

Sternal Steel Wire Induced Persistent Intermittent Mediastinal Wound Drainage After CABG

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ABSTRACT Delayed mediastinal wound drainage due to hypersensitivity to stainless steel sternal wire is very rare conditions in post sternotomy patients. In literature, although some cases reported about treatment by removing the sternal wires because of persistent chest pain due to hypersensitivity, it is rarely reported about conditions that persistent wound drainage from sternal incision due to reactions to sternal wires. We present such a complicated case about these who developed tissue overgranulation and sternal dehiscence and persistent intermittent sternal wound drainage for about twelve months after emergency coronary artery bypass. Repeated wound cultures were negative and no laboratory evidence was founded indicating mediastinitis. We believe there are no previously published papers in literature describing and managing condition like this.

Keywords: Coronary artery bypass; drainage; stainless steel; mediastinitis; surgical wound dehiscence

Stainless steel wire suture is a standard approach to approximate sternum for median sternotomy patients because of its safe, fast and inexpensive features since first described by Milton in 1897.¹ Sternal wound infection, sternal dehiscence and bony nonunion are among the complications mostly reported. Few cases were reported about persistent sternal pain because of hypersensitivity which required removal of sternal wires.^{2,3}

Compared with other published cases, this clinical case report is characterised intermittent persistent wound drainage from multiple small holes on the sternotomy incision without pain, repeated wound cultures were negative and no laboratory evidence was found indicating mediastinitis. Overgranulation tissue arised nearby sternal wires was also remarkable.

CASE REPORT

A 63-year old male patient was delivered our emergency service because of severe chest pain started two hours earlier. The electrocardiography and cardiac enzymes revealed acute coronary syndrome (ACS) and immediate coronary angiography was performed. Our heart team decided emergency three vessel coronary artery bypass grafting (CABG) operation because the patient was not stable haemodynamically.

The patient's medical history showed that he has had severe cervical and lumbar ankylosing spondylitis for thirteen years which makes the endotracheal intubation difficult to apply. The patient also have had cholecystectomy six years ago, right total hip replacement two years ago. He has

been suffering from chronic obstructive pulmonary disease (COPD) for five years; using wheel chair for about one year and taking clopidogrel 75mg daily for two months, he has no diabetes and no hypertension. Arterial blood gas analysis was shown as follows: PaCO₂ 46 mmHg, PaO₂ 47 mmHg, oxygen saturation was 82% at room temperature. The operation was finished successfully, chest tube drainage was 1800 cc. Five bags of erythrocyte suspension and fresh frozen plasma were given. The patient was discharged uneventfully on postoperative day of thirteen with oxygen concentrator for home use.

Three weeks later, the patient developed wound drainage at different points of sternal incisions, and sternal dehiscence was occurred soon after that. Wound drainage was gelatinous, odorless and dark yellow. Considered as for mediastinitis at first, the patient was hospitalised. The wound culture was taken at the drainage site, but no bacteria was cultivated. The blood study also did not show any infection. The patient had no fever, no leucocytosis and CRP was at normal range. After three days of CPAP (continue positive airway pressure) and intensive medication for bronchospasm, the amount of drainage was decreased significantly. Because of limited lung capacity, the sternal dehiscence was successfully repaired and the surrounding tissues was debrided under local anesthesia. Upon chest pains disappeared and no more drainage seen, the patient was discharged on third postoperative day.

After two weeks of follow up, drainage reappeared as same fashion at multiple sites of sternum without any signs of sepsis. Wound culture did not found any pathogens, the patient had neither fever

nor pain. Upon this unique situation, thorax CT scan was performed because of underlying pathology, and we found that the overgranulation tissues were arised just above the sternal wire sutures and upper part of sternotomy was healed while the lower part was not (Figure 1).

