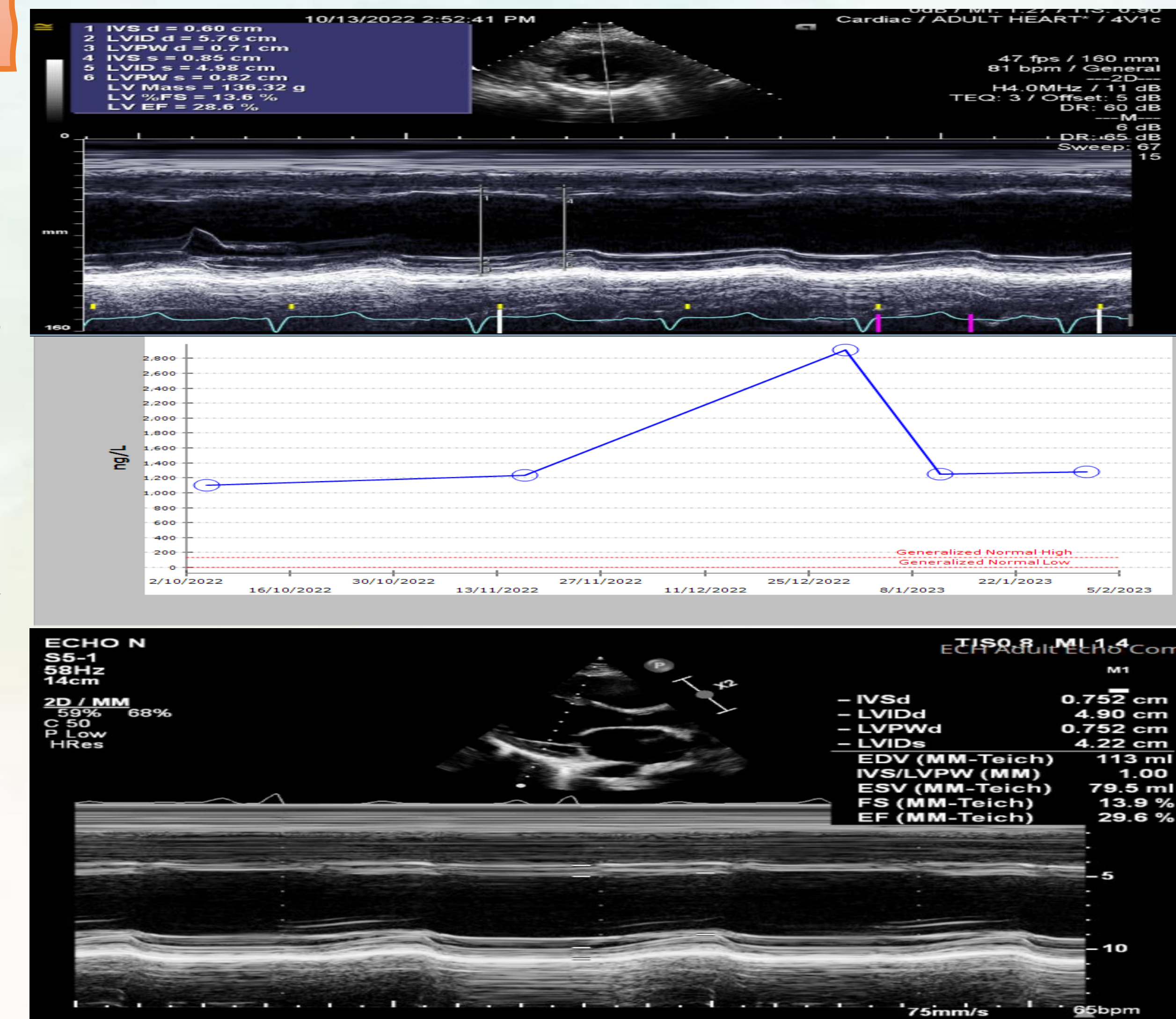


Case Discussion

- Chemotherapies are highly effective in treating most cancers, but their use is limited by the potential for cardiotoxicity.
- Chemotherapy-related cardiomyopathy has been reported in up to **5%** of all cancer survivors and **9%** of those exposed to anthracyclines in the modern world.
- Toxicity can occur early (within 1 year) or late (particularly among children, where late cardiac abnormalities are detectable in two-thirds of surviving patients).
- Doxorubicin is often used today as a crucial component of chemotherapy regimens for a range of childhood and adult cancers, including leukemias, lymphomas, sarcomas, and breast cancer.
- Pre-existing medical issues can have a negative impact on women and their offspring.

