
PRACTICING FOR PATIENTS PRESENTATIONS

- PRACTICING FOR PATIENTS PRESENTATION FOR STAFF (PPT)
- PRACTICING FOR PATIENTS PRESENTATION FOR LEADERSHIP (PPT)

https://saferbirth.org/aim-resources/aim-cornerstones/simulations/

GA Cardiologist Referral Network

for Pregnant & Postpartum People



www.georgiapqc.org/cardiac-conditions

Program Forms & Surveys

GaPQC Cardiac Initiative Enrollment Form

Download Enrollment Form (PDF)

Hospital Assessment of Cardiac Referral Networks

Complete Hospital Assessment Survey

Cardiologist Survey for Maternal Referrals

Add Your GA Cardiologist Practice to the Referral List

Key Driver Diagram: Maternal Cardiac Conditions

GOAL:

To reduce severe morbidity & mortality related to maternal cardiac conditions in Georgia.

SMART AIM:

By 02/6/2026, National Wear Red Day, to reduce harm related to existing and pregnancy related cardiac conditions through the 4th trimester by 20%.

Key Drivers

Readiness: EVERY UNIT - Implementation of standard processes for optimal care of cardiac conditions in pregnancy and post-partum.

Recognition & Prevention: EVERY PATIENT - Screening and early diagnosis of cardiac conditions in pregnancy and post-partum.

Response: EVERY UNIT - Care management for every pregnant or postpartum woman with cardiac conditions in pregnancy and post-partum.

Reporting/System Learning: EVERY UNIT - Foster a culture of safety and improvement for care of women with cardiac conditions in pregnancy and post-partum.

Respectful, Equitable, and Supportive Care — EVERY UNIT/PROVIDER/TEAM MEMBER - Inclusion of the patient as part of the multidisciplinary care team.

INTERVENTIONS

- ❑ Train all obstetric care providers to perform a basic Cardiac Conditions Screen.
- ❑ Establish a protocol for rapid identification of potential pregnancy-related cardiac conditions in all practice settings to which pregnant and postpartum people may present.
- ❑ Develop a patient education plan based on the pregnant and postpartum person's risk of cardiac conditions.
- ❑ **Establish a multidisciplinary "Pregnancy Heart Team" or consultants appropriate to their facility's designated Maternal Level of Care to design coordinated clinical pathways for people experiencing cardiac conditions in pregnancy and the postpartum period.** S1
- ❑ Establish coordination of appropriate consultation, co-management and/or transfer to appropriate level of maternal or newborn care.
- ❑ Develop trauma-informed protocols and training to address health care team member biases to enhance quality of care
- ❑ Develop and maintain a set of referral resources and communication pathways between obstetric providers, community-based organizations, and state and public health agencies to enhance quality of care. *

- ❑ Obtain a focused pregnancy and cardiac history in all care settings, including emergency department, urgent care, and primary care.
- ❑ **In all care environments assess and document if a patient presenting is pregnant or has been pregnant within the past year.** S2
- ❑ Assess if escalating warning signs for an imminent cardiac event are present.
- ❑ Utilize standardized cardiac risk assessment tools to identify and stratify risk.
- ❑ Conduct a risk-appropriate work-up for cardiac conditions to establish diagnosis and implement the initial management plan.

- ❑ Facility-wide standard protocols with checklists and escalation policies for management of **cardiac symptoms**.
- ❑ Facility-wide standard protocols with checklists and escalation policies for management of people **with known or suspected cardiac conditions.**
- ❑ Coordinate transitions of care including the discharge from the birthing facility to home and transition from postpartum care to ongoing primary and specialty care.
- ❑ Offer reproductive life planning discussions and resources, including access to a full range of contraceptive options in accordance with safe therapeutic regimens. *
- ❑ **Provide patient education focused on general life-threatening postpartum complications and early warning signs, including instructions of who to notify if they have concerns, and time and date of a scheduled postpartum visit.**

- ❑ For pregnant and postpartum people at high risk for a cardiac event, establish a culture of multidisciplinary planning, admission huddles and post-event debriefs.
- ❑ **Perform multidisciplinary reviews of serious complications (e.g. ICU admissions for other than observation) to identify systems issues.** S4
- ❑ Monitor outcomes and process data related to cardiac conditions, with disaggregation by race and ethnicity due to known disparities in rates of cardiac conditions experienced by Black and Indigenous pregnant and postpartum people. **Process Measures – 1-5**

- ❑ Screen for structural and social drivers of health that might impact clinical recommendations or treatment plans and provide linkage to resources that align with the pregnant or postpartum person's health literacy, cultural needs, and language proficiency.
- ❑ Engage in open, transparent, and empathetic communication with pregnant and postpartum people and their identified support network to understand diagnoses, options, and treatment plans.
- ❑ **Include each pregnant or postpartum person and their identified support network as respected members of and contributors to the multidisciplinary care team.** *S5

CCOC Process Measures: Reporting and Systems Learning

P1: Standardized Pregnancy Risk Assessments for People with Cardiac Conditions

P2: Multidisciplinary Care Plan for Pregnant People with Cardiac Conditions

P3: OB Provider and Nursing Education – Cardiac Conditions

P4: OB Provider & Nursing Education– Respectful and Equitable Care

P5: ED Provider and Nursing Education – Cardiac Conditions

OP1: Cardiovascular Disease (CVD) Assessment Among Pregnant and Postpartum Women

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VALVULAR HEART DISEASE

Marissa Platner, MD
Emory School of Medicine
Maternal Fetal Medicine

GAPQC Meeting

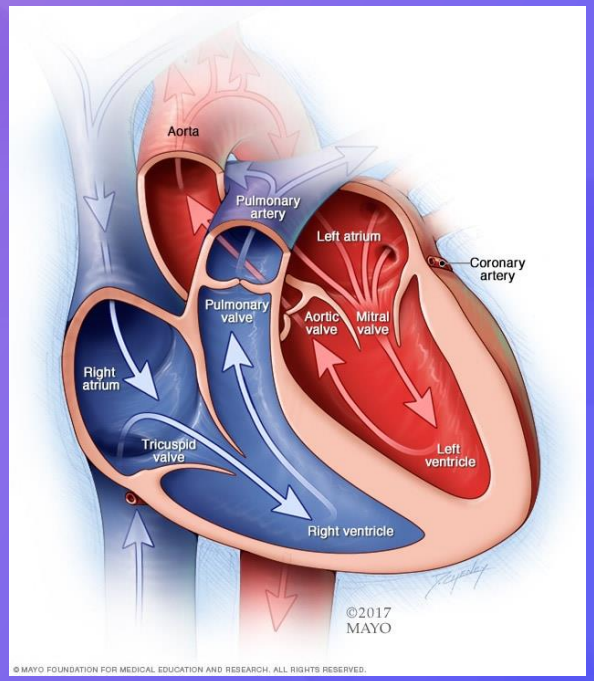
March 7, 2023

Disclosures

- I have no financial disclosures

OBJECTIVES

- General recommendations regarding assessment
- Gain an understanding of common valvular abnormalities
- Understand management strategies during pregnancy for each
- Review relevant cases



