AMERICAN JOURNAL OF PHARMTECH RESEARCH

Journal home page: http://www.ajptr.com/

Cardiovascular Diseases: Treating Devices And Methods: A Review

Beena T.L[1]*, K. Krishnakumar[2], L. Panayappan[1]

1.Department of Pharmacy Practice, St. James College of Pharmaceutical Sciences, Chalakudy, Kerala, India

2.St. James Hospital Trust Pharmaceutical Research Centre (DSIR Recognized), Chalakudy, Kerala, India

ABSTRACT

Cardiovascular diseases are a major public health problem, it includes disorders of the heart and blood vessel. Disease is diagnosed according to medical parameters, following diagnosis of the disease the treatment is started. The treatment includes medicines as well as lifestyle modifications. After the primary treatment, based on the patient's health status further procedure started by using treating devices and methods. This article explains about treating devices and methods in patient's emergency situations.

Keywords: Implantable cardioverter defibrillator (ICD), Cardiac resynchronization therapy.

*Corresponding Author Email: stjamespharmacyproject@gmail.com

Received 14 March 2017, Accepted 15 April 2017

Please cite this article as: Beena TL *et al*., Cardiovascular Diseases: Treating Devices And Methods: A Review. American Journal of PharmTech Research 2017.

INTRODUCTION

Cardiovascular diseases are the most common cause of sudden death. These are major health problem throughout the world and a common cause of premature morbidity and mortality, According to World Health Organization (WHO)[1].

Cardiovascular disease include heart and blood vessels disease. It diagnosed by using Physical examination, Cardiac Biomarkers, chest X-ray, Electrocardiogram(ECG), Doppler Echocardiogram and Chest computerized tomography (CT).

High in saturated fats, elevated serum cholesterol and blood pressure (BP), diabetes, and smoking are the risk factors of cardiovascular diseases[2]. Appropriate use of medicines and lifestyle changes are the primary treatment for patients. After disease diagnosis, procedure for surgery started.

Heart Valve Problems	**Arrhythmia**	**Heart Attack**	**Stroke**
✓ Medications ✓ Heart valve surgery	✓ Medications ✓ Pacemaker ✓ Implantable ✓ Cardioverter-Defibrillator (ICD)	✓ Medications ✓ Coronary Angioplasty ✓ Coronary Artery Bypass Graft Surgery	✓ Medications ✓ Carotid Endarterectomy ✓ Carotid angioplasty and stenting

Implantable Cardioverter-Defibrillator (ICD)

An ICD is a battery-powered device that has wires which are implanted into the heart tissue. It can deliver electrical shocks and detect the rhythm of the heart. It used in patients at risk for recurrent, sustained ventricular tachycardia or ventricular fibrillation, restores the heart to normal rhythm and helps prevent sudden cardiac death[3].

Surviving ventricular fibrillation (VF) or sustained ventricular tachycardia (VT) are at a high risk of death due to cardiovascular emergencies. The implantable cardioverter defibrillator (ICD) terminates VT or VF[4].In patients with a prior myocardial infarction and advanced left ventricular dysfunction, prophylactic implantation of a defibrillator improves survival of patient.

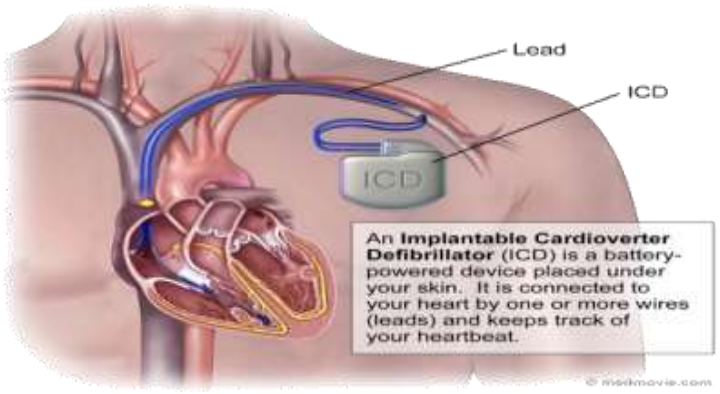

Figure 1: Implantable Cardioverter-Defibrillator (ICD)

Cardiac Resynchronization Therapy (CRT) (Pacemaker)

Cardiac resynchronization therapy, also known as biventricular pacing. A small device that has wires which are implanted in the heart tissue to send electrical impulses that help the heart beat in a regular rhythm. The device is powered by a battery. Pacemaker helps the heart beat in a regular rhythm[5].