Daily dressing was planned and first generation cephalosporin was given for preventing contamination. The sternal drainage showed crescendo-decrescendo pattern, but it never ceased during six months of follow up. Concerning the dehiscence worsen, we planned step by step removal of sternal wires, the upper wires were removed under local anesthesia through a mini incision under fluoroscopy (Figure 2). We found the drainage volume was decreased and the wound was healed completely at that site gradually. After one month of follow up, the rest of the wires were removed by the same way, additional two PDS sutures were placed lower part of sternum cautiously where the dehiscence still exists. Completely sternal dehiscence and wound healing was achieved after three months (Figure 3).

DISCUSSION

There are a few instances in which patients have suffered from allergic reactions to the wires that hold the sternum in place after cardiac surgery.⁴ Several case reports also demonstrated the hypersensitivity reaction to sternal wires which causes persistent postoperative pain.^{2,3} However, we did not find any published paper like this kind of cases describing long lasting aseptic drainage and dehiscence due to sternal steel wire reaction.

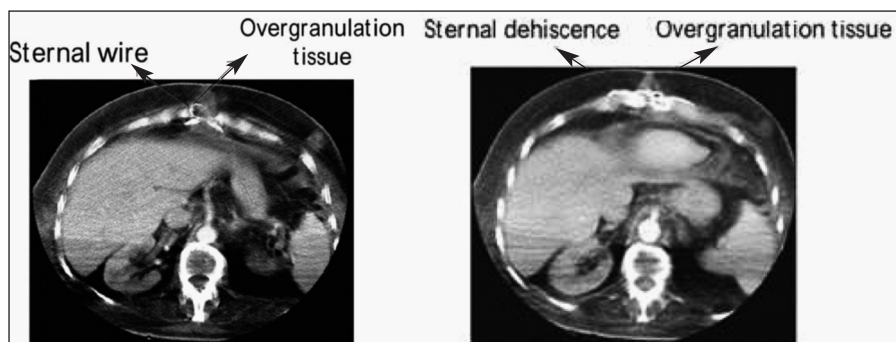


FIGURE 1: Thorax computed tomography scan.

Sternal dehiscence is more frequent among COPD patient who is associated with prolonged postoperative ventilatory support and increased intrathoracic pressure because of chronic cough, and it requires immediate correction due to deteriorating respiratory potential.³

Our patient was weaned ventilatory support after 15 hours postoperatively and stayed ICU for five days because of respiratory failure. Dehiscence occurred three weeks after the operation was linked this challenging respiratory involvement. Critically poor pulmonary function is also a significant factor preventing us from putting the patient general

anesthetic situation which is necessary for transverse plate fixation or zipfix system instead of steel wires.⁵ We had tightened the loosed wires and done limited debridement under local anesthesia.

Two weeks after the discharge, drainage from multiple defects nearby sternal wires began to appear that is the possible cause of sternal dehiscence of lower part of sternum. We had clearly seen the overgranulation tissues over the sternal wire and dehiscence at one third lower of sternum on thorax CT scan. First generation of cephalosporin and antiinflammation medication had been no use.⁶ Repeated wound culture was negative. De-

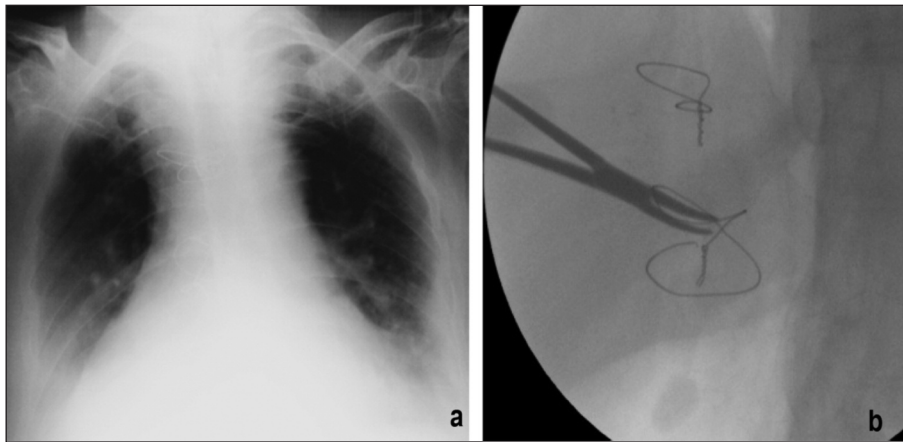


FIGURE 2: Preprocedure chest X-ray (a) and sternal wire removal under fluoroscopy (b).

