Case report

Anesthetic Considerations in a 98-year-old Male with Periprosthetic Femoral Shaft Fracture

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Abstract: A 98-year-old patient with periprosthetic fracture developed acute coronary event three days after. Femoral nerve and lateral femoral cutaneous nerve blocks combined with general anesthesia were implemented for the surgery. The recovery was uneventful after discharged. In this case report, we discussed the main considerations for anesthesia specifically for this complicated case.

The incidence of periprosthetic fractures after primary knee and hip arthroplasty is around 2.5% or even higher.¹ Fractures of the femur, especially after arthroplasty, are the most common complications in geriatric people due to poor bone quality and periprosthetic bone loss. Here we present a case of 98-year-old male patient who fell down, had periprosthetic fracture and developed acute coronary event three days after, and recovered after successful internal fixation surgery. Regarding the surgery characteristics and the patient's complex status, the main anesthesia considerations are discussed specifically for this case.

CASE DESCRIPTION

A 98-year-old male who had received hemiarthroplasty four years ago for right femoral neck fracture was diagnosed with a right periprosthetic femoral shaft fracture after a fall. Mold fixation was attempted but was aborted due to intolerable pain, swelling of lower extremity and decubitus ulcer formation. Three days after admission, the patient developed acute myocardial ischemia. Creatine kinase isoenzymes (CK-MB) mass reached 13.7ug/L. The patient was diagnosed with a non-ST segment elevation myocardial infarction (NSTEMI).

He was treated conservatively, with eventual consequence that CK-MB decreased to 2.7ug/L. Transthoracic echocardiography showed no motion abnormalities of cardiac segmental wall, and left ventricular ejection fraction (LVEF) of 64%. Open reduction and internal fixation was planned for the operative therapy of this patient. Prior to surgery, the patient exhibited a left bundle branch block and occasional premature ventricular contractions on ECG, but was otherwise stable.

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Physical exam showed his temperature was 37.2°C, heart rate 80~95 beats per minute, respiratory rate 20 per minute, blood pressure 110-130mmHg/50-65mmHg. Laboratory exam showed mildly prolonged prothrombin time (PT), activated partial thromboplastin time (APTT), normal platelet count, and hemoglobin of 99g/L. Ultrasound-guided femoral nerve and lateral femoral cutaneous nerve blocks were accomplished, and after arterial line placement he was induced and intubated for close hemodynamic monitoring. Anesthesia was maintained with sevoflurane 1.5% and air-oxygen mixture, with the Fraction of inspiration O₂ (Fi O₂) of 0.5. Surgery lasted two hours, with a blood loss of 800ml, intraoperative autologous blood transfusion of 236ml from Cell Saver 5+, and allogeneic blood transfusion of 4u. The hemoglobin level was maintained around 100g/L during the operation.

The patient was transported to ICU intubated after surgery. He was weaned from the ventilator successfully in the ICU on the 3rd postoperative day and then transferred to the department of Gerontology. Advanced treatments, including anti-infection, volume management, intensive care, nutritional support and functional exercise, were effectively applied. On the 53rd day after the operation, he was capable to ambulate with help and thus was discharged from the hospital.

DISCUSSION

Periprosthetic femoral fracture is one of the most common fracture types in geriatric patients.² It is associated with a high mortality rate early after fracture and significant functional disability. Surgery should always be considered as an option, even when the anesthetic risk is high, such as in this patient who presented acute coronary syndrome.³ Conservative therapy usually involves prolonged immobilization, predisposing patients to pneumonia, thromboembolic events, decubitus ulcer formation, as well as non-union fracture and severe pain. Currently, conservative therapy has been considered obsolete, especially in elderly patients.¹

For patients with femoral shaft fracture, the perioperative management often aims to minimize the anesthetic risk, especially through appropriate transfusion management and early mobilization. For the presented patient, the critical problems lie in the characteristics of periprosthetic fracture. First of all, patients with periprosthetic fractures are often in advanced age, such as the extreme advanced age in this case, accompanied with serious complications. Secondly, the surgery of periprosthetic femoral fracture is relatively difficult in condition of massive bleeding, which brings significant surgical trauma and stress response. Therefore, this case is not merely a simple fracture surgery for an elderly patient. How to judiciously choose anesthesia method became the key point of considerations for this patient.

General anesthesia and regional anesthesia are useful for geriatric patients in non-cardiac surgery.⁴ Although evidence has shown that epidural anesthesia is associated with superior perioperative outcomes on major lumbar surgery in elderly patients,⁵ there is little evidence and no conclusion for patients over 90 years old to receive periprosthetic fracture surgery. Intrathecal anesthesia alone would be sufficient for the surgery; however, it may not provide adequate oxygen supply and leaves the air way with no protection. We believe that adequate

oxygen supply is extremely important for the patient. Also, for patients at such an advanced age⁶ and lack of oral hygiene⁷, the incidence and prevalence of aspiration pneumonia increases remarkably, which is mainly related to alterations in oropharyngeal and gastro-esophageal motility as well as colonization by respiratory pathogens. For this reason, we believe that endotracheal intubation is important during the operation and in a short period of postoperative time, instead of using supraglottic device, for example, laryngeal mask airway. Although nerve block alone would not be a sufficient anesthetic for this procedure, regional anesthesia is still a valuable technique,^{8,9} given the patient's age, comorbidities and potential postoperative complications. Regional anesthesia combined with general anesthesia provides better pain control than general anesthesia alone as evidenced by reduced opioid consumption. Therefore, femoral nerve and lateral femoral cutaneous nerve blocks combined with general anesthesia became the anesthesia method we implemented for this patient. The relieved pain and uneventful recovery had confirmed the effectiveness and reasonability of the anesthetic method for this case.

As China is becoming an aging society, patients who receive arthroplasty live a longer life and have increased opportunities of periprosthetic fractures. As they age, their health conditions become more fragile, which predisposes them to complications during anesthesia. The overall therapeutic approaches in perioperative care should be jointly determined by a multidisciplinary team including orthopedist, geriatrician, anesthesiologist, and ICU physician.

Conflict of Interest Statement

The authors have no conflict of interest to disclose.

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