ORIGINAL ARTICLE

Bentall Operation, Initial Experience at Rawalpindi Institute of Cardiology

SHAHID KHALIL, NADIA MAQBOOL

ABSTRACT

Background: Aneurysmal ascending aorta is a risk factor for spontaneous rupture or dissection. Modified Bentall procedure (replacement of aorta with a tube graft with a valve prosthesis and reinsertion of coronary ostia) is the gold standard operation.
Methods: Between Jan 2013 to Jan 2017, 57 patients underwent Bentall operation at Rawalpindi institute of cardiology. Retrospective analysis of the operative data was done to study the surgical outcome.
Results: Mean age of the patient at the time of operation was 46±17. Operative mortality was 14%, higher operative mortality was noticed in patients with acute aortic dissections as much as 50% of overall mortality. Other complications include renal failure 2(3.5%), CVA 2(3.5%), respiratory complications 3(5.2%).
Conclusion: Bentall procedure offers good early and late clinical outcomes.
Keywords: Bentall operation, aorta, coronary ostia

INTRODUCTION

Dilatation of ascending aorta is the most common condition requiring surgery[1]. Dilatation causes aneurysms, dissections, rupture and aortic regurgitation. Surgery for aneurysms and dissection of aorta has always been a challenge for cardiac surgeons[2]. Increase age, hypertension, smoking, genetics, atherosclerosis and connective tissue disorder are the etiological problem associated with aneurysms[3,4]. In cases with the dilatation of aortic root modified bentall procedure (replacement of aorta with a vascular tube graft with biological or mechanical aortic valve prosthesis with reinsertion of coronary Ostia) is the gold standard operation[5,6]. In this study we have studied the clinical features and surgical outcome of bentall operation in this institution between 2013 and 2017.

METHODS

Patient's characteristics are described in Table 1. Between Jan 2013 to Jan 2017, 57 patients underwent bentall operation at Rawalpindi Institute of Cardiology. We retrospectively reviewed the medicals record of these patients. This study was approved by local ethical committee and individual consent was waived.

Pre operative Evaluation: It included detailed clinical examination, chest x ray, transthoracic and transesophageal echocardiography, CT aortogram and wherever necessary coronary angiography.

Rawalpindi Institute of Cardiology
Correspondence to Dr. Shahid Khalil, Associate Professor of Cardiac Surgery Email: drshahidkhalil333@gmail.com

Surgical techniques: The operation was performed by median sternotomy. Arterial cannulation was achieved either by cannulation of aortic arch or femoral artery. The venous cannulation was done by dual stage right atrial cannula. Myocardial protection was done through antegrade blood cardioplegia directly delivered into coronary ostia. Deep hypothermic circulatory arrest was achieved in 18(31.5%) patients. The coronary buttons were excised with small aortic patch and mobilized to facilitate re-implantation. Proximal anastomosis of valved conduit was implemented via pledgetted interrupted sutures. The distal graft to aorta anatomosis was done in continuous manner and coronary button were also anastomosed in continuous fashion. Carbomedics composite graft was used in all patients. Concomitant procedures were done in 13 patients included MVR in 3(5.2%), CABG in 4(7%), Hemiarch in 4(7%) and elephant trunk in 2(3.5%).

Follow up: Follow-up and anticoagulation was controlled by monthly PT assessment. Follow-up was primarily achieved on outpatient basis every six months. Thorough physical examination, ECG, chest x-rays and echocardiography were done in each visit.

Statistical analysis: Descriptive analyses were reported as mean±SD & for continuous variable as frequencies. Time related events were assessed by Kaplan Meir test. A P value of <0.05 was considered statistically significant. Calculations were performed by SPSS 15.

