Pneumoperitoneum after Cardiopulmonary Resuscitation

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Pneumoperitoneum after resuscitation is an uncommon complication of cardiopulmonary resuscitation (CPR). Herein, we described an elderly woman who had hollow organ perforation following a successful CPR for sudden cardiac arrest, which was caused by acute myocardial infarction. The pneumoperitoneum was confirmed by chest radiography obtained after resuscitation. However, she did not receive surgical intervention and expired finally due to the multiple organ failure under conservative treatment.

Key words: pneumoperitoneum, cardiopulmonary resuscitation

Introduction

Cardiopulmonary resuscitation (CPR) is the most useful life-saving maneuver in patient with sudden cardiac arrest. However, some complications have been reported following this procedure,¹⁴ even when it was performed properly. Herein, we presented a case of hollow organ perforation following a successful CPR.

Case Report

A 74-year-old woman presented with sudden collapse after progressive dyspnea and chest discomfort for three days. There was no nausea, vomiting, and abdominal pain during the whole course of illness. She has a medical history of diabetes mellitus, hypertension and coronary artery disease (CAD). Her son - an emergency medical technician (EMT) – witnessed the episode of sudden cardiac arrest and started CPR immediately, including use of laryngeal mask airway and bag-mask ventilation. At the same time, the bystander sent the patient to our emergency department. Endotracheal intubation was smoothly performed, and return of spontaneous circulation developed after a total of twenty minutes of CPR. However, progressive abdominal distention was noted and much fresh blood was drained from nasogastric tube. The examination of electrocardiogram (ECG) disclosed ST segment elevations in lead II, III and aVF, and the serum creatinine kinase level was 1096 IU/L, with MB fraction (16.6 ng/ml), and an elevated serum Troponin-I level (2.93 ng/ml). Chest radiography then showed diffuse infiltration over bilateral lung fields and right subphrenic free air (arrow) (Fig. 1). Computed tomography of abdomen disclosed massive intra-peritoneal air which indicated perforation of hollow organ. Because her family refused further surgical intervention, the patient died under conservative care two days later.
Fig. 1 Chest radiography showed diffuse infiltrations over bilateral lung fields and free air under diaphragm (arrow)

Discussion

In the present work, although the finding of pneumoperitoneum was noted after resuscitation, the patient did not have abdominal discomfort and the abdomen was soft without tenderness before CPR. In contrast, the patient had underlying disease of CAD and suffered from chest pain before collapse. Thus, the etiology of sudden cardiac arrest should be related with cardiac event, not acute abdomen. However, in spite of successful resuscitation, she finally died due to pneumoperitoneum developed after CPR.

CPR, this simple procedure, saved a lot of life since its development. However, complications such as rib and sternal fracture, pneumothorax, subcutaneous emphysema, hemothorax, and pulmonary or cardiac contusion have also been reported after CPR\(^{(1-4)}\). Most common intra-abdominal complications after CPR included gastric dilatation, liver and spleen injury. Gastric perforation is another uncommon, but life-threatening complication of this maneuver\(^{(5)}\). In our case, aggravated gastric dilation and further rupture secondary to forceful breath on laryngeal mask airway or bag-mask ventilation should be the cause of pneumoperitoneum.

Although pneumoperitoneum after resuscitation is a uncommon condition, clinicians should considered its occurrence after CPR, especially in the following situations. Bystander-provided basic life support (BLS), the use of a bag-mask ventilation and difficult airway management, such as esophageal intubation were the most common risk factors of this complication\(^{(5)}\). If a distended and tympanic abdomen presented after resuscitation, a chest radiography or further abdominal CT should be obtained to find out possible pneumoperitoneum.

In fact, this unusual complication after CPR is preventable. To correctly establish airway, such as proper manipulating bag-mask ventilation and the right placement of endotracheal tube, is the most crucial measure. In addition, cricoid pressure, which impedes the entrance of air into the stomach
during CPR, is another useful maneuver. Both of the above can avoid the excess volume and high inflation pressure into the stomach and further cause perforation.

In conclusion, physicians should be aware of this rare complication after CPR, and a chest radiography obtained post resuscitation may be helpful for the rapid diagnosis.

References

心肺復甦術後引起氣腹

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氣腹是心肺復甦術後少見的併發症，此次我們描述一位因急性心肌梗塞而心跳停止的老婦人，經成功的心肺復甦術後發現中空器官破裂。此氣腹經由急救後胸部X光診斷。然而，此病人因未接受外科手術而採用保守療法，最後因多器官衰竭死亡。

關鍵詞：氣腹，心肺復甦術