We report a case of 33 years old female, Gravida 3 Para 2, previous two cesarean deliveries in 2019 and 2021 at 37 and 30 weeks respectively for fetal indication (umbilical artery doppler with absent end diastolic flow). Her first pregnancy resulted from assisted reproductive technology, second and current pregnancies were spontaneous conception. In 2015 she was diagnosed with a left forehead primitive neuroectodermal tumor (Ewing's sarcoma) and underwent surgery and received 4 cycles of chemotherapy with vincristine, doxorubicin, cyclophosphamide alternating with ifosfamide, and etoposide. She was diagnosed to have chemotherapy-induced global cardiomyopathy with progressive worsening of ejection fraction compared to her previous pregnancies. She also had a pulmonary embolism and NSTEMI with right atrial thrombus in 2016 and was on NOAC (Non – Vitamin K Antagonist Anticoagulant). She presented to our hospital at 11 weeks of gestation. We report a case of 33 years old female, Gravida 3 Para 2, previous two cesarean deliveries in 2019 and 2021 at 37 and 30 weeks respectively for fetal indication (umbilical artery doppler with absent end diastolic flow). Her first pregnancy resulted from assisted reproductive technology, second and current pregnancies were spontaneous conception. In 2015 she was diagnosed with a left forehead primitive neuroectodermal tumor (Ewing's sarcoma) and underwent surgery and received 4 cycles of chemotherapy with vincristine, doxorubicin, cyclophosphamide alternating with ifosfamide, and etoposide. She was diagnosed to have chemotherapy-induced global cardiomyopathy with progressive worsening of ejection fraction compared to her previous pregnancies. She also had a pulmonary embolism and NSTEMI with right atrial thrombus in 2016 and was on NOAC (Non – Vitamin K Antagonist Anticoagulant). She presented to our hospital at 11 weeks of gestation.

