Crit Care Shock (2019) 22:275-280

Case report: a fatal case of severe pancreatitis associated with rhabdomyolysis

Saw Kian Cheah, Mohamed Izzad bin Isahak, Wan Rahiza Wan Mat, Shereen Suet Ping Tang, Rufinah Teo, Aliza Mohamad Yusof, Raha Abdul Rahman

Abstract

***Background*: Rhabdomyolysis is an uncommon presentation associated with severe acute pancreatitis (SAP). Patients usually present late and asymptomatic, thus it carries poorer clinical outcome and higher mortality rate.**

***Case report*: We report a case of SAP in a 42-year-old man who presented with persistent epigastric pain, elevated serum amylase, and characteristics of acute pancreatitis on the contrast-enhanced computed tomography of the abdomen. Investigations revealed persistent hyperkalemia and severely elevated creatinine kinase in the presence of acute kidney injury, which led to the uncommon possibility of diagnosing severe rhabdomyolysis. He suffered complications of intra-abdominal hypertension, feeding intolerance, severe ARDS and multi-organ failure. He succumbed to death after a month despite aggressive intensive care therapies and support.**

***Discussion*: The actual pathophysiology of rhabdomyolysis in SAP is complex. It is postulated that acute inflammation of pancreas causes ATP-dependent proton pump dysfunctions leading to skeletal muscle cells injury and therefore, rhabdomyolysis.**

***Conclusion*: Coexistence of rhabdomyolysis with SAP have higher risk for fatality, therefore, its presence allows early triage, early aggressive resuscitation and intensive care management.**

Key words: Severe acute pancreatitis, rhabdomyolysis, hyperkalemia, acute kidney injury, ATP-dependent proton pump.

Introduction

Rhabdomyolysis is a syndrome characterized by skeletal muscle cell injury that release intracellular muscle contents such as creatinine kinase (CK) enzyme, electrolytes and myoglobin into the circulation. Rhabdomyolysis commonly occurs following traumatic injuries, ischemic insults, infections, certain drugs administration, particular toxins exposure and hyperthermia. (1,2)

In recent years, rhabdomyolysis had been reported in the non-traumatic injury such as acute pancreatitis. (1) The exact pathophysiology of acute pancreatitis causing rhabdomyolysis is complicated but its presence is associated with poorer clinical outcome and higher mortality rate. (2)

In this case report, we would like to highlight a fatal case of severe acute pancreatitis (SAP) which was associated with severe rhabdomyolysis and acute kidney injury (AKI). It was complicated by refractory intra-abdominal hypertension (IAH), feeding intolerance, and multi-organ failure.

Case report

A 42-year-old previously well male, presented with epigastric pain, fever, vomiting and abdominal distension two days prior to hospital admission. He denied any history of cigarette smoking, alcohol consumption nor illicit drug usage.

From Department of Anaesthesiology and Intensive Care, Universiti Kebangsaan Malaysia Medical Centre, Bandar Tun Razak, Kuala Lumpur, Malaysia (Saw Kian Cheah, Wan Rahiza Wan Mat, Shereen Suet Ping Tang, Rufinah Teo, Aliza Mohamad Yusof, and Raha Abdul Rahman) and Department of Surgery, Pusat Perubatan Universiti Teknologi Mara, Kuala Lumpur, Malaysia (Mohamed Izzad bin Isahak).

Address for correspondence:
Saw Kian Cheah, MD
Department of Anaesthesiology and Intensive Care, Universiti Kebangsaan Malaysia Medical Centre
Jalan Yaacob Latif, Bandar Tun Razak, 56000 Cheras, Kuala Lumpur, Malaysia
Tel: +60 391455783
Fax: +60 391456585
Email: skii_cheah@yahoo.com

Initially he was admitted to general surgical ward from the emergency department. Despite having full consciousness, he was tachypneic at 40 breaths per minute and tachycardic at 153 beats per minute with high grade temperature of 39.2 ºC. However, both his conjunctivae did not show signs of anemia nor icterus. On the further examination, there were reduced breath sounds at both of his lung bases worsened by distended and guarded abdomen.

