

Noninvasive Continuous Hemodynamic Monitoring for Safe Anesthetic Management in a High-Risk Termination

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BACKGROUND TO THE CASE

- Severe cardiomyopathy in pregnancy carries high risk for major cardiac events, requiring vigilant hemodynamic monitoring.¹
- Noninvasive finger-cuff monitors (e.g., ClearSight) offer continuous CO, SV, SVR, and MAP with accuracy approaching invasive arterial lines.²
- Continuous noninvasive BP monitoring detects hypotension sooner than intermittent checks, reducing time below MAP <65 mmHg.³
- Obstetric anesthesia increasingly uses minimally invasive hemodynamic monitoring in high-risk patients beyond cesarean delivery.⁴
- Perioperative anxiety heightens pain and hemodynamic variability, supporting anxiolysis paired with continuous monitoring.⁵

DISCUSSION

- High-risk pregnancy with severe LV dysfunction carries significant maternal cardiac morbidity.
- Noninvasive continuous monitoring (ClearSight) enabled real-time hemodynamic assessment without invasive lines.
- MAC plus cervical block and anxiolysis maintained stability while minimizing physiologic stress.
- Interdisciplinary anesthesiology planning was critical for patient safety.
- Application of ClearSight beyond cesarean deliveries is feasible in high-risk first-trimester procedures.
- Demonstrates alignment with ACOG guidelines: individualized management of high-risk cardiac patients; this case suggests that noninvasive monitoring may safely extend to first-trimester terminations

CASE SUMMARY

- **Patient:** 40-year-old G1P0000 at 8w2d with NYHA class III dilated cardiomyopathy (EF <20%) and dual-chamber ICD presenting for medically indicated pregnancy termination.
- **Relevant history:** Severe left ventricular systolic dysfunction, progressive dyspnea with exertion, prior ICD placements/shocks, and anxiety related to invasive procedures.
- **Obstetric history:** First pregnancy; medically indicated first-trimester termination due to high maternal cardiac risk; no pregnancy-related complications reported.
- **Allergies:** Erythromycin; penicillins; sulfa antibiotics.
- **Medications:** Metoprolol succinate 25 mg daily; torsemide 10 mg daily; metformin XR 1000 mg BID; sertraline 100 mg daily; fluticasone nasal spray; omega-3 supplements.
- **Preoperative evaluation:** ASA III; Mallampati II airway; bedside ultrasound confirming EF <20%; cardiovascular exam notable for compensated chronic heart failure; lungs clear; ICD functioning appropriately.
- **Relevant labs:** Hgb 12.3 g/dL, Hct 37.7%, Plt 347 ×10³/μL, WBC 8.5 ×10³/μL; Na 137 mmol/L, K 4.0 mmol/L, Cr 0.64, BUN 13; LFTs WNL

Risk factors for hemodynamic instability in this patient: Severe systolic dysfunction (EF <20%, NYHA III), presence of ICD, advanced maternal age, primigravida after prior unsuccessful conception attempts, preoperative anxiety, first-trimester pregnancy with cardiac disease, need for MAC

