CASE REPORT

Left atrial appendage occlusion in a mirror-image dextrocardia: A case report and review of literature

Bei Tian, Chuang Ma, Jin-Wen Su, Jun Luo, Hong-Xia Sun, Jie Su, Zhong-Ping Ning

ORCID number: Bei Tian 0000-0002-2797-6084; Chuang Ma 0000-0001-9747-4189; Jin-Wen Su 0000-0001-5461-572X; Jun Luo 0000-0002-1274-5910; Hong-Xia Sun 0000-0002-2855-3577; Jie Su 0000-0003-2978-2942; Zhong-Ping Ning 0000-0002-1490-2385.

Author contributions: Ning ZP supervised the team efforts; Tian B, Sun HX, and Luo J served as the surgical nurses; Tian B and Su J performed the data review and provided guidance on preparation of the case report; Tian B performed the video production; Tian B, Ma C, and Su J performed the data collection and writing of the manuscript.

Informed consent statement: Informed written consent was obtained from the patient for publication of this report and any accompanying images.

Conflict-of-interest statement: The authors declare that they have no conflict of interest.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

Supported by: Pudong New Area Science and Technology

Abstract

BACKGROUND
In mirror-image dextrocardia, the anterior-posterior position of the cardiac chambers and great vessels is maintained, but the left-right orientation of the abdominal organs is reversed. The abnormal anatomy of the heart poses surgical challenges and problems in dealing with surgical risk and monitoring complications. There are few reports on closure of the left atrial appendage (LAA) in dextrocardia and no reports on the application of enhanced recovery after surgery (ERAS) following LAA occlusion (LAAO) procedures.

CASE SUMMARY
The objective for this case was to ensure perioperative safety and accelerate postoperative recovery from LAAO in a patient with mirror-image dextrocardia. ERAS was guided by the theory and practice of nursing care. Atrial fibrillation was diagnosed in a 77-year-old male patient, in whom LAAO was performed. The 2019 guidelines for perioperative care after cardiac surgery recommend that the clinical nursing procedures for patients with LAAO should be optimized to reduce the incidence of perioperative complications and ensure patient safety. Music therapy can be used throughout perioperative treatment and nursing to improve the anxiety symptoms of patients.

CONCLUSION
The procedure was uneventful and proceeded without complications. Anxiety symptoms were improved.
Key Words: Atrial fibrillation; Dextrocardia; Left atrial appendage occlusion; Music therapy; Enhanced recovery after surgery; Case report

The Author(s) 2022. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: Mirror dextrocardia has typical clinical characteristics. Because of the high prevalence and mortality of atrial fibrillation of patients with mirror dextrocardia, left atrial appendage occlusion has an important role in treatment, which continues to be confirmed. Left atrial appendage occlusion is an ideal choice for patients with atrial fibrillation. Moreover, music therapy can be used throughout perioperative treatment and nursing to improve the anxiety symptoms of patients.

INTRODUCTION

Enhanced recovery after surgery (ERAS) is a multimode, interdisciplinary care model designed to improve perioperative care, including medical care before, during, and after surgery and during rehabilitation. Increasing evidence supports the use of ERAS in surgical patients. ERAS is effective in reducing gastrointestinal infections and hospital stay associated with general colon and rectum surgery. The ERAS Society has been the source of international plans for colorectal, hepatobiliary, urinary, gastric, gynecological, and cardiac surgery groups, and provided evidence-based guidelines for the perioperative treatment and nursing of patients[1-3].

In cardiac surgery, the ERAS model shows that early extubation is safe and feasible, and can significantly shorten electrocardiogram (ECG) monitoring and coronary care unit (CCU) stays. However, the application of ERAS models in cardiac surgery is still at an early stage, and reports in interventional cardiology are limited. Studies have shown that ERAS regimens are feasible and safe in minimally invasive cardiac surgery, and have the potential to significantly improve patient prognosis[4,5].