Background

- Congenital heart disease accounts for 30-50% of cardiac disease in pregnancy
- Rheumatic heart disease most common worldwide
- European Registry on Pregnancy and Heart Disease:
  - Mitral stenosis or regurgitation: 63%
  - Aortic valvular disease: 23%
  - Patient with valvular heart disease had higher mortality rates than those with CHD

Nanna, 2014

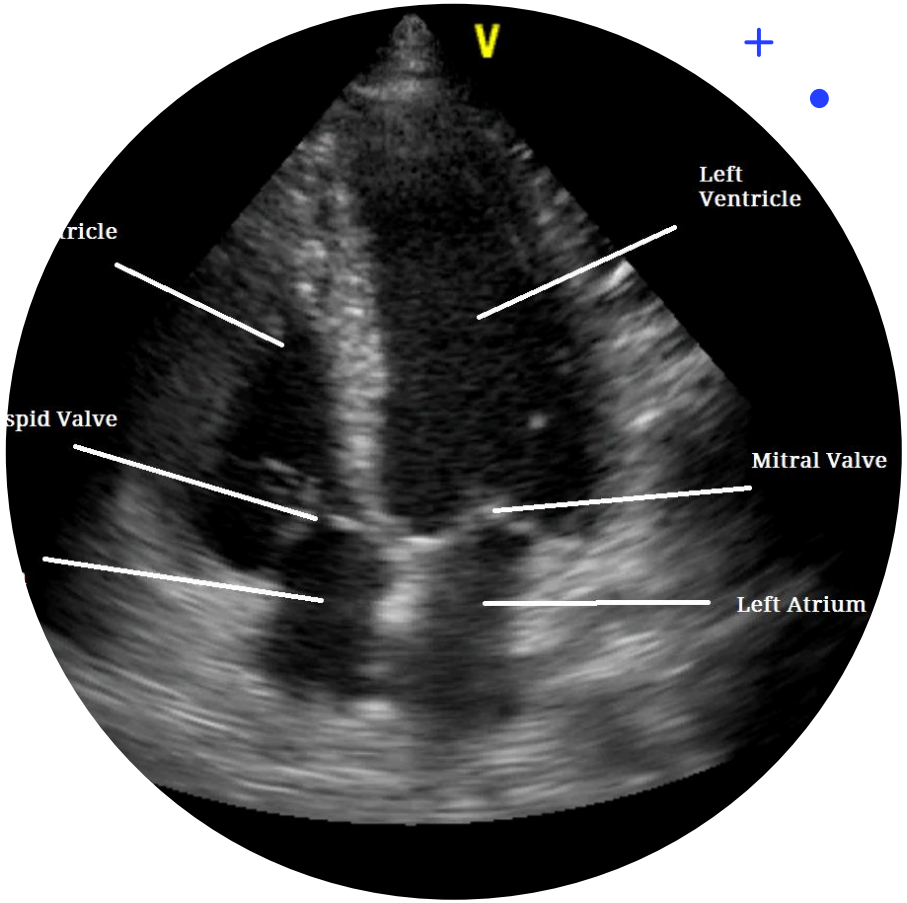
Preconception

- Patients with known valvular heart disease who desire conception should have a preconception consult with cardiologist who specializes in pregnancy management
- Detailed history- including any prior surgeries/valve interventions
- Physical exam- murmurs, volume status, JVD
- EKG
- TTE
- Determination of underlying cause- CHD, rheumatic heart disease, fam hx, etc

Silversides, UTD, 2022

Echocardiography

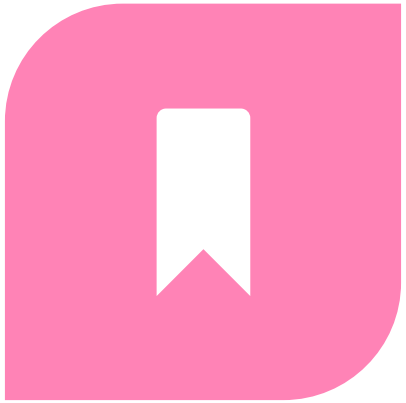
- Helpful in determining the type and severity of valvular disease
- Degree of left or right cardiac function and dilation (ejection fraction)
- Presence of pulmonary HTN
- Other associated heart defects
- Provides a baseline prior to physiologic changes in pregnancy



Silversides, UTD, 2022

Preconception

EXERCISE TESTING



BIOMARKERS

MEDICATIONS

Silversides, UTD, 2022

mWHO Risk Assessment

- mWHO Class I:
  - No increased risk of maternal mortality and no/mild increased risk of maternal morbidity
  - Mild pulmonic stenosis, mitral valve prolapse

Silversides, UTD, 2022

mWHO Risk Assessment

- mWHO Class II:
  - Small increased risk of maternal mortality/moderate increase risk in morbidity
  - Repaired TOF- residual pulmonary regurgitation/stenosis

Silversides, UTD, 2022

mWHO Risk Assessment

- mWHO Class II-III:
  - Significantly increased risk of maternal mortality/moderate to severe risk of morbidity
  - Bicuspid aorta with AA diameter <45 mm

Silversides, UTD, 2022

mWHO Risk Assessment

- mWHO Class III:
  - Significantly increased risk of maternal morbidity and mortality
  - Mechanical valve, mitral stenosis, severe AS, bicuspid AV 45-50 mm

Silversides, UTD, 2022

mWHO Risk Assessment

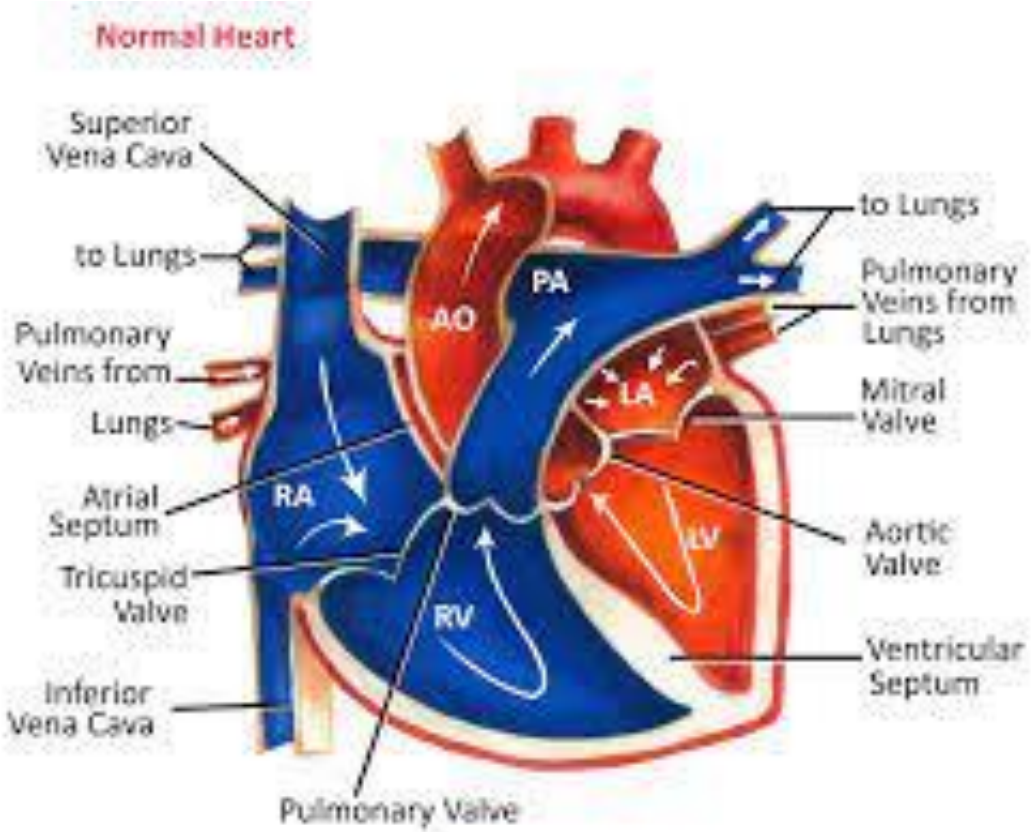
- mWHO Class IV:
  - Very high risk of maternal mortality or severe morbidity
  - Severe MS, severe symptomatic AS, bicuspic AV > 50 mm

