



Case Report / Olgu Sunumu

Endoscopic atrioventricular valve surgery in extreme obesity

Aşırı obezitede endoskopik atriyoventriküler kapak cerrahisi

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ABSTRACT

Obesity is one of the greatest public health challenges of the 21st century and worldwide incidence of extreme obese patients is increasing. Sternal dehiscence and wound infections are amongst the devastating morbidities associated with classic sternotomy in these patients. The perceived technical challenges, in-hospital morbidity and increased mortality risks often deter surgeons from offering these patients the option and benefits of minimally invasive approaches. This case series presents our perioperative and long-term clinical and echocardiographic outcomes of endoscopic port access atrioventricular valve surgery in seven consecutive patients with body mass indexes above 40, operated by our current surgical team.

Keywords: Extreme obesity; minimally invasive cardiac surgery; mitral and tricuspid valve disease; outcome.

Obesity is a significant public health challenge^[1] and recent reports suggest that the incidence of extreme obese patients (EOP) with body mass index (BMI) greater than 40 and 50 increased four and five times, respectively, over the last 20 years.^[2] Sternal dehiscence, wound infection and respiratory complications are amongst the devastating morbidities associated with conventional sternotomy approaches in EOP.^[3,4] The reported exclusion of EOP from minimally invasive (MI) outcome data reports due to the perceived technical challenges and risks of adverse outcomes^[5] undermine the potential beneficial role of MI approaches in these patients. This retrospective, observational, single-center case series presents the perioperative and long-term clinical and

ÖZ

Obezite 21. yüzyılın en önemli kamu sağlığı sorunlarından biridir ve dünya çapında aşırı obez hastaların görülme sıklığı artmaktadır. Sternal dehisens ve yara enfeksiyonları bu hastalarda klasik sternotomi ile ilişkili yıkıcı morbiditeler arasındadır. Öngörülen teknik zorluklar, hastane morbiditesi ve artmış mortalite riskleri cerrahları bu hastalara minimal invaziv yaklaşımlar seçeneğini ve bunların faydalarını önermekten sıklıkla alıkoymaktadır. Bu olgu serisinde mevcut cerrahi ekibimiz tarafından ameliyat edilen, vücut kütle indeksi 40'ın üzerinde olan yedi ardışık hastada endoskopik port erişimli atriyoventriküler kapak cerrahisindeki ameliyat sırası ve uzun vadeli klinik ve ekokardiyografik sonuçlarımız sunuldu.

Anahtar sözcükler: Aşırı obezite; minimal invaziv kardiyak cerrahi; mitral ve triküspit kapak hastalığı; sonuç.

echocardiographic outcomes of endoscopic port access surgery (EPAS) for atrioventricular valve disease in seven consecutive extreme obese patients who were operated by our current surgical team between 01 November 2008 and 30 September 2015.

CASE REPORT

The relevant preoperative EOP characteristics and surgical indications, which may be multiple per patient, were outlined in Tables 1 and 2, respectively. Our routine EPAS technique^[6] was modified in the context of EOP (Figure 1a). The skin folds and excessive subcutaneous tissues were retracted away from incision areas during draping. We established our working port over the fourth intercostal, anterior axillary space and utilized

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Table 1. Preoperative patient characteristics (n=7)

Variable	n	%	Mean±SD	Range
Mean age (year)			65.8±10.6	46.4-76.8
Age above 70 years	3	42.0		
Female	1	14.3		
Body mass index (range)			43.3±3.8	40.2-52.1
Mean length (centimeters)			162.6±9.8	150-178
Mean weight (kilograms)			114.0±12.4	96-138
Comorbidities present				
Hypertension	1	100.0		
Hypercholesterolemia	3	42.9		
Type 1 diabetes mellitus	3	42.9		
Previous deep venous thrombosis and pulmonary embolism	2	28.6		
Obstructive sleep apnea syndrome	4	57.1		
Abnormal lung function	5	71.4		
Forced expiratory volume in 1 second <90%	5	71.4		
Diffusing capacity for carbon monoxide <80%	5	71.4		
Hypertrophic obstructive cardiomyopathy	1	14.3		
Atrial fibrillation	6	85.7		
Renal dysfunction	3	42.9		
Pulmonary hypertension	7	100.0		
Mean pulmonary artery pressure (millimeters of mercury)			61.1±15.0	45-84
Mean EuroSCORE II (range)			5.2±1.5	3.1-7.3
Mean left ventricular function (range)			51.6±9.5	38-63
Impaired (<50%)	1	14.3		
New York Heart Association functional status				
III	5	71.4		
IV	2	28.6		

SD: Standard deviation.

an endoscopic non-rib-spreading access site soft tissue retractor (SurgiSleeve™, 2.5-6 centimeters, Covidien, Massachusetts, USA) for additional wound protection. We used extra-long (53- or 100-millimeter) endoscopic camera trocars (Vectec SA, Hauterive, France) and established all intercostal ports by blunt dissection (Figure 1b). Unobstructed visual and working access were ascertained by resecting excessive pericardial fat and retracting the diaphragmatic dome infero-laterally with exteriorized traction sutures.

