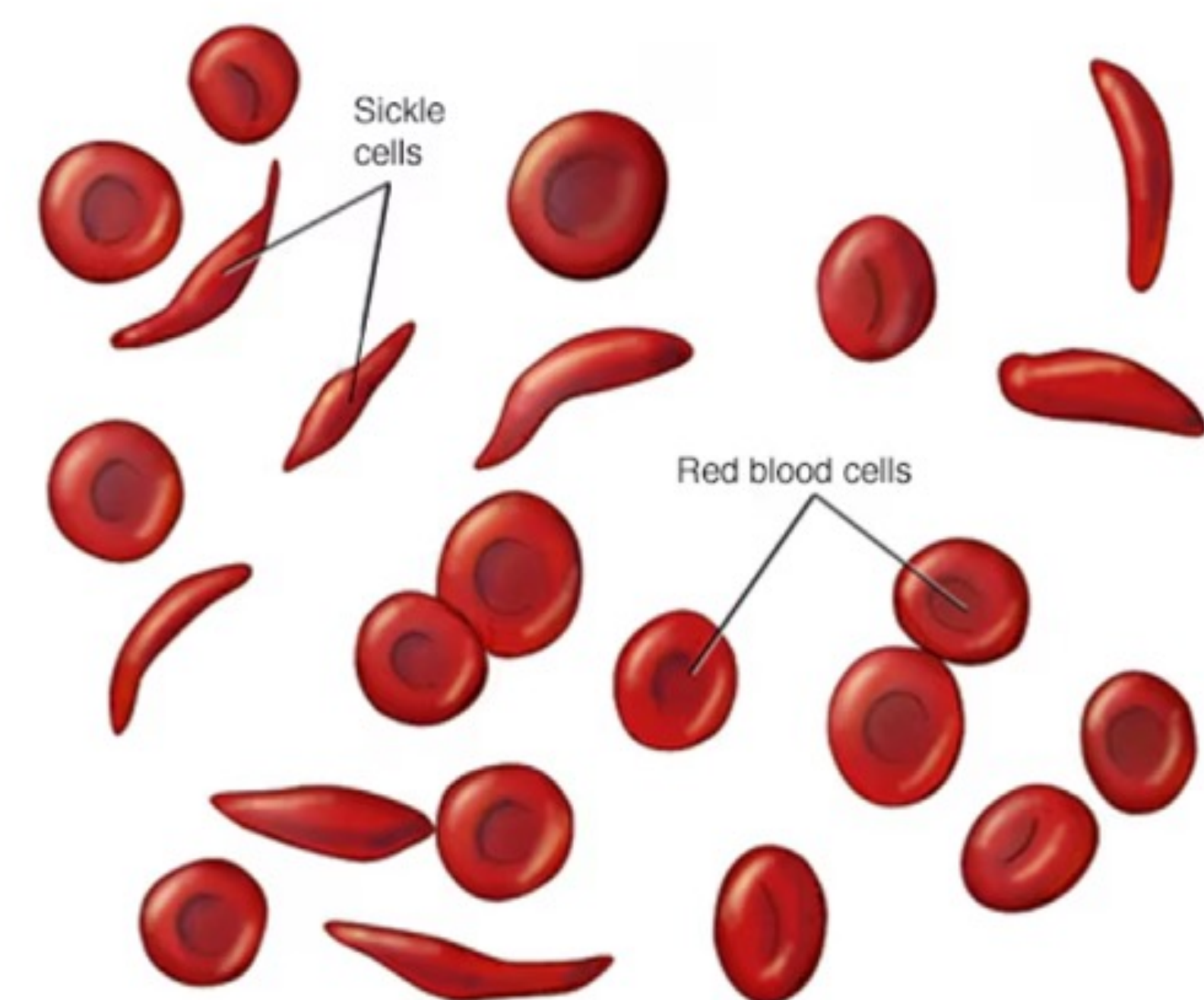
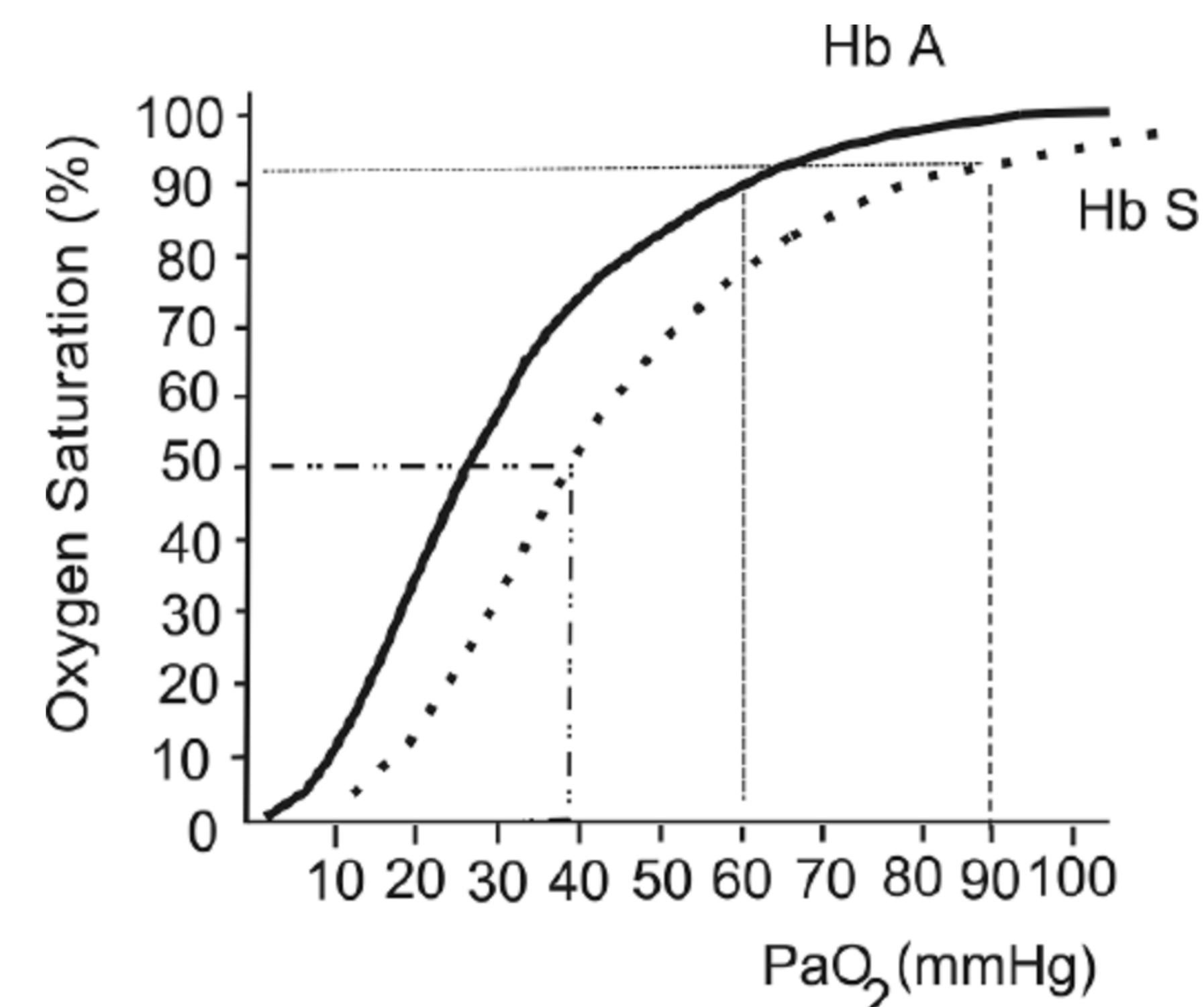


