

ACUTE TYPE A AORTIC DISSECTION: A PATHOLOGY UNDER DIAGNOSED

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ABSTRACT

Objective: To compare the frequency of acute type A aortic dissection with chronic dissections, at two large cardiac surgery centers of the country. *Acute type A aortic dissection: a pathology under diagnosed.*

Material and Methods: This study was conducted at Rehman Medical Institute, Peshawar and National Institute of Cardiovascular diseases, Karachi, between January 2001 and January 2007. All patients with type A aortic dissection are studied retrospectively. Patients with aortic aneurysm, under going aortic root surgery, were not included in the study.

Results: Out of 13 patients who underwent aortic root surgery for various pathologies of the aorta, 9 cases had type A aortic dissection. Eight patients were diagnosed by trans-thoracic and trans-esophageal echocardiography and one patient was diagnosed on contrast enhanced computerized tomography (CT) scan. None of the patients had cardiac catheterization or MRI. Six of the nine dissections were chronic. One patient had Marfan Syndrome. Eight patients were hypertensive. One patient had aortic valve repair with supra coronary tube graft interposition for ascending aortic dissection; while eight patients had aortic root replacement with prosthetic composite grafts. There was one in-hospital death. Post operative echocardiogram of the patient with aortic valve repair, revealed mild aortic regurgitation. Seven of the eight surviving patients are in NYHA class I while one patient is in NYHA class II.

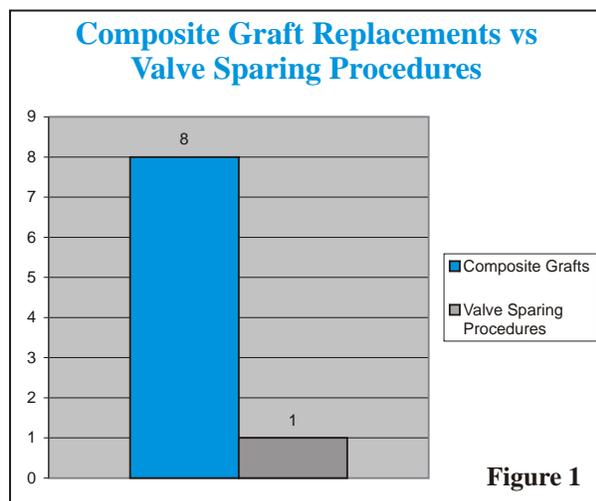
Conclusion: Aortic root surgery can be safely performed with results comparable to the published data. Hypertension needs to be controlled to avoid its potentially lethal complications, like aortic dissection. *Acute type A aortic dissection: a pathology under diagnosed.*

Key Words: Acute Type 'A' Aortic Dissection, Aortic Dissection, Aortic Root Replacement.

INTRODUCTION

Aortic dissections are not seen very frequently at our hospitals. There were six patients with aortic dissection in the data published by us on aortic root surgery cases, from the National Institute of Cardiovascular Diseases, Karachi; over a period of two and a half years in 2003. Four¹ of these dissections were chronic. The aim of surgery in patients presenting with acute type A dissection is to prevent aortic rupture, pericardial tamponade, to relieve aortic regurgitation, reduce the occurrence of malperfusion syndrome^{2,3} and prevent sudden death. Survival remains dismal for patients with acute type A aortic dissection without surgery.⁵ Mortality between fifty to sixty eight percent has been reported for patients with acute

type A aortic dissection, during first 48 hours, if not operated upon.^{6,7} This mortality figure rises to ninety percent in two weeks, for medically treated group of patients.⁸ Early referral of patients, improved surgical techniques and perioperative management has contributed to the improvement of surgical outcome, both for the aortic dissection and aneurysm groups. Replacement of the ascending aorta and aortic valve with composite graft is a safe and feasible procedure for a variety of pathological conditions involving the ascending aorta and aortic valve.⁹ Optimized medical management may be considered acceptable in certain high-risk groups.¹⁰ Patients are grouped high risk in the presence of cardiac tamponade, shock, congestive heart failure, cerebrovascular accident, stroke, coma, myocardial ischemia,



infarction, acute renal failure or mesenteric ischemia infarction at the time of surgery.¹¹

If we keep the natural history of type A aortic dissection in mind, up to nine out of every ten acute Type A aortic dissection patients would die during the first fourteen days of the event, if not operated upon. Therefore more patients with acute type A dissections should be presenting to any cardiac surgery facility than with chronic dissection. Since we have seen more patients in chronic state of type A aortic dissection, it may well mean that the diagnosis was missed in a much larger number of patients in acute state. The actual incidence of the disease in the community, therefore, will be much higher. The world wide reported incidence of the pathology is much higher as mentioned later in the discussion. The literature also mentions the possibility of missing the diagnosis easily; further pointing towards under diagnosis of the disease in our set ups. The aim of the study is to point towards the likelihood of under diagnosis of the pathology, and emphasize on a high level of clinical suspicion to avoid missing the diagnosis.