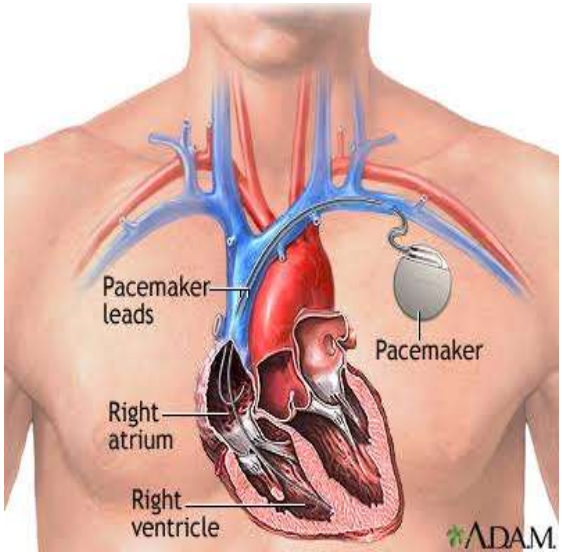

Figure 2: Cardiac Resynchronization Therapy

Left Ventricular Assist Device

The left ventricle is the large, muscular chamber of the heart that pumps blood out to the body. The LVAD is a battery-operated, mechanical pump-type device that's surgically implanted. It helps maintain the pumping ability of a heart. This device also called a "bridge to transplant".

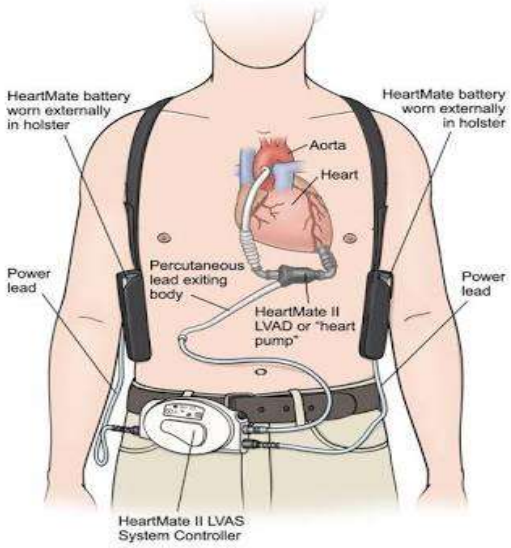

Figure 3: Left Ventricular Assist Device

Percutaneous coronary intervention (PCI) (angioplasty)

Heart failure can develop when blockages in the coronary arteries restrict the blood supply to the heart muscle. Angioplasty is used for removing these blockages can improve overall heart function.

The procedure is usually performed in the cardiac catheterization lab. A catheter (small tube) with a tiny deflated balloon on the end is inserted through an incision in the groin or other artery area and pushed through to the diseased artery[6].

A small amount of contrast liquid is injected through the catheter and is photographed with an X-ray as it moves through the heart's chambers, valves, and major vessels. From the digital pictures of the contrast material, the doctors can tell whether the coronary arteries are narrowed and whether the heart valves are working correctly[6].

After taking the decision for Angioplasty, the doctor will move the catheter into the artery with the blockage. Then the balloon is inflated to push open the artery. The balloon is removed once the artery has been fully opened. A stent may be placed during the procedure to keep the blood vessel open[7].The procedure usually lasts about 1 1/2 to 2 1/2 hours.

Different type of angioplasty

- Balloon angioplasty
- Stent
- Rotablation
- Atherectomy
- Cutting Balloon

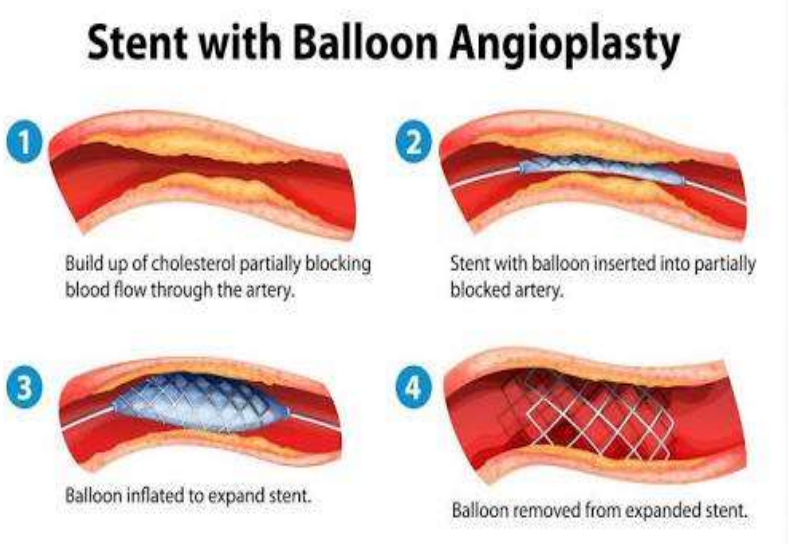

Figure 4: Stent with balloon

Coronary artery bypass

Coronary artery bypass surgery reroutes the blood supply around a blocked section of the artery. During this procedure, surgeons remove healthy blood vessels from another part of the body, such as a leg or the chest wall. They then surgically attach the vessels to the diseased artery in such a way that the blood can flow around the blocked section.