Silversides, UTD, 2022

SPECIFIC LESIONS

Right side

- Tricuspid valve
- Pulmonic valve

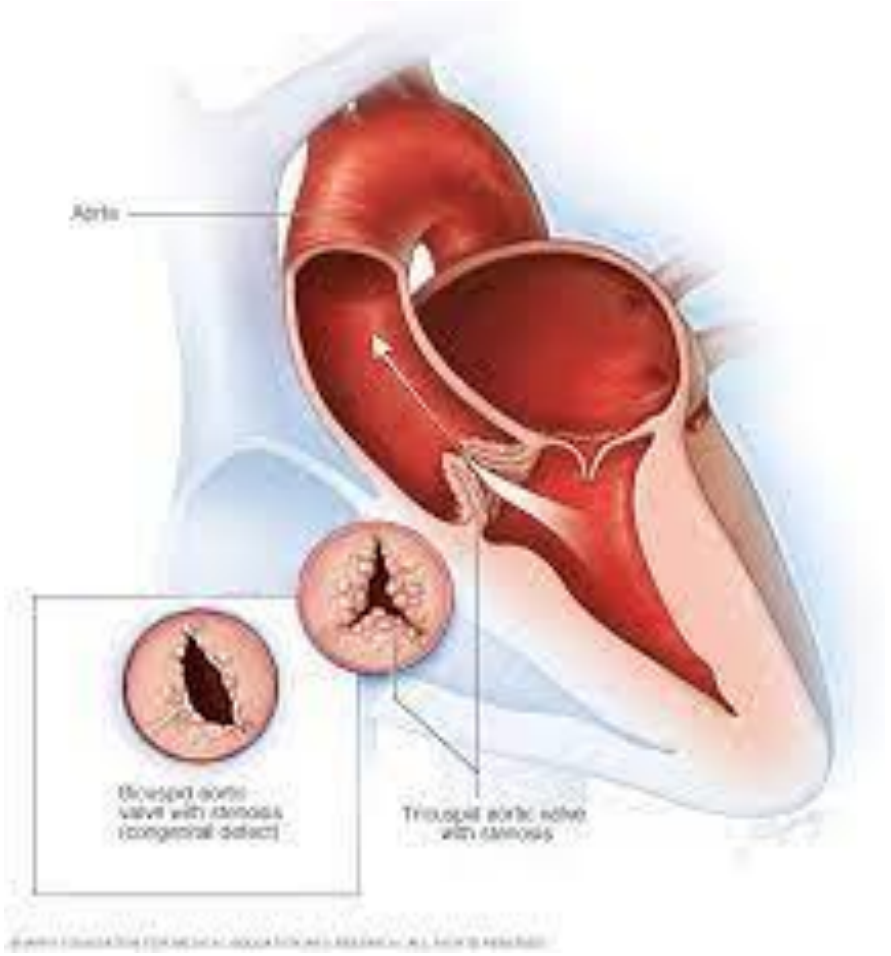


Left side

- Mitral valve
- Aortic valve

Aortic Stenosis

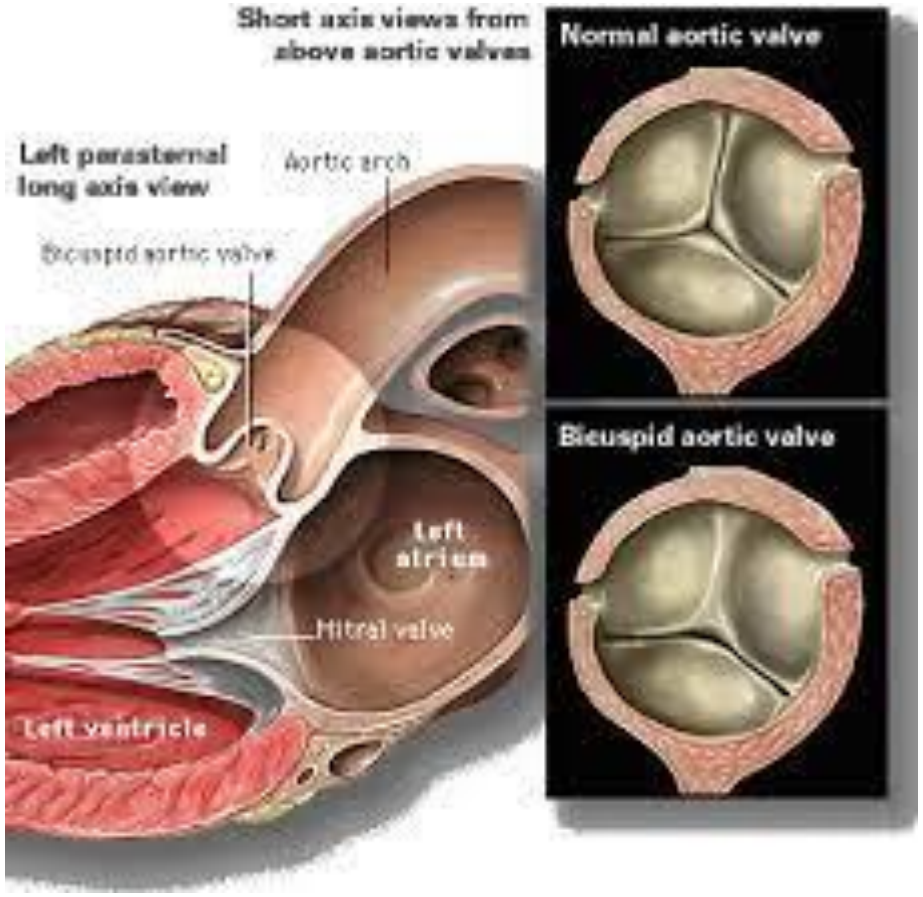
- Congenital bicuspid aortic valve
- Rheumatic heart disease
- Connective tissue disorders
- Marfan's, EDS, Turner's syndrome
- Infective endocarditis