His blood investigation revealed significantly elevated serum amylase level of 1061 IU/l. His Imrie score was 4 after 48 hours of admission (white blood counts $15.7x10^9$/l, blood urea nitrogen 21.1 mmol/l, lactate dehydrogenase 1151 U/l, and albumin 23 g/l) indicating high risk of developing SAP. His abdominal contrast-enhanced computed tomography (CECT) on the day of admission showed heterogeneously bulky head of pancreas measuring approximately 5.6 cm x 5.3 cm x 7.4 cm with extensive peripancreatic fat streakiness. However, there was no evidence of necrosis, calcification or peripancreatic collections. The gallbladder was distended with no calculus and the pancreatic ducts as well as biliary duct were not dilated (**Figure 1**).

His immediate managements were adequate parenteral analgesics, fluid resuscitations and kept fasted to rest the gastro-intestinal tract. However, he developed hypoxemic respiratory failure needing endotracheal intubation and mechanical ventilation. He was then referred to the intensive care team for further management. Following admission to intensive care unit (ICU), he developed unstable haemodynamics requiring inotropics support with concurrent fluid resuscitation. On day 2 of ICU admission, he developed grade 2 intra-abdominal hypertension (IAH) as his abdomen became further distended and was tense.

In subsequent days, his kidney functions deteriorated and were associated with persistent hyperkalemia. Despite fluid resuscitations and repeated cycles of the lytic cocktail regimes, his kidney functions declined further requiring renal replacement therapy (RRT). Concurrent investigation showed serum CK level elevated and peaked on day 6 of ICU admission at 105,829 U/l from the baseline of CK level of only 63 U/l on day 1 of ICU admission.

With RRT, the serum CK levels gradually normalized and kidney functions improved. However, his abdomen remained distended and noted to have persistent hypocalcemia required replacement. Furthermore, he developed feeding intolerance despite initiation of prokinetics. Abdominal CECT was repeated on day twelve of ICU admission. It showed persistently, enhanced, and an enlarged pancreas but without focal areas of necrosis. However, this repeated abdominal CECT showed extensive peripancreatic fluid collections with thin enhancing wall at lesser sac measuring at 7.6 cm x 7.4 cm x 5 cm, right paracolic gutter measuring at 3.8 cm x 7.3 cm x 5.4 cm, and left anterior pararenal space measuring at 10.7 cm x 5.2 cm x 12 cm (**Figure 2**). As the extensive peripancreatic fluid collections contributed to the distended abdomen, a transcutaneous pigtail catheter was inserted by the interventional radiologist for decompression and drainage of the collections. Despite the drainage, the patient's abdomen remained distended with feeding intolerance. In the following days leading up to his death, he developed nosocomial infections, severe acute respiratory distress syndrome (ARDS), and multi-organ failure (MOF).

Discussion

Acute pancreatitis is an acute inflammation of the pancreas, characterized by the activation of pancreatic proenzymes with autodigestion, proteolysis, edema, vascular damage, interstitial hemorrhage, and fat necrosis. (1) Acute pancreatitis is a surgical emergency that can lead to local and systemic complications. According to the revised Atlanta classification (2012), SAP was defined as an acute pancreatitis with organ failures (respiratory, cardiovascular, and renal) that persist for more than 48 hours. (3) The overall incidence of SAP was about 15-20% of all cases of acute pancreatitis, yet the reported cases of SAP showed poorer clinical outcome with high mortality for up to 50%. (3,4,5).

