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INFORMATION
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In its broadest sense, interventional cardiology or interventional catheterization refers to any catheterization during which some type of therapeutic procedure is undertaken. In human medicine, the most common application of interventional cardiology is dilation of coronary artery stenosis known as percutaneous transluminal coronary angioplasty (PTCA). Interventional catheterization techniques were first applied to congenital heart disease in children in 1966 when Dr. William Rashkind reported the use of balloon catheters to create atrial septal defects in children with transposition of the great vessels. Since that time, guidelines have been put forth for pediatric therapeutic catheterization covering indications and contraindications for balloon and blade atrial septostomies, balloon dilation of all four cardiac valves, balloon dilation of peripheral vessels including the aorta and pulmonary arteries, implantation of occlusion devices, foreign body retrieval, and ablation of abnormal conduction pathways. A more practical definition for veterinary medicine would include catheterization procedures during which obstructive lesions are dilated (ballooned), abnormal vascular communications are occluded, abnormal conduction pathways are interrupted (catheter ablation), or foreign bodies are retrieved.

Balloon Valvuloplasty

The application of balloon dilation in the therapy of congenital pulmonic, subaortic and tricuspid stenosis as well as cor triatriatum dexter have been reported. In 1987, Bright et al reported the first successful application of balloon dilation in the therapy of pulmonic stenosis in a dog. Since that time, several reports have confirmed the safety and efficacy of this procedure. The long term efficacy of balloon dilation of subaortic stenosis is less universally accepted. Delellis and her colleagues reported the results of balloon dilation in nine dogs with subaortic stenosis (SAS) and suggested that balloon dilation was beneficial; however, long term results have been less encouraging. Preliminary results from Lehmkuhl and Bonagura suggest that despite very favorable early results, in less than half the dogs with SAS undergoing balloon dilation is significant (>50%) gradient reduction at six months maintained. Important questions that remain unanswered regarding balloon dilation of SAS include whether or not balloon dilation improves quality or quantity of life and whether or not sudden death is significantly altered by the procedure. Readers are referred to excellent reviews of these procedures for more information.

Valvular pulmonic stenosis (PS) is reportedly the third most common congenital heart defect in the dog. The severity of PS can be graded as mild (16-49 mmHg), moderate (50-79 mmHg), and severe (> 80 mmHg) based on estimates of the transpulmonic pressure gradient determined by Doppler echocardiography (DEG). Additionally, PS can be considered severe with a DEG < 80 mmHg if marked right ventricular hypertrophy or significant clinical signs such as collapse, exercise intolerance or ascites are present. Mild and moderate PS is considered to result in no reduction in either quality or quantity of life. Dogs with severe PS are more likely to present and/or develop clinical signs including sudden death. Current recommended therapy for severe PS includes balloon valvuloplasty (BV) or surgical valulotomy. There are few reports of the benefits of BV in the dog and current recommendations are based on the positive results of BV in human patients with PS.

We have reviewed the short and long-term results of BV on DEG in 50 consecutive dogs with severe pulmonic stenosis (PS). All cases of severe PS with complete medical records that underwent BV at Texas A&M University Veterinary Medical Center included. Baseline DEG were determined in dogs prior to BV. Short-term BV results were based on a repeat DEG within 7 days of BV. Long-term results were based on a repeat DEG at least 1 month following BV (med=8, mean=16, range=1-88). Successful BV was defined as ≥50% reduction in DEG from baseline or gradient reduction to < 80 mmHg.
The mean pre-BV DEG was 128mmHg (med=120, range=65-206). 36% of dogs showed clinical signs such as syncope, exercise intolerance or ascites prior to BV. Short-term follow up data was available for 45/50 dogs and the mean DEG was 50mmHg (med=50, range=15-158) representing a mean percent gradient reduction of 58% (med=58, range=15-87). 87% (39/45) of dogs had a successful BV based on short-term DEG, 9% failed (4/45) and 4% (2/50) died during BV. Long-term DEG data was available for 23/48 dogs and the mean DEG was 75mmHg (med=58, range=36-185). 78% (18/23) of dogs had a successful BV based on long-term DEG and 22% (5/23) failed. In addition, 71% of symptomatic dogs became asymptomatic by their long-term reevaluation. These finding suggest that BV can successfully decrease the DEG and that gradient reductions tend to be maintained in the majority of dogs. In addition successful BV may decrease symptoms and thus improve quality of life in dogs with severe PS.

Broader application of balloon dilation procedures is expected. The author has used balloon dilation to successfully relieve the obstruction associated with cor triatriatum dexter and is aware of at least one other successful application in that lesion. The use of interventional catheterization in dogs and cats with portosystemic vascular anomalies shows promise and will most likely expand. The author has recently developed a transvenous approach to identify and catheterize portosystemic shunts. Improved visualization and assessment of the hemodynamics associated with PSS will most likely increase our ability to occlude them percutaneously.

Although the application of interventional catheterization techniques is appealing, it is imperative not to embrace these techniques simply because they are less invasive and potentially less costly. We must critically evaluate the safety and efficacy of these techniques. This is especially true when interventional catheterization techniques are applied to disease processes for which established successful therapies are available.

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