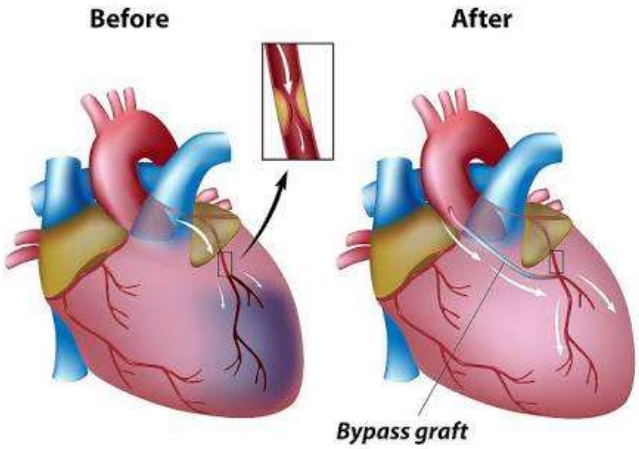

Figure 5: Bypass Graft

Valve replacement

Heart valve surgery is done to replace or repair heart valves that aren't working correctly. Most valve replacements involve the aortic and mitral valves. The aortic valve separates the left ventricle and the aorta. The mitral valve separates the left atrium from the left ventricle. Heart failure is may be caused by a defective or diseased heart valve. Heart valves regulate the flow of blood inside the heart. A variety of different replacement valves can be used: a mechanical valve made from metal and plastic, one made from human or animal tissue. During the surgery, the patient is connected to a heart-lung machine that supplies blood to the brain and body. The bad valve is removed andreplaced[8].

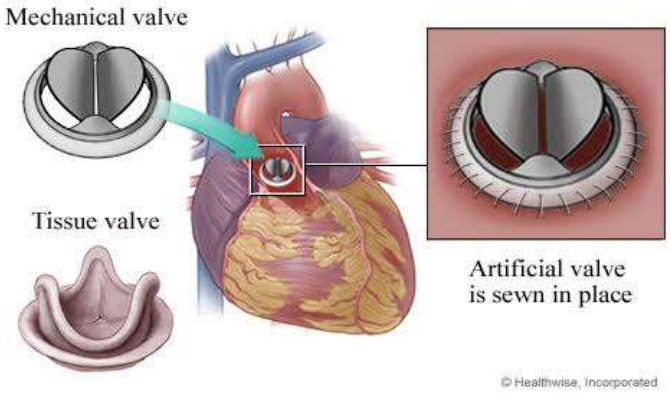

Figure 6: Value Replacement

Carotid Endarterectomy

The blood vessels that bring blood to brain and face are called the carotid arteries. If plaque and other fatty materials block an artery, it slows or blocks the blood flow to brain that cause stroke. Carotid Endarterectomy is a surgery to remove fatty deposits (plaque) that are narrowing the arteries in neck[9].

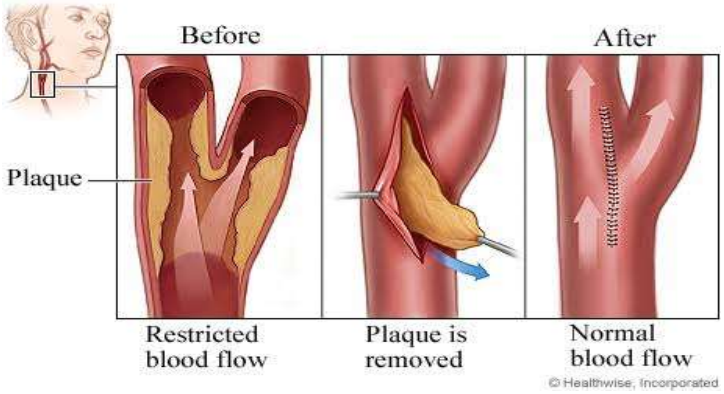

Figure 7: Carotid Endarterectomy

Carotid angioplasty and stenting

In the past few years, CAS has been introduced as an alternative to CEA for the treatment of carotid artery stenosis, particularly for patients who are at high surgical risk, and is probably preferable for patients younger than 70 years of age. Carotid artery is a procedure that opens clogged arteries to prevent or treat stroke. In his procedure involves temporarily inserting and inflating a tiny balloon where carotid artery is clogged to widen the artery.Carotid angioplasty is often combined with the placement of a small metal coil called a stent in the clogged artery. The stent helps prop the artery open and decreased the chance of it narrowing again.[10]