Rhabdomyolysis is an uncommon complication seen in acute pancreatitis. The exact pathophysiology role of rhabdomyolysis in acute pancreatitis is rather complex. The possible postulated theory would be SAP induced systemic inflammatory response, persistent hyperthermia, and extensive injury of pancreas causing the excessive adenosine triphosphatase (ATP) utilization and depletion. (6) With ATP depletion, pump functions such as Na/K-ATPase and Ca^{2+}-ATPase will get affected and disrupted. These will subsequent lead to the muscle cell membrane breakdown, increased in the cell membrane permeability and get accumulated in the cytoplasm's sodium and calcium ion concentration. The excess of the calcium ion intracellularly will further enhance the increase in the intracellular proteolytic enzymes activity causing muscle cell degradation. With the existence of the muscle cell degradation and necrosis, this leads to the severe rhabdomyolysis and large release of electrolytes such as potassium, phosphate, myoglobin,

and CK into the circulation and subsequent causing of renal tubular cell injury, obstruction, ischemia, and AKI. (7)

Severe and prolonged hypocalcemia might also occur with the concurrent conditions of SAP with rhabdomyolysis. (2) In SAP, saponification of fat usually deposits in the pancreas, however, concurrent presentation of rhabdomyolysis will worsen the condition as calcium salt will further deposit in the damaged muscle cell as seen in this patient. (2,8)

Although the association between rhabdomyolysis with acute pancreatitis is uncommon, when it does happen, patients usually present with acute deterioration accompanied by MOF leading to possible death. In this case report, we reported the patient initially presentation of acute pancreatitis, but rapidly developed AKI with hyperkalemia requiring RRT. Concurrently, these were accompanied by the refractory intra-abdominal hypertension (IAH), feeding intolerance, and multi-organ dysfunctions. We believed that his deterioration was largely associated with the ongoing rhabdomyolysis in SAP.

