DOWNLOAD PDF PERCUTANEOUS THERAPIES FOR VALVULAR HEART DISEASE TED FELDMAN

Chapter 1 : Grossman & Baim's Cardiac Catheterization, Angiography, and

Percutaneous mitral valvuloplasty is an important therapeutic tool in treating rheumatic mitral stenosis. Although the prevalence of rheumatic heart disease has declined significantly in the United States, this procedure still remains an important therapeutic option for the symptomatic patient with mitral stenosis.

Although percutaneous intervention began with coronary angioplasty and other interventional tools see Chapters 28 , 29 , 30 and 31 , the concept of treating diseased heart valves began soon thereafter. The initial thrust was to open stenotic pulmonic, mitral, and aortic valves via balloon valvuloplasty for which the basic techniques and equipment have changed little over the last two decades. More recently, there has been a revolution in this area as exciting new therapies for percutaneous treatment of mitral regurgitation and percutaneous replacement of pulmonic and aortic valves have entered clinical testing and have been introduced in clinical practice. This chapter reviews the mechanisms, indications, techniques, and clinical results of balloon valvuloplasty of the mitral, pulmonic, and aortic valves and describes the novel catheter-based approaches for valve repair and replacement. Although the prevalence of rheumatic heart disease has declined significantly in the United States, this procedure still remains an important therapeutic option for the symptomatic patient with mitral stenosis. In the third world or developing countries where rheumatic heart disease remains prevalent, percutaneous mitral valvuloplasty is the treatment of choice for treating patients with mitral stenosis. As shown by echocardiographic, fluoroscopic, and anatomic studies, the expanding balloon splits fused commissures in the same manner as does surgical commissurotomy. Unlike for valve surgery, the presence of pulmonary hypertension or abnormal left ventricular function is not a contraindication. Patients with anatomically suitable valves who have developed restenosis commissural refusion after prior surgical or balloon commissurotomy can also undergo percutaneous mitral valvuloplasty with results almost as good as those for previously untreated patients. Percutaneous mitral valvuloplasty is a particularly valuable tool in treating the symptomatic pregnant woman with critical mitral stenosis. It can also be a lifesaving emergency procedure in the patient with mitral stenosis and refractory pulmonary edema or cardiogenic shock. Reproduced with permission from: Contraindications Although the procedure can be performed at higher risk with thrombus localized to the left atrial appendage, thrombus within the left atrium itself is a contraindication to this procedure. Patients with mitral stenosis and aortic or tricuspid valve lesions that require cardiac surgery should be referred for surgery. Concomitant coronary disease can be treated with PCI in conjunction with valvuloplasty when the coronary anatomy is suitable. This can be done in one session or staged, with the clinically more severe lesion treated first. Anatomic Factors in Patient Selection for Balloon Mitral Valvuloplasty High-quality transthoracic and transesophageal echocardiography TEE is an essential part of proper patient selection. TEE prior to the planned valvuloplasty procedure excludes the presence of left atrial thrombus and moderate or severe mitral regurgitation. In addition to ensuring that there are no anatomic contraindications, echocardiography provides valuable information that helps the interventional cardiologist select patients and predict results. As the degree of subvalvular disease increases, the quality of the result with percutaneous mitral valvuloplasty decreases. Similarly, increasing degrees of calcification of the mitral valve diminish the effectiveness of mitral valve dilatation and increase the complication rate. Dilating mitral valves with commissural calcification may lead to leaflet tearing along noncommissural lines and is associated with a higher incidence of procedure-related mitral regurgitation. When commissural fusion is symmetric, even in the presence of calcification, bicommissural splitting is more likely than when commissural fusion is asymmetric. Older patients who present with mitral stenosis often have valves poorly suited for percutaneous mitral commissurotomy. In such cases, the goals of therapy must be considered individually for patient selection. Patients who are excellent candidates for mitral valve replacement, or those who have associated multivalve or complex coronary