The ERAS model has characteristics specific to different clinical fields, but the basic concept is common to all fields. The 2019 guidelines for accelerating postoperative rehabilitation of heart surgery include correcting malnutrition before surgery, smoking and drinking cessation, establishing a cardiac preadaptation plan including education, nutrition optimization, sports training, social support, and reducing anxiety, infection prevention, carbohydrate loading (sugar prestorage), establishment of an electronic health platform, etc. The intraoperative care package includes local nasal treatment to eliminate staphylococcus colonization, skin preparation, deflation scheme, dressing changes, prevention of hypothermia, keeping venous access open, rigid sternum fixation, and hemostasis. Whole-process management of patients in the perioperative period includes intensive glycemic control, pain management, delirium screening, drug anticoagulation, early extubation, biomarkers for early identification of high-risk patients with acute kidney injury, and goal-directed recommendations (i.e., blood pressure, cardiac index, systemic venous oxygen saturation, and urine volume). Fluid management therapy is a cooperative multiteam effort, including nutritionists, early cardiac rehabilitation therapists, and physiotherapists.

Left atrial appendage occlusion (LAAO) is a minimally invasive intervention guided by medical imaging equipment[6]. A device is positioned in the left atrial appendage (LAA) by percutaneous venipuncture to prevent thrombi from entering the blood circulation in patients with atrial fibrillation. Medical staff are concerned about the consequences of and low compliance with long-term use of oral anticoagulants and the high risk of bleeding. Therefore, LAAO has been applied as an alternative for stroke prevention and
it is the most widely used LAAO closure device[9]. Studies have shown that the effectiveness of LAAO against thrombus formation is similar to that of oral warfarin, and it has advantages in preventing stroke and maintaining quality of life[10-13]. In long-term follow-up, the incidence of both bleeding and stroke decreased significantly. LAAO was also found to be suitable for patients with atrial fibrillation who cannot tolerate oral anticoagulants, have a high risk of bleeding, have anticoagulant contraindications, and for whom anticoagulation did not prevent stroke[14-16]. The Watchman device was also found to reduce the incidence of perioperative complications, hemorrhagic stroke, stroke disability and mortality, cardiovascular events, and all-cause mortality, and to improve clinical outcomes and prognosis[17-20]. With ongoing advances in perioperative care, LAAO will continue to develop as an effective alternative strategy to prevent stroke in patients with atrial fibrillation.

In dextrocardia, the apex of the heart points to or is located on the right side of the chest[21,22]. Using the longitudinal axis of the heart as a reference, dextrocardia can be seen as either situs solitus, in which the abdominal organs are in their normal positions, or situs inversus, in which the abdominal organs are horizontally reversed or “mirrored”[23]. Mirror-image dextrocardia is a rare anomaly, with an incidence of about 1:10,000 in the general population[24]. There have been few published reports of LAAO in patients with dextrocardia, which is surgically challenging because of the anatomical anomalies, surgical risk, and complication monitoring that must be considered[25,26]. There have also been no reports on the application of the ERAS model to LAAO. This case describes our experience with ERAS following the 2019 accelerated cardiac surgery rehabilitation perioperative nursing guidelines for perioperative care of a patient with dextrocardiac LAAO.

CASE PRESENTATION

Chief complaints
The patient presented to the outpatient facility with atrial fibrillation.

History of present illness
The patient reported having experienced occasional palpitations and discomfort without obvious chest tightness and pain, and presented with fluent speech, unclear articulation, hearing loss, and mild activity impairment of the left lower limb.

History of past illness
The patient had a history of cerebral infarction, hypertension, cholecystectomy, prostatic hyperplasia surgery, and fractures of both upper limbs and the left lower limb. Long-term oral aspirin was discontinued in the previous month because of hematochezia.

Personal and family history
No family history.

Physical examination
On presentation, the patient’s body temperature was 37 °C, the pulse was 89 beats/min, respiration rate was 18 breaths/min, blood pressure was 143/76 mmHg, and the numerical rating scale pain score was 0. Twelve-lead electrocardiography revealed atrial fibrillation with a change in the ST-T segment.

Imaging examinations
Twelve-lead electrocardiography revealed atrial fibrillation with a change in the ST-T segment.

FINAL DIAGNOSIS
The diagnosis was arrhythmia, paroxysmal atrial fibrillation, cardiac function New York Heart Association level II, level II very high-risk hypertension, sequelae of cerebral infarction, and visceral inversion (Figure 1).
TREATMENT

Percutaneous LAAO was performed under general intravenous anesthesia (Figure 1).

