

Point-by-point responses to the reviewers' comments

Reviewer #1:

Scientific Quality: Grade B (Very good)

Language Quality: Grade B (Minor language polishing)

Conclusion: Accept (General priority)

Specific comments to authors

1. English is poor and requires correction eg "However, if the pericardial injury is not WORSE enough to LUXATE the heart, it may only cause intermittent ECG changes or be asymptomatic". (WORSE should be replaced by BAD; LUXATE should be replaced with DISLOCATE or CAUSE HERNIATION OF)

Response

Thank you for your thoughtful review and comments.

We have revised the manuscript as follows:

Abstract – Background section (page 2):

From

“However, if the pericardial injury is not worse enough to luxate the heart, it may only cause intermittent ECG changes or be asymptomatic.”

To

“However, pericardial injuries not **bad** enough to **dislocate** the heart may only cause intermittent ECG changes or be asymptomatic.”

Abstract – Core Tip section (page 2):

From

“If a patient with blunt chest trauma shows fluctuating vital signs and accompanied ECG abnormalities, we should consider the probability of pericardial rupture and cardiac luxation.”

To

“If a patient with blunt chest trauma shows fluctuating vital signs and accompanying ECG abnormalities, pericardial rupture and cardiac **herniation** should be considered.”

Discussion (page 7)

From

“Motto et al. reported that cardiac luxation could be intermittent; therefore, sequential evaluation is recommended (7). We performed serial laboratory follow-ups for elevated cardiac enzymes, consecutive chest CTs, and preoperative TTE. In our case, however, the pericardial hole was only 4×4 cm and too narrow to cause severe symptomatic cardiac luxation. Instead, we hypothesized that it may have caused intermittent anginal symptoms such as inferior MI. Unfortunately, the pain from the patient’s rib fractures may have been severe and may have masked the anginal pain due to cardiac luxation.”

To

“Motto et al. reported that cardiac **herniation** could be intermittent; therefore, sequential evaluation is recommended (7). We performed serial laboratory follow-ups for elevated cardiac enzyme levels, consecutive chest CTs, and preoperative TTE. In our case, however, the pericardial hole was only 4×4 cm and was too narrow to cause a severe symptomatic cardiac **herniation**. Instead, we hypothesized that it may have caused intermittent ECG changes and vital instability, resembling MI. In addition, pain from the patient’s rib fractures may have masked chest discomfort due to cardiac **herniation**.”

Conclusion (page 7)

From

“If a patient with blunt chest trauma shows fluctuating vital signs and accompanying ECG abnormalities, the probability of pericardial rupture and cardiac luxation should be considered.”

To

“If a patient with blunt chest trauma shows fluctuating vital signs and accompanying ECG abnormalities, pericardial rupture and cardiac **herniation** should be considered.”

2. Words do not end at the line, and are carried over to the next line. This requires resetting their word program/file. A bad example is the paragraph on "Core Tip".

Response

Thank you for your thoughtful review and comments.

We have reset our software settings in accordance with your comment:

3. The descriptions of the ECGs in Fig1, C and D are incorrect. The ECG changes worsened from C to D, with prominent widespread ST elevation throughout being more pronounced in D. This patient is unlikely to have an MI because

- There was no serial changes to the ECG as would be expected in an MI

- The ST elevation was widespread and not in the classical anterior, lateral or inferior leads as one would expect from regional MI

- ST depression in D was present in III, AVR, and V1, are not the classical reciprocal ECG changes seen in MI, which should be located in regions opposite to the locality of the

regional MI.

Response

Thank you for your thoughtful comments and ECG analyses. We totally agreed with your opinion. As you can see, this patient did not show any typical symptoms or findings which met the criteria of MI (we are not sure whether the patient experienced anginal pain as it would have been masked by the pain from multiple rib fractures). However, it is true that as trauma surgeons working at a regional trauma center, we have to be sensitive to even the slightest change in ECGs. In such cases, we tend to adhere completely to the opinion of the cardiologist.

The cardiologist in our hospital recommended TTE to confirm cardiac condition because he could not rule out the probability of MI with only the ECG. He also said that the TTE was inevitable because the patient's systolic blood pressure intermittently fluctuated with prominent ECG changes, even though the ECG did not show the typical patterns of MI, as you mentioned.

We highly appreciate your insightful comments. As per your comments, we have made changes in the relevant paragraphs as follows:

Initial treatment (page 4)

From

“Postoperative care in the surgical intensive care unit (SICU) was provided as usual. Blood tests for elevated cardiac enzymes were repeated every 4 hours that showed gradual improvements. The patient did not complain of worsened chest pain, which was successfully controlled with analgesics. However, ECG changes, including an elevated ST segment, were accompanied by fluctuations in blood pressure, which was monitored by an arterial line

(Figure 1).

On day 2 of hospitalization, TTE was performed to check for cardiac conditions. It was confirmed that the patient neither had pericardial fluid collection nor abnormal cardiac movement. Although the ECG findings were still suggestive of inferior MI, we regarded these findings as non-meaningful and indicative of usual transient changes after cardiac contusion.”

