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# Delayed revascularization following complete transection of left anterior descending artery after a stab wound



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## ABSTRACT

**INTRODUCTION:** Penetrating heart injury as a consequence of a stab wound is usually considered fatal. Nevertheless, there are rare lucky cases with mild symptoms which deserve clinical suspicion and proper management.

**PRESENTATION OF CASE:** We report a penetrating cardiac trauma with left anterior descending coronary artery transection after a stab wound. Successful revascularization without cardiopulmonary bypass support was performed.

**DISCUSSION:** Coronary artery injuries after penetrating cardiac trauma are mostly fatal. The standard approach has traditionally been coronary artery ligation with serious morbidity. We report a case of complete coronary artery transection with delayed revascularization validating the safety of off-pump approach. We add a short literature review of the management of traumatic coronary artery injury.

**CONCLUSION:** This adds to the world literature on coronary artery trauma with successful off-pump revascularization. Coronary artery transection stab-wound victims can have only mild symptoms. Slightest intimation of heart injury should provoke proper clinical examination and management.

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## 1. Introduction

Penetrating cardiac injury remains a highly lethal form of trauma. Cardiac tamponade and exsanguination are the greatest immediate and life-threatening risks.<sup>1,2</sup> Clinical presentation is extremely variable and diagnosis may be difficult. Coronary artery injury is rarely survivable. We report the case of a young man who suffered a stab wound with complete coronary artery transection. Successful diagnosis and treatment was performed next day.

## 2. Presentation of case

A 30-year-old man visited emergency room (ER) in the morning because of violent knife attack the night before. He was completely hemodynamically stable. A non-bleeding stab wound slightly above his left nipple was found. There were non-specific changes on ECG (Fig. 1). CT scan showed left hemothorax so left pleural drain was inserted. He was admitted originally for

observation only but because of 1 cm thick circular pericardial effusion proven on CT and echocardiography, surgical exploration was indicated. After midline sternotomy, pericardial sac was opened and 300 ml of blood was evacuated. There was clearly visible already non-bleeding LAD transection with dislocation of both ends of the vessel and non-penetrating left ventricle injury (Fig. 2). Consequent surgery was performed with OPCAB technique (off-pump coronary artery bypass grafting). Ends of the transected LAD were ligated, revascularization of distal part of LAD was performed with harvested LIMA and left ventricle trauma incision was reinforced with pledgeted sutures. Left lung was not injured. Postoperative course was uneventful and the patient was released home seven day after intervention. Heart function was assessed by echocardiography – slightly decreased function of left ventricle was subscribed (ejection fraction of 50%) with hypokinesis of apical and anteroapical septal segments.

## 3. Discussion

Penetrating cardiac wounds are mostly fatal either due to cardiac tamponade, exsanguination or coronary artery injury.<sup>2</sup> High mortality rate such as 67% is reported by Molina et al.<sup>3</sup> Broad review of the last 15 years of published penetrating cardiac injuries was covered by Kaljusto et al.<sup>4</sup> Coronary artery injury is usually considered deadly. Fortunately, less than 10% of chest injuries involve heart and even less coronary arteries.<sup>5</sup> According to retrospective study of 532 victims by Demetriades and van der Veen, coronary

*Abbreviations:* LAD, left anterior descending (artery); LIMA, left internal mammary artery; ER, emergency room; OPCAB, off-pump coronary artery bypass grafting.

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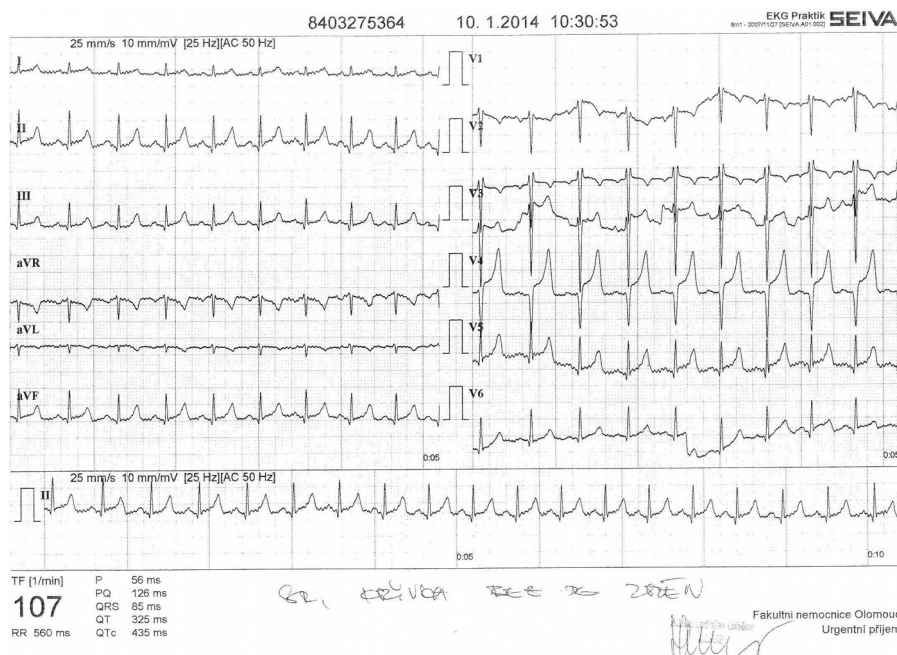


Fig. 1. ECG.

artery transection was uncommon.<sup>6</sup> Due to its location, LAD is the most commonly injured coronary artery.