## Learning Objective

Understand how the pathophysiology of Sickle Cell Anemia complicates anesthetic management during prolonged surgery, with emphasis on the physiologic risks and pharmacologic considerations in robotic-assisted abdominal reconstruction.



## Case Report

A 49-year-old female with Hb-SS disease on Voxelotor, hypertension, Stage 2A chronic kidney disease, (baseline Cr 1.2), chronic pain, obstructive sleep apnea, multiple prior surgeries and thoracic adenopathy presented for robotic-assisted complex abdominal wall reconstruction. Preoperatively, she was transfused to a goal hemoglobin of 8 g/dL. Intraoperative challenges included metabolic acidosis, hyperkalemia, and hypothermia. A radial arterial line was placed, and post-induction ABG revealed metabolic acidosis, possibly due to CKD. Ventilator adjustments included increasing tidal volumes and I:E ratio to lower PCO<sub>2</sub> with minimal increase in PIP. Additionally, two units of packed RBCs were transfused, and a surgical pause to deflate the abdomen helped improve ventilation. Despite warming with forced-air devices and warm IV fluids, her temperature dropped from 35.9°C to 34.6°C, prompting aggressive rewarming. The patient was extubated postoperatively and transferred to PACU. She had no signs of vaso-occlusive crisis or acute chest syndrome. Her postop acute kidney injury resolved, and she was discharged on POD5.

## Discussion

- Sickle cell disease increases anesthetic risk due to the potential for red cell sickling under physiologic stressors such as hypoxia, hypercapnia, acidosis, hypothermia, hypovolemia, and pain.
- Pneumoperitoneum can impair venous return and gas exchange, increasing the risk of hypoxia and hypercarbia. Intraoperative metabolic acidosis and hypothermia required prompt correction to prevent sickling.
- Voxelotor, a hemoglobin oxygen-affinity modulator, may have conferred some protection by stabilizing oxygenated hemoglobin and reducing HbS polymerization.
- Pfizer voluntarily withdrew Voxelotor from the market, due to concerns that the increased risk of vaso-occlusive crisis and mortality during treatment outweighed the potential benefit.
- This case emphasizes the importance of a comprehensive perioperative plan that addresses both the pathophysiology of sickle cell disease and the specific physiologic stresses imposed by robotic assisted surgery.

## Arterial Blood Gases and Vent Settings

| Time                      | 1147 | 1257 | 1408 | 1635 | 1839        |
|---------------------------|------|------|------|------|-------------|
| pH                        | 7.18 | 7.09 | 7.22 | 7.16 | 7.18        |
| PCO <sub>2</sub> (mmHg)   | 47   | 60   | 48   | 55   | 49          |
| PO <sub>2</sub> (mmHg)    | 210  | 180  | 198  | 172  | 116         |
| BE                        | -10  | -12  | -8   | -10  | -10         |
| V <sub>T</sub> (ml)       | 440  | 400  | 475  | 477  | 454         |
| RR                        | 14   | 22   | 22   | 22   | 13 (Spont)  |
| PIP (cm H <sub>2</sub> O) | 35   | 35   | 36   | 40   | 5 (PSV/Pro) |
| I:E                       | 1:2  | 1:2  | 1:1  | 1:1  | --          |

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