



MEMO

To: Obstetrical care providers at BCW

From: Chantal Mayer, Medical lead BCW Ultrasound

Date: November 4, 2020

Re: Ultrasound and MFM referrals for irregular fetal heart rate

Irregularly irregular fetal heart rate of routine auscultation:

Irregular fetal heart rate is commonly incidentally encountered during fetal auscultation or fetal monitoring/NST. Fetal heart rate on auscultation is typically described as overall normal with “skipped beats” or “double beats” occurring either irregularly in isolation or small clusters.

When an irregularly irregular fetal heart rate as described above is auscultated, expectant mothers can be reassured that this finding is most likely to be entirely benign.

The attached algorithm and explanatory notes are intended to assist care providers triage and refer expectant mothers to the appropriate facility in a clinically appropriate time frame.

Referral to the Urgent care center (UCC) or urgent MFM consult is not indicated unless:

1. Fetal heart rate baseline is <120bpm (or <110 bpm if gestational age 37+0 weeks GA or more) or sustained FH>180bpm on auscultation for 60 sec or more.
2. Other maternal or fetal clinical concerns require urgent assessment

Transient bradycardia reported on routine detail ultrasound:

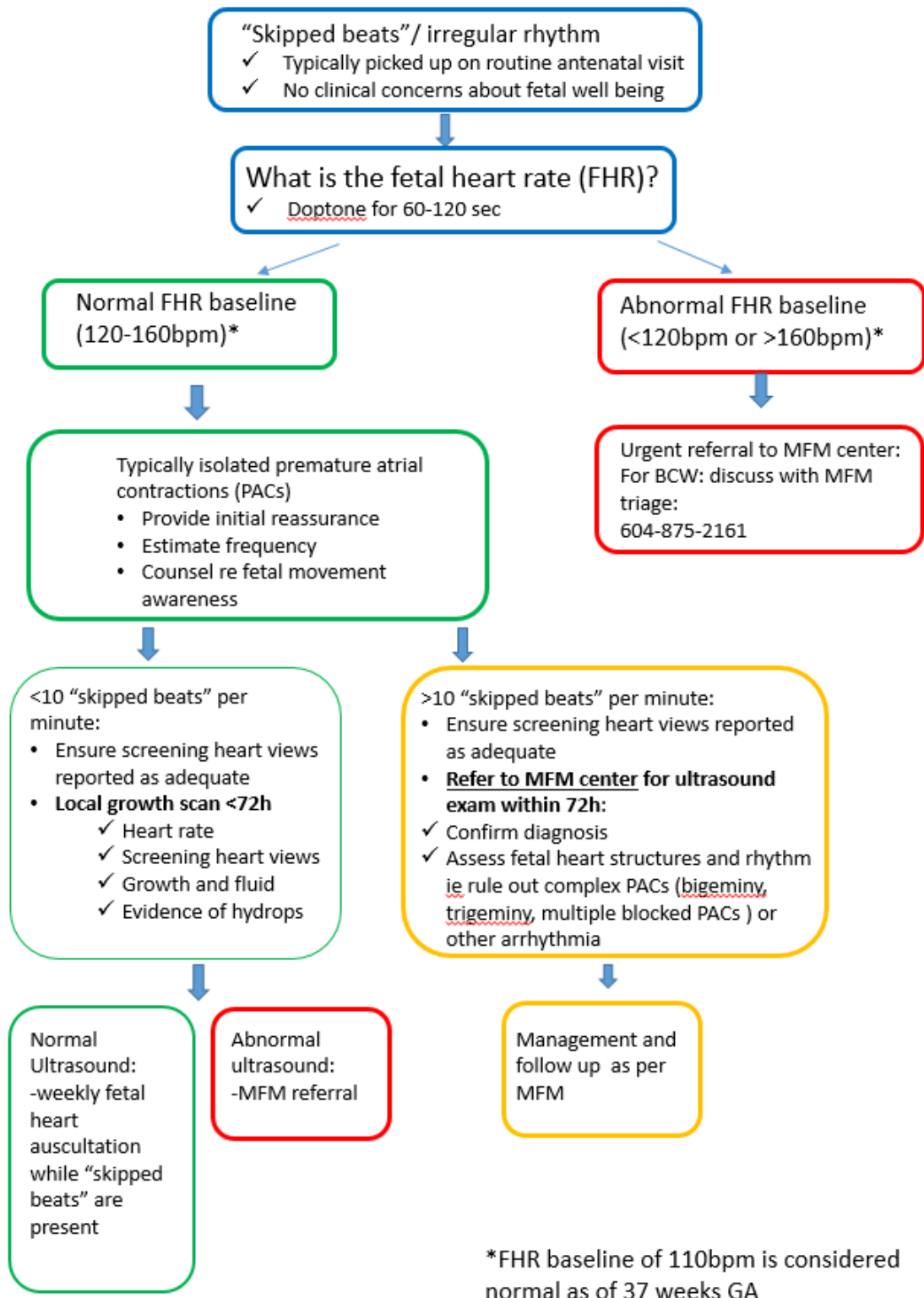
Transient fetal bradycardia episodes are commonly encountered at the time of routine obstetrical detail ultrasound.

