International Journal of Anesthesia and Clinical Medicine
2024, Vol. 12, No. 2, pp. 81-84
https://doi.org/10.11648/j.ijacm.20241202.13

Case Report

A Case of Optimizing Anesthetic Management for an Elderly Patient with Severe Left Ventricular Dysfunction Through a Multi-disciplinary Treatment Approach

Dai-liang Zhao[1, *], **Yan Li**[2]

[1]Department of Anesthesiology, West China Hospital, Sichuan University, Chengdu, China
[2]Department of Ophthalmology, Chengdu BOE Hospital, Chengdu, China

Abstract

This case report presents a multi-disciplinary treatment (MDT) approach to optimize anesthetic management for an elderly patient with a giant inguinal hernia and severe left ventricular dysfunction. The patient, a 68-year-old male, had a 30-year history of a large inguinal hernia and was diagnosed with left ventricular hypertrophy and cardiac insufficiency, with an ejection fraction of 24%. Given the patient's complex comorbidities and the risks associated with anesthesia, a MDT was formed to develop a personalized treatment plan. The team included gastrointestinal surgeons, anesthesiologists, cardiovascular specialists, and intensive care physicians who collaborated to mitigate perioperative risks. The MDT strategy involved continuing preoperative cardiovascular medications, selecting anesthesia techniques to minimize impact, and maintaining strict fluid management during surgery. The patient underwent a successful tension-free repair of the inguinal hernia with the aid of an ultrasound-guided nerve block and local infiltration anesthesia. Throughout the procedure, vital signs remained stable, and the patient experienced no discomfort or complications related to anesthesia. The patient recovered well and was discharged after five days. The effectiveness of MDT in overseeing the care of elderly patients with high-risk conditions throughout the perioperative anesthesia phase is underscored. It underscores the importance of a collaborative approach to ensure patient safety and optimal outcomes in complex surgical cases. The MDT framework helps to prevent treatment deviations and delays, reducing patient anxiety and improving the overall quality of care.

Keywords

Multi-Disciplinary Treatment (MDT), Perioperative Anesthesia, High-Risk Elderly Patient, Patient Safety, Complication-Free Recovery

1. Introduction

With the global population ageing, over 40% of surgical patients are elderly individuals [1]. Elderly patients often present with age-related physiological changes, multiple underlying diseases, and functional insufficiency in vital organs such as the heart and lungs [2, 3]. Consequently, there is significantly increased postoperative complications and mortality. In clinical practice, managing perioperative risks for elderly patients with complex comorbidities can be chal-

*Corresponding author: zhao671228@163.com (Dai-liang Zhao)

Received: 6 May 2024; **Accepted:** 9 July 2024; **Published:** 31 July 2024

lenging for surgeons and anesthesiologists [4, 5]. These challenges can sometimes exceed the risks associated with the surgery itself. Multi-disciplinary treatment (MDT) involves discussions among senior experts from various disciplines to formulate personalized treatment plans based on patients' conditions [6, 7].

Although MDT is a well-established method for managing chronic diseases, its use in the individualized management of high-risk elderly patients during perioperative anesthesia is still in its early stages. This case study exemplifies successful use of MDT for the individualized management of a giant inguinal hernia with severe left ventricular dysfunction in an elderly patient during perioperative anesthesia.

1.1. General Information

Upon admission, the patient, a 68-year-old male with a height of 148 cm and a weight of 57.5kg, presented with vital signs within normal limits: Heart Rate (HR) at 90 beats/min, Blood Pressure (BP) at 123/80 mm Hg, and Respiratory Rate (RR) at 20 breaths/min. The patient reported a mass in his right inguinal region approximately 30 years ago, which measured approximately 15 cm x 20 cm. The mass reduced in size when the patient was in a supine position and exhibited neither localized tenderness nor swelling. However, the patient experienced localized pain and discomfort in the area when standing or walking for extended periods. Two years ago, the patient had been diagnosed with left ventricular hypertrophy and cardiac insufficiency, which was characterized by an ejection fraction (EF) of 24%, after experiencing palpitations and chest tightness following physical activity. The patient has been managed long-term with medications, including enalapril maleate, spironolactone, hydrochlorothiazide, and digoxin. Biochemical assessments, including complete blood count, liver and kidney function tests, and coagulation profiles, revealed no significant abnormalities. Noteworthy cardiac markers were observed. Blood tests revealed a B-type natriuretic peptide precursor level of 2862 ng/L and a troponin-T level of 23.4 ng/L. Additional tests revealed sinus rhythm with an average heart rate of 97 beats/min, ranging from 66 to 141 beats/min, 48 episodes of multifocal ventricular premature beats per 24 hours, incomplete left bundle branch block, and ST-T changes.

