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■Plenary Session13（Emer/Med Policy/New Fields）
Up Date of Intensive Care for Cardiogenic Shock

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集中治療室に入室する患者のなかでもとりわけ心原性ショックは、その方向性を見誤ると救命困難に至ることもあり、血行動態の評価および治療法の選択など迅速な決断を要する場合も散見される。心原性ショックの死亡率は 1970 年代に 70%を超えていたが、2010 年以降は 30～40%まで改善してきた。最近 10 年間で新しい補助循環装置も登場したが、現在の日本における心原性ショックの発生頻度と死亡率は不明である。わが国における心原性ショックの転帰を改善させるために病院前救護体制、病院収容後の救急診療、集中治療管理などの現状を把握することは重要である。本セッションの目的は、①地域での心原性ショックの発生頻度と予後予測因子、②循環器専門施設への集約化と早期治療開始の啓発、③心原性ショックの初期対応医と循環器専門医の連携および循環器専門医と集中治療専門医の連携、④急性心筋梗塞、急性心筋炎等の心原性ショックをきたす疾患ごとの病態の相違と転帰、⑤IABP、ECMO、IMPELLA などの補助循環装置の効果と選択のタイミングおよび合併症予防（適応、導入、管理、離脱もしくはその限界）、など心原性ショックの死亡率改善の対策を講じることにある。本セッションではこの分野では先進的な施設での治療成績から最新の取り組みまでをも紹介していただき、このセッションを聴講したすべての参加者が明日からの心原性ショックの循環管理の実践に少しでもお役に立てれば幸いである。

演者１：

ECPR for Out-of-Hospital Cardiac Arrest in the United States

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Extracorporeal cardiopulmonary resuscitation (ECPR) using percutaneous veno-arterial extracorporeal membrane oxygenation (VA-ECMO) is emerging internationally as a feasible and effective strategy for treating out-of-hospital cardiac arrest (OHCA) that is refractory to standard care. In the United States, implementation of ECPR for OHCA has been limited due to high resource intensity, challenges coordinating the system-of-care, and lack of randomized clinical trials demonstrating efficacy. However, two recently published randomized clinical trials in the U.S. have the potential to impact implementation. The EROCA trial was a pilot study that explored the feasiblity of transporting patients with refractory OHCA to an emergency department capable of initiating ECPR within 30 minutes of cardiac arrest onset, and of emergency medicine physicians initiating ECPR within 30 minutes of ED arrival. The ARREST trial demonstrated the effectiveness of transporting patients with refractory OHCA to the cardiac catheterization lab for initiation of ECPR followed by immediate coronary angiography and PCI if indicated. The same group reported on the use of a mobile ECPR cannulation team to reduce the time to OHCA ECPR initiation. Finally, a number of studies have described the complications of ECPR after OHCA. Overall these recent studies provide important insights into the number and type of patients most likely to benefit from this therapeutic strategy, and will inform system-of-care design to maximize patient eligibility and optimize outcomes.

キーワード

cardiopulmonary resuscitation／extracorporeal circulation

演者 2：

Temporal Trends in In-hospital Mortality and Mechanical Circulatory Support in Patients with Acute Myocardial Infarction -Lessons from MIYAGI AMI Registry-

[演者] Jun Takahashi:1

[共同演者] Koichi Sato:1, Kiyotaka Hao:1, Yasuhiko Sakata:1, Hiroaki Shimokawa:1, Satoshi Yasuda:1