Figure 1 Details of the surgical procedure. A: Transesophageal echocardiography; B: Dextrocardia (45°); C: Morphology of left atrial appendage; D: Left femoral vein puncture; E: Atrial septum puncture; F: Superior pulmonary vein of guide wire; G: Sheath follow up; H: Auricle not fully exposed; I: Right anterior oblique cardiography; J: Occluder selection; K: Implantation of sealing umbrella; L: Pulling and plugging the closure umbrella; M: Release the closure umbrella; N: Multi angle compression ratio (24%-27%); O: No residual shunt (0°); P: 1.5mm residual shunt (45°); Q: No residual shunt (90°); R: No residual shunt (135°).
OUTCOME AND FOLLOW-UP

After the LAAO procedure, the patient was admitted to the CCU. His vital signs were closely monitored and found to be stable following surgery. At 18 h, the heart rate was 75 beats/min, average blood pressure was 139/80 mmHg, average $\text{O}_2$ saturation was 97%, and the urine volume was 2100 mL. At 19 h, the blood pressure was 197/99 mmHg, the heart rate was 64/min, $\text{O}_2$ saturation was 92%, and the urine volume was 900 mL. Infusion of 0.9% normal saline 250 mL + 10 mg isosorbide nitrate was maintained at 10 mL/h, as advised by the doctor. At 19 h 15 min, the blood pressure was 190/85 mmHg, the heart rate was 64 beats/min, and the $\text{O}_2$ saturation was 95%. At 20 h, the blood pressure was 172/94 mmHg, heart rate was 69 beats/min, $\text{O}_2$ saturation was 97%, and the blood pressure was 135/68 mmHg.

Puncture wounds were treated by finger compression to stop bleeding. If after 20 min no bleeding had occurred, then an elastic bandage was applied for compression. A 1 kg sandbag was applied for 6 h and a right lower limb brake was applied for 12 h. The wound dressing was changed daily. TEE on the first day after the procedure showed that the position of the umbrella was good, and that the residual shunt was about 2 mm behind the lower edge of the umbrella. No procedure-associated complications occurred during hospitalization or in the 12 d after the procedure. Follow-up echocardiography on October 18, 2019, 45 d after the procedure, and November 21, 2019 found that the occluder was in a good position, with a residual shunt of 2 mm around the lower edge of the umbrella. There had been no serious arrhythmia, bleeding, or cerebrovascular accident (Figure 1).

DISCUSSION

Dextrocardia situs inversus totalis is a rare congenital cardiac anomaly[26] in which the relationship of the great arteries is normal or transposed, as in mirror dextrocardia (coordinated cardiac circulation). Uncoordinated cardiac circulation usually shows congenital transposition of great arteries[27]. In patients with mirror dextrocardia, the main challenge for surgeons is the reversal of the whole heart, and in this case, the ECG leads were placed in the mirror mode (i.e., reversed). The fluoroscopy image is reversed horizontally, and the catheter is rotated in the opposite direction from normal [28]. The risks of coronary atherosclerosis and acute myocardial infarction in those with mirror dextrocardia are not different from those in normal individuals.

Anatomical characteristics of LAA

LAA is a remnant of the primitive atrium in the embryo. It has pectinate and trabecular muscle a unique rough endocardium[11]. It usually has three anatomical regions, the mouth, neck, and leaf and a morphology usually described as chicken wing, cactus, windsock, and cauliflower, which are present in different proportions[29, 30] and appear different when observed from different angles. Some studies have reported that the LAA regulates pressure and volume load, releases atrial natriuretic peptide and B-type natriuretic peptide, and regulates hemodynamics.

Capacity load

The increase of volumetric load blood pressure after cardiac interventions may be related to excess intraoperative infusion. The left ventricular cardiac ejection fraction of the patient, who weighed 79.8-80 kg, was 56%. Fluid loss was $[(d \times 10) + (2 \times 10) + (1 \times 60)] \times 9 = 1080$ mL and replenishment was complete within 2 h after the start of anesthesia[31,32]. The volume of fluid replenishment at 1 h was 1080/2 + 110 = 650 mL, with an additional 650 mL at 2 h. After that, a physiological requirement of 110 mL/h was maintained. The patient was given antibiotics (0.9% normal saline 100 mL + cefuroxime 1500 mg), sodium lactate ringer injection 500 mL + 5% glucose, normal saline 500 mL + heparin 5000 U within 2 h after the start of anesthesia. The total of 2100 mL, which was more than needed, may have contributed to the postoperative elevated blood pressure. It was agreed that the total intraoperative fluid given to the patient was not likely to have exceeded 1500 mL.

