

Direct Comparison of General Anesthesia and Neuraxial Anesthesia In A Single Patient With Severe Aortic Stenosis

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Introduction

- Neuraxial anesthesia (NA) has historically been considered a relative contraindication for patients with severe aortic stenosis (AS) due to sympathetic block and potential for hypotension.
- This precautionary recommendation has not been backed by significant published scientific evidence.
- Recent research suggests that NA may be a viable option for severe AS patients, considering individual factors, and a literature review on its use in AS shows no reported cases of cardiovascular collapse or mortality.^{1,2}

Case Presentation

- A 76-year-old female with hypertension, severe bicuspid AS, and moderate aortic aneurysm presented for elective left total knee arthroplasty (TKA).
 - Preoperative evaluation revealed no cardiac symptoms (METs >4).
 - Transthoracic echocardiogram,
 - severe AS (peak valve velocity 4.28 m/s, mean gradient 41 mmHg, aortic valve area 0.97 cm², index 0.48 cm²/m²)
 - preserved left ventricular ejection fraction (67%).
 - Exercise stress echocardiogram revealed no ischemia or symptomatic angina identified at the achieved heart rate (141 bpm, 92% maximum predicted heart rate).
 - No significant changes in aortic valve characteristics were noted between anesthetics.
- 60mg of 2% mepivacaine injected intrathecally at the L3-L4 level
- Sedation was maintained with propofol infusion with a native airway and oxygen supplementation via simple mask. Under NA, hemodynamics were supported with ephedrine and phenylephrine boluses and a phenylephrine infusion.
- No opioids were required for this procedure.
- Adductor canal catheter was placed postoperatively with no complications.
- Hemodynamically stable and oxygenated well in PACU.

References
1. Tabrizi NS, Demos RA, Schumann R, Musuku SR, Shapeton AD. Neuraxial Anesthesia in Patients With Aortic Stenosis: A Systematic Review. J Cardiothorac Vasc Anesth. 2024 Feb;38(2):505-516. doi: 10.1053/j.jvca.2023.09.027. Epub 2023 Sep 24. PMID: 37880038.
2. Van Herreweghe I, De Fré O, Polus F, Cops J, López AM, Vandepitte C, Van Boxstael S, Van Poucke S, Mesotten D, Hadzic A. Spinal anesthesia in patients with aortic stenosis: a research report. Reg Anesth Pain Med. 2024 Jan 24;rapm-2023-105113. doi: 10.1136/rapm-2023-105113. Epub ahead of print. PMID: 38267077.