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Background: Little is known about the contemporary use of mechanical circulatory support devices in patients with acute myocardial infarction (AMI) in Japan. Methods and Results: In MIYAGI AMI Registry Study, we enrolled 5,714 AMI patients from 2013 to 2017. Mechanical circulatory support devices were used in 620 patients (10.9%) (69.1±12.6 yrs, M/F 487/133), of whom 109 (17.6%) complicated with out-of-hospital cardiac arrest (OHCA) and 313 (50.5%) had heart failure (HF) (Killip class ≥II) on admission. In-hospital mortality was 23.7% in the patients received intra-aortic balloon pump (IABP) only (n=515), 55% in those with extra-corporeal membrane oxygenation (ECMO) only (n=20), and 71.8% in those with both (n=85). Importantly, following the increase in the prevalence of OHCA and HF on admission among entire subjects, both usage rate of IABP and ECMO significantly increased over time, whereas in-hospital mortality of mechanical-supported patients remained unchanged (Figure). Conclusions: These results indicate that in-hospital mortality remained high despite of increased use of mechanical circulatory support in the critical care for the contemporary AMI patients in Japan.

キーワード

artificial heart/cardiac support devices／myocardial infarction

演者 3：

Optimal Management of Cardiogenic Shock: Delivering the Comprehensive, Collaborative, and Multidisciplinary Care

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Cardiogenic shock (CS) is a high-acuity, hemodynamically complex state resulting in life-threatening multisystem organ failure. Despite advances in reperfusion therapy and mechanical circulatory support, management of CS remains highly variable and outcomes poor. Recently a multidisciplinary standardized team-based approach including cardiac interventionalist, surgeon, emergency physician or intensivist is focused on the possibilities to improve CS outcomes. The mission of the Cardiac Care Unit (CCU) committee at the Japanese Society of Intensive Care

Medicine (JSICM) is to improve the quality of care and outcomes of the critically ill patients with emergency cardiovascular diseases. In 2016, the CCU committee reported the results of questionnaire survey on the current state of CCU. A total of 554 the Japanese Circulation Society (JCS) authorized "cardiovascular specialist training facilities" replied about location of CCU: 48% were in ICU, 16% were in general ward, 9% were in HCU, 8% were in critical care center, and dedicated CCU was 18%. There is no certified ICU specialist in dedicated CCU of approximately 80%. A half of dedicated CCU is managed together with ICU specialist or will hope in such a setting. CCU is not limited to within the unit's geographical boundaries, extending to different specialties and subspecialties of cardiology, in order to optimally manage the wide scope of acute cardiovascular and multisystem organ failure in highly complex CS patients. Furthermore, CCU may contribute to mid-term cardiovascular treatment and to the initiation of secondary prevention strategies. It is important to continue collaborative action of JSICM and JCS for delivering the comprehensive and multidisciplinary care for CS patients.

キーワード
shock／acute coronary syndrome

演者４：

The Indication and Management Practices of Cardiogenic Shock Based on Our Experience of 70 IMPELLA Cases

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Background: Novel mechanical circulatory support device, IMPELLA has become widespread for patients with refractory cardiogenic shock (CS). However, there are few data about the efficacy and safety of the device. Methods: We used 78 IMPELLA in 68 patients with CS between December 2017 and June 2020, and retrospectively examined the baseline characteristics, clinical outcomes and complications. Results: The mean age was 71.8±12.5 years and 48 patients (70.6%) were male. Out of all patients, 37 patients were diagnosed as AMI(8 patients with VSP), 6 patients as fulminant myocarditis(FM). IMPELLA were used as ECPELLA in 43 cases (55.1%), 18 cases in ECPELLA were persistent CPA, 9 cases were PCCS. IMPELLA CP has been used in most cases(95.8%) since September 2019. All IMPELLA removal rate was 51.3%, IMPELLA alone was 90.6%, ECPELLA was 24.3%, and especially FM was 83.3%. The 75% of 44 patients who introduced IMPELLA first were successfully removed, but VF, hypoxia, aortic dissection, cardiac rupture, and others were escalated to 5.0 or ECPELLA. The insertion of IMPELLA by puncture were performed at 20.5min(mean), half of the cases are done within 15 minutes, and procedure success rate was 98.1%. Only 1 case of hemolysis leading to dialysis, and 5 cases had access site complication. Severe hemorrhagic complications was observed in 23 ECPELLA cases and 9 IMPELLA cases, all cases in AMI(CPA or DAPT or long-use for VSP) and PCCS. Conclusions: The management protocol has been gradually changed at our facility based on experiences. IMPELLA improved outcome in non-CPA AMI and FM, but the proper management of hemorrhagic complications might be required.