Preoperative aorto-iliac-femoral-axis evaluation was routinely performed in all patients either during coronary catheterization or by magnetic resonance angiography. Classic open femoral vascular exposure or total percutaneous peripheral cannulation was performed with the use of vascular closure devices according to surgical preference (Figure 2a). Lymphatic regions in the groin were avoided to minimize devastating postoperative lympho-infective wound complications. Peripheral cardiopulmonary bypass was established by trans-esophageal echocardiography (TEE) guided cannulation of the right internal jugular

vein (16-18Fr, OptiSite™, Edwards Lifesciences, Irvine, California, USA), right femoral vein (22-25 Fr, Quickdraw™, Edwards Lifesciences, Irvine,

Table 2. Surgical indications (n=7)

Surgical indications	%
Mitral valve dysfunction	100.0
Annular dilatation	28.6
Myxomatous degenerative disease	28.6
Rheumatic valve disease	28.6
Systolic anterior motion	14.3
Carpentier classification	
Type 1	28.6
Type 2	42.9
Type 3a	28.6
Tricuspid valve dysfunction	42.9
Carpentier classification	
Type 1	42.9
Patent foramen ovale	14.3
Atrial fibrillation	42.9
Left ventricle outflow tract obstruction (gradient 80 mmHg)	14.3

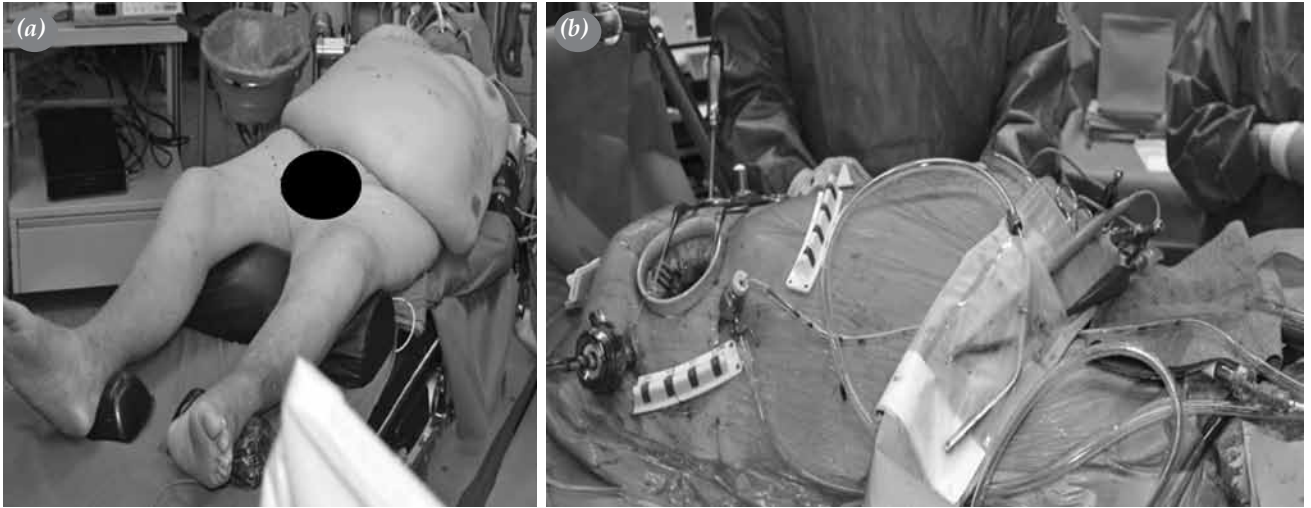


Figure 1. (a) Endoscopic port access atrioventricular valve surgery in an extreme obese patient. (b) Port placement and surgical setup.

California, USA) and right femoral artery cannulation (21Fr or 23Fr, EndoReturn™, Edwards Lifesciences, Irvine, California, USA).

An endo-aortic balloon (IntraClude™, Edwards Lifesciences, Irvine, California, USA) was utilized for aortic occlusion and delivery of cold antegrade crystalloid cardioplegia. Routine atrioventricular valve surgery was performed with long shafted instruments (Table 3).

Endoscopic transatrial left ventricular outflow tract resection was performed by detaching the anterior mitral valve (MV)-leaflet segments A1-A2-A3 from the MV-annulus with subsequent myomectomy from the aortic valve to the papillary muscle base. The anterior MV-leaflet was reattached to the annulus with the incorporation of an oversized bovine pericardial patch.

Tricuspid valve (TV) surgery was performed by bicaval snaring, argon-gas surgical cryoablation (Medtronic Inc, Minneapolis, USA) and left atrial appendage closure for chronic atrial fibrillation and closure of patent foramen ovale were routinely performed.

Post-procedural TEE guided de-airing was ensured by left atrial and aortic balloon venting catheters and continuous flooding of the operative field with carbon dioxide. Temporary ventricular pacing wires were placed on the ventricular aspect.

Cardiorespiratory support, pulmonary hypertension protocols, sedation, analgesia, glycemic control, wound reviews (Figure 2b and c) and anticoagulation stabilization were applied as indicated in intensive care and general ward.