Nursing guidance by ERAS recommendations

The preoperative nutritional status of the patient was good; he did not smoke or drink. His hemoglobin was 136 g/L, and he was infection-free. An electronic health platform allowed for establishment of a real-time hospital community with an application for those with coronary heart disease to participate in a cardiac preconditioning plan that
| Phase          | Project                        | Level of evidence | Recommendation | Remarks                                                                                     |
|----------------|--------------------------------|-------------------|----------------|---------------------------------------------------------------------------------------------|
| Preoperative   | Hemoglobin                     | IIA, C-LD         | Yes            | Preoperative measurement of hemoglobin to assist risk stratification                          |
|                | Albumin                        | IIA, C-LD         | Yes            | Preoperative assessment of albumin contributes to risk stratification                          |
|                | Correcting malnutrition        | IIA, C-LD         | Yes            | Recommend correcting nutritional deficiencies where feasible                                |
|                | Smoking and drinking           | I, C-LD           | Yes            | Patients were advised to stop 4 wk prior to elective surgery                                 |
|                | Carbohydrate load              | IIIB, C-LD        | Yes            | Carbohydrate loading (sugar prestocking) can be performed 2-4 h before general anesthesia    |
|                | Infection prevention           | IA                | Yes            | Cephalosporins are recommended for 30-60 min before surgery                                  |
|                | E-health platform              | IIA, C-LD         | Yes            | Establish electronic health education platform                                              |
|                | Cardiac preconditioning program| IIA, B-NR         | Yes            | These include education, nutrition optimization, sports training, social support, and mindfulness stress reduction training to reduce anxiety |
| Intraoperative | Implementation care package    | I, B-R            | Yes            | Including local intranasal therapy to eliminate staphylococcal colonization                   |
|                | Recovery temperature           | III, B-R          | No             | Skin preparation, depilation plan, dressing change after every 48 h                         |
|                | Rigid sternum fraction         | IIA, B-R          | No             | Avoid high temperature during cardiopulmonary bypass reheating, that is the core temperature should not be > 37.9 °C |
|                | Bleeding prevention            | I, A              | No             | Rigid sternum fraction is beneficial in patients undergoing sternotomy                       |
|                | Enhanced glycemic control      | IIA, B-NR         | Yes            | Tranexamic acid or amino hoxic acid is recommended for cardiopulmonary bypass               |
| Postoperative  | Insulin infusion to treat      | IIA, B-NR         | No             | Insulin infusion is recommended to treat perioperative hyperglycemia                          |
|                | hyperglycemia                  |                   |                | Factors of postoperative hyperglycemia: glucose toxicity, oxidative stress, prethrombotic effect, inflammation |
|                | Pain management                | I, B-NR           | No             | Prescription of acetaminophen, tramadol, dexmedetomidine, pregabalin, gabapentin, etc.        |
|                | Hypothermia                    | I, B-NR           | Yes            | Warm blankets, elevated room temperature, heat perfusion and intravenous infusion are recommended for postoperative use |
|                | Delirium                       | I, B-NR           | Yes            | At least one delirium screening is recommended for each nursing class                        |
|                | Anticoagulant drugs            | IIA, C-LD         | Yes            | Drug anticoagulation is recommended to reduce the risk of thrombosis                          |
|                | Early extubation               | IIA, B-NR         | Yes            | Strategies are recommended to ensure that the tube is extubated within 6 h of surgery        |
|                | Acute renal injury             | IIA, B-R          | Yes            | Biomarkers are recommended for early identification of at-risk patients early and guide the reduction of AKI |
|                | Goal-directed fluid therapy    | I, B-R            | Yes            | Goal-directed fluid therapy is recommended to reduce postoperative complications              |
| Other          | Goal-directed fluid therapy    | I, B-R            | Yes            | Goal-directed fluid therapy is recommended to reduce postoperative complications              |
|                | Other                          | Unrated           | Yes            | Cardiopulmonary bypass, perfusion, mechanical ventilation at low tidal volume, early postoperative enteral feeding and postoperative mobilization are recommended |