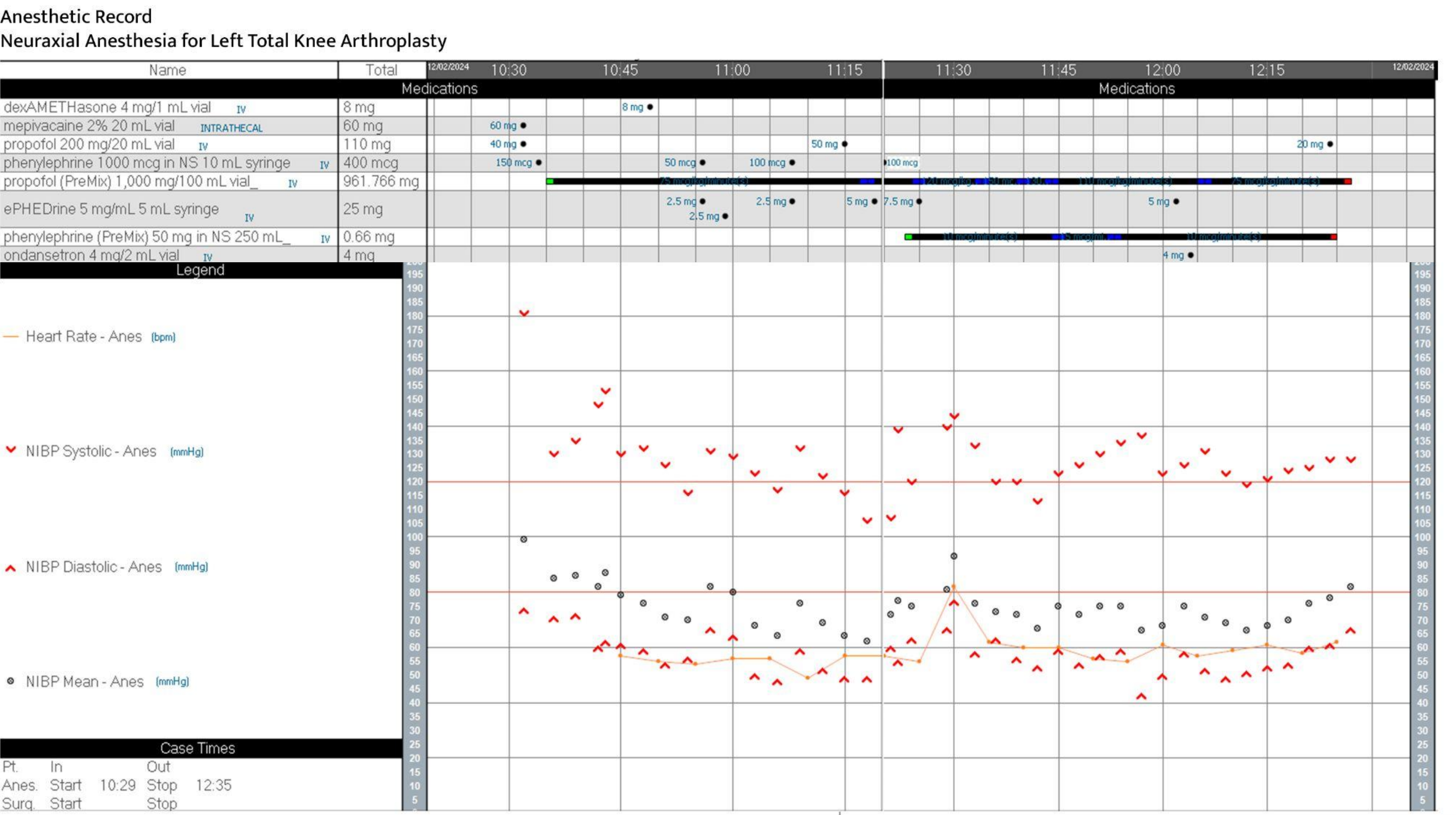
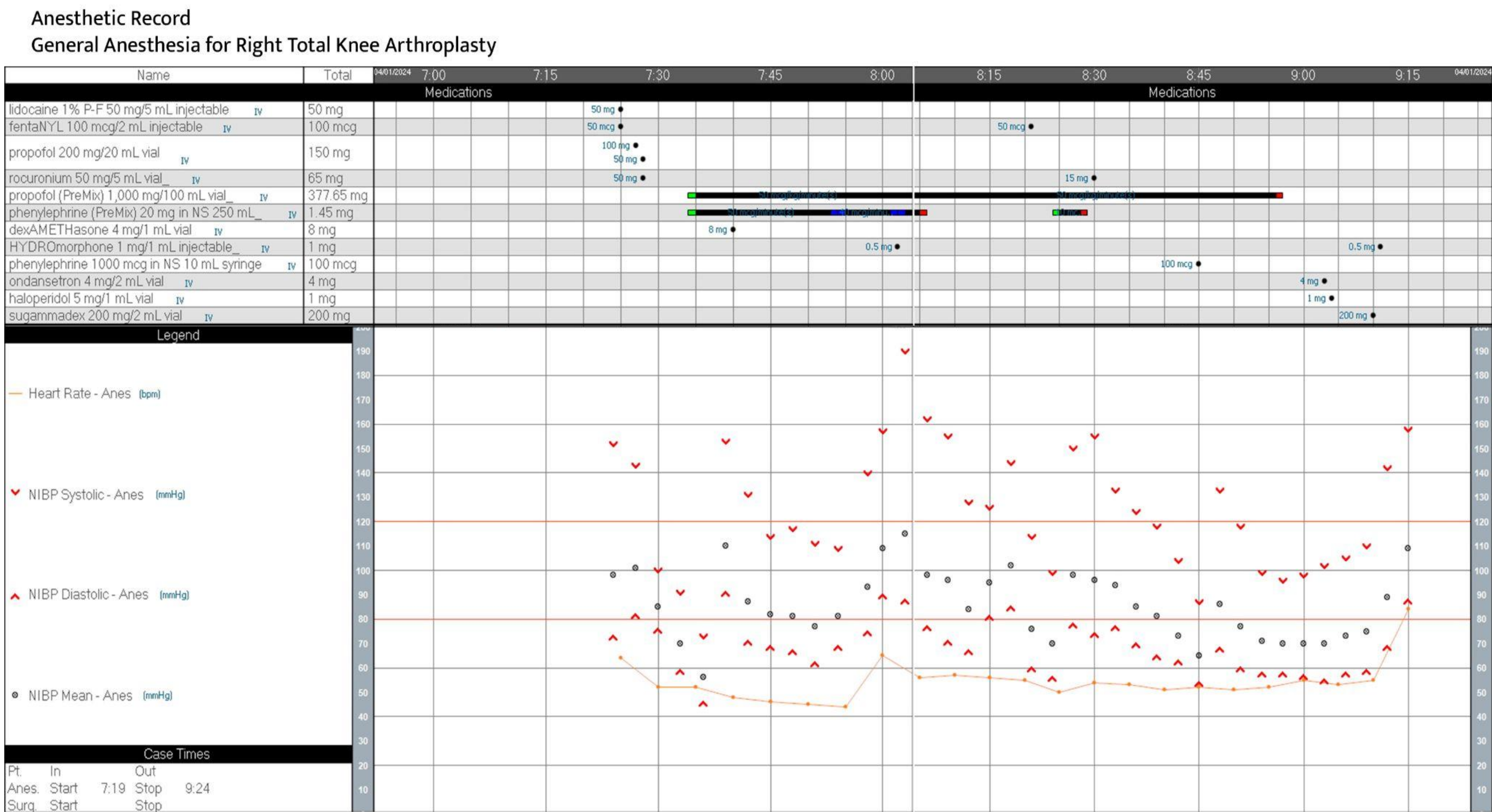


