

Ventricular septal defect as a post-acute myocardial infarction complication, management in the acute phase

Comunicación interventricular como complicación de infarto agudo al miocardio, su manejo en fase aguda

Jaime G. López-Taylor, Carlos A. Jiménez-Fernández, David Ramírez-Cedillo, Italo Masini-Aguilera, Miguel A. Medina-Andrade and Alejandra Peña-Juárez

Thoracic and Cardiovascular Surgery Service. Hospital Civil de Guadalajara Fray Antonio Alcalde. Guadalajara, Jalisco, Mexico.

ABSTRACT

Introduction: post-acute myocardial infarction (AMI) ventricular septal defect (VSD) is a rare complication with high mortality. Its timely diagnosis is key to reducing mortality and surgery continues to be the treatment of choice. The objective of this study is to present the results of a series of cases of post-AMI VSD managed in the acute phase at our institution. **Material:** retrospective study, case series type where a total of six patients were evaluated during the period from 2020 to 2024. **Results:** the female gender predominated with 66.6% (n = 4), the average age in years was 70, the main risk factors were type 2 diabetes and accompanied by hypertension in 33.3%, respectively, subsequent heart attack was the main one (66.6%) as well as the apical VSD. There have been no reinterventions or mortality to date, only one patient has a residual defect. **Conclusions:** post-AMI VSD is a rare complication; surgery remains the treatment of choice with good results.

Keywords: acute myocardial infarction, ventricular septal defect, cardiac surgery.

RESUMEN

Introducción: la comunicación interventricular (CIV) postinfarto es una complicación rara y con alta mortalidad. Su diagnóstico oportuno es clave para disminuir la mortalidad y la cirugía sigue siendo el tratamiento de elección. El objetivo de este estudio es presentar los resultados de una serie de casos de CIV postinfarto manejado en la fase aguda en nuestra institución. **Material:** estudio retrospectivo, tipo serie de casos, donde se valoraron un total de seis pacientes durante el periodo de 2020 al 2024. **Resultados:** el género femenino predominó con el 66.6% (n = 4), la media de edad en años fue de 70, los principales factores de riesgo fueron diabetes tipo 2 y acompañada de hipertensión en 33.3%, respectivamente, el infarto posterior fue el principal (66.6%) al igual que la CIV apical. No se presentaron reintervenciones ni mortalidad hasta el momento, solo un paciente presenta defecto residual. **Conclusiones:** la CIV postinfarto es una complicación rara y la cirugía sigue siendo el tratamiento de elección con buenos resultados.

Palabras clave: infarto agudo al miocardio, comunicación interventricular, cirugía cardíaca.

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Correspondence: Dra. Rocio Alejandra Peña Juárez. E-mail: alepejz@gmail.com



Abbreviations:

AMI = Acute Myocardial Infarction

CABG = Coronary Artery Bypass Grafting

VSD = Ventricular Septal Defect

Ventricular septal defect (VSD) after acute myocardial infarction (AMI) is a rare pathology with an approximate incidence of 1-2%, being associated with a mortality of almost 80% without surgical treatment. Surgery is recommended as a management with high morbidity and high risk of residual defect.¹

As acute reperfusion strategies for AMI have evolved, post-AMI VSD is increasingly rare and is identified earlier in the course after AMI. However, despite current management strategies for AMI, the prognosis of VSD as a complication of AMI remains poor.²

We present a series of cases of post-heart attack VSD over a period of four years treated at our institution.

MATERIAL

This study is a descriptive, retrospective case series that was previously approved by the institutional ethics committee. Categorical variables were analyzed using percentages, while numerical variables were described in terms of their range as minimum and maximum values. The study included patients with a diagnosis of post-AMI VSD, confirmed by color Doppler echocardiography, who were presented at a medical-surgical meeting and accepted for surgical management between 2020 and 2024.

RESULTS

A total of six patients with post-AMI VSD were treated at our institution. The demographic and clinical characteristics

Table 1: Demographic variables (N = 6).

Variable	n (%)
Gender	
Female	4 (66.6)
Male	2 (33.3)
Age (years)	
Mean	70
Minimum	62
Maximum	75
Risk factors	
Diabetes mellitus 2	2 (33.3)
Diabetes mellitus and arterial hypertension	2 (33.3)
Smoking	1 (16.6)
Arterial hypertension	1 (16.6)
Location of the infarction	
Posterior wall	4 (66.6)
Anterior wall	2 (33.3)

Table 2: Surgical and post-surgical variables.

