

Successful perioperative management of simultaneous transcatheter aortic valve implantation and hip fracture surgery: a case report

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ABSTRACT

A 90-year-old woman with severe aortic stenosis experienced hospital readmission for chronic heart failure exacerbations many times and was admitted to our hospital for undergoing transcatheter aortic valve implantation. Thereafter, she fell in the ward and fractured her femoral trochanter, requiring early hip fracture surgery. We proposed that we should perform simultaneous transcatheter aortic valve implantation and hip fracture surgery to cardiologist and orthopedist from anesthetic and perioperative management perspective. We considered that it was difficult to maintain cardiovascular function without cardiac intervention during hip fracture surgery and starting rehabilitation as early as possible was important. General anesthesia was induced without any complications, and the tracheal tube was removed after the successive surgeries. On postoperative day 1, bedside rehabilitation was started, and on postoperative day 3, she was transferred from the intensive care unit to the general ward. On postoperative day 32, she was transferred to another hospital. Anesthesiologist should play an important role for decision making in not only intraoperative but perioperative management for critical case, we should communicate with other departments. The successful perioperative management of simultaneous transcatheter aortic valve implantation and hip fracture surgery enabled to start rehabilitation early and prevented further patient hospitalization.

Keywords: transcatheter aortic valve implantation, aortic stenosis, simultaneous surgery, hip fracture surgery

Abbreviations:

TAVI: transcatheter aortic valve implantation

AS: aortic stenosis

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INTRODUCTION

Few cases of simultaneous transcatheter aortic valve implantation (TAVI) and non-cardiac surgery have been reported. Anesthesiologist should play important role in not only intraoperative

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but perioperative management cooperating with multidiscipline departments. We report here a case of successful perioperative management of simultaneous emergency TAVI and hip fracture surgery.

CASE PRESENTATION

A 90-year-old woman (height, 152 cm; weight, 44 kg) who experienced hospital readmission for chronic heart failure exacerbations many times visited our hospital with dyspnea. She had a medical history of severe aortic stenosis (AS), hypertension, diabetes mellitus, and chronic kidney disease and had undergone percutaneous coronary intervention with drug-eluting stent placement for angina pectoris. She had been administered an oral antiplatelet drug (Aspirin 100mg/day). Transthoracic echocardiography revealed no asynergy, a peak velocity of 372 cm/s, a mean pressure gradient of 32 mmHg, a maximum pressure gradient of 55 mmHg, and an aortic valve area of 0.65 cm². Based on transthoracic echocardiography findings and her symptom, she was diagnosed with chronic heart failure exacerbation due to AS. After admission, undergoing non-invasive positive pressure ventilation and diuretics gradually improved her symptoms. Severe symptomatic AS was as an indication for TAVI; then, elective TAVI was scheduled for AS treatment.

After admission day 11, the patient fell and broke her femoral trochanter. Hip fracture surgery was need as early as possible. Because the patient had taken an oral antiplatelet drug, spinal anesthesia was not suitable and general anesthesia was applied. We considered that it was difficult to maintain cardiovascular function without cardiac intervention during hip fracture surgery and starting rehabilitation as early as possible was important. From anesthetic and perioperative management perspective, we proposed that we should perform simultaneous emergency TAVI and hip fracture surgery to cardiologist and orthopedist. We started general anesthesia, using remifentanyl (0.15 µg/kg/min), midazolam (1 mg), and rocuronium (30 mg), with infusing norepinephrine (0.035 µg/kg/min) for anesthesia induction. Maintaining intraoperative anesthesia, we infused remifentanyl (0.15–0.2 µg/kg/min) with desflurane (2%) and norepinephrine (0.02–0.035 µg/kg/min). For anesthetic management, we inserted an arterial catheter and a central venous catheter. For intraoperative monitoring, we used transesophageal echocardiography, Bispectral index™ (Nihon Kohden, Tokyo, Japan), and Somasensor™ (Covideien, Japan, Tokyo). First, TAVI was performed under heparinization. After reversal of heparinization, trochanteric fracture surgery was performed. The tracheal tube was successfully removed in the operating room, and the patient's respiratory condition and hemodynamics were stable. She was admitted to the intensive care unit, and her general condition was stable, except for hemiparesis and visual disorder. Two weeks after the operation, transthoracic echocardiography revealed trivial perivalvular leakage around the prosthetic valve, no asynergy, and an ejection fraction of 58%. On postoperative day 1, rehabilitation was started by the bedside. On postoperative day 2, she was moved in a wheelchair, and on postoperative day 3, she was transferred from the intensive care unit to the general ward. She had a right visual disorder and could stand up with help. On postoperative day 32, she was transferred to another hospital for rehabilitation.

DISCUSSION

Hip fractures have a high incidence in the elderly population. Current guidelines recommend early surgery within 2 days after admission for hip fracture surgery.¹ In previous report, a positive effect of early surgery on the mortality rate was observed.² Early surgery reduce post-

injury mortality and provide effective functional results for the remaining years of life.³ From this perspective, we should cooperate with orthopedist and multidiscipline departments, in order to perform hip fracture surgery as early as possible to improve the patient's quality of life in the elderly population.

Performing non-cardiac surgery for AS patients is a high risk for major adverse cardiovascular events in the perioperative period.^{4,5} Aakash reported that AS was associated with a significantly increased risk of complications in elderly patients undergoing surgery for hip fracture.⁶ The current guidelines recommend that non-cardiac surgery should be postponed for symptomatic AS patients until after aortic valve surgery.⁷ In our case, symptomatic severe AS patient need non-cardiac surgery, we thought performing AS treatment prior to hip surgery was reasonable.

Tashiro et al⁵ reported that perioperative death rates were lower in AS patients than in historical reports, and that emergent surgery, rather than AS, was the principal determinant of perioperative mortality. The recommendation of postponing surgical intervention until AS is corrected seems to be overly conservative and may delay necessary non-cardiac surgery.⁷ Tashiro et al also reported that symptomatic patients and patients with Revised Cardiac Risk Index ≥ 2 should be considered for a reduction in the risk of cardiovascular instability due to severe AS prior to non-cardiac surgery.⁵ In our case, symptomatic AS patient that was candidate for surgical treatment need emergency hip surgery, there were risk factors for perioperative cardiovascular adverse event. It is important to decide which surgery should be performed prior to the other surgery communicating with other departments.

Perioperative management of TAVI is challenging, as patients undergoing TAVI have high frailty and comorbidities. In a previous study, rehabilitation after TAVI and after surgical aortic valve replacement was assessed using the Functional Independence Measure score that assesses physical and cognitive disability and evaluate activity of daily living.⁸ TAVI patients were older and had high comorbidities; improvement in the Functional Independence Measure score was comparable in both groups. On the other hand, open thoracic surgery is not reasonable for frail patients, and it may be difficult to perform hip fracture surgery and surgical aortic valve replacement simultaneously. Because full heparinization is need for establishing cardiopulmonary bypass, that may induce more bleeding from fracture site.

If we were applied to general anesthesia for emergency non-cardiac surgery with severe AS, we had better consider to performing TAVI and non-cardiac surgery simultaneously. This less invasive simultaneous surgery enables to start rehabilitation and recover early for elderly and frail patient.

CONCLUSIONS

We managed TAVI and hip fracture surgery simultaneously in symptomatic AS patient successfully. Simultaneous and successive surgeries may be one of the choices for patients requiring early recovery and timely rehabilitation. Anesthesiologist should play an important role for decision making in not only intraoperative but perioperative management, and it is essential for anesthesiologist to communicate with other departments.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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