These are considered benign findings and urgent referral to an MFM center for assessment or specific follow up are not recommended unless:

- A. There is sustained bradycardia <100bpm for more than 60 sec OR
- B. There are multiple, recurrent episodes during the examination

An urgent referral to an MFM center for assessment is recommended only if either A or B above is met.

Fetal Irregular Arrhythmias:
BCW Algorithm



Fetal Irregular Arrhythmias:

Explanatory notes

Fetal cardiac rhythm abnormalities are common, occurring in 1-2% of pregnancies. The vast majority of these are going to be irregular rhythm abnormalities (approximately 90%) and the majority of these are due to benign atrial ectopic beats.

This discussion does not refer to other FHR arrhythmias such as tachyarrhythmias or bradyarrhythmias, which may necessitate an urgent consult or transfer.

Atrial ectopy leads to premature atrial contractions (PACs). PACs are most common from the second trimester onwards. They can be conducted, resulting in an irregular rhythm, or blocked, leading to a short pause.

In a minority (1-2%) of cases, PACs are associated with congenital heart disease. Two-3% of fetuses with PACs and irregular FHR will progress to a sustained tachycardia in utero or within the first month of life. The risk for progression seems to be highest in cases where there are multiple blocked PACs leading to a low ventricular rate or complex ectopy such as bigeminy or trigeminy. The natural history of PACs is that they usually resolve spontaneously either prior to or just after delivery.

Of note, rarely, premature beats can be ventricular in origin (premature ventricular contractions or PVCs). These can be difficult to differentiate from PACs. These are also usually benign and the same considerations as those for PACs apply.

Suggested management:

Most of these fetuses will not have structural cardiac disease and will not run into any trouble due to their arrhythmia. Therefore, a fetal echo is not indicated as the first assessment. Instead, it should be ensured that a detailed ultrasound was done and that routine screening heart views (situs, 4 chamber view and outflow tract assessment) were normal. Fetal echo should be reserved for those fetuses whose ultrasound is suspicious for abnormality or a more complex arrhythmia is suspected.

Since a small minority of fetuses will develop SVT, it is reasonable to suggest weekly FHR auscultation for 1 minute. This may be limited to those fetuses who have frequent PACs (>10 per minute), frequent blocked PACs or complex ectopy (bigeminy or trigeminy).

Commonly, it has been suggested to assess the maternal thyroid status. The literature does not support this and patients should be managed according to their history. Patients have been asked to refrain from any caffeine consumption. Again, this would not seem to be evidence-based.

If the arrhythmia disappears prior to delivery and is not present on newborn assessment, no further follow up would be indicated. If the arrhythmia is still present after delivery, suggest thorough newborn assessment which may involve Pediatric consult, Pediatric Cardiology consult, EKG etc.

APPENDIX: Confirming PACs on ultrasound

Fetal Premature Atrial Contractions (PACs, also known as atrial ectopic beat) leading to an irregularly irregular fetal arrhythmia can be documented by M-Mode or Doppler.