MATERIAL AND METHODS

Thirteen patients under went aortic root surgery for various pathologies of the aorta and aortic valve, between January 2001 and January 2007, at two major cardiac surgical facilities of the country; Rehman Medical Institute, Peshawar and National Institute of Cardiovascular Diseases, Karachi. All (total number nine) patients with type A aortic dissection are studied retrospectively. Patients with aortic aneurysm, under going aortic root surgery, are not included in the study. Eight patients had their diagnosis made by trans-thoracic and trans-esophageal echocardiography. One patient, referred from another center, had contrast enhanced computerized tomography (CT) scan, as a first investigation, to make diagnosis. None of

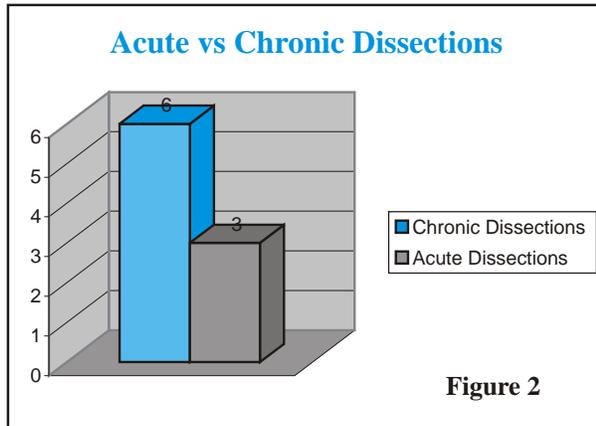
the patients had cardiac catheterization or MRI.

TECHNIQUE OF OPERATION

Patients were painted and draped in the routine way. Groins were also painted for emergency cardiopulmonary bypass, if required. Aorto-right atrial bypass was established in seven patients. Aortic cannulation, in these patients, was performed as high up, close to the arch, as possible. One patient had femoro-femoral bypass which was later on converted to femoro-right atrial bypass while one patient had Femoro-Right Atrial bypass during the whole procedure. The operations were performed at moderate hypothermia (25-28 degrees C). Cold crystalloid cardioplegia, as part of myocardial preservation, was given directly into the coronary ostia. Aortic Valve was inspected and decision regarding replacement or repair made. Aortic Valve was re-suspended at the commissures in one case. Ascending aorta was replaced, in this case, with a tube graft distal to coronary ostia. Aortic root was replaced with composite graft in the remaining eight cases. Interrupted 2 / 0 Ethibond was used for the proximal end of the composite graft in four cases while three sutures of 3 / 0 prolene were used in the other four. Coronary buttons technique¹²⁻¹⁴ was used for re-implantation of coronary arteries into the composite graft in 3 patients. Aortic wall around coronary ostia was sutured to the perimeter of the holes made in the conduit, for re-implantation of coronary arteries, as described by Bentall,¹⁵ in four patients. One patient had dissection of right coronary artery. His left coronary artery was re-implanted by the method as described by Bentall, while Right Internal Mammary Artery was anastomosed to Right coronary artery. The distal anastomosis with aorta was made using 3 / 0 or 4 / 0 prolene. Teflon felt was sutured internally in the distal ascending aorta first, in one of the cases, with dissection extending into the arch and further down, and then anastomosis with the composite graft made. Biological glue was used at the anastomotic sites, when available, before the release of aortic cross clamp. The heart was de-aired while the patients were re-warmed to normothermia and weaned off cardiopulmonary bypass. Protamine was given to reverse Heparin. Heart was decannulated and hemostasis ensured.

RESULTS

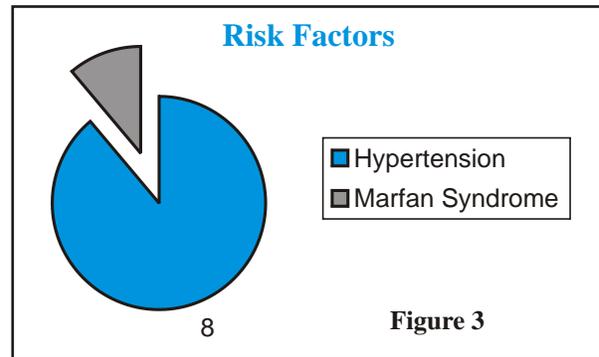
In the study group of patients the age range was from 25 years to 45 years with a mean age of 36.5 years. Male to female ratio was 8: 1. Three of the dissections were acute, presenting within two weeks of the onset of chest pain (dissection); while the remaining six were chronic. Dissection was limited to ascending aorta in seven



patients. Arch of the aorta and descending thoracic aorta were involved in dissection, in addition to the ascending aorta, in two patients. There were no neurological complications in any of the patients at the time of presentation. Severe aortic regurgitation was present in eight of the nine dissection patients. One patient had moderate aortic regurgitation. One patient died in the operation theatre due to uncontrolled bleeding. Another one was re-explored for excessive bleeding. Average ICU stay was 75 hours (48-120 hours). Hospital Stay was 10.2 days (8-15 days). There were no focal neurological deficits in any patients post operatively. All the surviving patients have attended the outpatient clinic at-least twice since their operation. Seven patients are in NYHA class I while one patient is in NYHA class II. The patient with the aortic valve sparing procedure has shown mild aortic regurgitation on trans-thoracic and trans-esophageal echocardiogram, performed eight weeks post operatively.

