Case report

Sternal dehiscence after cardiac surgery and ACE type 1 inhibition

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Abstract

We report two cases, which underwent surgery through Median sternotomy. They were on an ACE type I inhibitor pre-operatively. Both of these patients developed persistent dry cough post-operatively, which resulted in sternal wound dehiscence. They had no clinical or bacteriological evidence of sternal wound infection. Although one patient was overweight and had moderately impaired left ventricular function, there were no other associated risk factors. Both patients underwent rewiring of the sternum. Type II receptors inhibitor were introduced post-rewiring, which cured the persistent dry cough. Both the patients are enjoying a good quality of life at 2 year 6 months and 2 years post-rewiring of the sternum. © 2001 Elsevier Science B.V. All rights reserved.

Keywords: Sternal dehiscence; Cardiac surgery; ACE inhibition

1. Introduction

Persistent dry cough is a well-known side effect of ACE type I inhibitors. Different randomised controlled trials have shown that Angiotensin type II receptor inhibitors minimise the chances of persistent dry cough as compared to ACE type I inhibitors. Persistent cough following median sternotomy produces excessive tension on the sternal bone plate and may lead to sternal dehiscence.

In the authors review of 2400 consecutive cardiac cases there has been a total of four rewirings (0.2%), one due to infection and one due to severe cough secondary to respiratory infection. The other two cases, which are the subject of this paper, had persistent dry cough due to ACE type 1 inhibitors contributing to sternal dehiscence.

2. Case number 1

A 59-year-old male on Lisinopril for control of hypertension was admitted with sudden onset of chest pain following bilateral inguinal hernia repair. He had occasional short spells of dry cough, which never lasts long, and was thought to be insignificant in view of his medical illness.

He had evidence of inferiolar ischaemia, and coronary angiography showed a critical stenosis in the right coronary artery with angiographic evidence of significantly stenosed right coronary artery. He underwent immediate successful percutaneous transvenous coronary angioplasty (PTCA) on the same setting.

Three days later, he suffered a cardiac arrest for which he required CPR&DC shock. A repeat coronary angiogram showed a patent right coronary anastomosis (RCA) along with normal left coronary system. Echocardiogram performed at this time showed haematoma around the right ventricle, raising the strong suspicion of a ruptured right ventricle.

The patient was stabilised with an intra-aortic balloon pump and was explored through a median sternotomy at the first available theatre. Sternotomy was closed with six wires, two to the manubrium and four pericostal wires.

Post-operatively, he developed a persistent dry cough which was difficult to control despite being on different cough suppressants. He subsequently developed sternal wound dehiscence on day three post-operatively, without any clinical or bacteriological evidence of sternal wound infection. Intra-operatively there was no evidence of sternal or mediastinal infection and the sternotomy was midline. The edges of the sternum were trimmed with an oscillating saw and rewired with four peri-costals and two manubrial stainless steel wires. Post-operatively his Lisinopril was changed to Losartan (ACE type II receptor inhibitor) which cured his persistent dry cough. The sternum remained stable and he was discharged home 5 days post rewiring in a satisfactory condition.

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sternum. He has no recurrence of dry cough on Losartan 2 years 6 month following the rewiring of the sternum.

3. Case number 2

A 54-year-old, overweight, female underwent elective coronary artery revascularization through median sternotomy. The sternotomy was closed with four pericostal and 2-manubrial stainless steel wires. Preoperatively she was on Lisinopril for moderately impaired left ventricular function, with occasional episode of nocturnal dry cough. Lisinopril was continued post-operatively as occasional pre-op nocturnal dry cough was thought to be insignificant in view of her medical condition. She developed persistent dry cough, post-operatively, which failed to respond to all conservative measures (cough suppressant, bronchodilators and steam inhalation). On the fourth post-operative day, she had clinical and radiological evidence of sternal wound dehiscence without any evidence of infection. Intra-operatively four of the wires were found to have cut through the sternum bone. There was no clinical or bacteriological evidence of infection. The edges of the sternum were trimmed with an oscillating saw and rewired with four peri-costals and two manubrial stainless steel wires. Post-operatively Lisinopril was changed to Losartan, which cured her persistent dry cough.

She made a smooth and uneventful recovery. She was discharged home 5 days post rewiring of the sternum. She is enjoying good quality of life with a stable and healed sternum without recurrence of cough 2 years post rewiring.

4. Discussion

The angiotensin converting enzyme inhibitors are currently the drugs of choice for the treatment of hypertension and congestive heart failure. However, it has been reported that in some of these patients, ACE-inhibitors induce hypersensitivity of the airways with occurrence of persistent dry cough, dyspnoea and wheezing. The mechanism of hyperactivity is connected to accumulation of bradykinin, tachykinins and other inflammatory mediators in the airway [1]. The increased concentration of inflammatory neuropeptides stimulates bronchial C fibres and rapidly adapting receptors locally which provoke the cough reflex. Inflammatory process in the airway is followed by contraction of airway smooth muscles. Franova [1], in his experimental work in animal models, has shown the increased bronchial activity after Enalapril treatment. Pharmacological treatment of the cough induced by ACE type I inhibitors with Cromolyn, Theophylline, Sulindac and local anaesthetics has been reported [2]. In our experience all measures to control dry cough failed except changing ACE type I inhibitors to Angiotensin type II receptor blocker.

ACE type I inhibitors have shown a significant increase incidence of persistent dry cough as compared to Angiotensin receptor II blocker in many double blind studies [3–5]. In both of our patients the persistent dry cough resolved completely after stopping ACE type I inhibitor. We believe that persistent cough produces a continuous stress on the sternum. This prevents the normal healing process and can also lead to sternal wire cutting through the bone.

Once identified, this potential problem can be avoided by changing ACE type I inhibitor to Angiotensin type II receptor blocker immediately post-operation in almost all of these patients. Special measures for sternal closure should be applied in exceptional cases (more than six wires or peri-costal bands etc) if the medication cannot be changed from ACE type I inhibitors to ACE type II receptors inhibitors.

References