The cardiac colour Doppler ultrasound showed that the left ventricle (LV) was enlarged, with an inner diameter of 70 mm, and the left atrium (LA) had an inner diameter of 46 mm. There was mild aortic and mitral valve regurgitation, significantly reduced left ventricular systolic function with an EF of 24%, and a reduced left ventricular wall motion amplitude with a stroke volume (SV) of 61 ml. The CT chest plain scan revealed multiple patchy, stricture, and nodular shadows in the upper lobe of the right lung, some with calcification, alongside mild emphysema in both lungs and scattered small pulmonary bullae. CT coronary angiography revealed mild stenosis (25%—49%) in the main lumen of the left coronary artery, mixed plaques on the wall of the anterior descending branch of the left coronary artery with moderate stenosis in the lumen (50%—69%), and similar observations in the proximal segment of the right coronary artery. Admission Diagnosis: (1) Giant right inguinal hernia. (2) Severe left heart dysfunction. (3) Coronary atherosclerotic heart disease. A tension-free repair of the right inguinal hernia is scheduled.

1.2. MDT Diagnosis and Treatment Process and Conclusion

The diagnosis of the patient's condition is unequivocal. Although the patient does not exhibit incarceration or compressive symptoms, the large size of the hernia significantly impairs their daily activities. Therefore, surgical intervention is necessary to improve their future quality of life. Due to the complexity of the case, especially considering the severe cardiac insufficiency and associated risks, the patient's primary physician formed a MDT. The team, consisting of gastrointestinal surgeons, anesthesiologists, cardiovascular specialists, and intensive care physicians, collaborated to develop a customized management strategy for the perioperative anesthesia period. The team agreed that the patient's current condition allows for surgical intervention, but the perioperative anesthesia carries significant risks, such as potential malignant arrhythmias, exacerbation of cardiac insufficiency, and the risk of sudden cardiac arrest or death. Before administering surgical anesthesia, the patient and their family were extensively consulted, and informed consent was obtained. Emergency protocols were also established in preparation for the surgery. The MDT developed specific plans and guidelines to mitigate potential risks, including: (1) The patient's oral cardiovascular medications will continue preoperatively. (2) Anesthesia techniques and agents will be selected to minimize their impact on the patient's overall condition and comorbidities. The plan involves performing an ultrasound-guided surgical-side ilioinguinal/iliohypogastric nerve block, supplemented by local infiltration anesthesia. If necessary, reversible analgesic and sedative drugs with minimal impact on respiratory and circulatory functions may be administered to reduce systemic stress responses caused by pain and anxiety. This can help to decrease myocardial oxygen consumption and the risk of cardiovascular events during the perioperative anesthesia period. (3) During surgery, it is important to monitor arterial pressure to maintain stable blood pressure and effective myocardial perfusion. Strict fluid management is necessary to prevent exacerbation of cardiac insufficiency, and electrolyte and acid-base balance should be maintained, paying particular attention to avoiding hypokalemia, which can trigger severe arrhythmias. (4) Additional aspirin of 100 mg/d may be considered 24h after surgery. (5) Throughout the perioperative anesthesia period, expert guidance from cardiovascular and intensive care specialists will be available to ensure the patient's well-being.