Simple surgical ligation used to be a method of choice for coronary artery injury treatment.<sup>7</sup> Unfortunately, it has been associated with mortality rates of up to 75% due to myocardial ischemia.<sup>8</sup> Perfusion of up to one half of the left ventricle may be affected by simple coronary artery ligation. Later, survival rates of patients with coronary artery injuries have improved with development of cardiopulmonary bypass techniques and revascularization procedures.<sup>9</sup> While the use of cardiopulmonary bypass with myocardial arrest provides a quiet, bloodless surgical field, it requires full heparinization and predisposes for later coagulopathy and bleeding, which may be deleterious in poly-trauma patient. Recently, off-pump coronary artery bypass grafting (OPCAB) techniques has been applied to this injury with considerable success.<sup>10–12</sup> Reported world experience in OPCAB to manage traumatic coronary artery injuries was published by Moore et al.<sup>12</sup>

In our case report, patient with transected LAD was admitted approx. 12 h after accident and he was completely hemodynamically stable. Brief spasm of both transected ends of LAD probably

prevented fatal cardiac tamponade. During admission, routine ECG was performed and only non-specific old changes were originally subscribed. On CT scan, small left hemothorax was found and later in ER drained. Small circular hemopericardium was not considered important by examining physician according to hemodynamic status of the patient and monitoring only was proposed. At our department, ECG was evaluated again with Q-waves and limited apical infarction depicted (Fig. 1). Echocardiography confirmed pericardial effusion and experienced heart team led by cardiac surgeon indicated surgical exploration with subsequent procedure mentioned above.

According to some reports, simple penetrating cardiac injury might be successfully managed by general surgeon.<sup>2</sup> Because of special instruments needed, even a cardiac surgical “take-away” kit was proposed in case of acute care at remote hospitals.<sup>13</sup> In our case, coronary artery lesion was treated by OPCAB approach, LIMA grafting and left ventricle suturing, possible only with specialist cardiac surgical skills.

Our case report clearly shows that not only cardiac surgeon, but also other members of “heart-team” are important for proper diagnosis and management of heart trauma (skilled echocardiographer, cardiologist, etc.). Heart injuries might be quite complex and final diagnosis and mode of treatment is proposed and delivered by surgeon at the theater after chest opening (cardiopulmonary bypass insertion, heart stabilization equipment for OPCAB, valve prostheses, etc.). Proper specialized approach to the heart trauma patient eliminates possible serious late consequences.<sup>14,15</sup> This kind of treatment is carried out best in centers specialized for cardiac surgical procedures.

#### 4. Conclusion

Our case report shows that complete coronary artery transection after a stab wound is survivable. At even slight suspicion, surgical exploration of pericardial sac and heart is always strongly justified. Off-pump coronary artery by-pass is a safer alternative for transected artery treatment. Examination and treatment of cardiac injuries in facility with “heart team” and cardiac surgical expertise is always strongly recommended.

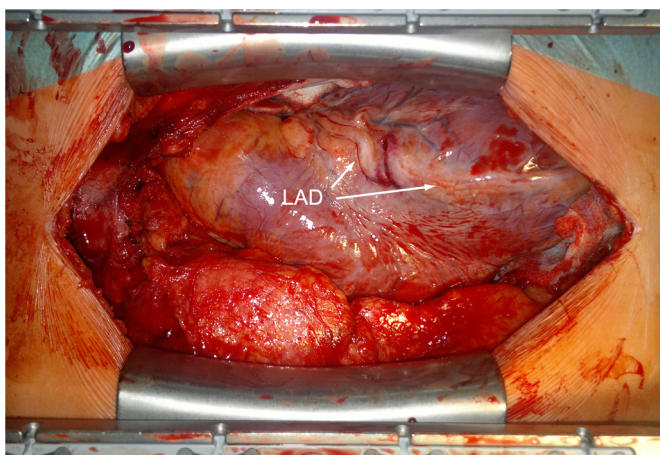


Fig. 2. Transected left anterior descending artery.

### Competing interests

The authors declare that they have no competing interests.

### Funding

None declared.

### Ethical approval

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

### Authors' contributions

PS and VL managed the patient as attending and indicating consultants. AS performed the surgery. All authors read and approved the final manuscript.

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