PACs are either conducted or blocked:

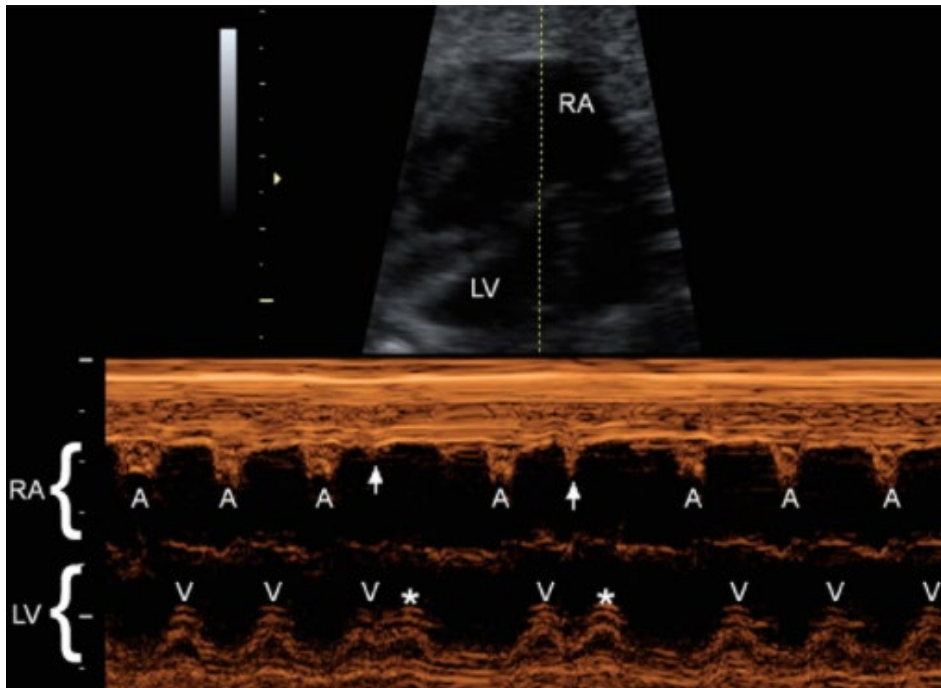
- Conducted PACs result in “early beats” and are followed by a “compensatory pause” due to resetting of the sinus node by the PAC.
- Non-conducted/blocked PACs occur when the PAC is so premature that it fails to conduct across a refractory AV node, resulting in “skipped beats”

Ultrasound diagnosis can be routinely made on either M-Mode or Doppler.

1. M-Mode:

- Requires sampling of atrial wall and ventricular wall to document atrial mechanical contraction (A) and ventricular mechanical contraction (V)
- Zoom magnification and increasing gain may help visualization

FIG 1: M-mode Conducted PACs



A= atrial contractions, V= ventricular contractions, arrow=PAC, *= ventricular contraction following PAC

2. Doppler tracing:

- Diagnosis can be made using any Doppler tracing for paired artery and vein: SVC/Ao, pulmonary artery/vein or renal artery/vein are commonly used.
- Technical tips: optimize zoom and sweep speed, use color Doppler, increase sample gate size to 3mm