RESULTS

Table 1: Preoperative characteristics

Preoperative variables	**n**
Patients	57
Age (yrs) ± SD	46.3 ± 17.5
Male/Female	35/22(61.4/38.6)
Hypertension	31 (54.3)
Diabetes mellitus	21 (36.8)
Cerebrovascular accident	2(3.5)
Chronic kidney disease	7(12.2)
NYHA class	2.7± 1.3
EuroSCORE II (%)	4 [2–6]
Aorta ascendens diameter (mm)	62.7 ± 8.3
Grade of aortic regurgitation	2.8 ± 1.5
Ejection fraction (%) [before operation]	40± 11

Table 2: Operative data

Operative data	**n**
Aortic pathology	
Annuloaortic ectasia	38 (66.6)
Dissection (acute)	11 (19.2)
Dissection (chronic)	8(14)
Implanted valve type	
Mechanical valve	57 (100)
Composite valve size (mm)	25.9 ± 1.7
Comcomitant cardiac procedures	
Mitral valve replacement	3(5.2)
Coronary artery bypass	4 (7)
Total arch replacement	2 (3.5)
Pacemaker implantation	1 (1.7)
Hemiarch	4 (7)
Cardiopulmonary bypass	
Operation time (min)	245 [210–305]
Cardiopulmonary bypass time (min)	155 [130–185]
Aortic cross-clamp time (min)	113 [100–137]
DHCA use	13 (22.8)
Pharyngeal temperature (˚C)	25.6 ± 6.1
Timing of operation	
Emergency	11(19.2%)
Urgency	4(7%)
Elective	42(73.6%)

Table 3: Causes of complications

Complications	**n**
Intraoperative complications	
Bleeding	2(3.5%)
Arythmias	1(1.7%)
Early postoperative complications	
Bleeding	2(3.5%)
Diffuse cerebral hypoxia	2(3.5%)
Pericardial tamponade	1(1.7%)
Low cardiac output	3(5.2%)
Renal failure	2(3.5%)
Mult iorgan failure	4(7%)

Patient's demographics were described in table 1. There were 22(38.6%) females & 35(61.4%) males. The mean patient age at the time of operation was 46±17. 31(54.4%) patients had hypertension 21(36.8%) had diabetes mellitus and 7(12.2%) patients had renal dysfunction, 2(3.5%) patients had CVA. The main indication of operations were annuloaortic ectasia in 38(66.6%) patients, 11(19.2%) patients had acute aortic dissection where as 8(14%) had chronic dissection. Mean LVEF was 40±11. Operative variables were described in table 2. Operative mortality was 8(14%), higher motility was noted in patients with acute dissection almost 50% of overall mortality. Causes of mortality were low cardiac output syndrome 3, ventricular arrhythmia n=1 excessive bleeding 3 renal failure 1. Two patients with severely depressed myocardial function couldn't be weaned off from CPB. Duration of follow-up of 49 survivals ranged from 2 months to 4 years. There were 2 deaths related to anticoagulation related hemorrhage.

DISCUSSION

Despite the advancement in surgical techniques and myocardial protection surgery for aortic aneurysms and dissection remains a major challenge for cardiac surgeons[2]. The modified bentall operation is appropriate and gold standard operation for the patients with dilated aortic root and ascending aorta[5,6]. This can be performed with lower risk and good long term results. For non dissecting aortic anuerysmal dilatation the reported mortality is around 2% to 4%[7]. Whereas the patients of aortic dissection carries a verse outcome in view of heterogeneity of pathological anatomy and the fact that most of these operations were life saving emergencies[8]. Various studies have shown that independent risk factors for death after bentall procedure : advance age , dissection , marfan syndrome, severe LV dysfunction with LVEF< 35, emergency status , NYHA IV are the predictors of early and late death[9,10]. In this study we observed higher mortality rates in acute dissection as compared to that of International Registry for Acute Dissection (IRAD) in terms of extent f dissection flap table.

Recent reports have demonstrated better surgical outcome in patients with aortic dissection over time[11,12,13,14]. Current surgical mortality rates for acute type A dissection 5-10%[15,16]. The lower mortality rates were due to advances in diagnosis improved surgical techniques & increased surgical experience[17,18].

This study has several limitations i.e., it was retrospective observational and prospectively collective date base. Secondly sample size was small.

CONCLUSION

Bentall procedure offers good early and late clinical outcomes.