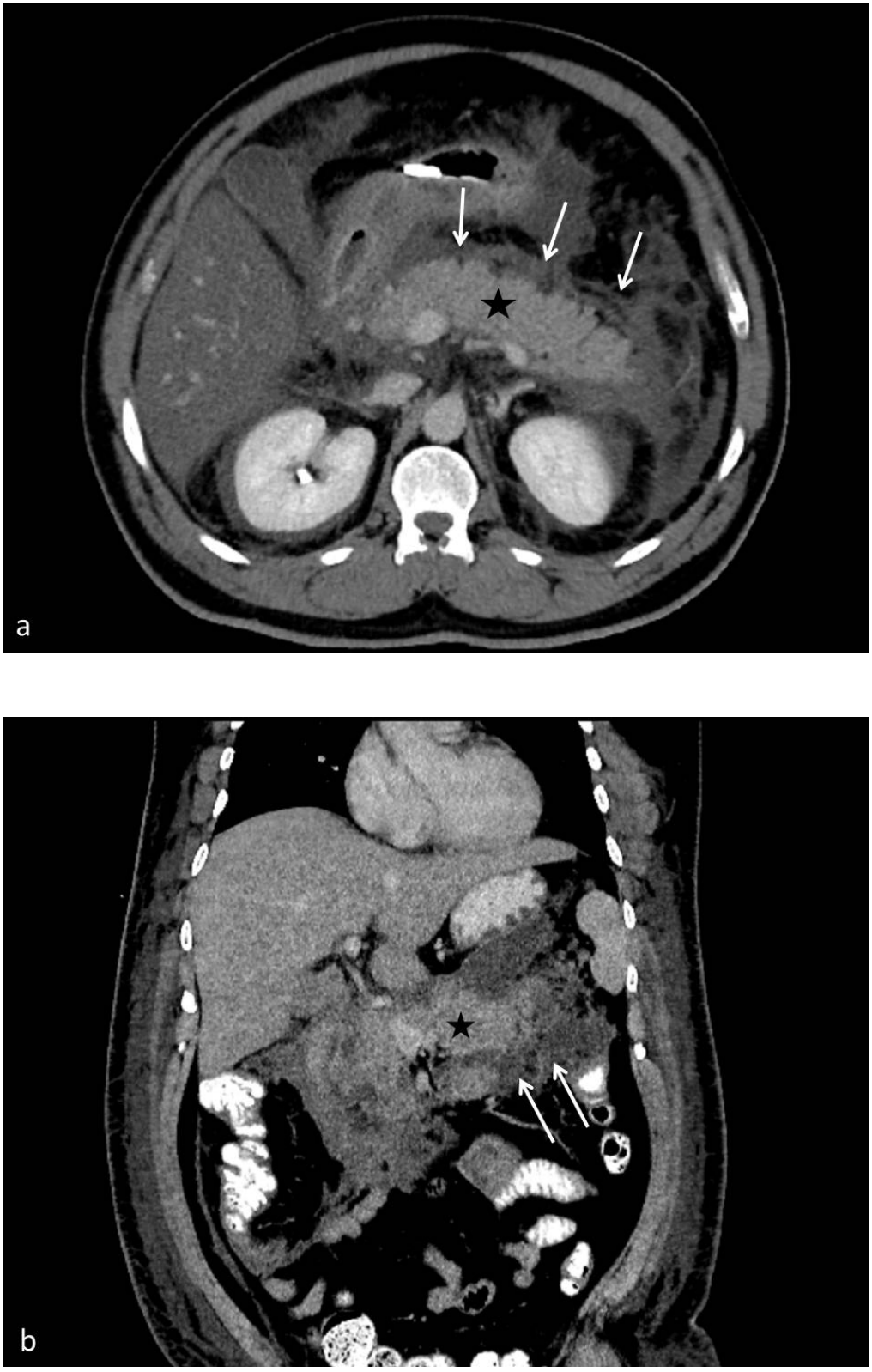
Conclusion

If an acute deterioration developed in an otherwise relatively stable acute pancreatitis patient, especially with early development of AKI and persistent hyperkalemia, acute rhabdomyolysis should be suspected to institute early aggressive resuscitation and intensive care management.

Acknowledgement

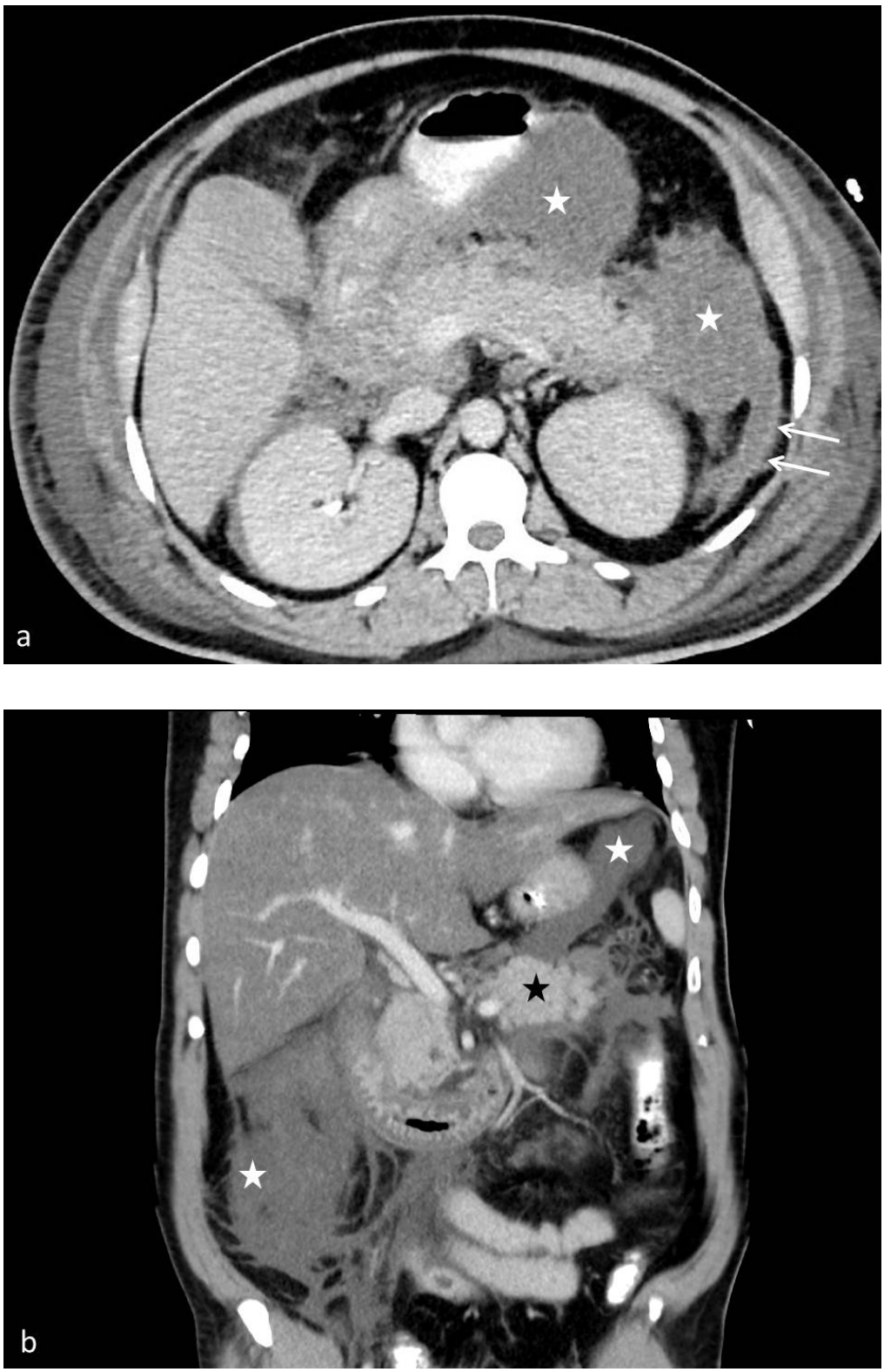
Associate Professor Dr. Faizah Mohd Zaki, Department of Radiology Universiti Kebangsaan Malaysia Medical Centre for helping in the radio-images selection.