DISCUSSION

The estimated worldwide prevalence of Type A Aortic Dissection is 0.5 to 2.95 per 100,000 per year; the prevalence ranges from 0.2 to 0.8 per 100,000 per year in the United States.¹⁶ Hai-Yu and colleagues have reported the incidence of aortic dissection to be 43 per 1 000000 population in Taiwan.¹⁷ Ninety percent of the patients with Type A Aortic Dissection will die within 2 weeks, unless emergency surgery is performed to prevent the catastrophic natural course of the disease.⁸ Acute Aortic Dissection can be easily mistaken for other diseases like acute myocardial infarction. It can also present with neurological symptoms or as acute abdomen. Aortic dissection was the initial clinical impression only in 15 % of the cases (13 / 84 patients) in the study by Meszaros I and colleagues.⁷ Hagan PG et al have also pointed towards the wide range of manifestations of acute aortic dissection and stressed that a high level of clinical suspicion was required.¹⁸ In their report, the Task Force of European Society of Cardiology



has mentioned that ante-mortem diagnosis was made in only 15% of patients with aortic dissection, revealing that many immediately fatal events go undiagnosed.³ The National Institute of Cardiovascular Diseases, Karachi, drains patients from a large area of Sindh, Balochistan, Southern Punjab and also from the NWFP. Similarly Rehman Medical Institute has the largest cardiac surgery facility in NWFP draining both local patients and patients from Afghanistan. With a total population of the country of 160 millions, more patients with acute type A dissection would be expected at these large cardiac surgery centers of the country, keeping in view the reported incidence in literature. The total number of Type A aortic dissections cases experienced, at the Rehman Medical Institute and National Institute of Cardiovascular Diseases over a period of six years, is only nine. There are only three cases of acute aortic dissection among them. Since we have seen more patients with chronic dissection in our study, it may mean that vast majority of the acute dissection cases probably die without diagnosis; as mentioned earlier up to ninety percent of the surgically untreated patients die during first two weeks. Significant prolongation in life expectancy has been observed with replacement of ascending aorta and aortic root for a variety of pathological conditions involving ascending aorta and aortic valve.¹⁹ We can compare our results of Aortic Root Surgery for Aortic Dissection with those published data in literature. We had one in hospital death (11.1 %). Various studies have reported mortality from 3 % to 18 %.^{13, 20-23} Pseudo-aneurysm formation at the coronary suture line has been reported in literature.¹²⁻¹⁴ It is more common when aortic wall is wrapped around the conduit. We have not experienced this complication in any of our cases. One patient was re-explored for bleeding (11.1 %). While another patient had re-wiring of sternum for sternal instability 12 days after surgery. Bio-glue, though available in the country, has to be arranged for individual cases. Its use as a routine can help reduce the postoperative bleeding problem. Prosthetic Valves need life long anticoagulation. Follow up of patients for

anticoagulation is less than satisfactory in our circumstances. Valve sparing /repair procedure and replacing the ascending aorta only, whenever possible, is a better option. Valve sparing procedure with excision of the aortic sinuses and re-implantation of the coronary buttons into the conduit has been reported with acceptable results.²⁴ 21.1 % incidence of moderate aortic regurgitation has been shown in the valve-sparing group, for patients with Marfan Syndrome.²⁵ Gallo and colleagues, in valve sparing patients, have reported late degeneration of the aortic valve cusps. Replacement of normal dynamic aortic roots with non-compliant conduit, in their view “must affect the function of the aortic valve complex”.²⁶ The sinuses create eddy currents behind the valve leaflets, which initiates valve closure and promote coronary blood flow. In addition, the curvilinear configuration created by the unique attachment of the aortic leaflets to the sinuses of valsalva allows for stress sharing between the valve leaflets and aortic wall. Any aortic reconstruction that ignores and disrupts this complex stress-sharing configuration will result in increased leaflet stress, increased leaflet fatigue, and decreased durability of the valve.²⁷ To avoid late degeneration of the Aortic valve, Yacoub and colleagues have suggested conduit tailoring “to produce three separate tongue-shaped processes that act as individual sinuses”.²⁸ Zehr and colleagues used three precisely measured square pieces of Dacron to make the expandable, individual sinuses.²⁹ We were able to spare aortic valve in one of our patients in this study group. She had moderate degree of aortic regurgitation on pre operative echocardiography. More of these procedures can be tried in future. The study has got only nine patients in it. A countrywide database needs to be established to find out more accurate incidence of the disease.

CONCLUSION

Many of the acute type A dissection cases probably go un-diagnosed. Awareness of the disease among health care professionals at the primary care level, and a high level of clinical suspicion, can lead to the right and early diagnosis and prompt referral to centers where treatment facilities are available. Hypertension was the most common predisposing condition in our patients. With more aggressive control of hypertension potentially lethal complications like aortic dissection can be avoided.

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