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Rajesh Pradhan, MD
Thomas Jefferson University Hospital

Toshimasa Okabe, MD
Thomas Jefferson University Hospital, Toshimasa.Okabe@jefferson.edu

Kazuki Yoshida, MD
Harvard School of Public Health

Dimitrios Angouras, MD
Attikon University Hospital, Athens Greece

Matthew Decaro, MD
Thomas Jefferson University Hospital, Matthew.DeCaro@jefferson.edu

See next page for additional authors

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Patient Characteristics and Predictors of Mortality Associated With Pericardial Decompression Syndrome

Rajesh Pradhan, Toshimasa Okabe, Kazuki Yoshida, Dimitrios Angouras, Matthew V. Decaro, Gregory D. Marhefka

1 Thomas Jefferson University Hospital, Division of Cardiology, Philadelphia, PA, USA; 2 Harvard School of Public Health, Boston, MA, USA; 3 Attikon University Hospital, Athens, Greece

Abstract

Background

Pericardial decompression syndrome (PDS) is a rare and potentially fatal complication of apparently successful pericardiocentesis, characterized by paradoxical hemodynamic deterioration, ventricular dys-synchrony and profound hypotension. We sought to elucidate clinical characteristics and risk factors associated with mortality in patients with PDS.

Methods

A systematic review of all cases of PDS reported in PubMed was performed. We collected baseline clinical variables, echocardiographic and hemodynamic variables, methods of drainage (needle versus surgical drainage), amount of fluid drained, and clinical outcomes. A case of PDS from our institution was added. T-test and Fisher’s exact test were used for analysis of continuous and categorical variables, respectively.

Results

A total of 34 cases (male:female 12:22) were identified. Needle pericardiocentesis, surgical drainage, and both were performed in 18, 15, and 1 patients, respectively. The procedure was done for cardiac tamponade in 32 (94%) cases. Twenty patients (59%) had an underlying malignancy. Etiologies of effusion were malignant, infectious, traumatic, post-radiation, post-cardiac surgery, and unknown in 12 (35%), 3 (9%), 1(4%), 1 (4%), 1(4%) and 15 (43%) cases, respectively. The procedure was performed 'immediate' to 48 hours. Cardiogenic pulmonary edema without shock, left ventricular dysfunction, right ventricular dysfunction, and severe mitral regurgitation were present in 30 (85%), 12 (35%), 3 (9%) and 1 (4%) cases, respectively. Twenty patients (59%) died of PDS. Mortality was seen only after surgical drainage and the association was statistically significant (p<0.001). Severe LV dysfunction normalized in all PDS survivors. What role did the decision of needle pericardiocentesis versus surgical drainage in these patients is unknown.

Conclusion

PDS is a rare complication of pericardiocentesis with a high mortality rate. The minimum amount of drained effusion in our series was 450 mL, surgical drainage was associated with mortality in PDS.

Background

Pericardiocentesis is a needle-based procedure for drainage of pericardial effusion.

PDS can be life-saving in cardiac tamponade by promptly draining fluid.

Methods

A systematic review of all cases of PDS reported in PubMed was performed since the first reported case in 1983.

All cases with abstracts available in English language were collected and reviewed.

A case of PDS from Thomas Jefferson University Hospital (TJUH) was added to a total of 34 cases analyzed.

We collected baseline clinical variables, echocardiographic and hemodynamic variables, methods of drainage (needle versus surgical drainage), amount of fluid drained, and clinical outcomes. T-test and Fisher’s exact test were used for analysis of continuous and categorical variables, respectively.

Results

A total of 34 cases (male:female 12:22) were identified. Needle pericardiocentesis, surgical drainage, and both were performed in 18, 15, and 1 patients, respectively. The procedure was done for cardiac tamponade in 32 (94%) cases. Twenty patients (59%) had an underlying malignancy. Etiologies of effusion were malignant, infectious, traumatic, post-radiation, post-cardiac surgery, and unknown in 12 (35%), 3 (9%), 1(4%), 1 (4%), 1(4%) and 15 (43%) cases, respectively. The procedure was performed 'immediate' to 48 hours. Cardiogenic pulmonary edema without shock, left ventricular dysfunction, right ventricular dysfunction, and severe mitral regurgitation were present in 30 (85%), 12 (35%), 3 (9%) and 1 (4%) cases, respectively. Twenty patients (59%) died of PDS. Mortality was seen only after surgical drainage and the association was statistically significant (p<0.001). Severe LV dysfunction normalized in all PDS survivors. What role did the decision of needle pericardiocentesis versus surgical drainage in these patients is unknown.

Conclusion

PDS is a rare complication of pericardiocentesis with a high mortality rate. The minimum amount of drained effusion in our series was 450 mL, surgical drainage was associated with mortality in PDS.

Etiology of Pericardial Effusion

- Malignant
- Infectious
- Traumatic
- Post-radiation
- Post-cardiac surgery
- Unknown

PDS cases at TJUH

A case of PDS at TJUH

A 41-year-old male with myelodysplastic syndrome with transformation into acute myeloid leukemia presented with chest pain.

Immediate resolution of right ventricular collapse with minimal residual pericardial fluid seen adjacent to right atrium.

Echocardiogram revealed low normal left ventricular systolic function.

Troponin T was elevated at 0.9 ng/mL (normal <0.01 ng/mL).

Heart rate 122 bpm, blood pressure 109/70 mm Hg, respiratory rate 22 per minute, pulse oximetry 98%.

Echocardiogram revealed worsening ST-segment depression in the inferior leads with diastolic pericardial T wave inversion.

Critical cardiac silhouette and improved bilateral lung infiltrates compared to one month prior.

Not contraindicate the use of needle pericardiocentesis in patients with PDS.

Conclusions

- 15 patients had evidence of new severe left ventricular dysfunction associated with PDS.
- 11 of those had follow-up echocardiogram and all of them demonstrated complete normalization of left ventricular systolic function.
- 10 (29%) patients died of PDS.
- Surgical drainage was the only predictor of mortality associated with PDS (p<0.001).

Association with mortality in PDS by route of drainage

- Surgical drainage
- Needles drainage
- Both
- Overall

Etiology of Pericardial Effusion

- Malignant
- Infectious
- Traumatic
- Post-radiation
- Post-cardiac surgery
- Unknown

PDS cases from TJUH

- Presenting ECG
- Echocardiogram
- Coronary angiography

Limitations

- This is a retrospective series of reported cases and has inherent biases related to such studies.
- The sample size is small and is not representative of low incidence of PDS.
- There is possible publication bias as milder cases may not have been reported, and hence the reported cases may not represent the overall patient population.
- The reported cases of PDS in our series may be a heterogeneous group of disorders due to lack of standard definition and diagnostic criteria for PDS.
- Decision for needle pericardiocentesis versus surgical drainage was unknown.

Conclusions

- PDS is a rare complication of pericardiocentesis with a high mortality rate.
- The minimum amount of drained effusion in our series was 450 mL.
- Surgical drainage was a predictor of mortality in PDS.

Disclosure Statement

All the authors have read and approved the content of this paper. None of the authors have potential conflicts of interest in any relationship to industry.