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Commissurotomy: Clinical Outcomes, and Advances in the Surgical Treatment of Mitral Valve Stenosis

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Description

Commissurotomy, a surgical procedure aimed at addressing heart valve stenosis, has been a essential element in the management of valvular heart disease for decades. The origins of commissurotomy can be traced back to the early 20th century when pioneering surgeons first explored interventions for mitral valve stenosis. In 1923, Dr. Albert Starr performed the first successful commissurotomy, marking a significant milestone in cardiac surgery. Initially, commissurotomy was conducted *via* open-heart surgery with a direct incision of the mitral valve leaflets. However, with advancements in minimally invasive techniques, percutaneous approaches have gained prominence in recent years.

Commissurotomy primarily targets the mitral valve, although it can also be performed on other cardiac valves, such as the aortic or tricuspid valve, in select cases. There are two main types of commissurotomy, surgical and percutaneous. Traditionally, surgical commissurotomy involved a thoracotomy or sternotomy to access the heart. Surgeons would directly incise the fused or thickened valve leaflets to relieve stenosis and restore valve function. While effective, this approach carried significant risks and morbidity associated with open-heart surgery. Percutaneous balloon valvuloplasty, also known as percutaneous commissurotomy, revolutionized the treatment of mitral valve stenosis. This minimally invasive procedure involves inserting a catheter with a balloon at its tip into the narrowed valve. The balloon is then inflated, stretching the valve leaflets and improving blood flow. This technique has become the preferred approach for many patients due to its lower risk profile and shorter recovery times.

Commissurotomy is primarily indicated for patients with symptomatic mitral valve stenosis, typically due to rheumatic heart disease. Symptoms may include dyspnea, fatigue, palpitations, and chest discomfort, often worsening with exertion. Diagnostic tests such as echocardiography, cardiac catheterization, and electrocardiography aid in assessing the severity of stenosis and determining the appropriateness of commissurotomy. Patient selection is essential to achieving favorable outcomes with commissurotomy. Factors such as age, comorbidities, valve morphology, and overall cardiac function influence candidacy for the procedure.

Procedural technique and outcomes

Traditional surgical commissurotomy requires cardiopulmonary bypass and aortic cross-clamping. The surgeon carefully incises the fused commissures of the mitral valve, aiming to create a more open valve orifice while preserving valve integrity. Despite its efficacy, surgical commissurotomy is associated with longer hospital stays, higher costs, and increased perioperative risks compared to percutaneous approaches. Percutaneous balloon valvuloplasty is performed in a catheterization laboratory under fluoroscopic guidance. After accessing the heart *via* a peripheral artery, such as the femoral artery, a catheter is advanced into the left atrium and positioned across the narrowed mitral valve. The balloon is then inflated, exerting radial force on the valve leaflets and stretching the stenotic orifice.

Outcomes following commissurotomy vary depending on several factors, including the severity of stenosis, underlying cardiac function, and procedural technique. In general, both surgical and percutaneous approaches can lead to significant improvements in symptoms, exercise tolerance, and quality of life. However, the durability of these improvements may differ, with some patients experiencing valve restenosis over time, particularly with percutaneous interventions. While commissurotomy is generally safe and effective, it is not without risks. Complications associated with surgical commissurotomy include bleeding, infection, atrial fibrillation, and valve injury. Percutaneous balloon valvuloplasty carries its own set of risks, including vascular injury, arrhythmias, stroke, and valve regurgitation. Careful patient selection, procedural planning, and meticulous postoperative care are essential in minimizing these risks and optimizing outcomes.

The future of commissurotomy lies in advancing techniques and technologies to further enhance patient outcomes and minimize procedural risks. Continued refinement of percutaneous approaches, including the development of novel balloon catheters and imaging modalities, aims to improve precision and efficacy. Furthermore, the integration of transcatheter valve replacement technologies may offer alternative treatment options for patients with complex valve pathology or failed previous interventions. By utilizing the regenerative potential of stem cells and bioactive materials, researchers aim to develop biocompatible valve replacements that can grow and adapt with the patient's own tissue, reducing the need for repeat interventions and improving long-term outcomes.

Conclusion

Commissurotomy remains a essential element in the management of valvular heart disease, providing symptomatic relief and improving quality of life for many patients. From its early beginnings in open-heart surgery to the advent of minimally invasive percutaneous techniques, commissurotomy has undergone significant evolution over the years. With ongoing advancements in technology, patient selection, and procedural techniques, commissurotomy continues to play a vital role in the treatment of mitral valve stenosis, offering hope and improved outcomes for patients worldwide.

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