FIG2: Doppler tracing of conducted and blocked PACs

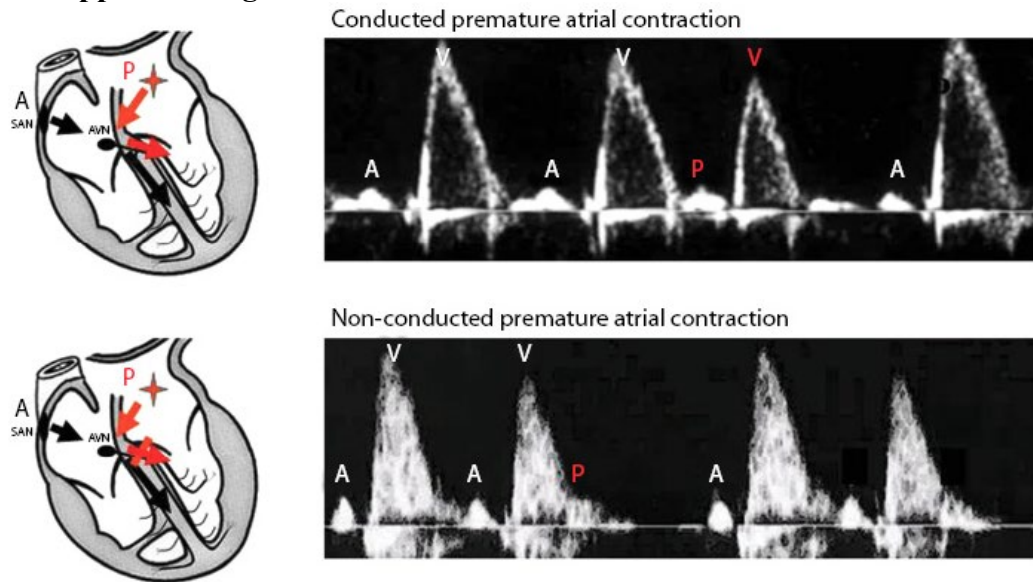
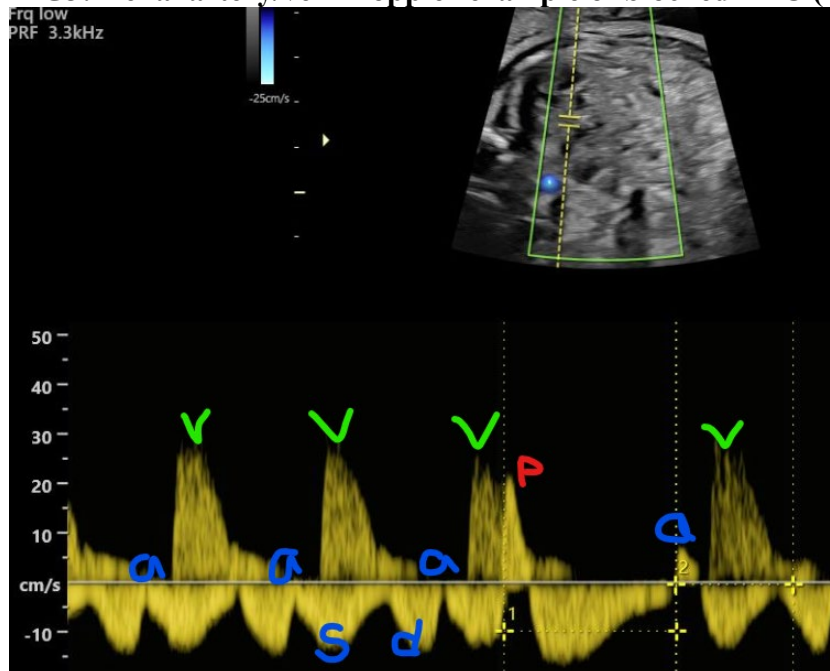


FIG3: Renal artery/vein Doppler example of blocked PAC (P)



Arterial tracing: V denotes systolic ventricular ejection

Venous tracing: S= systole, d= early diastole, a=atrial contraction P= blocked PAC

References

1. Abuhamad, A, Chaoui. A Practical Guide to Fetal Echocardiography. 2010.
2. Simpson, LL. Fetal supraventricular tachycardias: diagnosis and management. *Semin Perinatol* 2000; 24:360-372.
3. Vergani, P, Mariani, E, Ciriello E, et al. Fetal arrhythmias: natural history and management. *Ultrasound Med Biol* 2005;31:1-6.
4. Carvalho, JS. Fetal Dysrhythmias. *Best Practice & Research Clinical Obstetrics & Gynaecology* 2019;58: 28-41
5. Simcha Yagel; Norman H. Silverman; Ulrich Gembruch. *Fetal Cardiology: Embryology, Genetics, Physiology, Echocardiographic Evaluation, Diagnosis, and Perinatal management of Cardiac Diseases*, Third edition. CRC Press 2019