disease, may be better served by surgery. The very elderly, or patients with multiple comorbid conditions or prior median sternotomy, may have excellent palliation from percutaneous mitral commissurotomy despite a high degree of valve and subvalvular deformity and calcification. A prototypic example is the octogenarian patient with prior aortic valve replacement and coronary bypass surgery who presents with a heavily calcified mitral valve and severe symptomatic mitral stenosis. The results of percutaneous commissurotomy in these patients are clearly not as good as in younger patients with pliable valves, but the value of palliative therapy is substantial. Many find the echocardiographic scoring system of Wilkins et al. This echocardiographic classification system is shown in Table Points are given for leaflet mobility, valve thickening, subvalvular thickening, and valvular calcification. The final score is determined by adding up the points from each category. Higher scores indicate more severe anatomic disease and less likelihood of a successful procedure. A review of over 1, patients undergoing balloon mitral valvuloplasty was carried out using a logistic model to improve patient selection. The duration of palliation in such patients may be less than that in patients with ideal valve morphology, and the acute procedure success rate is lower. When valve deformity is associated with other clear indications for open heart surgery, the decision is relatively simple. This patient group includes patients with associated significant aortic stenosis or insufficiency, multivessel coronary artery disease, or severe tricuspid regurgitation in need of repair. When none of these indications are present or clear, percutaneous commissurotomy in patients with significant valve deformity can be a successful palliative therapy. This is an especially useful strategy in patients with borderline aortic insufficiency or stenosis, in whom a waiting period after mitral commissurotomy may allow for a more timely decision for double-valve replacement at a later date. Technique Several basic techniques of percutaneous mitral valvuloplasty PMV are in use. Retrograde transarterial techniques, used alone or in combination with antegrade trans-septal puncture techniques, have been used in some centers for singleand double-balloon PMV. Disadvantages of these techniques include the risk of arterial injury because of the larger balloons used. In addition, the procedures can be technically difficult and time-consuming. The most commonly used approaches are transvenous antegrade i. Alternatively, a double-balloon technique can be used with two balloons advanced over separate guidewires from the femoral vein to the left atrium, across the mitral valve into the left ventricle. In this patient, the mitral valve was first dilated with a single balloon, after which double balloons were used to achieve the desired hemodynamic result. When properly performed, the doubleballoon technique results in excellent improvement in mitral valve area. Percutaneous balloon dilatation of the mitral valve: Br Heart J ; An adaptation of the double-balloon technique uses a monorail approach to deliver two balloons across the mitral valve over a single guidewire. There are no substantial differences in the mechanism of delivery of force by two balloons using this approach when compared with the conventional double-wire, double-balloon technique. In the early surgical era of closed heart mitral commissurotomy, a metallic dilator, or commissurotome, was used via a left ventricular apical incision. A 19F metallic commissurotome can be passed across the interatrial septum over a guidewire and used to accomplish mitral commissurotomy. There has been some evidence that bicommissural splitting can be accomplished more frequently with the metal commissurotome. Randomized comparisons of the Inoue balloon and metallic commissurotome have not demonstrated significant differences in long-term outcome. However, the Inoue balloon technique is faster and less cumbersome, and generally requires less fluoroscopy time than these other approaches. The Inoue balloon system may, however, result in a slightly higher incidence of mitral regurgitation. Her hemodynamic evaluation showed a mean mitral valve gradient of 22 mmHg. This was reduced to 10 mmHg after single-balloon valvuloplasty A and 4 mmHg after double-balloon dilatation B. Inoue Balloon Technique All antegrade approaches begin with the crucial first step of successful trans-septal catheterization. This technique, which is described in Chapter 6 , not only requires successful access to the left atrium, but must also be performed through