1.3. Anesthesia and Operation Process

Upon the patient's arrival in the operating room, an intravenous line was established, and continuous electrocardiogram monitoring was initiated. The patient's vital signs were recorded as follows: heart rate (HR) of 93 beats per minute, non-invasive blood pressure (NIBP) of 122/65 mmHg, respiratory rate (RR) of 16 breaths per minute, and oxygen saturation (SpO2) of 95% on room air, which increased to 100% following the administration of oxygen via a mask. Following local anaesthesia, invasive arterial catheterisation was performed. Subsequent blood gas analysis showed no significant abnormalities. The anaesthesia protocol included recommendations from the MDT: (1) The patient received a continuous intravenous infusion of dexmedetomidine at a dose of 0.4 $\mu g \cdot kg^{-1} \cdot h^{-1}$, along with intravenous administration of midazolam at 1 mg and sufentanil at 5μg. (2) An ultrasound-guided right ilioinguinal/iliohypogastric nerve block was performed. The needle was inserted from outside to inside, using the acoustic shadow of the iliac spine as a bony landmark. The needle was inserted into the fascial layer between the internal oblique and transverse abdominis muscles, where the nerve is located. Care was taken to ensure that no blood was aspirated before injecting 30 ml of 0.33% ropivacaine. The surgical procedure commenced smoothly 20 minutes after the injection and lasted for 1 hour and 50 minutes. The patient's vital signs remained stable throughout the operation, and no discomfort was reported. The postoperative period was without incident, with no complications related to anaesthesia. The patient made a good recovery and was discharged after five days.

2. Discussion

As patients age, they often present with cardiovascular and cerebrovascular diseases, and sometimes significant organ dysfunction [8, 9]. The proportion of elderly individuals among surgical patients is steadily increasing [3, 10, 11]. During the perioperative anesthesia phase, the risks associated with comorbidities and organ dysfunction, attributable to these diseases, are frequently much higher than those associated with the surgery itself. This presents a significant challenge for surgeons and anesthesiologists in decision-making [11]. Surgeons often argue for the necessity of surgery to enhance future quality of life for patients. Conversely, anesthesiologists are concerned about substantial perioperative risks, which may ultimately prevent patients from reaping the benefits of surgery. In traditional models of diagnosis and treatment, high-risk patients often decline surgery due to fears of surgical and anesthesia risks. Alternatively, surgeons and anesthesiologists might postpone surgery or opt for conservative treatment, concerned about the patient's potential lack of benefit from the surgery. Additionally, the thinking models in single consultations for comorbidities have limitations, potentially extending consultation time and even delaying the surgical process due to inadequate preoperative preparation. This can lead to increased patient anxiety and stress, exacerbating underlying conditions, missing optimal surgical opportunities, and potentially creating emergency situations that endanger the patient's life.

In this case, the patient had concomitant coronary artery atherosclerotic heart disease and severe left ventricular dysfunction, posing a significant safety threat during the perioperative anesthesia period. Therefore, the attending physician initiated a MDT meeting focused on managing the patient's perioperative anesthesia period. Considering the severity of the patient's comorbidities, the MDT selected the optimal surgical approach, timing of surgery, anesthesia method, and individualized management plan for the perioperative anesthesia period to ensure a smooth and safe recovery for the patient until discharge.

MDT is a diagnostic and treatment process led by a team of senior experts from various disciplines. The team develops personalized treatment plans based on the patient's specific condition and needs. MDT is widely utilized for managing chronic diseases such as cancer, heart failure, and stroke [12]. As MDT gains more acceptance, it is gradually being applied to perioperative anesthesia management plans for high-risk and complex surgical patients [13-15]. In the MDT framework, experts from multiple disciplines collaborate to develop the most suitable preparation and treatment plan for the patient. This approach helps to prevent treatment deviations and delays caused by the limitations of a single discipline, reducing the patient's waiting time for diagnosis and treatment and ensuring the best possible treatment outcome. The ultimate objective of a MDT is to ensure that patients receive the appropriate interventions, conducted under optimal conditions, at the right time and place [16].

3. Conclusion

This case successfully applied MDT individualization in the treatment of elderly patients with huge inguinal hernia and severe left ventricular dysfunction during perioperative anesthesia. Regrettably, due to inequitable distribution of medical resources, coupled with limitations in MDT's feasibility, numerous regions in China are without standardized MDT diagnostic and treatment protocols, and efficient MDT teams. Consequently, the progress of MDT's development presents an unpromising outlook. Especially with fewer MDTs initiated or led by anesthesiologists. Moreover, consensus on relevant guidelines remains incomplete, leaving significant room for improvement in multiple areas. Nonetheless, this process is still a work in progress and demands further enhancements in future practice. Finally, we hope that the MDT initiated by anesthesiologists can help critically ill patients safely navigate the perioperative period.