Figure 1. Contrast enhanced CT abdomen of the patient at presentation in axial (a) and coronal (b)



Legend: The pancreas was swollen and homogenously enhancing (black star) with associated peripancreatic fluid and increased fat streakiness (white arrows).

Figure 2. Repeated contrast enhanced CT abdomen at day-12 of ICU admission in axial (a) and coronal (b)



Legend: There were multiple new collections with thin enhancing wall at the lesser sac and peripancreatic region, perisplenic, and right paracolic gutter (white stars). There was no dominant necrosis in the pancreas (black arrow).

References

1. Pezzilli R, Billi P, Cappelletti O, Barakat B, Miglio F. Rhabdomyolysis and acute pancreatitis. J Gastroenterol Hepatol 1999;14:168-71.
2. Nankivell BJ, Gillies AH. Acute pancreatitis and rhabdomyolysis: a new association. Aust N Z J Med 1991;21:414-7.
3. Banks PA, Bollen TL, Dervenis C, Gooszen HG, Johnson CD, Sarr MG, et al. Classification of acute pancreatitis - 2012: revision of the Atlanta classification and definitions by international consensus. Gut 2013;62:102-11.
4. Banks PA, Freeman ML, Practice Parameters Committee of the American College of Gastroenterology. Practice guidelines in acute pancreatitis. Am J Gastroenterol 2006;101: 2379-400.
5. Fagenholz PJ, Castillo CF, Harris NS, Pelletier AJ, Camargo CA Jr. Increasing United States hospital admissions for acute pancreatitis, 1988-2003. Ann Epidemiol 2007;17:491-7.
6. Zou RH, Bednash JS. Acute Pancreatitis and Hyperthermia: An Unusual Case of Rhabdomyolysis. Med Sci Case Rep 2018;5:6-9.
7. Khan FY. Rhabdomyolysis: a review of the literature. Neth J Med 2009;67:272-83.
8. Williamson RC. Early assessment of severity in acute pancreatitis. Gut 1984;25:1331-9.