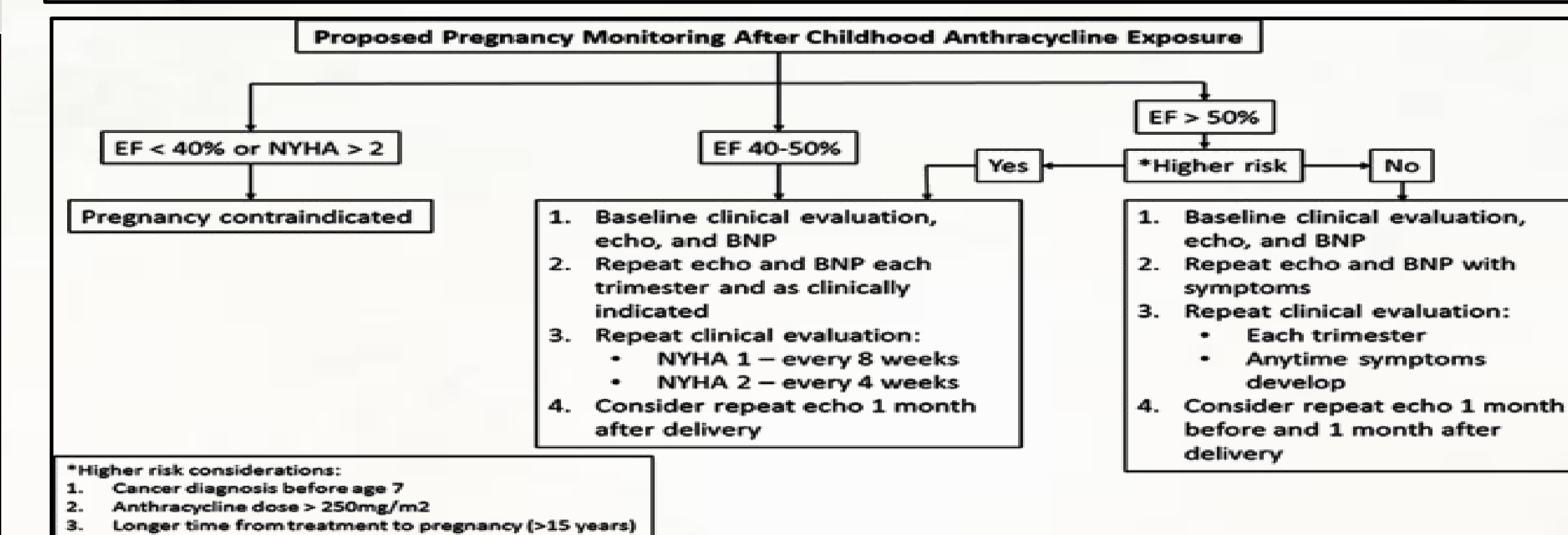


Discussion

- Pregnancy is associated with substantial changes in cardiac physiology and volume overloading.
- The stress of physiologic changes that lead to increased cardiac output during pregnancy can also lead to decompensation of cardiac function.
- In patients with a history of peri-partum cardiomyopathy, future pregnancies are generally not recommended, even if left ventricular (LV) function recovers as there can be an associated decrease in LV function and/or possible death. The risk seems higher in those who have a subsequent pregnancy with persistent LV dysfunction
- The fetus is also affected by poor placentation that can stem from a decrease in uterine perfusion secondary to decreased cardiac output, which can lead to an increased risk for fetal growth restriction, oligohydramnios, and the possibility of intrauterine fetal demise.

- Antenatal fetal surveillance includes ultrasound evaluation of fetal anatomy, monitoring of fetal growth, amniotic fluid volume, and placental function..

WHO I	WHO II
- Patent ductus arteriosus (small/medium) - Patent foramen ovale (small/medium) - Atrial valve prolapse (mild/moderate) - Successfully repaired simple shunt defects (ASD, VSD, etc.) - Edema, up during pregnancy: once or twice in second trimester - Delivery: Local hospital	- Unrepaired ASD or VSD - Repaired tetralogy of Fallot - Turner syndrome without aortic dilatation - Follow-up during pregnancy: every trimester in second trimester - Delivery: Local hospital
WHO III	WHO III
- Mild left ventricular impairment (EF=55%) - Native or tissue valve disease risk not considered WHO I or IV - Edema, after EFAD syndrome without aortic ASD >45mm in bicuspid aortic valve - Unrepaired coarctation - ASD - Follow-up during pregnancy: Bimonthly in second trimester - Delivery: Expert centre	- Left ventricular impairment (50-55%) - Mechanical valve - Systemic valve prosthesis with good or mildly prosthesis (if otherwise well) - Unrepaired cyanotic disease - Moderate mitral stenosis - Severe asymptomatic aortic stenosis - Moderate aortic dilatation - Follow-up during pregnancy: (bi)monthly in second trimester - Delivery: Expert centre
WHO IV: pregnancy not recommended	WHO IV: pregnancy not recommended
- Profound aortic hypertension - Severe systemic ventricular dysfunction (EF<50%) - Moderate systemic right ventricular dysfunction - Severe mitral stenosis - Severe aortic stenosis - Severe aortic dilatation - Severe EFAD syndrome - Severe (a)coarctation - Edema with ascites - Follow-up during pregnancy: Monthly in second trimester - Delivery: Expert centre	- Severe aortic stenosis - Severe mitral stenosis - Severe aortic dilatation - Severe EFAD syndrome - Severe (a)coarctation - Edema with ascites - Follow-up during pregnancy: Monthly in second trimester - Delivery: Expert centre



Conclusion

- Heart failure and arrhythmia are the most prevalent consequences of cardiomyopathy during pregnancy.
- Pregnant patients with cardiomyopathy who were previously discouraged can now, in many situations, proceed with the assistance of a multidisciplinary team, despite the increased risk of complications. As a result, these parents must receive comprehensive preconception counseling and be aware of the risks.

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Figure 1. The spectrum of cardiac toxicity and the most common related causative antineoplastic agents.