To

“Postoperative care in the surgical intensive care unit (SICU) was provided as usual. Blood tests for elevated cardiac enzymes were repeated every 4 hours and showed gradual improvement. The patient did not complain of worsening chest pain, which was successfully controlled with analgesics. **However, the patient’s systolic blood pressure fluctuated intermittently with prominent ECG changes. Although the changes were not the classical reciprocal findings observed for the myocardial infarction (MI), we still found it necessary to confirm the patient’s cardiac condition** (Figure 1).

On Day 2 of hospitalization, TTE was performed to check for cardiac conditions. The patient was confirmed to have neither pericardial fluid collection nor abnormal cardiac movements. **The patient’s ECG remained variable, fluctuating from normal to prominent ST elevations**, and we regarded these findings as non-meaningful and indicative of the usual transient changes after cardiac contusion”

Figure legend (Figure 1, page 11)

From

“Figure 1. (A) Initial chest contrast CT showed traumatic hemothorax, with no evidence of heart injury; (B) Initial abdominal contrast CT showed visceral herniation through an abdominal wall defect (Red arrow); (C) The initial ECG showed abnormal findings,

including elevated ST segments on the anterior leads (V3 and V4), but these findings do not meet the criteria for myocardial infarction (MI); (D) ECG performed later when the patient showed fluctuating systolic blood pressure. showed prominent ST changes, with elevations at the lateral leads (V5, V6, Lead I, and aVL), and depressions at the lead III and aVR, which are the findings suggestive of an acute MI.”

To

“Figure 1. A: Initial chest contrast CT showing traumatic hemothorax, with no evidence of heart injury; B: Initial abdominal contrast CT showing visceral herniation through an abdominal wall defect (red arrow); C: The initial ECG showed widespread abnormal findings, but did not meet the criteria for myocardial infarction (MI); and D: ECG performed later when the patient showed fluctuating systolic blood pressure. The ECG showed prominent ST changes with depressions at the lead III, aVR, and V1, which are not the classical reciprocal ECG changes seen in MI.”

4. The description of the ECG in Fig 3 B is also incorrect. The ECG is much improved, with resolution of all ST depression, and much less ST elevation than that present in Fig 2 D.

Response

Thank you for your thoughtful review and comments.

We have made changes in the figure legend as per your comment.

Figure legend (Figure 3, page 12)

From

“(A) The operation field during surgical stabilization of rib fractures. We routinely performed

a thoracic cavity exploration before fixing rib fractures. The white arrow indicates the left ventricle was visible through the 4×4 cm pericardial rupture, which was an incidental finding; (B) Postoperative ECG findings were still abnormal, but findings that indicated myocardial infarction were not observed.”

To

“A: The operation field during surgical stabilization of rib fractures. We routinely performed a thoracic cavity exploration before fixing the rib fractures. The white arrow indicates that the left ventricle was visible through the 4×4 cm pericardial rupture, which was an incidental finding. B: **The postoperative ECG with the resolution of all ST depressions and lower ST elevations than that present in the preoperative period.**”

Reviewer #2:

Scientific Quality: Grade C (Good)

Language Quality: Grade B (Minor language polishing)

Conclusion: Minor revision

Specific comments to authors

This is an interesting and rare case. I have comments as follows:

1. Due to initial an elevated ST segment and elevated troponin T, I think it might be an direct blunt injury to the pericardium and myocardium, not be an anginal injury.

Response

Thank you for your thoughtful review and comments. We totally agreed with your comments that the patient's ECG changes and vital instability did not indicate MI. However, in our case, we needed to rule out even the slightest possibility of MI. Our statements on the original test may have caused confusion, so we have revised the manuscript based on your advice.

Discussion (page 7)

From

“Instead, we hypothesized that it may have caused intermittent anginal symptoms such as inferior MI. Unfortunately, the pain from the patient's rib fractures may have been severe and may have masked the anginal pain due to cardiac luxation.”

To

“Instead, we hypothesized that it may have caused **intermittent ECG changes and vital instability, resembling MI. In addition, pain from the patient’s rib fractures may have masked chest discomfort due to cardiac herniation.**”

2.The ST segment changes caused by mechanical compression or spasm of the coronary arteries should be intermittent and transient. In this case, however, the changes of ST segments were consistently elevated, but to a different degree.

Thank you for your thoughtful comments on ECG analyses. We totally agreed with your opinion. Frankly speaking, the ECG changes were not constant, but were intermittent and variable. The ECG changes and vital instability were especially notable when the patient was re-positioned to prevent pressure sores. We initially deemed these findings as the typical results of cardiac contusions, which do not require treatment. Despite our mistake, the patient’s ECG markedly improved after the operation.

As mentioned earlier in our response to reviewer #1, this patient did not show any typical symptoms or findings which met the criteria of MI. The cardiologist in our hospital recommended TTE to confirm the patient’s cardiac conditions because he could not rule out the probability of MI only with the ECG. He also said that the TTE was inevitable because the patient’s vital signs were intermittently unstable with prominent ECG changes, even though the ECG did not show the typical patterns of MI.