AKI: Acute kidney injury.
depression in patients with Alzheimer’s disease. Studies in China have shown that five-element music therapy improved the sleep quality of patients with heart failure and anxiety and that Wuxing music combined with Baduanjin had a positive effect on the psychology of patients with poor health status[37,38]. Music therapy was used in the care of this patient. Six pieces of music were selected and played at 8:00-8:30 in the morning and 20:00-20:30 in the evening. The volume was 40-60 DB. On September 6, the SAS score was 46, and the anxiety state had significantly improved. Music therapy was easy to provide and not limited by the venue, and was enjoyed by the patient (Table 1).

CONCLUSION

Mirror dextrocardia has typical clinical characteristics. Because of the high prevalence and mortality of atrial fibrillation of patients with mirror dextrocardia, LAAO has an important role in treatment, which continues to be confirmed[39,40]. LAAO is an ideal choice for patients with atrial fibrillation. The 2019 nursing guidelines for accelerated cardiac surgery recovery optimize the clinical nursing path of patients with LAAO and can reduce perioperative complications and ensure the patient safety. The application of music therapy can reduce patient anxiety and is suitable for the entire process of treatment and nursing care.

ACKNOWLEDGEMENTS

The authors would like to express their gratitude to Wong F, for performance of the transesophageal echocardiography assessment; to Liu YX, for serving as the patient’s anesthesiologist; and to Zheng QQ, who performed language translation activities for the case report.

REFERENCES

1. Engelman DT, Ben Ali W, Williams JB, Perrault LP, Reddy VS, Arora RC, Roselli EE, Khoynezhad A, Gerdisch M, Levy JH, lobdell K, Fletcher N, Kirsch M, Nelson G, Engelman RM, Gregory AJ, Boyle EM. Guidelines for Perioperative Care in Cardiac Surgery: Enhanced Recovery After Surgery Society Recommendations. JAMA Surg 2019; 154: 755-766 [PMID: 31054241 DOI: 10.1001/jamasurg.2019.1153]

2. Kubitz JC, Schulte-Uentrop L, Zoellner C, Lemke M, Messner-Schmitt A, Kaltbacher D, Sill B, Reichenspurner H, Koell B, Girdauskas E. Establishment of an enhanced recovery after surgery protocol in minimally invasive heart valve surgery. PLoS One 2020; 15: e0231378 [PMID: 32271849 DOI: 10.1371/journal.pone.0231378]

3. McGinigle KL, Eldrup-Jorgensen J, McCall R, Freeman NL, Pascarella L, Farber MA, Marston WA, Crowner JR. A systematic review of enhanced recovery after surgery for vascular operations. J Vasc Surg 2019; 70: 629-640.e1 [PMID: 30922754 DOI: 10.1016/j.vjs.2019.01.050]

4. Sola M, Ramm CJ, Kolarczyk LM, Teeter EG, Yeung M, Caranasos TG, Vavalle JP. Application of a Multidisciplinary Enhanced Recovery After Surgery Pathway to Improve Patient Outcomes After Transcatheter Aortic Valve Implantation. Am J Cardiol 2016; 118: 418-423 [PMID: 27344271 DOI: 10.1016/j.amjcard.2016.05.015]

5. Zaouter C, Imbault J, Labrousse L, Abdelmoumen Y, Coiffic A, Colonna G, Jansens JL, Ouattara A. Association of Robotic Totally Endoscopic Coronary Artery Bypass Graft Surgery Associated With a Preliminary Cardiac Enhanced Recovery After Surgery Program: A Retrospective Analysis. J Cardiothorac Vasc Anesth 2015; 29: 1489-1497 [PMID: 26119408 DOI: 10.1053/j.jvca.2015.03.003]

6. Alsagheir A, Koziaza A, Belley-Côté EP, Whitlock RP. Left Atrial Appendage Occlusion: A Narrative Review. J Cardiothorac Vasc Anesth 2019; 33: 1753-1765 [PMID: 30857852 DOI: 10.1053/j.jvca.2019.01.054]

