creatinine kinase-MB fraction was 79 μg/L. The remaining blood test results were normal. An echocardiogram showed normal anatomy of the coronary arteries, a moderately dilated left ventricle (end-diastolic diameter: 61 mm [Z-score=2.48]), an ejection fraction of 45% and moderate mitral failure. An MRI scan showed an ejection fraction of 50% with a normal end-diastolic volume. A delayed enhancement study showed a pattern of patchy subepicardial enhancement in the lateral wall. An area of increased signal intensity was visible in the T2-weighted MRI image, which was suggestive of edema (Fig. 2).

The patient's course was favorable; his systolic function returned to normal with a decrease in markers of damage. The suspected diagnosis was acute myocarditis. At admission, the results of polymerase chain reaction of blood and nasopharyngeal aspirate were negative for viruses; therefore the causal agent was not identified.

The third patient was a 10-year-old girl who presented to the emergency department after experiencing 4 episodes of oppressive chest pain, radiating to her arm. Each episode lasted approximately 1 h. An echocardiogram showed moderate ST-elevation of 1 mm in V1, V3, and V5, with troponin I at 9.12 μg/L and creatine kinase-MB fraction at 272 μg/L. An echocardiogram showed normal coronary artery anatomy, a hypertrophic left ventricle (septum 10 mm [Z-score=2.77]; posterior wall 9 mm [Z-score=2.13]), which was not dilated, with an ejection fraction of 65%. T2-weighted MRI scan showed subepicardial areas of increased signal intensity in the free wall of the left ventricle. The delayed enhancement sequences showed generalized, subepicardial enhancement of the left ventricle, compatible with acute myocarditis. Polymerase chain reaction testing of blood and nasopharyngeal aspirate was negative for viruses. The patient's course was favorable.

Precordial pain is a presentation of acute myocarditis and, although uncommon in children, should be included in the differential diagnosis.

The usefulness of MRI in these patients has been previously reported. The clinical course is usually favorable and the most commonly described causative agent is Parvovirus B19. In the cases reported here, the diagnostic utility of MRI should be emphasised as it allowed catheterization to be avoided in our patients. It should be performed as an emergency procedure and, if inconclusive, a coronary angiography should be conducted to rule out coronary disease.

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Fenestration Closure After Fontan Surgery. Contributions of Percutaneous Interventionism

Cierre de fenestración tras la cirugía de Fontan. Aportaciones del intervencionismo percutáneo

To the Editor,

The Fontan procedure is the final step in surgery for patients with a single ventricle. The hemodynamic changes that occur after the procedure can have a negative impact on the immediate outcome due to a sudden increase in pulmonary artery pressure. Fenestration of the Fontan circuit during surgery is therefore a common procedure in high-risk patients, although systemic saturation may decrease as a result. The development of percutaneous implantation devices has enabled fenestration closure without the need for further surgery when hemodynamic conditions allow.2,3

Here, we analyze our experience of percutaneous closure of fenestrations in the extracardiac circuit after the Fontan procedure, taking into account the properties of the new occlusion devices available. In addition, we study the changes in pulmonary artery
### Baseline Characteristics of the 13 Patients

<table>
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<th>Underlying disease</th>
<th>Age, years</th>
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<th>Height, cm</th>
<th>Saturation before closure, %</th>
<th>AoP at baseline, mmHg</th>
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<th>AoP after closure, mmHg</th>
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*AoP: aortic pressure; AS: atrial shunt; D-TGA: D-transposition of the great arteries; DRVO: double right ventricular outflow; FC: functional class; HLV: hypoplastic left ventricle; PA: pulmonary atresia; PAIS: pulmonary atresia with intact septum; PAP: mean pulmonary artery pressure; PFO: patent foramen ovale; PS: pulmonary stenosis; SV: single ventricle; TA: tricuspid atresia; VS: ventricular shunt.*

**Scientific Approach:** The use of fenestration during the Fontan procedure has been a subject of ongoing research and discussion. The approach involves creating a small opening in the atrial septum to allow for the mixing of oxygenated and deoxygenated blood, thereby improving overall systemic oxygenation. This technique is particularly useful in patients with complex congenital heart defects, where complete surgical correction may not be feasible or may not provide sufficient long-term improvement in hemodynamics.

**Results:** In this study, the fenestration technique was performed in 13 patients, with varying underlying cardiac anomalies. The table above provides a detailed overview of the baseline characteristics, including age, weight, height, and baseline oxygen saturation, as well as the systolic and diastolic pressures before and after the fenestration procedure. The angiographic data and echocardiographic parameters were closely monitored to assess the immediate and long-term effects of the intervention.

**Discussion:** While fenestration can significantly improve outcomes in selected cases, it is important to note that the procedure is not without risks. Long-term surveillance is crucial to monitor the development of complications such as arrhythmias, atrial septum defects, or endocarditis. The experience from this study suggests that fenestration is a viable approach in complex congenital heart disease, albeit with the need for close follow-up and careful patient selection.

**Conclusion:** The use of fenestration during the Fontan procedure offers a promising strategy for improving hemodynamics in complex congenital heart disease. Further research is needed to refine selection criteria and optimize outcomes, ensuring the best possible long-term outcomes for these patients.
hemodynamic conditions of each patient. Closure of the Fontan fenestration by catheterization is a safe and effective technique in these patients.

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