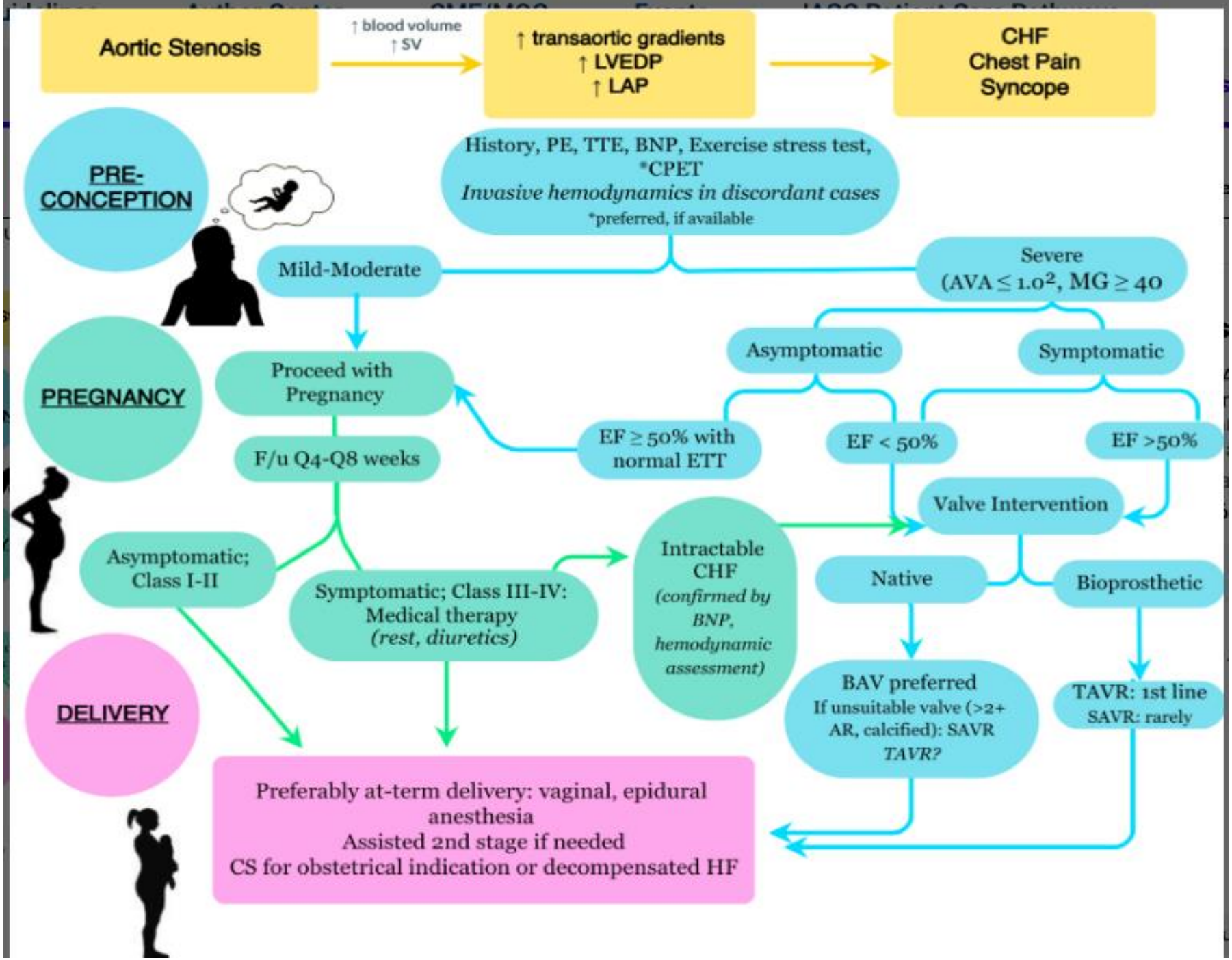
Nanna, 2014

Aortic Stenosis

- Pregnancy is well tolerated if mild or moderate (aortic valve area >1 cm2)
- Maternal mortality <1%
- Most common complications:
  - Heart failure
  - Arrhythmias- ventricular or atrial