7. Holmes DR Jr, Doshi SK, Kar S, Price MJ, Sanchez JM, Sievert H, Valderrabano M, Reddy YV. Left Atrial Appendage Closure as an Alternative to Warfarin for Stroke Prevention in Atrial Fibrillation: A Patient-Level Meta-Analysis. J Am Coll Cardiol 2015; 65: 2614-2623 [PMID: 26088300 DOI: 10.1016/j.jacc.2015.04.025]

8. Chow DHF, Wong YH, Park JW, Lam YY, De Potter T, Rodés-Cabau J, Asmarats L, Sandri M, Sideris E, McCaw T, Lee RJ, Sievert H, Søndergaard L, De Backer O. An overview of current and emerging devices for percutaneous left atrial appendage closure. Trends Cardiovasc Med 2019; 29: 228-236 [PMID: 30205924 DOI: 10.1016/j.tcm.2018.08.008]

9. Francisco ARG, Infante de Oliveira E, Nobre Menezes M, Carrilho Ferreira P, Canas da Silva P, Nobre A, Pinto FJ. Combined MitraClip implantation and left atrial appendage occlusion using the
Watchman device: A case series from a referral center. *Rev Port Cardiol* 2017; 36: 525-532 [PMID: 28673783 DOI: 10.1016/j.rcpi.2016.11.012]

10 Chanda A, Reilly JP. Left Atrial Appendage Occlusion for Stroke Prevention. *Prog Cardiovasc Dis* 2017; 59: 626-635 [PMID: 28457791 DOI: 10.1016/j.pcad.2017.07.003]

11 Naksuk N, Padmanabhan D, Yogeswaran V, Asirvatham SJ. Left Atrial Appendage: Embryology, Anatomy, Physiology, Arrhythmia and Therapeutic Intervention. *JACC Clin Electrophysiol* 2016; 2: 203-412 [PMID: 26795858 DOI: 10.1016/j.jacep.2016.06.066]

12 Gliskon M, Wolff R, Hindricks G, Mandrola J, Camm AJ, Lip GYH, Faucher L, Betts TR, Llewel-ter T, Saw J, Tzakas A, Sternik L, Nieltsch P, Berti S, Sievert H, Bertog S, Meier B. EHRA/EAPCI expert consensus statement on catheter-based left atrial appendage occlusion - an update. *EuroIntervention* 2020; 15: 1133-1180 [PMID: 31474583 DOI: 10.4244/EIJY19M08_01]

13 Reddy VY, Sievert H, Halperin J, Doshi SK, Buchbinder M, Neuzil P, Huber K, Whisnant B, Kar S, Swanup V, Gordon N, Gordon N, Holmes D. PROTECT AF Steering Committee and Investigators. Percutaneous left atrial appendage closure vs warfarin for atrial fibrillation: a randomized clinical trial. *JAMA* 2014; 312: 1988-1998 [PMID: 25399274 DOI: 10.1001/jama.2014.15192]

14 Berti S, Santoro G, Brsic E, Montorffano M, Vignali L, Danna P, Tondo C, D’Amico G, Stabile A, Sacca S, Patti G, Rapacciuolo A, Poli A, Polino P, Magnavacchi P, De Caterina A, Meucci F, Pezzulli B, Rezzaghi M, Stolcova M, Tarantini G. Left atrial appendage closure using AMPLATZER™ devices: A large, multicenter, Italian registry. *Int J Cardiol* 2017; 248: 103-107 [PMID: 28797952 DOI: 10.1016/j.ijcard.2017.07.052]

15 Lee OH, Kim JS, Pak HN, Hong GR, Shim CY, Uhn JS, Cho IJ, Joung B, Yu CW, Lee HJ, Kang WC, Shin ES, Choi RK, Lim DS, Jang Y. Feasibility of Left Atrial Appendage Occlusion for Left Atrial Appendage Thrombus in Patients With Persistent Atrial Fibrillation. *Am J Cardiol* 2018; 121: 1534-1539 [PMID: 29038103 DOI: 10.1016/j.amjcard.2018.02.045]