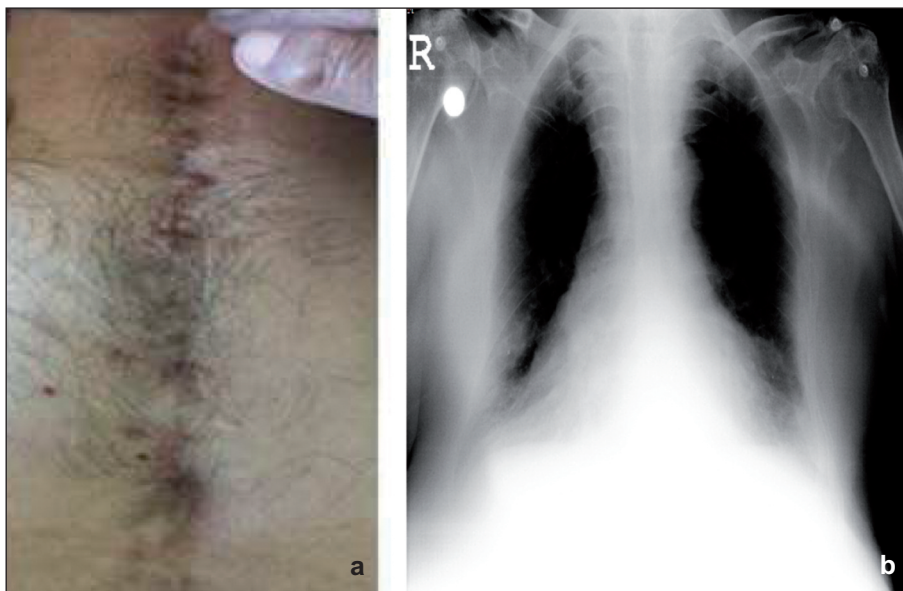


FIGURE 3: Healed wound (a) and chest X-ray (b) fifteen months after CABG.

spite the patch test was negative, we believed the long lasting drainage was in association with steel wire reaction. We removed the sternal wires step by step under local anesthesia and fixed lower sternum by two polydioxanone sutures.⁷ Following days, the drainage volume decreased gradually, wound healed and dehiscence recovered completely after three months.

In this case, not doing pathological examination from wound drainage and granulation tissue to determine immuno-inflammatory responses to stainless steel wire is our omission.⁸ And it is also very controversial if the steel wires removed at first sternal repair period and left the sternal dehiscence secondary healing can prevent long lasting drainage.⁹

In conclusion, Even under the life threatening condition of MI and ACS, the comorbid factors should be evaluated promptly, enhanced sternal closure should be planned to prevent dehiscence and reoperation. In case of persistent aseptic wound drainage, removal of sternal wire as soon as possible is very essential for quick recovery and it is also more reasonable to curb costs incurred by both patients and health care systems.

Informed Consent

The written informed consent was obtained from the patient

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Emin Can Ata; **Design:** Emin Can Ata; **Control/Supervision:** Banu Benli Boylu; **Data Collection and/or Processing:** Emin Can Ata; **Analysis and/or Interpretation:** Emin Can Ata; **Literature Review:** Banu Benli Boylu; **Writing the Article:** Emin Can Ata; **Critical Review:** Banu Benli Boylu; **References and Fundings:** Emin Can Ata; **Materials:** Emin Can Ata.

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