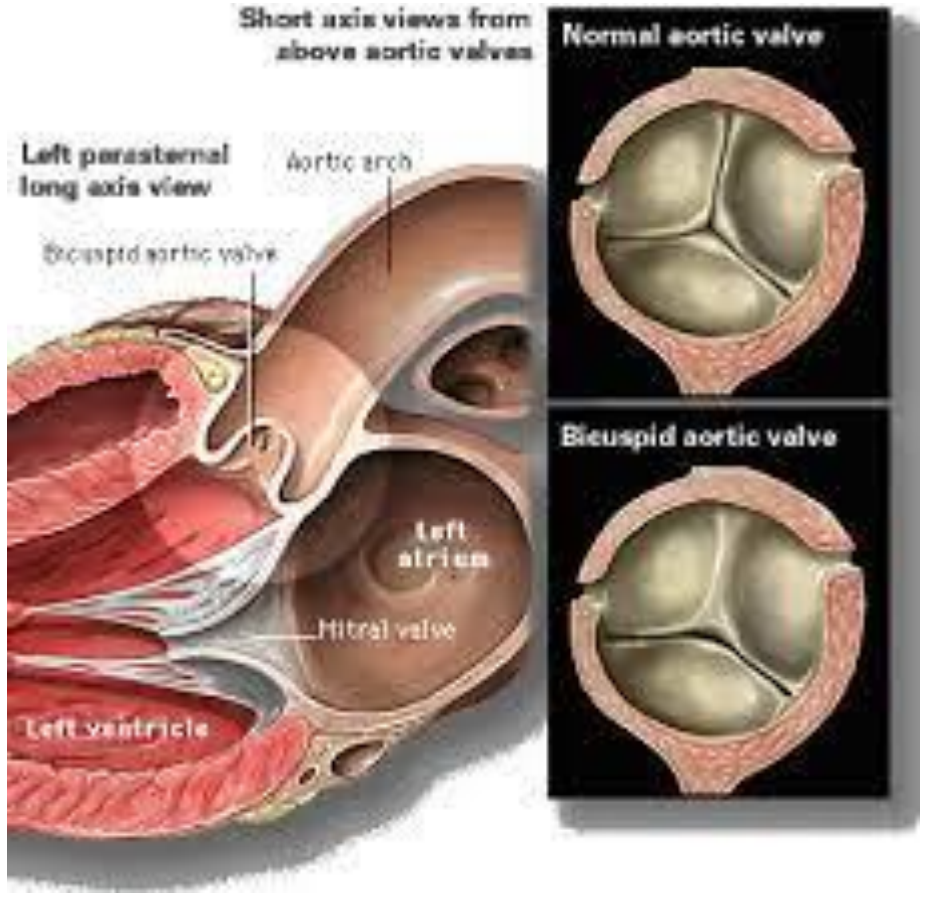
Nanna, 2014



Elkayam, 2022

Bicuspid aortic valve

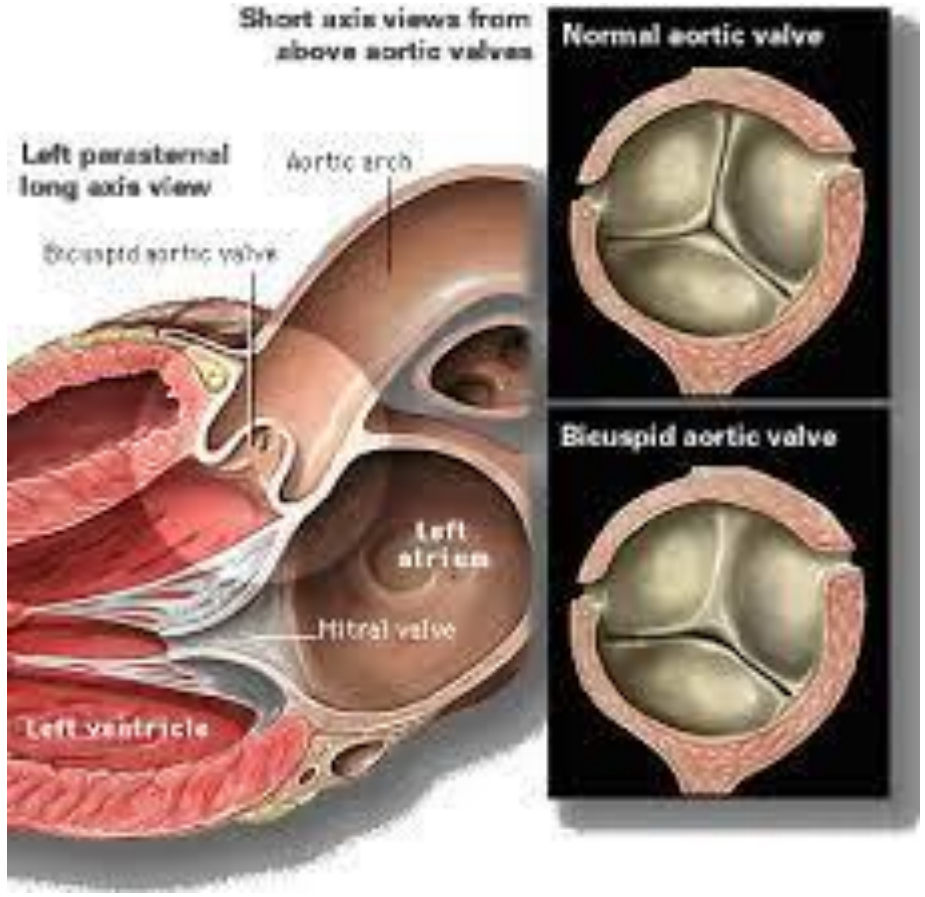
- Most common CHD
- Can be functionally normal or with AR or AS
- Associated with dilation of the ascending aorta



Waksmonski, UTD, 2021

Bicuspid aortic valve

- Either sporadic or autosomal dominant inheritance
- Other aortopathies increase risk including risk of aortic enlargement, dissection, worsening AS or AR

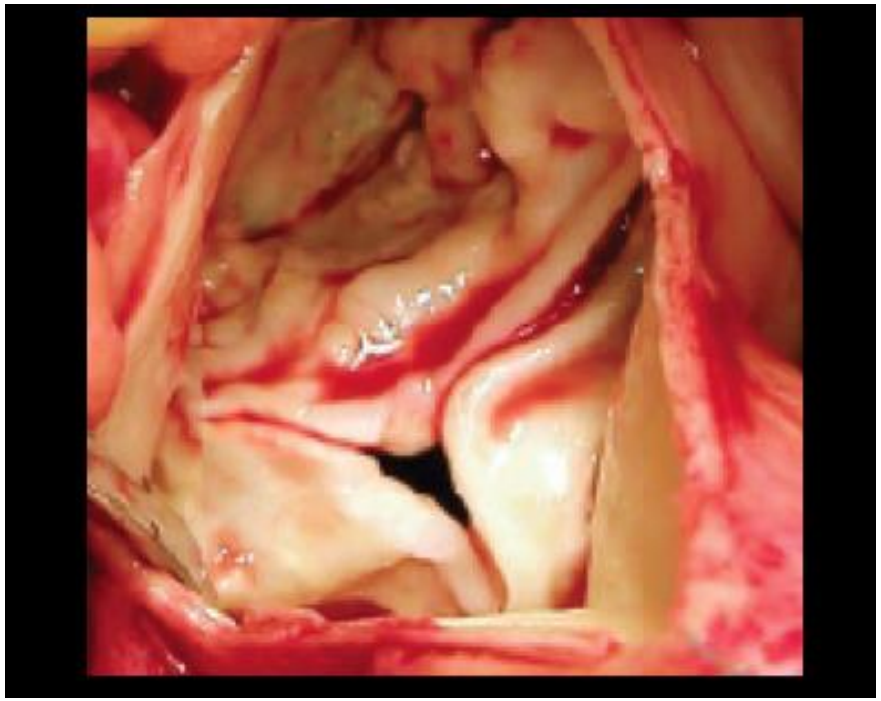


Waksmonski, UTD, 2021

Management

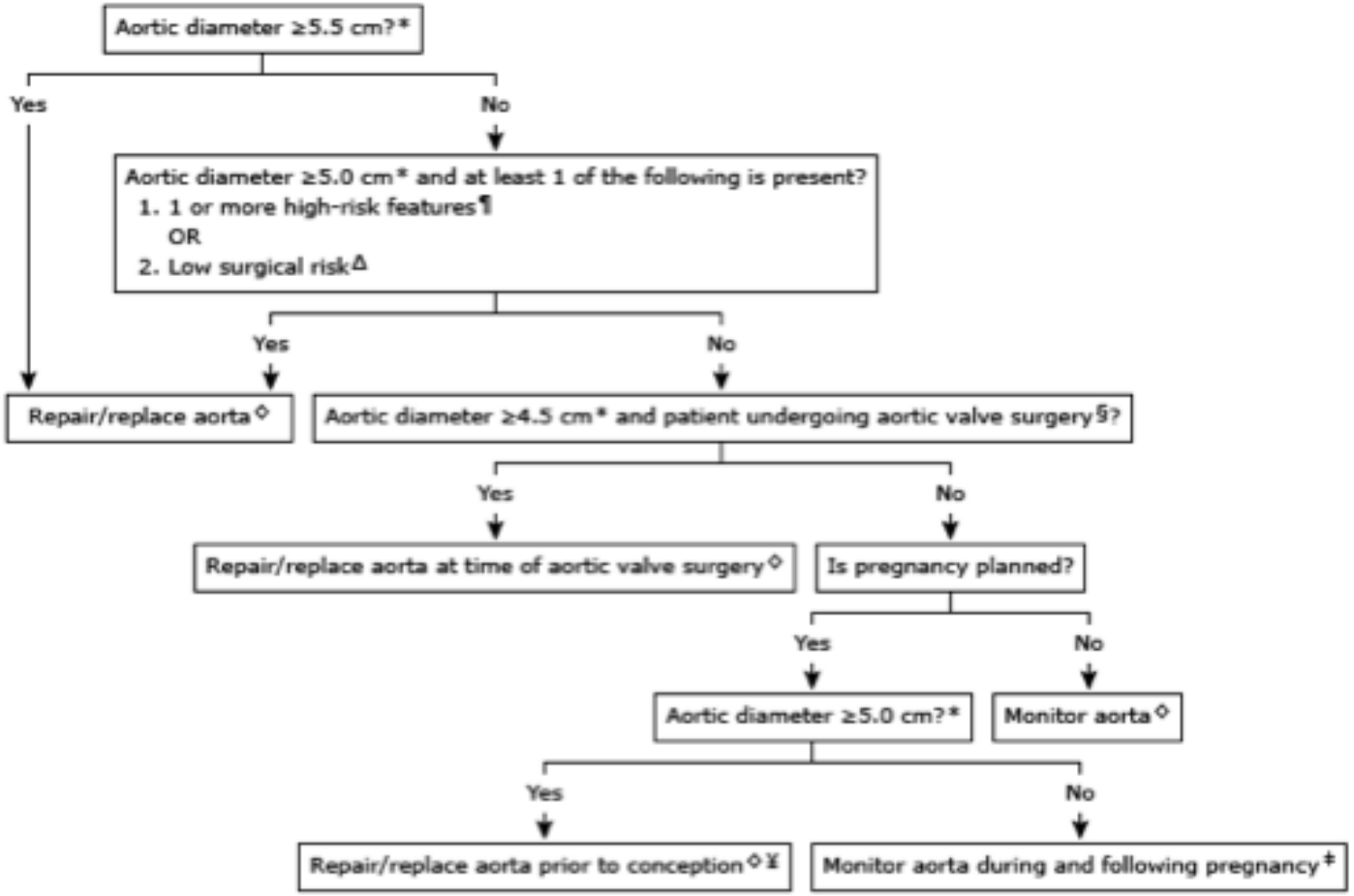
- Surgery prior to conception due to fetal risks and need for cardiopulmonary bypass