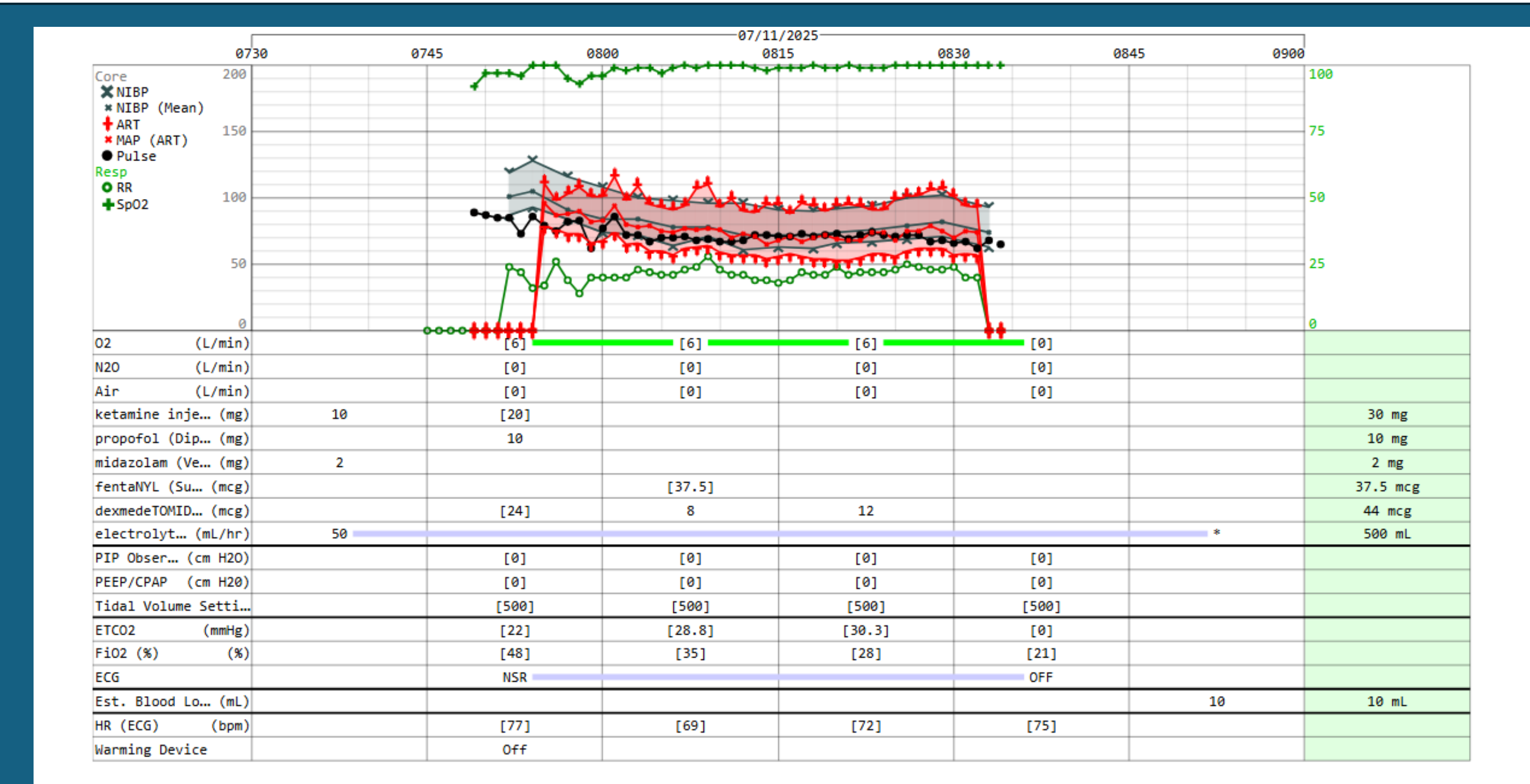


Figure 1. Intra-op anesthetic monitoring and management

- **Intraoperative Course:** Procedure uneventful; hemodynamics stable throughout (Figure 1); no hypotension or arrhythmias noted; estimated blood loss minimal; no transfusion required.
- **Anesthetic Plan:** MAC with ketamine, propofol, dexmedetomidine, and fentanyl; cervical block with 1% lidocaine for analgesia; preoperative midazolam for anxiolysis; noninvasive continuous hemodynamic monitoring with ClearSight (CO, SV, SVR, MAP); invasive lines avoided but general anesthesia and invasive monitoring available if needed; IV fluids administered; vasopressors (epinephrine, norepinephrine) prepared, preincisional bedside TTE confirmed EF <20%, dual-chamber ICD functioning
- **Postoperative Course:** Patient awake but drowsy, pain adequately controlled, airway patent, cardiovascular and respiratory status acceptable; tolerated ambulation with mild dizziness; scant vaginal bleeding noted; hemodynamically stable throughout PACU stay; discharged home same day in stable condition.

CONCLUSION

- Noninvasive continuous hemodynamic monitoring can safely guide anesthetic management in high-risk obstetric patients.
- Careful perioperative planning and anxiolysis contribute to stable intra- and postoperative courses.
- Interdisciplinary collaboration enhances patient safety and outcomes in complex cardiac cases.

FUTURE DIRECTIONS

- Evaluate ClearSight use in other high-risk obstetric procedures beyond cesarean deliveries.
- Investigate protocols combining MAC, regional anesthesia, and noninvasive monitoring in severe cardiac disease.
- Study outcomes comparing noninvasive versus invasive monitoring in first-trimester high-risk pregnancies.

REFERENCES

1. ACC. *Pregnancy in Heart Failure: Concerns for All Clinicians*. 2022.
2. Fujiwara T, et al. *ClearSight vs. invasive arterial pressure monitoring in cesarean delivery*. 2022.
3. Maheshwari K, et al. *Randomized trial of continuous noninvasive BP monitoring and hypotension reduction*. Anesth Analg. 2018.
4. Dennis A, et al. *Maternal hemodynamic monitoring in obstetric anesthesia*. 2015.
5. Cho S-H, et al. *Maternal anxiety and pain perception during invasive procedures*. J Pain Res.