mid-right coronary artery (50%), total occlusion of the circumflex artery, and moderate aortic valve regurgitation. On October 13, we grafted the left ITA to the left anterior descending artery using the techniques described above with the exception that, during CPB (56 minutes), the esophageal temperature was kept normal and was not allowed to drift down. Because of atrial fibrillation, an esmolol drip was supplemented by a calcium blocker (verapamil) given intermittently in intravenous doses of 2.5 mg, achieving a brief asystole. The performance of distal anastomosis was aided by the Visuflow Surgical Site Visualization Wand (Research Medical, Inc, Midvale, UT). She is doing well.

References


Liposomal Amphotericin B for Postoperative *Aspergillus fumigatus* Endocarditis

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A 10-month-old infant girl presented with *Aspergillus fumigatus* endocarditis localized to a Gore-Tex patch used as part of the repair for double-outlet right ventricle. A new liposomal preparation of amphotericin B combined with surgical debridement resulted in a successful outcome with no evidence of disease recurrence at 15 months’ follow-up. Echocardiography provided an optimal modality for ongoing evaluation of therapeutic outcome.


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The prognosis for *Aspergillus* endocarditis in the pediatric population is poor with mortality in excess of 95%; [1–3]. We present the case report of an immunocompetent child with invasive *Aspergillus fumigatus* localized to a Gore-Tex (W.L. Gore, Flagstaff, AZ) patch used for ventricular septal defect closure as part of repair for double-outlet right ventricle. Early surgical debridement combined with intensive antifungal therapy using the new liposomal preparation of amphotericin B (AmBisome; Vestar Inc, San Dimas, CA) and 5-flucytosine (5-FC), resulted in a successful outcome with no evidence of residual disease. We believe the outcome of this case will provide encouragement for future therapy of postoperative *Aspergillus* endocarditis.

A 10-month-old female child underwent repair of double-outlet right ventricle, subaortic ventricular septal defect (VSD) associated with valvar and subvalvar pulmonary stenosis. Her postoperative course was complicated by VSD patch dehiscence requiring revision on day 9. Three months after her initial cardiac repair, she presented in extremis. Echocardiography showed a recurrence of the VSD patch dehiscence (with a residual defect of 0.8 × 0.8 cm) associated with left-to-right shunting. Adherent to the inferior aspect of the VSD patch was a well-defined, slightly nodular 1.5 × 1.3-cm echogenic mass (Fig 1A). With all bacterial cultures remaining negative, the evolving clinical picture supported the diagnosis of a fungal endocarditis. As both clinically significant renal and hepatic impairment already were present (urea level, 28 mmol/L; creatinine level, 189 mmol/L; aspartate aminotransferase level, 864 IU/L) administration of the liposomal preparation of amphotericin B was started (2 mg·kg⁻¹·day⁻¹ initially, 5 mg·kg⁻¹·day⁻¹ thereafter) along with 5-flucytosine (150 mg·kg⁻¹·day⁻¹). During the next 10 days, despite clinical improvement, serial echocardiography demonstrated no diminution in vegetation size with a slow progression of right ventricular outflow tract obstruction.

On day 14 she underwent surgical debridement and patch closure of the residual VSD using bovine pericardium. When we entered the right ventricular outflow tract, a 14- to 18-mm firm, pink mass was discovered adhering by a thick stalk to the base of the VSD patch. Dehiscence of a large portion of the Gore-Tex patch was seen with clear invasion of the crest of the interventricular septum by the infectious process. Histologic examination of the resected mass demonstrated features characteristic of *Aspergillus* (Fig 1B). *Aspergillus* was present contiguous to the sample edge, indicating the potential for residual fungal material to have remained in situ. Immediately after debridement two-dimensional echocardiography demonstrated residual filamentous fronds of tissue adherent to the patch (Fig 1C). Serial studies during the ensuing 6 months demonstrated progressive resolution of these fronds.

After surgical debridement there was rapid hemodynamic improvement followed by a gradual decrease in her indices of infection (erythrocyte sedimentation rate, white blood cells). Administration of the liposomal am-
photericin B preparation (5 mg·kg⁻¹·day⁻¹) was continued for 3 months and then changed to the conventional desoxycholate preparation (1 mg·kg⁻¹·day⁻¹). Antifungal therapy of amphotericin B, 5-flucytosine (150 mg·kg⁻¹·day⁻¹), and rifampin (20 mg·kg⁻¹·day⁻¹) was administered for a 6-month therapeutic course. Cumulative antifungal dosage was 345 mg/kg of liposomal amphotericin B and 19 mg/kg of desoxycholate amphotericin B.

Fifteen months after her initial repair, clinical examination revealed a healthy, well-nourished young girl steadily gaining weight and regaining developmental milestones. Clinical and echocardiographic cardiac examination was normal apart from moderate pulmonary regurgitation. At present she is off all medications.