- Surgery performed during pregnancy due to refractory HF due to severe AS or AR, aortic dissection or enlargement of aorta



Waksmonski, UTD, 2021

Indications for prophylactic ascending aortic surgery for patients with bicuspid aortic valve



These indications for prophylactic ascending aortic surgery apply to patients with bicuspid aortic valve without Turner syndrome. Separate recommendations for prophylactic aortic surgery with aortic size thresholds adjusted for body size apply to patients with Turner syndrome. Refer to the discussion of aortic dilation in the UpToDate topic on management of Turner syndrome.

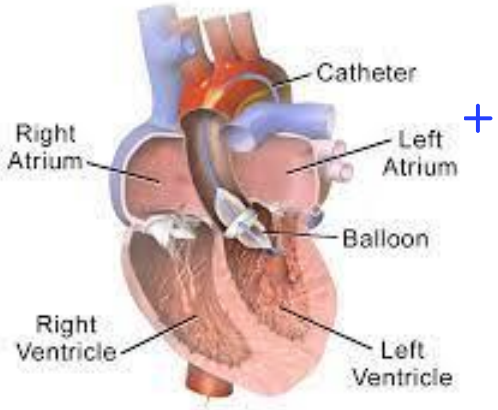
Waksmonski, UTD, 2021

Management During Pregnancy

- Maintain BP < 140/90 mmHg
- Avoid ARBs and ACE-I
- If severe AS and/or EF <40% consider termination
- Conservative management with close monitoring, beta blockers, and O2
- Interventions for refractory symptoms:
  - Balloon valvotomy
  - TAVR

Waksmonski, UTD, 2021

Balloon aortic valvotomy

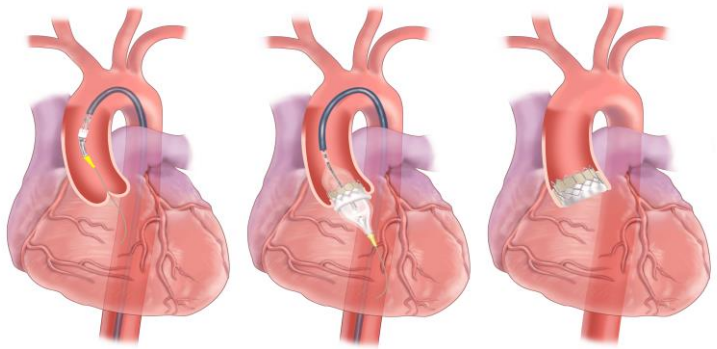


Balloon Valvuloplasty for Aortic Stenosis

- First line option during pregnancy if medical management fails
- Avoids risks of surgery in pregnancy
- Optimizes risks of gestation and L&D for pregnancy
- Still risks of AR, recurrent stenosis
- No significant fetal complications reported

Elkayam, 2022

Transcutaneous aortic valve replacement



- Usually valve in valve replacement due to bioprosthetic valve deterioration
- Best performed in 2nd trimester
- Improves transvalvular mean pressure gradients without high rates of maternal or fetal complications
- Usually requires anticoagulation
- No significant fetal complications reported

Elkayam, 2022

Transcutaneous aortic valve replacement

- Limited value in patients with bicuspid aortic valve
- Technically difficult due to valve shape and size
- Suboptimal imaging
- High incidence of permanent pacemaker needed
- Limited durability of prosthetic valve

Elkayam, 2022

Aortic Regurgitation

- Generally well tolerated in pregnancy
- Increased HR and decreased SVR --> decreased in regurgitant flow
- If severe AR, recommend surgical replacement prior to pregnancy
- Usually medically managed during pregnancy

Silversides, UTD, 2022

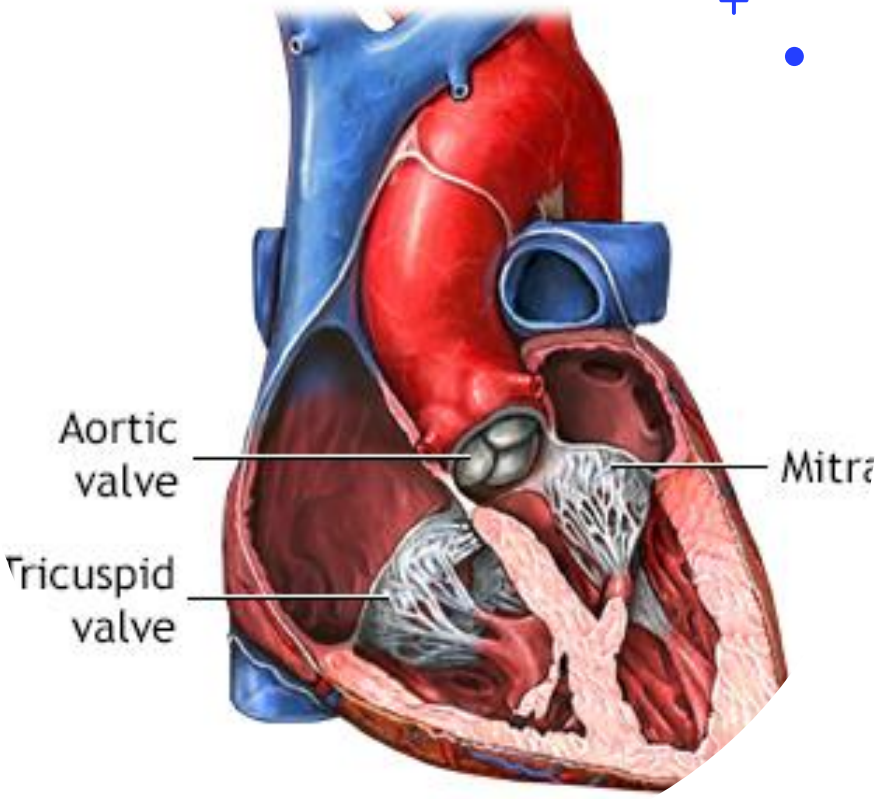
Mitral Stenosis

- Most commonly caused by rheumatic heart disease
- Strongly associated with FGR and preterm birth
  - Rates increase from 14% with mild MS to 28 and 33% in moderate and severe MS
- Moderate or severe MS is poorly tolerated in pregnancy
  - Increased CO and HR --> increased left atrial pressure

