

DPC データベースを用いた小児心筋炎の疫学、及び重症例転帰に関連する因子の検討

目的

小児の急性心筋炎（AM）は、致死率の高い重症病態だが、希少性が高いため研究あるいは治療提供に困難性を抱えている。その臨床的特徴、管理、および転帰を解析し、特に劇症心筋炎（FM）グループの死亡率に関連する因子を評価した。

方法

6年分の全国 DPC データベースを使用し、18歳未満の心筋炎による入院患者を抽出した。多変量ロジスティック回帰分析で、FM グループ（すなわち、陽性変力剤/昇圧剤、機械的循環サポート、および/または心肺蘇生法を受けた患者）における院内死亡率の予測因子を調べた。

結果

866人の患者（FM382人を含む）が対象となった。院内死亡率は11.1%であり、非FMグループと比較してFMグループで有意に高かった（24.1%vs 0.8%、 $P < 0.001$ ）。FMグループでは、院内死亡率の低下が次の要因と有意に関連していた：0歳児と比較して6～11歳（オッズ比[OR]、0.37; 95%信頼区間[CI]、0.15～0.90.; $P = 0.029$ ）および12～17歳（OR、0.22; 95%CI、0.08～0.60; $P = 0.003$ ）。四分位で最も治療数が少ない病院群（6年間で1～2例）と比較して、最も治療数が高い病院群（6年間で6例以上; 0.26; 95%CI、0.11～0.59; $P = 0.001$ ）の病院での治療。

結論

小児FMの院内死亡率は依然として高値である。重症例の経験数の多い施設への集約化が生存率を向上させる潜在的な要因であることを示唆した。

小児の重症患者の救命率向上には、診療する施設の要因(case-volume relationship)が影響していることを示唆する。希少例である小児重症患者管理を考える際に、各地域における拠点病院の集約化や搬送を踏まえた検討を行うことと共に、全国的症例登録やデータベースの作成と地域における活用の重要性が示唆される。

学会発表

Ohki S, Hosokawa K, Matsuoka M, Tomioka S, Matsuda S, and Shime N: Clinical features, management, and factors associated with mortality in pediatric patients with acute myocarditis: an analysis of a Japanese administrative database. EUSEM 2019 (Prague, October 2019)

論文等

なし

Clinical features, management, and factors associated with mortality in pediatric patients with acute myocarditis: An analysis of a Japanese administrative database

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Background

- ◆ Pediatric acute myocarditis frequently causes severe symptoms and sudden death.
- ◆ A subgroup of acute myocarditis patients with acute severe hemodynamic compromises, referred to as fulminant myocarditis (FM), requires inotropes, vasopressors, mechanical circulatory support (MCS), or heart transplantation.
- ◆ Despite recent advances in therapeutic modalities, FM is still associated with high mortality.
- ◆ Because of its low prevalence, large-sized surveys have been limited, and the factors associated with mortality have not been studied extensively

Objective

- ◆ To describe the clinical characteristics, management, and outcomes of pediatric patients with acute myocarditis and to investigate the relationship between clinically relevant factors, including hospital case volume and mortality.

Methods

- ◆ We performed a retrospective observational study in Japan from April 2012 to March 2017.
- ◆ We used the Diagnosis Procedure Combination (DPC) database, a Japanese in-hospital patient register system.
- ◆ In the database, we identified pediatric patients aged <18 years who were diagnosed with acute myocarditis.
- ◆ We defined patients with FM as those who received inotropes, vasopressors, and/or mechanical circulatory support ≤7 days from admission.
- ◆ We defined hospital case volume as the mean annual number of pediatric FM patients treated in each hospital in a single year. We categorized it into tertiles (low, middle, and high) .
- ◆ In the FM subgroup, we performed multivariate logistic regression analysis to investigate the factors associated with all-cause in-hospital mortality. We entered prespecified variables in multivariate analysis based on the results from previous studies and our interest.

Results

- ◆ We identified 524 pediatric patients with acute myocarditis treated at 242 hospitals.
- ◆ There were no statistically significant seasonal changes in the number of patients ($P = 0.478$)
- ◆ All-cause in-hospital mortality in the total cohort was 10.1%.
- ◆ A total of 231 (43.3%) patients were categorized into the FM subgroup (Table 1).
- ◆ In-hospital mortality in the FM subgroup was significantly higher than that in the non-FM subgroup (21.7% vs 1.3%, $P < 0.001$).
- ◆ The hospital case volume in the FM subgroup ranged from 0.2 to 4.4 patients/hospital/year.

Table 1. Comparison of the variables based on the in-hospital survival in the FM subgroup

Variables	Survivors (n = 181)	Non-survivors (n = 50)	P-value
Patient characteristics			
Male sex	93 (51.4)	24 (48.0)	0.750
Age (years)	6.0 (1.0–12.0)	3.0 (0.0–10.0)	0.046
Hospital characteristics			
Hospital type			
Tertiary care emergency hospital	139 (76.8)	39 (78.0)	1.000
Hospital case volume categories (patients/hospital/year)			
Low (<0.4)	49 (27.1)	20 (40.0)	0.031
Middle (0.4–<0.8)	57 (31.5)	19 (38.0)	
High (≥0.8)	75 (41.4)	11 (22.0)	
Patient management			
Therapeutic procedures			
Cardiopulmonary resuscitation	25 (13.8)	29 (58.0)	<0.001
Mechanical circulatory support	75 (41.4)	24 (48.0)	0.424
Mechanical ventilation	144 (79.6)	45 (90.0)	0.101
Renal replacement therapy	31 (17.1)	18 (36.0)	0.006
Medications			
Intravenous immunoglobulin	141 (77.9)	32 (64.0)	0.064
Corticosteroids	98 (54.1)	25 (50.0)	0.634
Inotropes/vasopressors	179 (98.9)	50 (100.0)	1.000

Values are given as n (%) or median (interquartile range).
FM, fulminant myocarditis

- ◆ Multivariate logistic regression analysis in the FM subgroup showed the following results (Table 2):
 - ✓ All-cause in-hospital mortality was significantly lower in the highest age category (12–17 years) and in the highest hospital case volume category (≥0.8 patients/hospital/year).
 - ✓ Requirement of MCS was associated with a significantly higher mortality.
 - ✓ Administration of intravenous immunoglobulin or corticosteroids was not associated with mortality.

Table 2. Multivariate logistic regression analysis for in-hospital mortality in the FM subgroup

Variables	OR (95% CI)	P-value
Male sex	0.97 (0.48–1.98)	0.933
Age categories (years)		
0	Reference	
1–5	1.34 (0.52–3.44)	0.541
6–11	0.57 (0.20–1.63)	0.294
12–17	0.22 (0.08–0.59)	0.003
Hospital case volume categories (patients/hospital/year)		
Low (<0.4)	Reference	
Middle (0.4–<0.8)	0.95 (0.42–2.12)	0.895
High (≥0.8)	0.32 (0.12–0.80)	0.015
Mechanical circulatory support	2.84 (1.53–5.25)	0.001
Intravenous immunoglobulin	0.53 (0.25–1.12)	0.097
Corticosteroids	0.72 (0.35–1.51)	0.388

FM, fulminant myocarditis; OR, odds ratio; CI, confidence interval

Conclusions

- ◆ In-hospital mortality of pediatric patients with acute FM was as high as 22%.
- ◆ A lower mortality was associated with older age and treatment at high-case-volume hospitals.
- ◆ Further investigations are required to elucidate the reason for better outcome in high-case-volume hospitals, which may differ from low-case-volume hospitals in the management of pediatric patients with acute myocarditis.