the appropriate part of the atrial septum to allow easy access to the mitral valve. After successful placement of a Mullins-type dilator and sheath into the left atrium and confirmation of its position by a hand injection of contrast, the patient is anticoagulated with heparin. Baseline hemodynamic measurements are then recorded, confirming the appropriateness of the degree of mitral stenosis for PMV. Subsequently, a special solid-core coiled 0. The femoral vein and interatrial septum are then dilated with a long 14F dilator over the coiled guidewire within the left atrium. The previously prepared, tested, and now slenderized Inoue balloon is then introduced over the guidewire into the left atrium. The Inoue balloon Figure Owing to the variable elasticity along its length, the balloon inflates in three distinct stages as illustrated in Figure This allows for stable positioning of the balloon catheter across the mitral valve, as described below. The distal portion of the balloon is inflated slightly to aid in crossing the valve and to prevent intrachordal passage. By maneuvering the balloon catheter while rotating and withdrawing the stylet, the balloon tip can be moved anteriorly and inferiorly toward the mitral orifice. Once the balloon catheter is placed across the mitral orifice, the distal portion of the balloon is inflated more fully and the catheter is pulled back gently to confirm that the inflated distal portion of the balloon is secure across the mitral valve. As further volume is added to the balloon, the proximal end inflates to lock the valve between the proximal and distal ends of the balloon. Inflation to precalibrated volume then dilates the valve orifice to the corresponding preset size. It is then allowed to deflate passively before it is withdrawn into the left atrium. The top panel shows the length of the catheter. On the far left, at the hub, the stretching metal tube has been fully advanced, resulting in stretching and elongation of the balloon catheter, seen on the right side of the figure. This results in a minimized profile to facilitate passage through a femoral venous sheath or directly through the skin. In the second panel, the stretching metal tube on the far left has been pulled back, allowing the balloon to shorten and fatten. The stretching tube is pulled back in this manner after the balloon is passed across the atrial septal puncture. This is seen on the right side of the second panel. Panels 3 through 6 show the stepwise inflation characteristics of the balloon. In panel 3, the balloon is uninflated. In panel 4, the distal portion has been inflated. This allows the balloon to self-position within the mitral valve. Upon final inflation, as seen in panel 6, the waist of the balloon is fully expanded, ultimately resulting in commissural splitting. The pressure gradient across the mitral valve is measured after each balloon dilatation, and echocardiography may be used to assess the mitral valve area, leaflet mobility, and the degree of mitral regurgitation. If the first inflation has not resulted in a satisfactory increase in the mitral valve area, and the degree of mitral regurgitation has not improved, the balloon is then readvanced across the mitral valve and inflation repeated with the balloon diameter increased by 1 or 2 mm by delivery of slightly more of the precalibrated syringe volume in a stepwise dilatation process, which is repeated until the desired result is achieved. The Inoue balloon comes in four sizesâ€”24, 26, 28, and 30 mm, referring to the fully inflated maximal balloon diameter. The 24 mm balloon is not available in the United States. However, since actual balloon size is dependent on the volume used for inflation, the actual diameter can be varied over a range from 6 mm less than nominal up to the full rated diameter, as required. We generally estimate the expected maximal inflated balloon diameter using an empirical formula based on the height of the patient one-tenth the height in centimeter plus 10 mm. It is important to start with a smaller balloon diameter, especially for valves that are very much thickened or rigid or have moderate amounts of subvalvular disease, to minimize the development of mitral regurgitation, which can develop suddenly with as little as a 1- to 2-mm increase in inflation diameter of the balloon. Distal tip of the Inoue balloon has crossed the mitral valve. With the distal tip of the balloon filled, the catheter was withdrawn to straddle the mitral valve. Partial filling of the balloon. Complete filling of the Inoue balloon across the mitral valve. Following this dilation, the mitral valve gradient was reduced from 18 mmHg to 2 mmHg.