Silversides, UTD, 2022

Mitral Stenosis

- Significance of the degree of mitral stenosis is likely more closely related to the mean gradient across the valve
  - Will increase during pregnancy
- Recommend exercise testing prior to pregnancy to determine maternal risk
- Heart failure occurs frequently in pregnant women with moderate or severe mitral stenosis (area <1.5 cm^2)



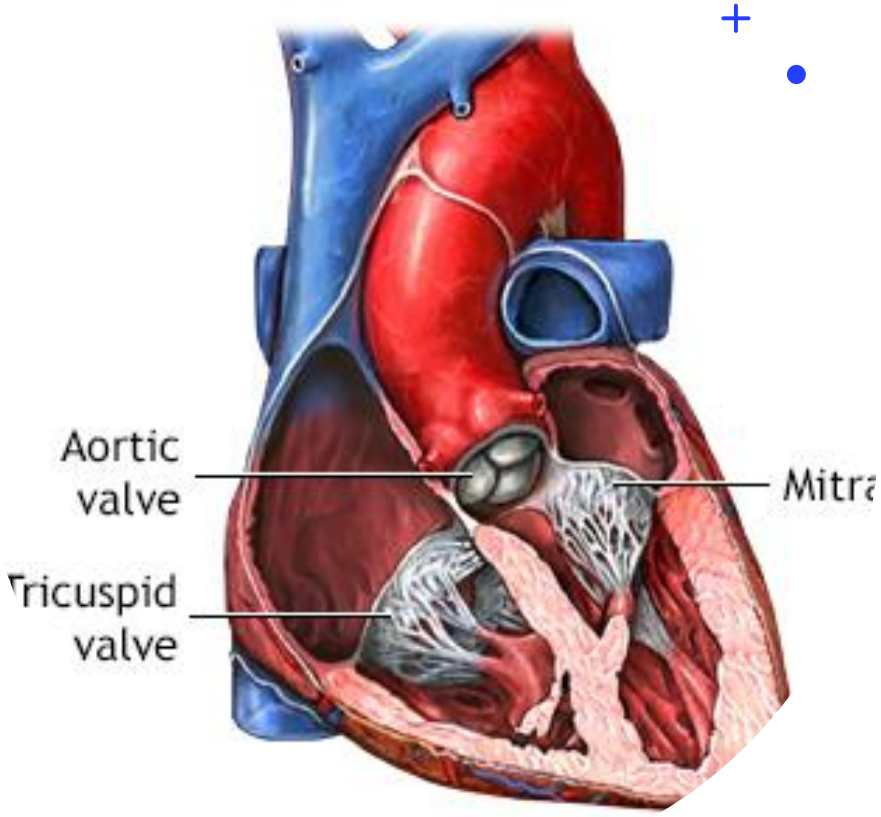
Silversides, UTD, 2022

Management During Pregnancy

- Medical management
  - Limitation of activity
  - Diuretics
  - Beta-blockers

- Percutaneous valve replacement
  - If severe MS and symptoms refractory to medical management

- If atrial fibrillation or thrombus is present, may require therapeutic anticoagulation



Silversides, UTD, 2022
Nanna, 2014

Labor and Delivery

- Moderate or high risk valvular disease should deliver at a hospital that specializes in cardiac disease in pregnancy
- OB anesthesia consult prior to delivery is recommended
- High risk lesions should be on continuous telemetry intrapartum and postpartum
- Vaginal delivery is the recommended mode of delivery for most patients, while considering minimization of Valsalva with early epidural and assisted second stage of labor
  - Exceptions include severely dilated aortic root
  - Critical AS with reduced EF and symptoms
  - Aortic dissection

CASE 1

History of Present Illness:

- 26 yo G2P1001 @ 15w6d with hx of bicuspid aortic valve with aortic stenosis presents for care. She underwent aortic valve replacement in 2008 with a bioprosthetic porcine valve, but now presents with critical AS in pregnancy.
- She had been followed for 10 years and was asymptomatic, therefore lost to follow up until a few months ago when she developed progressive dyspnea on exertion and orthopnea.
- Since being pregnant symptoms have gotten progressively worse with hypotension to the 80s/50s. Recently admitted to an outside hospital with a reduced EF of 35%, severe MR and moderate to severe AS.

History of Present Illness:

- Repeat TEE demonstrated EF 24% with critical AS
- Received IV diuresis with lasix and transfer to higher level of care for possible valve in valve TAVR

ObHx: 1 prior full term cesarean delivery, no cardiac complications

PMH: Gestational diabetes on insulin, hypothyroidism

Plan:

- mWHO Class IV, NYHA Class III
- Discussed options of pregnancy termination with surgical valve replacement versus valve in valve TAVR
- Patient declined termination and opted for TAVR

Procedure:

- Uncomplicated
- Started on ASA 162 mg/day
- Endocarditis ppx lifelong
- IV diuresis

Discharged to home on post-op day 2.

Post-Procedure:

- Diagnosed with valve thrombosis requiring therapeutic anticoagulation
- Underwent scheduled repeat cesarean delivery at 37 weeks
- Monitored in the CCU for 24 hours postpartum
- No complications and discharged to home on post-op day 3

CASE 2

History of Present Illness:

- 22 yo G2P1001 @ 17w2d with hx of endocarditis s/p dental procedure requiring placement of bioprosthetic mitral valve in 2017, now with acute cardiac decompensation, volume overload and heart failure.

- Had been followed by cardiologist q3 months since her procedure and developed symptoms last month of acute onset orthopnea, shortness of breath and chest discomfort.

History of Present Illness:

- Admitted to a local hospital where an ECHO demonstrated severe RV enlargement, severe mitral stenosis, and pulmonary HTN. Normal LV contractility with EF 59%

- Transferred to higher level of care for intervention

- ObHx: uncomplicated SVD at 38w6d
- PMH: no significant hx

Plan:

- mWHO Class IV
- With severe pulmonary HTN, risk of mortality as high as 25% without interventions
- Discussed options of pregnancy termination with surgical valve replacement versus transcutaneous mitral valve replacement
- Patient declined termination and opted for transcutaneous mitral valve replacement

Procedure:

- Uncomplicated- underwent ViV TMVR
- Initiated on therapeutic lovenox and ASA 81 mg
- PO Lasix
- Metoprolol- beta blocker

Discharged to home on post-op day 2.

QUESTIONS

What is the most common cause of aortic stenosis?

A. Rheumatic heart disease

B. Endocarditis

C. Bicuspid aortic valve

D. Aortic coarctation

What is the most common cause of aortic stenosis?