キーワード shock／myocardial infarction

演者 5：
Clinical Features of Deteriorating Cardiogenic Shock Patients

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The management of patients with cardiogenic shock (CS) remains a significant challenge. The Society for Cardiovascular Angiography and Interventions have recently clarified CS patients into five stages labeled A-E. Stage D, which represent "Deteriorating" or "Doom" CS, describes a patient who has failed to stabilize despite initial interventions and further escalation is required. However, no reports to date examined the clinical feature of these patients. We analyzed 56 consecutive CS cases who required mechanical circulatory support (MCS), including intra-aortic balloon pumping (IABP), Impella, or venoarterial extracorporeal membrane oxygenation (VA-ECMO) in our institution between July 2019 and July 2020. The median age was 63(interquartile range (IQR), 52-73) and cause of CS were heterogeneous (acute coronary syndrome 25%, acute decompensated heart failure 61%, postcardiotomy shock 12%, incessant ventricular arrhythmia 2%). Dependent of the cardiorespiratory situation variations of MCS were used as initial MCS (IABP n=32, VA-ECMO and IABP n=13, VA-ECMO n=4, Impella n=7). 10 patients (18%) were deteriorated and required additional MCS with a median interval of 12 hours (IQR 8-21) after initiation of first MCS. 3 patients received V-A ECMO and IABP then upgraded V-A ECMO and Impella, 3 patients received Impella then V-A ECMO, 2 patients received IABP then upgraded Impella, and 2 patients received IABP then V-A ECMO. Indications for additional MCS were pulmonary edema or hypoxia (n=3), low cardiac output (n=6), and arrhythmia (n=1). The 30-day all cause mortality in stage D patients was 40%. Appropriate initial MCS selection and careful observation after initiation of first devices, specially first 24hrs, are important for patient outcome.

キーワード
shock／extracorporeal circulation

演者 6：

Predicting Parameters for Successful Weaning from Veno-Arterial Extracorporeal Membrane Oxygenation in Refractory Cardiogenic Shock

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Percutaneous veno-arterial extracorporeal membrane oxygenation (VA-ECMO) is utilized for patients with cardiogenic shock (CS) or cardiac arrest. Although assessment of cardiac function is necessary for the management of patients with CS supported by VA-ECMO, few studies have investigated the usefulness of the echocardiographic and pulmonary artery catheter (PAC) parameters for predicting successful weaning from VA-ECMO in those patients. We studied 50 patients who were hospitalized in National Cerebral and Cardiovascular Center and supported by VA-ECMO for >48 hours. Patients successfully weaned from VA-ECMO without re-introduction of VA-ECMO or left ventricular assist device implantation were defined as 30-day survivors. Twenty-four patients were successfully weaned from VA-ECMO, whereas 26 were not. Fractional shortening, corrected LV ejection time (LVETc, defined as LVET divided by the square root of heart rate), LV outflow tract velocity time integral (VTI), and LVETc divided by pulmonary artery wedge pressure (PAWP) were significantly larger in the 30-day-survivor groups. Multivariable analysis revealed LVETc/PAWP as a significant independent predictor of successful weaning [LVETc/PAWP, OR 0.82, 95%CI 0.71-0.94, p = 0.005]. Receiver-operating characteristic curve analysis revealed 15.9 as the optimal LVETc/PAWP for predicting successful weaning (area under the curve, 0.82). In conclusion, the present findings indicate that LVETc/PAWP is a potential predictor of the successful weaning and the PAC providing simultaneous monitoring may be beneficial to detect relative hemodynamic changes during the support and predict the successful weaning from the VA-ECMO.

キーワード
extracorporeal circulation／shock