Comment
Surgery has a crucial role in the management of hemoodynamically significant endocarditis [4]. Clearly, surgical debridement of the fungal vegetation was instrumental in the success of this case. Right ventricular outlet obstruction was progressing and intensive antifungal and antimicrobial therapy had resulted in only minimal clinical improvement with no evidence for any diminution of vegetation mass. Debridement not only resulted in improved hemodynamics from an unobstructed right ventricular outflow tract, but also removed a large portion of the infective mass.

Desoxycholate amphotericin B therapy acts by binding to the ergosterol of fungal membranes, thus creating channels through which vital molecules leak from the cells leading to cellular death. Unfortunately, cross-reactivity to the cholesterol of mammalian cells leads to its well-recognized toxicity [5]. In the presence of preexisting hepatic and renal impairment, the liposomal formulation was chosen in an attempt to ameliorate these toxic effects. Although the pediatric experience has been limited, early clinical results in neonates [6] and immunocompromised patients [7] were encouraging and gave support to our choice of the liposomal formulation for therapy.

To our knowledge no data are available regarding liposomal amphotericin B therapy for Aspergillus endocarditis. As a consequence our decision for 3-months’ duration of liposomal therapy with a further 3 months of desoxycholate amphotericin B was intuitive. Enhanced safety of AmBisome was illustrated by the absence of renal dysfunction (urea level, 4 to 7 mmol/L; creatinine level, 60 to 75 mmol/L) in a patient with compromised
hemodynamics, during a therapeutic course of 106 days. We used serial echocardiography to maintain close observation for any recurrence of vegetative material along the patch, as the histologic examination indicated the probability of residual fungal material. During the last 4 to 6 weeks of therapy no change was seen in the morphology of the VSD patch. This, along with normal granulocyte profile and clinical examination, were supportive of the decision to discontinue antifungal therapy at 6 months. Because there are no laboratory or clinical investigations that can confirm fungal eradication and late relapse has been reported, close follow-up is essential.

We believe the most probable route of Aspergillus entry to the heart was direct inoculation, either at the time of her first repair or during the immediate patch revision. In the months preceding her operation, hospital construction was occurring around the surgical suites. Associated with the construction was a temporal water leak within the surgical suite ceiling [8]. No other occurrence of invasive Aspergillus had been reported in the hospital during that time or since this case.

The successful outcome of this case offers hope for a more promising future for the pediatric patient with postoperative Aspergillus endocarditis. We suggest that early surgical excision and debridement of vegetations combined with intensive antifungal therapy will provide an optimal therapeutic regimen. In the acutely compromised patient the liposomal formulation of amphotericin B (AmBisome) provided safe, optimal action with minimal side effects.

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References


Aortic Dissection: Rupture Into Right Ventricle and Right Pulmonary Artery

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Rupture of an acute ascending aortic dissection into a surrounding cardiac chamber or pulmonary artery is an uncommon occurrence, and is often only diagnosed post mortem. Although fistulization (aortopulmonary and aorta–right atrial) after acute aortic dissection has been well documented in the literature, acute aortic dissection fistulizing into both the right ventricle and pulmonary artery has not. We report on a 75-year-old woman who presented with an acute ascending aortic dissection with both aortopulmonary and aorta–right ventricular fistulas who underwent repair and had long-term survival.


Acute aortic dissection, commonly seen in patients with chronic hypertension, is caused by an intimal tear in the aorta that results in blood tracking through the media. The false channel that forms can then reenter the aortic lumen and progress retrogradely, causing occlusion of the coronary arteries and aortic insufficiency, or it can proceed antegrade and occlude the head vessels and other branches of the aorta, leading to neurologic and other ischemic complications. The dissection can also rupture through the adventitia of the aorta, leading to cardiac tamponade or hemothorax. Although rare, the dissection can cause a fistula to form between the aorta and other anatomic structures in the area (ie, pulmonary artery and cardiac chamber), resulting in a left-to-right shunt. Several such cases have been reported, including aortopulmonary, aorta–right atrial, and aorta–right ventricular fistulas. We have encountered a case of an acute ascending aortic dissection rupturing into two different structures, causing both aortopulmonary and aorta–right ventricular fistulas.

A 75-year-old woman with a medical history significant only for hypertension presented to the North Shore University Hospital emergency room with complaints of chest pain and shortness of breath. Upon admission, the patient underwent electrocardiography that revealed a sinus tachycardia of 130 beats/min with no ST or T wave changes. An admission chest x-ray study revealed the presence of congestive heart failure and bilateral effusions. The patient was admitted to the medical intensive care unit so that she could be watched for possible Accepted for publication Aug 12, 1994.

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