Table 1

Procedure Name	Right Total Knee Arthroplasty	Left Total Knee Arthroplasty
Month and Year of Procedure	04/2024	12/2024
Anesthetic Type	General	Neuraxial
Heart Rate Range (bpm)	42 - 84	49 - 82
Heart Rate Average (bpm)	54	58
MAP Range	56 - 115	62 - 99
MAP Average	84.7	74.6
Opioid Medication Administration	Fentanyl IV 100mg Hydromorphone IV 1mg	None
Vasopressors administered and dosage totals	Phenylephrine Bolus IV - 100mcg Phenylephrine IV Infusion - 1.45mg	Ephedrine IV Bolus - 25mg Phenylephrine Bolus IV - 400mcg Phenylephrine IV Infusion - 0.66mg

Discussion

- This report directly compares GA and NA for TKA in a single patient with severe AS.
- Despite traditional avoidance of NA in AS, this case comparison highlights its potential to enhance hemodynamic stability and minimize opioid use.
- General anesthetics carry their own risk of hypotension similar to neuraxial anesthesia.
- Hemodynamic parameters (Table 1), including heart rate and mean arterial pressure were more tightly controlled with NA.
- AS is not a singular diagnosis but encompasses a spectrum of acuity, requiring individualized anesthetic evaluation.
- We suggest NA be included in potential anesthetic choices based on individual patient factors and surgery type.
- The use of 2% mepivacaine for spinal anesthesia was well tolerated, something that has not been previously reported.

Conclusion

- NA can offer additional hemodynamic stability over GA in a patient with AS undergoing TKA.
- Mepivacaine can be used as a spinal anesthetic for select cases and offers an advantage for its relative isobaricity and shorter duration compared to bupivacaine.
- Future research should focus on larger patient cohorts to refine best practices for the use of neuraxial anesthesia in severe AS.