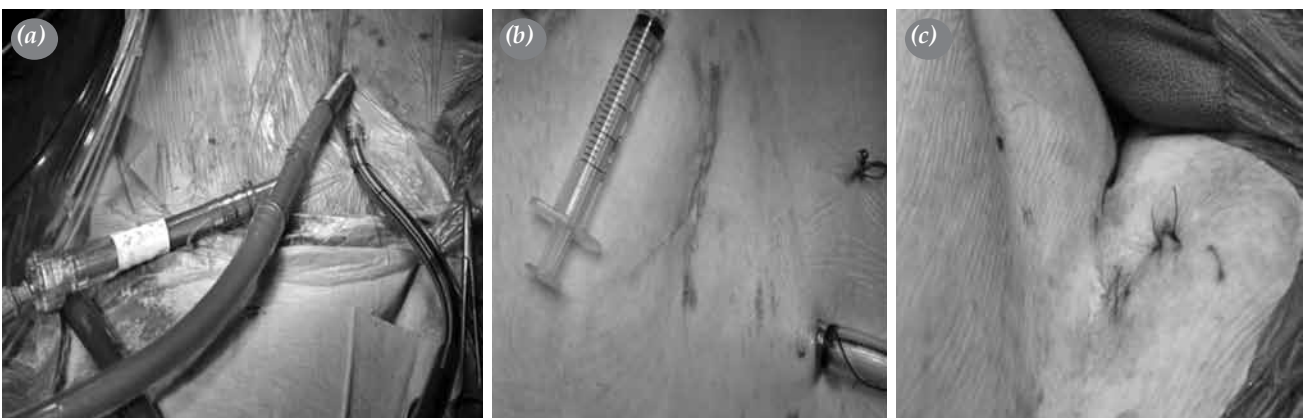


Figure 2. (a) Percutaneous cardiopulmonary bypass facilitated by vascular closure devices. (b) Postoperative working port and (c) groin incision.

Table 3. Procedures applied, cardiopulmonary bypass and ischemic times (n=7)

Procedures performed	n	%	Mean±SD	Range
Mitral valve repair	5	71.4		
Ring implantation	5	71.4		
Leaflet resection	1	14.3		
Leaflet patch reconstruction	1	14.3		
Cleft closure	3	42.9		
Papillary muscle transfer	1	14.3		
Secondary chordae release	1	14.3		
Neochordae implantation	2	28.6		
Mitral valve replacement	2	28.6		
Left ventricle septal myomectomy	1	14.3		
Tricuspid valve repair	1	14.3		
Ring implantation	1	14.3		
Foramen ovale closure	1	14.3		
Cryoablation	3	42.6		
Left atrial appendage exclusion	6	85.7		
Cardiopulmonary bypass time (min)			144.9±36.7	112-224
Endoballoon occlusion time (min)			98.3±34.1	76-174

SD: Standard deviation.

There were no 30-day mortalities. One patient (14.3%) required revision for bleeding, which was performed through the same incision without further complications. Prolonged intensive care admission (more than six days), incision wound infection, dialysis, hospital acquired pneumonia and eventual permanent pacemaker insertion all occurred in one patient (14.3%), who sustained a perioperative stroke and subsequent mechanical valve thrombosis on day 10 postoperatively. This was treated medically and eventual home discharge was achieved on day 72. The mean length of hospitalization was 22.6±22.7 days (range 7-72 days). Analyses of a total of 276.0 patient months (100% complete, range 2.2-84.5 months, mean 39.4±88.4 months, 85.7% longer than two years) revealed no late mortalities, no reinterventions, no residual MV-regurgitation more than grade 1 following MV-repair and no paravalvular leaks post-MV-replacement. Residual TV-regurgitation more than grade 2 was present in one patient (14.3%), the mean systolic pulmonary artery pressure was 38.7±15.6 mmHg and six patients (85.7%) had residual BMI greater than 40. New York Heart Association class I or II was achieved in six patients (85.7%).

DISCUSSION

The devastating morbidities associated with conventional sternotomy access in EOPs are well described, while to our knowledge; no reports

currently describe the outcomes of MI approaches for atrioventricular valve disease in this population. Our single-center series of seven patients confirmed the benefits of our strategy despite the presence of significant high-risk comorbidities. There were no 30 day- or long-term follow-up mortalities, no late atrioventricular valve reinterventions, no residual mitral valve regurgitation more than grade 1, paravalvular leaks or residual tricuspid valve regurgitation more than grade 2. Preoperative atrial fibrillation was present in six patients (85.7%), of which five (71.4%) maintained sinus rhythm at recent review.

In conclusion, endoscopic port access surgery for atrioventricular valve disease in extreme obese patients can be performed safely in experienced centers with favorable perioperative and long-term procedural, clinical and echocardiographic outcomes. Extreme obesity should not be perceived as a contraindication to endoscopic approaches and not deter surgeons and referring physicians from offering these patients the full range of benefits associated with MI cardiac surgery.

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