16 Lemperreux M, Aminian A, Freixa X, Gafoor S, Shaker S, Orhan M, Bertel S, Santoro G, Kefer J, Landmesser U, Nielsen-Kudsk JE, Cruz-Gonzalez I, Kanagaratnam P, Nieltsch P, Ibrahim R, Sievert H, Schillinger W, Park JW, Gloekler S, Tzikas A. Left Atrial Appendage Occlusion in Patients With Atrial Fibrillation and Previous Major Gastrointestinal Bleeding (from the Amplatzer Cardiac Plug Multicenter Registry). *Am J Cardiol* 2017; 120: 414-420 [PMID: 28595859 DOI: 10.1016/j.amjcard.2017.04.046]

17 Price MJ. Safety and Efficacy of Transcatheter Left Atrial Appendage Closure for Stroke Prevention in Patients With Persistent Atrial Fibrillation. *Prog Cardiovasc Dis* 2018; 60: 542-549 [PMID: 29339165 DOI: 10.1016/j.pcad.2018.01.002]

18 Wiebe J, Franke J, Lehnt K, Hofmann I, Vaskelyte L, Bertog S, Sievert H. Percutaneous Left Atrial Appendage Closure With the Watchman Device: Long-Term Results Up to 5 Years. *JACC Cardiovasc Interv* 2015; 8: 1915-1921 [PMID: 26738659 DOI: 10.1016/j.jcin.2015.07.040]

19 Hutt E, Wazni OM, Saliba WJ, Kama J, Takakij KG, Aguilera J, Barakat AF, Rasmussen P, Uchino C, Russman A, Hussain S, Wisco D, Kapadia S, Lindsay BD, Hussein AA. Left atrial appendage closure device implantation in patients with prior intracranial hemorrhage. *Heart Rhythm* 2019; 16: 663-668 [PMID: 30521942 DOI: 10.1016/j.hrtm.2018.11.022]

20 Reddy VY, Doshi SK, Kar S, Gibson DN, Price MJ, Huber K, Horton RP, Buchbinder M, Neuzil P, Gordon NT, Holmes DR Jr, PREVAIL and PROTECT AF Investigators. 5-Year Outcomes After Left Atrial Appendage Closure: From the PREVAIL and PROTECT AF Trials. *J Am Coll Cardiol* 2017; 70: 2964-2975 [PMID: 29103847 DOI: 10.1016/j.jacc.2017.10.021]

21 Perloff JK. The cardiac malpositions. *Am J Cardiol* 2011; 108: 1352-1361 [PMID: 21861958 DOI: 10.1016/j.amjcard.2011.06.055]

22 Li Y, Fang JB. Nursing strategy and complication prevention of cardiac resynchronization therapy for a patient with dextrocardia. *Huli Xuebao* 2018; 25: 59-61

23 Qutbi M. SPECT myocardial perfusion imaging in patients with Dextrocardia. *J Nucl Cardiol* 2019; 26: 1197-1204 [PMID: 31062220 DOI: 10.1016/j.snucn.2019.01.0173-w]

24 Yilmaz S, Demirtas A, Tokpinar A, Niyazi A. Dextrocardia and Situs Inversus Totalis in a Turkish Subject: A Case Report. *Int J Morphol* 2019; 37: 900-902

25 González-Cordero A, López-Puebla J, Franco-Rivera H. Implantation of a completely right sided subcutaneous cardioverter-defibrillator in a patient with situs inversus dextrocardia. *Indian Pacing Electrophysiol J* 2019; 19: 72-74 [PMID: 30468861 DOI: 10.1016/j.ipej.2018.11.010]

26 Onan B, Aydin U, Kahraman Z, Baki R. Robotic atrial septal defect closure and tricuspid annuloplasty in a case of situs inversus totalis with dextrocardia. *J Robot Surg* 2017; 11: 87-90 [PMID: 27344445 DOI: 10.1007/s11701-016-0619-3]

27 Zhou GB, Ma J, Zhang J, Guo XG, Yang JD, Liu SW, Ouyang FF. Catheter ablation of supraventricular tachycardia in patients with dextrocardia and situs inversus. *J Cardiovasc Electrophysiol* 2019; 30: 557-564 [PMID: 30661266 DOI: 10.1111/jce.13847]

