Sinus bradycardia associated with traumatic haemothorax

R. S. Kong and P. R. Wood

SUMMARY

A 39-year-old male suffered a closed chest deceleration injury. He presented with clinical and radiological signs consistent with trauma to the thoracic aorta, but also developed sinus bradycardia which was relieved by drainage of a haemothorax. The possible mechanisms of the changes in heart rate are discussed and direct compression of the vagus nerve is proposed to explain this previously unreported finding. (Br. J. Anaesth. 1994; 72: 358-360)

KEY WORDS

CASE REPORT

A 39-year-old man was ejected from his motorcycle at high speed in a road traffic accident. After initial management in the Accident Department, he was admitted to the Major Injuries Unit (MIU), 2.5 h after injury. On arrival, he was conscious (Glasgow coma score 15) and complained of pain in the left side of the chest. Physical examination revealed slight anterior neck swelling without airway obstruction. He had a ventilatory frequency of 28 b.p.m. and air entry to the left chest was decreased.

Heart sounds were audible and normal, heart rate was 60 beat min\(^{-1}\) and systolic arterial pressure, measured via a 20-gauge cannula in the right radial artery, was 130 mm Hg. A three-lead electrocardiograph (ECG) monitor revealed sinus rhythm.

A lateral cervical spine x-ray was normal but a supine anteroposterior chest x-ray revealed fractures of the first and second ribs on the right side and left pleural effusion. The width of the upper mediastinum and aortic profile were also considered abnormal (fig. 1). Arterial blood-gas analysis revealed a \(P_{\text{a}O_2}\) of 19.05 kPa, \(P_{\text{a}CO_2}\) 6.09 kPa and pH 7.35, with the patient breathing oxygen 6 litre min\(^{-1}\) via a face mask. Haemoglobin was 10.3 g dl\(^{-1}\).

Approximately 15 min after admission to the MIU, as preparations were being made for insertion of a chest drain, the ECG monitor began to display increasingly frequent runs of sinus bradycardia decreasing to 35 beat min\(^{-1}\), with spontaneous resolution up to 55 beat min\(^{-1}\). His neurological status and systolic arterial pressure remained unchanged (130–160 mm Hg).

Under local anaesthesia, a 32-gauge chest drain was inserted by cut-down and blunt dissection through the fifth intercostal space at the left anterior axillary line. Blood (500 ml) was drained rapidly and his heart rate increased immediately to 60–65 beat min\(^{-1}\). Arterial pressure remained unchanged but ventilatory frequency decreased to 20–22 b.p.m. At no point during the subsequent clinical history did bradyarrhythmia reappear.

A chest x-ray after insertion confirmed a satisfactory position of the chest drain but the abnormal radiological features were then more noticeable (fig. 2). Blood transfusion was necessary to replace a total loss of 1.15 litre over a 2-h period, throughout which the patient remained normotensive with a heart rate of 75–80 beat min\(^{-1}\).

Thereafter, he was transferred to the regional cardiothoracic centre where aortography revealed an abnormality near the aortic isthmus and exploratory thoracotomy was performed. This revealed mediastinal haematoma related to a previously undiscovered anterior fracture of the left second rib and also surrounding the distal aortic arch. The descending aorta was opened, but on inspection there was no evidence of an intimal tear. Postoperative recovery was complete.

DISCUSSION

Injury to the thoracic aorta after blunt chest trauma may present with a variety of clinical features, but none is constant or specific [1, 2]. The appearance of a widened mediastinum on a plain chest x-ray is the most frequent radiological finding [3]. In this patient, we postulate that the observed changes in heart rate were a specific indication of mediastinal haemorrhage. The parasympathetic cardiopulmonary nerves in humans arise from the recurrent laryngeal nerves and thoracic vagi. Interconnections with cervical sympathetic nerves form the dorsal and ventral cardiopulmonary plexuses from which emerge the three main cardiac nerves [4].

Hoarseness has been reported after thoracic aortic injury [5] and this may have resulted from compression of the recurrent laryngeal nerve by mediastinal haematoma. The cardiopulmonary plexuses lie in front and behind the aortic arch near the ligamentum arteriosum, and it has been suggested...
that stimulation of these may be responsible for the upper extremity hypertension which is an occasional feature of a contained rupture of the thoracic aorta [1]. In our patient there was no visible aortic injury and mediastinal haematoma resulted principally from a left second rib fracture. We propose that haemorrhage into the mediastinum produced pro-
gressive bradycardia by physical compression of either the recurrent laryngeal or thoracic vagus nerve and this was corrected immediately by drainage of the haemothorax.

Vagal "reflexes" are well documented during general anaesthesia, but the patient was conscious throughout the period of observation, he was not
taking any medication at the time of admission and systemic opioid analgesics were administered after insertion of the chest drain. The patient’s neurological status also excluded brainstem compression as a potential cause of the bradycardia.

Myocardial contusion may present with sinus bradycardia, but a normal 12-lead ECG and heart rate response to thoracentesis make this an unlikely explanation. Cardiac tamponade may be excluded from the clinical features and no evidence of such injury was found at thoracotomy. The cardiovascular response to induced hypertension includes reflex bradycardia. Such a mechanism would not seem relevant in a patient who was not hypertensive before decompression of the haemothorax.

As the patient was normally physically very active, it is possible that a pre-existing increased vagal tone accentuated the observed effects, including the relative bradycardia before and after insertion of the chest drain. However, there was no suggestion from the patient’s postoperative charts that his resting heart rate was unusually slow.

In conclusion, we believe that after blunt chest trauma the differential diagnosis of sinus bradycardia should include the possibility of mediastinal haemorrhage.

REFERENCES