ABSTRACT
High-dose radiation brachytherapy is a treatment for inoperable cervical and endometrial carcinoma. A general anesthetic is often utilized for patient comfort, facilitating patient transport to imaging resources, and allowing rapid discharge home after the procedure. Patient comorbidities, however, must be considered for every anesthetic performed. We describe a successful surgical epidural anesthetic for a patient with challenging comorbidities, including cardiac, pulmonary, and hematologic body systems.

Key words: Brachytherapy; epidural anesthesia; morbid obesity; noninvasive positive-pressure ventilation; pulmonary hypertension

Introduction
Endometrial carcinoma is a common malignancy among women, with incidence and mortality rates increasing.[1] When total abdominal hysterectomy with bilateral salpingo-oophorectomy is not available as primary treatment, primary or palliative radiation may be offered. High-dose-rate (HDR) brachytherapy is an effective radiation modality in these instances.[1] A case of a super-obese woman with severe pulmonary hypertension, chronic obstructive pulmonary disease (COPD), and obstructive sleep apnea (OSA)/obesity hypoventilation syndrome (OHS) presenting for brachytherapy in an out of the operating room location is presented. This case expands on the current literature regarding epidural use in this combination of comorbidities and procedure location, coupled with therapy nonadherence.

Case Report
A 57-year-old super-obese (body mass index 54) woman with a complex medical history including super obesity, OSA, OHS, severe COPD presented for HDR brachytherapy of her inoperable endometrial carcinoma in an out of the operating room procedure suite. She had been living in a nursing home for over 1 year, wheelchair dependent, unable to perform activities of daily living. She required 4 L/min of nasal cannula oxygen while awake and bilevel positive airway pressure (BiPAP) 17/11 cm H₂O with oxygen at night. Unfortunately, her chronic nonadherence to BiPAP therapy coupled with continuing to smoke one pack per day led to the development of severe, category three pulmonary hypertension.[2] Resting arterial blood gases (ABGs) in February 2015 showed pH 7.33, PCO₂ 77 mmHg, PO₂ 50 mmHg.
(7.33/77/50), with transthoracic echo (TTE) revealing pulmonary artery systolic pressures (PASPs) of 85 mmHg, increased from 65 mmHg in 2012. Pulmonary function tests obtained at the same time showed forced expiratory volume in 1 s (FEV1) 25%, forced vital capacity (FVC) 34%, and FEV1/FVC 57% revealing very severe COPD. Given her immobility and history of deep vein thromboses, she was taking rivaroxaban daily.

Curiously, this patient had repeat TTE and ABG in July 2015 showing PASP 30 mmHg and 7.29/43/81. She was determined to be optimized for the procedure by cardiology and pulmonology, despite no explanation for this dramatic improvement, as she continued to be nonadherent to BiPAP therapy, and only mildly more compliant with oxygen therapy. During the preoperative interview on the day of the procedure before any sedation, she was drowsy requiring repeated awakening, with baseline pulse oximetry 91% on her home oxygen. The decision was made to postpone the procedure given her tenuous status. The patient was to return for the procedure under carefully titrated epidural after holding anticoagulation for 3 days.

When she returned 3 days later, an awake arterial line was placed before the epidural, with baseline ABG on home oxygen revealing 7.33/66/48. This result was consistent with February 2015 values, not the alleged improved July preoperative values, and likely associated with severely elevated pulmonary artery pressures. An epidural without sedation was obtained at L2–L3 on the first attempt, and after negative test dose, 2% lidocaine was titrated in small 3–5 mL aliquots with continuous monitoring of vital signs. Despite a small decrease in blood pressure, titration of the epidural was tolerated well and an adequate surgical block to T7 was obtained.[3] Because the patient could not lie flat, BiPAP on home settings was employed in the sitting position to allow gradual lowering to supine, then high lithotomy position.[4] She tolerated radiation tandem placement in her uterus without sedation. Three milliliters aliquots of 2% lidocaine were intermittently administered through epidural to maintain adequate analgesic level. Additional ABG was obtained during the procedure to titrate BiPAP settings. Unfortunately, after tandem placement, the radiation oncologist deemed that the geometry of her cancer would require an unacceptable dose of radiation to the nearby bowel. The procedure was aborted. The patient was transported to the recovery room, the epidural was removed, and she was weaned off BiPAP onto home oxygen. The epidural blockade receded appropriately, and she was discharged to the nursing home.

Discussion

In a patient with inoperable endometrial cancer complicated by super obesity, severe pulmonary hypertension, OSA/OHS, and severe COPD, we report successful epidural anesthesia for HDR brachytherapy. Kapala et al. previously demonstrated epidural with sedation and BiPAP in a patient with hemidiaphragm paralysis and severe OSA for colon resection.[5] Nawaaz and Salem demonstrated epidural for right hemicolectomy in severe pulmonary hypertension from connective tissue disease.[3] Krenz et al. managed a parturient with severe pulmonary hypertension and right to left shunting under epidural.[6] Our patient combined to demonstrate a combination of these comorbidities, in an out of the operating room location.

Due to the uniqueness of the procedure environment distant from the operating room, we placed the arterial line and epidural in our preoperative holding area, adjacent to the main hospital operating rooms. We ensured patient hemodynamics tolerated epidural dosing to an adequate level before traveling to the procedure suite. Because she tolerated the epidural dosing and BiPAP in a supine position without sedation, and because of the minimally invasive nature of the procedure, we began the case without central venous access or a pulmonary artery catheter. Moreover, due to the less invasive nature of the HDR procedure versus surgery, we could have immediately aborted the procedure and stopped further epidural dosing of anesthetic if she did not tolerate the procedure or if hemodynamic compromise had been too great. If epidural anesthesia had failed, a future conversation between the anesthesiologist, oncologist, and patient about goals of care, life expectancy, and quality of life would need to take place. Serious commitment to smoking cessation and adherence to oxygen and BiPAP therapies would be necessary before a general anesthetic could be offered, as general anesthesia with endotracheal intubation in her current status would almost certainly have led to prolonged postoperative mechanical ventilation, Intensive Care Unit admission, ventilator-associated pneumonia, and eventual death.

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Conflicts of interest
There are no conflicts of interest.

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