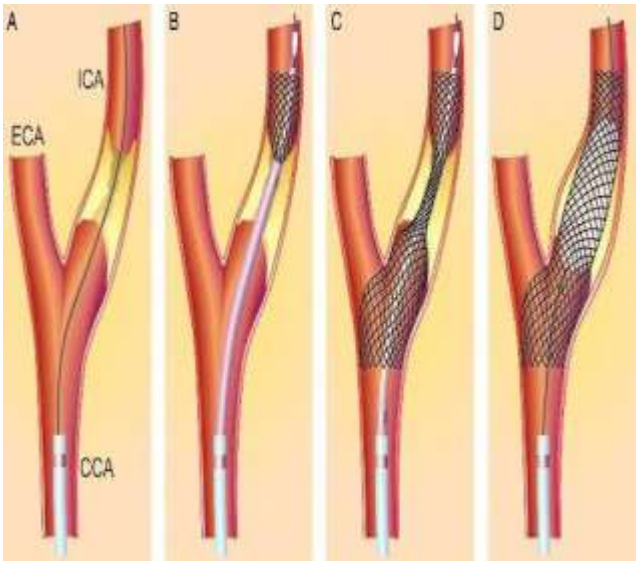

Figure 8: Carotid angioplasty and stenting

Heart transplantation

In severe, progressive heart failure cases heart transplantation is the better option. Surgeons replace the damaged heart with a healthy one taken from a donor. The donor heart that closely matches the tissues of the person receiving the transplant. In this procedure, the surgeon connects the patient to a heart-lung machine, which takes over the functions of the heart and lungs. The surgeon then removes the diseased heart and replaces it with the donor heart. Finally, the major blood vessels are reconnected and the new heart is ready to work.[11]

CONCLUSION

Cardiovascular diseases are one of the most threatening problem faced by the people. It may cause sudden death of our loved ones. Doctors play a major role in saving our life. After findings of patient examination result, doctors take the decision for treatment. Doctors choose correct treatment according to the patient's situation. Now a days, Angioplasty and valve replacement are conducted daily in hospitals. By using these devices and treating procedures, we can reduce the sudden cardiac death and save the patient's health & life.

REFERENCE

1. Kharade S.M, Rajmane M.A, Samudre P.A, Patil S.S. A Review: Etiology and Pathophysiology of Congestive Heart Failure. International Journal of Pharmaceutical and Phytopharmacological Research, 2014; 3(5): 352-356.
2. McKee PA, Castelli WP, McNamara PM, Kannel WB "The natural history of congestive heart failure: the Framingham study". N. Engl. J. Med. 285 (26): 1971: 1441–6.
3. Schocken DD, Prevention of heart failure: A scientific statement from the American Heart Association. Circulation. 2008; 117:2544
4. Hsu DT, Pearson GD. Heart failure in children: part I: history, etiology, and pathophysiology. Circ Heart Fail 2009; 2:63.
5. Recognizing Signs and Symptoms of Acute Heart Failure. (2009, June 4). Science Daily. Retrieved July 20, 2012.
6. Connolly SJ1, Gent M, Roberts RS, Dorian P, Roy D, Sheldon RS, Mitchell LB, Green MS, Klein GJ, O'Brien B. Canadian implantable defibrillator study (CIDS): a randomized trial of the implantable cardioverter defibrillator against amiodarone. Circulation. 2000; 101(11):1297-302.

7. Edin Omerbasic, Ilirijana Haxhibeqiri Karabdic, Elnur Tahirovic. Successful Implantation of Bipolar Epicardial Leads and Dual Chamber Pacemaker in Infant After Postoperative Atrioventricular Heart Block. Acta Inform Med. 2015 23(3): 177-178.
8. Klop B, Scheffer MG, McFadden E, Bracke F, van Gelder. Treatment of Pacemaker-Induced Superior Vena Cava Syndrome by Balloon Angioplasty and Stenting. Neth Heart J, 2011; 19:41–46.
9. Grines CL, Westerhausen DR Jr, Grines LL, Hanlon JT, Logemann TL, Niemela M, Weaver WD, Graham M, Boura J, O'Neill WW, Balestrini C; Air PAMI Study Group. A randomized trial of transfer for primary angioplasty versus on-site thrombolysis in patients with high-risk myocardial infarction: the Air Primary Angioplasty in Myocardial Infarction study. J. Am. Coll. Cardiol. 2002; 39(11):1713-1719.
10. Coylewright M, Cabalka AK, Malouf JA, Geske JB, Pollak PM, Suri RM, Rihal CS. Percutaneous mitral valve replacement using a transvenous, transseptal approach: transvenous mitral valve replacement. JACC Cardiovasc Interv. 2015;8(6):850-857.
11. Amir Gahremanpour, Emerson C. Perin, Guilherme Silva. Carotid Artery Stenting versus Endarterectomy. Heart Inst J, 2012; 39(4):474-487.