Abbreviations

MDT	Multi-Disciplinary Treatment
HR	Heart Rate
BP	Blood Pressure
RR	Respiratory Rate
EF	Ejection Fraction
LV	Left Ventricle
LA	Left Atrium

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Vacas S, Canales C, Deiner SG, Cole DJ. Perioperative Brain Health in the Older Adult: A Patient Safety Imperative. Anesth Analg. 2022; 135(2): 316-328. https://doi.org/10.1213/ANE.0000000000006090

[2] Makary MA, Segev DL, Pronovost PJ, et al. Frailty as a predictor of surgical outcomes in older patients [J]. Journal of the American College of Surgeons, 2010(6): 210. https://doi.org/10.1016/j.jamcollsurg.2010.01.028

[3] Jablonski S G, Urman R D. The Growing Challenge of the Older Surgical Population [J]. Anesthesiology Clinics, 2019, 37(3). https://doi.org/0.1016/j.anclin.2019.04.001

[4] Eamer G, Al-Amoodi M J H, Holroyd-Leduc J, et al. Review of risk assessment tools to predict morbidity and mortality in elderly surgical patients [J]. The American Journal of Surgery, 2018, 216(3): 585-594. https://doi.org/10.1016/j.amjsurg.2018.04.006

[5] Turrentine FE, Wang H, Simpson VB, Jones RS. Surgical risk factors, morbidity, and mortality in elderly patients [J]. Journal of the American College of Surgeons, 2006, 203(6): 865-877. https://doi.org/10.1016/j.jamcollsurg.2006.08.026

[6] Chang T T, Sawhney R, Monto A, et al. Implementation of a multidisciplinary treatment team for hepatocellular cancer at a Veterans Affairs Medical Center improves survival [J]. Hpb, 2008, 10(6): 405-411. https://doi.org/10.1080/13651820802356572

[7] Hansen MFC, Storkholm JH, Hansen CP. The results of pancreatic operations after the implementation of multidisciplinary team conference (MDT): A quality improvement study [J]. International Journal of Surgery, 2020, 77: 105-110. https://doi.org/10.1016/j.ijsu.2020.03.045

[8] Lloyd-Jones D, Adams RJ, Brown TM, et al. Heart disease and stroke statistics—2010 update: a report from the American Heart Association [J]. Circulation, 2010, 121(7): e46-e215. https://doi.org/10.1161/CIRCULATIONAHA.109.192667

[9] Heidenreich PA, Trogdon JG, Khavjou OA, et al. Forecasting the future of cardiovascular disease in the United States: a policy statement from the American Heart Association [J]. Circulation, 2011, 123(8): 933-944. https://doi.org/10.1161/CIR.0b013e31820a55f5

[10] Barnett K, Mercer SW, Norbury M, et al. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study [J]. The Lancet, 2012, 380(9836): 37-43. https://doi.org/10.1016/S0140-6736(12)60240-2

[11] Biccard BM, Rodseth RN. Utility of clinical risk predictors for preoperative cardiovascular risk prediction [J]. British Journal of Anaesthesia, 2011, 107(5): 446-450. https://doi.org/10.1093/bja/aer194

[12] Patkar V, Acosta D, Davidson T, et al. Cancer Multidisciplinary Team Meetings: Evidence, Challenges, and the Role of Clinical Decision Support Technology [J]. International Journal of Breast Cancer, 2011, 2011: 831605. https://doi.org/10.4061/2011/831605

[13] Holt N F. Trends in healthcare and the role of the anesthesiologist in the perioperative surgical home - the US perspective. [J]. Current Opinion in Anaesthesiology, 2014, 27(3): 371. https://doi.org/10.1097/ACO.0000000000000064

[14] Brindley P G. I. Improving teamwork in anaesthesia and critical care: many lessons still to learn [J]. British Journal of Anaesthesia, 2014(3): 399-401. https://doi.org/10.1093/bja/aet334

[15] Howell S J. Abdominal aortic aneurysm repair in the United Kingdom: an exemplar for the role of anaesthetists in perioperative medicine [J]. Br J Anaesth, 2017(suppl_1): i15–i22. https://doi.org/10.1093/bja/aex360

[16] Taberna M, Gil Moncayo F, Jan é-Salas E, et al. The multidisciplinary team (MDT) approach and quality of care [J]. Frontiers in oncology, 2020, 10: 85.https://doi.org/10.3389/fonc.2020.00085