28 He J, Sun Y, Zhang X, Wang Y, Zhong J, Lin F, Liu Y. Emergent percutaneous coronary intervention for acute myocardial infarction in patients with mirror dextrocardia: case reports and brief review. *Cardiovasc Diagn Ther* 2016; 6: 267-273 [PMID: 27280091 DOI: 10.21037/cdt.2015.12.12]

29 Barbero U, Ho SY. Anatomy of the atria. *Herdziehr Elektrophys* 2017; 38: 347-354

30 López-Minguez JR, Nogales-Acasios JM, Infante De Oliveira E, De Gama Ribeiro V, Ruiz-Salmerón R, Azurmendi-Aizpurua D, Costa M, Gutiérrez-García IJ, Fernández-Díaz JA, Martín-Yuste V, Ramí-Merchán JC, Moreno-Gómez R, Benedicto-Buenija A, Igüeza-Romero A. Long-term Event Reduction After Left Atrial Appendage Closure. Results of the Iberian Registry II. *Rev Esp Cardiol*
Tian B et al. LAAO in mirror-image dextrocardia

English version

(WJCC) https://www.wjgnet.com
February 6, 2022 Volume 10 Issue 4

Caliskan E, Cox JL, Holmes DR Jr, Meier B, Lakkireddy DR, Falk V, Salzberg SP, Emmert MY. Interventional and surgical occlusion of the left atrial appendage. Nat Rev Cardiol 2017; 14: 727-743 [PMID: 28795688 DOI: 10.1038/nrcardio.2017.107]

Huang WQ, Xu X. Expert consensus on fluid therapy during anesthesia operation. Annual Meeting of Anesthesiology Branch of Beijing Medical Association. 2014; 24-25

Vaudeville R, Avila L, Bradt J, Pasquina P. Music therapy applied to complex blast injury in interdisciplinary care: a case report. Disabil Rehabil 2019; 41: 2333-2342 [PMID: 30845807 DOI: 10.1080/09638288.2018.1462412]

Wood C, Cutshall SM, Wiste RM, Gentes RC, Rian JS, Tipton AM, Ann-Marie D, Mahapatra S, Carey EC, Strand JJ. Implementing a Palliative Medicine Music Therapy Program: A Quality Improvement Project. Am J Hosp Palliat Care 2019; 36: 603-607 [PMID: 30949091 DOI: 10.1080/1049909119834878]

Sihvonen AJ, Särkämö T, Leo V, Tervaniemi M, Altenmüller E, Soinila S. Music-based interventions in neurological rehabilitation. Lancet Neurol 2017; 16: 648-660 [PMID: 28663005 DOI: 10.1016/S1474-4422(17)30168-0]

Chu H, Yang CY, Lin Y, Ou KL, Lee TY, O’Brien AP, Chou KR. The impact of group music therapy on depression and cognition in elderly persons with dementia: a randomized controlled study. Biol Res Nurs 2014; 16: 209-217 [PMID: 23639952 DOI: 10.1177/1099800414485410]

Gao J, Yi X, Wu CX, Bai DX, Ye Y, Zhu R, Wu S. Application effect of noon ebb flow timing five element music therapy in patients with chronic heart failure anxiety. Zhonghua Huli Zazhi 2016; 51: 443-448

Geng YQ. Research on the intervention effect of Baduanjin and Five-notes music on mental sub-health state. Nanjing University of Traditional Chinese Medicine (Dissertation), 2013

Schnabel RB, Yin X, Gona P, Larson MG, Beiser AS, McManus DD, Newton-Cheh C, Lubitz SA, Magnani JW, Ellison PT, Seshadri S, Wolf PA, Vasan RS, Benjamin EJ, Levy D. 50 year trends in atrial fibrillation prevalence, incidence, risk factors, and mortality in the Framingham Heart Study: a cohort study. Lancet 2015; 386: 154-162 [PMID: 25960110 DOI: 10.1016/S0140-6736(14)61774-8]

Lin JJ, Fan YQ. Nursing care of 4 patients with transcatheter closure of left atrial appendage. Zhonghua Huli Zazhi 2015; 50: 629-631