REFERENCES

1. Zalzstein E, Hamilton R, Zucker N, Diamant S, Webb G. Aortic dissection in children and young adults: diagnosis, patients at risk, and outcomes. Cardiol Young. 2003;13:341–4.
2. Boyer JK, Gutierrez F, Braverman AC. Approach to the dilatedaortic root. Curr Opin Cardiol. 2004;19:563–9.
3. Hiratzka LF, Bakris GL, Beckman JA, Bersin RM, Carr VF, Casey DE Jr, et al. ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM guidelines for the diagnosis and management of patients with thoracic aortic disease: A report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine. Circulation 2010; 121: e266–e369.
4. Borger MA, Preston M, Ivanov J, Fedak PW, Davierwala P, Armstrong S, et al.Should the ascending aorta be replaced more frequently in patients with bicuspid aortic valve disease? J Thorac Cardiovasc Surg 2004; 128: 677–683.
5. Bentall H, De Bono A. A technique for complete replacement of the ascending aorta. Thorax. 1968;23:338–9. doi: 10.1136/thx.23.4.338.
6. Kim TS, Na C-Y, Sam Sae O, Kim JH. Long-term mortality and morbidity after Button Bentall operation. J Card Surg. 2013;28:280–4. doi: 10.1111/jocs.12085.
7. Bhan A, Choudhary SK, Saikia M, Sharma R, Venugopal P. Surgical experience with dissecting and non dissecting aneurysms of the ascending aorta. Indian Heart J. 2001;53:319–22.
8. Januzzi JL, Isselbacher EM, Fattori R, Cooper JV, Smith DE, Fang J, et al. Characterizing the young patient with aortic dissection: results from the International Registry of Aortic Dissection (IRAD). J Am Coll Cardiol. 2004;43:665–9.
9. Prifti E, Bonacchi M, Frati G, Proietti P, Giunti G, Babatasi G, et al. Early and long-term outcome in patients undergoing aortic root replacement with composite graft according to the Bentall's technique. Eur J Cardiothorac Surg. 2002;21:15–21. doi: 10.1016/S1010-7940(01)01037-5.
10. Sioris T, David TE, Ivanov J, Armstrong S, Feindel CM. Clinical outcomes after separate and composite replacement of the aortic valve and ascending aorta. J Thorac Cardiovasc Surg. 2004;128:260–5. doi: 10.1016/j.jtcvs.2003.11.011.
11. Miller DC, Mitchell RS, Oyer PE, Stinson EB, Jamieson SW, Shumway NE. Independent determinants of operative mortality for patients with aortic dissections. *Circulation*. 1984;70(suppl I):I-153-I-164.
12. Svensson LG, Crawford ES, Hess KR, Coselli JS, Safi HJ. Dissection of the aorta and dissecting aortic aneurysms. *Circulation*. 1990;82(suppl IV):IV-24-IV-38.
13. Crawford ES, Kirklin JW, Naftel DC, Svensson LG, Coselli JS, Safi HJ. Surgery for acute dissection of ascending aorta: should the arch be included? J Thorac Cardiovasc Surg. 1992;104:46-59.
14. Kouchoukos NT, Wareing TH, Murphy SF, Perrillo JB. Sixteen-year experience with aortic root replacement: results of 172 operations. Ann Surg. 1991;214:308-320.
15. Laas J, Jurmann MJ, Heinemann M, Borst HG. Advances in aortic arch surgery. Ann Thorac Surg. 1992;53:227-232.
16. Lytle BW, Mahfood SS, Cosgrove DM, Loop FD. Replacement of the ascending aorta: early and late results. J Thorac Cardiovasc Surg. 1990;99:651-658.
17. Miller DC. Surgical management of acute aortic dissection: new data. Semin Thorac Cardiovasc Surg. 1991;3:225-237.
18. Rizzo RJ, Aranki SF, Aklog L, Couper GS, Adams DH, Collins JJ, Kinchla NM, Allred EN, Cohn LH. Rapid noninvasive diagnosis and surgical repair of acute ascending aortic dissection. J Thorac Cardiovasc Surg. 1994;108:567-575.