C. Bicuspid aortic valve

What is the most common complication in women with severe AS?

A. Aortic dissection

B. Heart failure

C. Arrhythmias

D. Both B and C

What is the most common complication in women with severe AS?

D. Both B and C- heart failure and arrhythmias

Pregnant patients with severe MS do not tolerate pregnancy well due to:

A. Decreased CO and decreased HR

B. Increased CO and increased HR

C. Decreased CO and decreased SVR

D. Increased CO and increased SVR

Pregnant patients with severe MS do not tolerate pregnancy well due to:

B. Increased CO and increased HR

In which cardiac lesion is a cesarean delivery recommended?

A. Mild to moderate aortic stenosis, aortic root measuring 4.0 cm

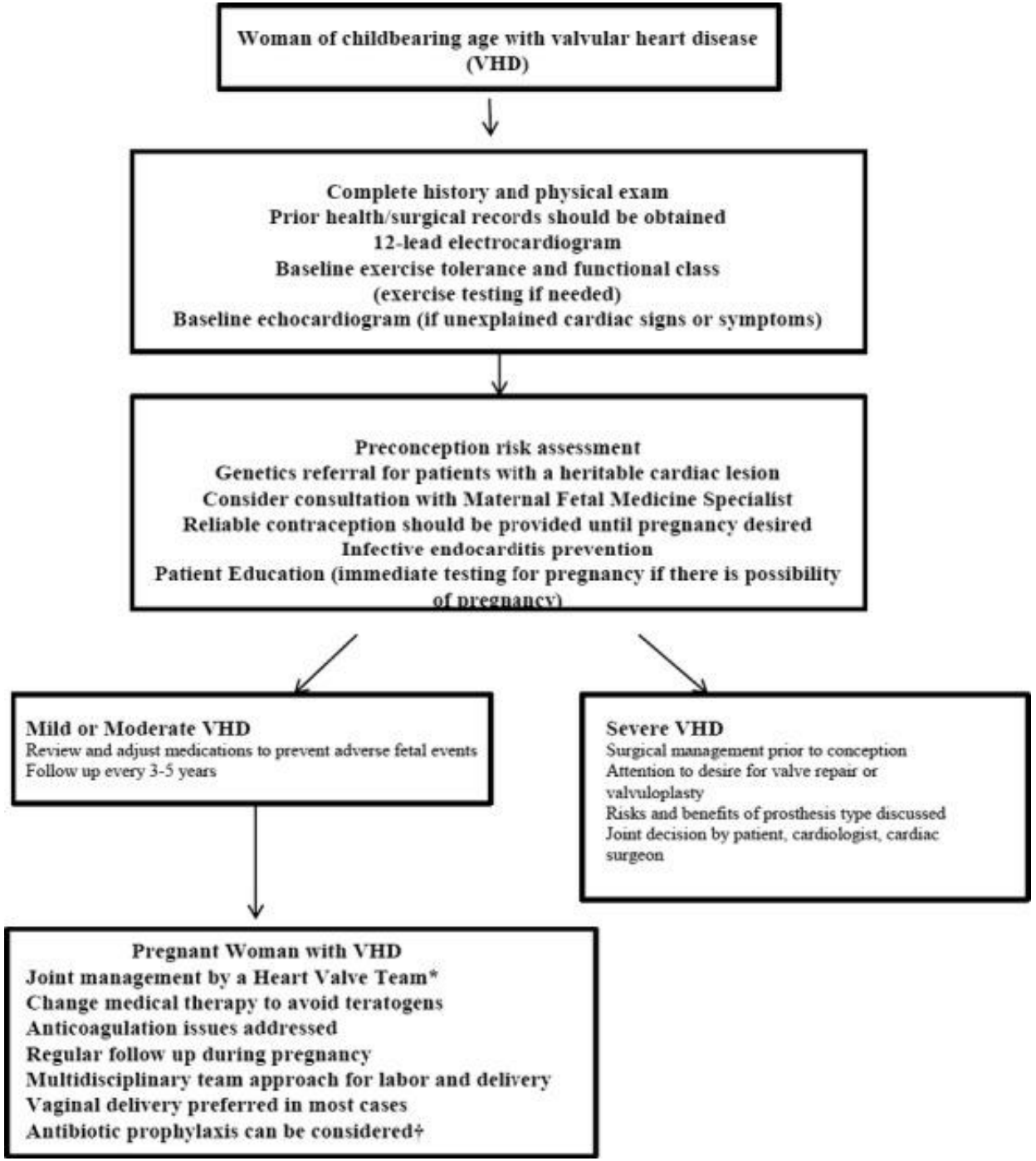
B. Bicuspid AV with aortic root measuring 5.5 cm

C. Moderate MR, asymptomatic

D. Severe AS, asymptomatic

In which cardiac lesion is a cesarean delivery recommended?

B. Bicuspid AV with aortic root measuring 5.5 cm


Woman of childbearing age with valvular heart disease (VHD)
Complete history and physical exam
Prior health/surgical records should be obtained
12-lead electrocardiogram
Baseline exercise tolerance and functional class (exercise testing if needed)
Baseline echocardiogram (if unexplained cardiac signs or symptoms)
Preconception risk assessment
Genetics referral for patients with a heritable cardiac lesion
Consider consultation with Maternal Fetal Medicine Specialist
Reliable contraception should be provided until pregnancy desired
Infective endocarditis prevention
Patient Education (immediate testing for pregnancy if there is possibility of pregnancy)
Mild or Moderate VHD
Review and adjust medications to prevent adverse fetal events
Follow up every 3-5 years
Severe VHD
Surgical management prior to conception
Attention to desire for valve repair or valvuloplasty
Risks and benefits of prosthesis type discussed
Joint decision by patient, cardiologist, cardiac surgeon
Pregnant Woman with VHD
Joint management by a Heart Valve Team*
Change medical therapy to avoid teratogens
Anticoagulation issues addressed
Regular follow up during pregnancy
Multidisciplinary team approach for labor and delivery
Vaginal delivery preferred in most cases
Antibiotic prophylaxis can be considered†

Nanna, 2014

Key Take Home Points

- Cardiac output increases by 30-50% in the 1st trimester and continues to increase into the 2nd and 3rd trimesters
- Preconception counseling and multidisciplinary care throughout pregnancy is key
- Exercise/stress testing prior to pregnancy is highly predictive of how pregnancy will be tolerated
- Vaginal delivery is generally the preferred method of delivery

THANK YOU

References

- Silversides, C. Pregnancy and Valve Disease. In *UpToDate.* Connolly H and Lockwood C (Ed), UpToDate, Waltham, MA (accessed Feb 27, 2023)
- Waksmonski, C. Bicuspid aortic valve: Management during pregnancy. In *UpToDate.* Connolly H and Lockwood C (Ed), UpToDate, Waltham, MA (accessed Feb 27, 2023)
- Elkayam U, Bansal P, Mehra A, et al. Catheter-Based Interventions for the Management of Valvular Heart Disease During Pregnancy. *JACC Adv.* 2022 Jun, 1 (2)
- Nanna M, Stergiopoulos K. Pregnancy complicated by valvular heart disease: an update. J Am Heart Assoc. 2014 Jun 5;3(3):e000712.