Chapter 2 : Pearls From: Ted Feldman, MD | Medpage Today

Until recently, percutaneous catheter therapy for valvular heart disease was limited to catheter balloon valvuloplasty for aortic, mitral, or pulmonic stenosis. A number of new approaches to percutaneous valve therapy are now developing rapidly, including methods for catheter-based valve replacement and repair.

This article has been cited by other articles in PMC. Rapid progress in interventional cardiology has recently seen the rate of percutaneous coronary intervention overtake that of coronary artery bypass surgery. Now attention is directed towards the treatment of valvular heart disease, with exciting developments in balloon and stent technology having the potential to transform the management of many common heart conditions. In many countries, though improved living conditions and better access to antibiotics and healthcare have seen a decline in rheumatic heart disease, the prevalence of degenerative valve disease has escalated with ageing of the population. Increasing availability of cardiopulmonary bypass, surgical expertise and intensive care facilities has seen valve repair and replacement widely performed to relieve symptoms and improve prognosis, despite associated morbidity and mortality. Conversely, a less invasive therapy may also permit treatment of valvular heart disease at an earlier stage in its natural history and avoid the onset of progressive ventricular dysfunction. Patient preference for minimally invasive therapies is strong, particularly in those who have often undergone many operations. Furthermore, the success of these technologies could have an important economic impact due to associated reduction in intensive care and hospital stay. Dysfunction may arise when there is a primary defect in these structures, but can also occur as a consequence of dilatation of the left heart chambers. Symptoms result from pulmonary venous congestion, atrial arrhythmia and reduced cardiac output. Valve repair is increasingly preferred as it is associated with better survival and avoids the need for anticoagulation. Moreover, it conserves the papillary muscle architecture and its vital role in overall ventricular function. Furthermore, its uncomplicated nature attracted interventionalists to develop an analogous transcatheter based technique. In surgery, however, the repair is usually combined with an annuloplasty, which is not currently the case in the catheter approach. If the location of the clip is suboptimal, the clip can be reopened and repositioned; only once the final position is confirmed is the delivery system detached. In some cases deployment of two devices has been necessary to achieve adequate reduction in mitral regurgitation. At 6 months, the device is completely incorporated into the tissue bridge and mimics the pathological result of surgery. The procedure is performed under general anaesthesia with fluoroscopic and transoesophageal echocardiographic guidance; it is technically demanding and is likely to be limited to specialist centres with experienced interventionalists and echocardiologists who work closely together. Open in a separate window Figure 1 Main picture: Chronic healing at 6 months following Evalve clip deployment in a porcine model. Courtesy of Evalve Inc. Inclusion required moderate to severe mitral regurgitation, due to degenerative disease without annular dilatation, in patients who were candidates for surgery. Clips were implanted in 24 out of 27 patients recruited, with no procedural complications and four major adverse events: Three further patients required surgery later for significant residual mitral regurgitation. Eighteen patients remained free from surgery and in 13, mitral regurgitation remained mild or less so at 6 months. The majority of those requiring surgery were able to undergo valve repair rather than replacement. To date, over 70 patients have undergone treatment with this device, within either study, with no reported mortality T Feldman, personal communication, May

Chapter 3 : - NLM Catalog Result

percutaneous valve therapies the american journal of geriatric cardiology vol. 15 no. 5 T herapy for valvular heart disease has been synonymous with surgical treatment for over.

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Chapter 4 : New percutaneous treatments for valve disease

Percutaneous Mitral Valve Ted Feldman, MD, FESC, FSCAIb,c, was the first effective catheter therapy for mitral valvular heart disease. The technique and.*

Chapter 5 : Percutaneous Therapies for Valvular Heart Disease | Thoracic Key

Interestingly, the percutaneous approach was associated with a higher rate of subsequent surgery for mitral-valve dysfunction, with persistent grade 3+ or 4+ mitral regurgitation in 23% of patients.

Chapter 6 : Dr. Ted Feldman, MD â€“ Evanston, IL | Cardiology

To date, > patients have been treated, with only a single procedure-related mortality and good results in a population of pediatric patients with congenital heart disease who otherwise would face third or fourth open heart procedures. Percutaneous aortic valve replacement with a stent-mounted bioprosthetic valve device was initially reported by Cribier et al 5,6 in , with a growing experience since then.