Variable	Frequency Range (Mean)
CPB time (minutes)	111-176 (150)
Aortic clamping (minutes)	90-123 (89)
Surgical time (hours)	5-8 (6)
Ventilation time (hours)	5-9 (6)
Time spent in therapy (days)	3-9 (4)
Mortality	0
Reintervention	0

CPB = cardiopulmonary bypass.

of the patients are summarized as follows: the mean age was 70 years, with a female predominance (66.6%). The average interval between AMI and surgical intervention was eight days. Echocardiography was used to diagnose the septal defect in 66% of patients, while angiography was used in the remaining cases. Multiple coronary artery disease was present in 66% of patients, with diabetes mellitus type 2 and systemic arterial hypertension being the most common risk factors (33.3% each). Posterior myocardial infarction was the most common type (66.6%), and 50% of patients presented with cardiogenic shock at the time of intervention. The estimated risk by EuroSCORE was 41 ± 24 (*Table 1*).

Surgical treatment involved median sternotomy with moderate hypothermia and cardiopulmonary bypass in all cases. Anterograde cardioplegia with crystalloid solution was administered, and closure of the VSD was performed with a double patch technique in all patients. The VSD was approached through the infarcted area of the left ventricle in 17% of patients and through the right atrium in 83%. Concomitant coronary artery bypass grafting (CABG) was performed in 66.6% of patients, using the left internal mammary artery and saphenous vein grafts in all cases. The mean cardiopulmonary bypass time was 150 minutes, the mean aortic clamping time was 89 minutes, and the mean surgical time was 6 hours. All patients underwent postoperative echocardiography evaluation (*Table 2*).

Postoperative management included a mean ventilation time of six hours and a mean hospital stay of five days. Patients were divided into groups based on ventilation time (< 6 hours or > 6 hours) and hospital stay (< 5 days or > 5 days). The majority of patients (66.6%) required ventilation for more than 6 hours, and a similar proportion had a hospital stay longer than five days. These patients were more likely to have undergone concomitant CABG and VSD closure after AMI. Only two patients had residual shunt, and no patient required reintervention. There was no surgical mortality, and the mean follow-up period was two years, with only one patient requiring rehospitalization for a non-cardiac cause (*Table 2*).

DISCUSSION

The incidence of VSD following AMI has decreased significantly with the advent of modern revascularization strategies. According to recent reports, the incidence of VSD after AMI is approximately 1-2%.² Furthermore, hospitalizations for this condition have declined substantially, with a reported decrease of 41.6% between 1999 and 2014, attributed to advancements in reperfusion techniques.³

The mortality rate for VSD post-AMI remains high, approximately 80%, if left untreated. Surgical intervention is generally considered the management of choice,⁴ although percutaneous management has been reported to yield good results in select cases.¹ Nevertheless, surgery continues to be the preferred treatment option.³ Several independent risk factors have been identified for developing VSD as a complication of AMI, including advanced age, female sex, previous ischemic injury, and chronic kidney disease.²

In most studies, female predominance is observed, consistent with our series. The underlying cause of this phenomenon remains uncertain; however, it is hypothesized that factors such as advanced age, atypical symptoms, and delayed management may contribute to the higher incidence in women.⁵ Additionally, anatomical differences, such as a thinner septum in women compared to men, may also play a role.⁶

The American College of Cardiology Foundation/American Heart Association guidelines recommend immediate surgical intervention for patients with post-AMI VSD to improve hemodynamic status, classifying it as a surgical emergency.⁷ However, some studies suggest that delaying surgery for 21 days after AMI may be associated with lower mortality rates.⁵ Nevertheless, advances in surgical techniques and myocardial preservation have been shown to improve outcomes in most patients with post-AMI VSD.⁶ Given the low incidence of this condition, we believe that the optimal timing of surgery should be determined on a case-by-case basis, considering the individual patient's morbidities and the center's expertise.

Another topic of ongoing debate is the role of CABG and VSD closure. While the issue remains controversial, several studies have found no significant association between CABG and perioperative mortality,² which is consistent with our series, where over 50% of cases underwent concomitant CABG without an increase in mortality. However, our series

did reveal that these patients had longer ventilation times and hospital stays, likely due to more extensive cardiac damage and greater left ventricular dysfunction.

The main limitations of this study are the small sample size and single-center design. Nevertheless, we believe that our results can provide valuable insights and serve as a reference point for further statistical discussion and analysis.

CONCLUSION

Despite a decline in incidence over recent decades, VSD as a complication of AMI continues to be associated with significant morbidity. Surgical repair remains the primary management strategy for this condition.

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