Interesting artifact: distortion of invasive arterial line trace from somatosensory evoked potential signal

Editor—An otherwise healthy 14-yr-old child underwent T3–L2 posterior spine fusion for progressively worsening idiopathic scoliosis. Invasive arterial pressure and intraoperative neurophysiological monitoring (IONM) were planned in addition to standard ASA monitoring for the procedure. After uneventful induction of general anaesthesia, a radial arterial line and electrodes for somatosensory evoked potential (SSEP—bilateral median and posterior tibial nerves) and trans-cranial motor evoked potential (MEP) were placed. General anaesthesia was maintained with 0.6 MAC of sevoflurane supplemented with remifentanil infusion. Neuromuscular blockers were avoided in order to optimize MEP signals.

An hour into the procedure, without any abrupt changes in the depth of anaesthesia or surgical stimulus, we noted the sudden appearance of a persistent double systolic peak in the arterial line tracing with concurrent changes in the plethysmographic trace (Fig. 1). ECG tracing, arterial pressure, and SSEP signals remained stable during this episode. The arterial line tracing looked similar to pulsus bisferiens which has been described in patients with hypertrophic obstructive cardiomyopathy (HOCM) and aortic regurgitation.1 The tracing suddenly reverted back to normal only to reappear intermittently. We noted that the distortion of arterial and plethysmographic waveform was temporally associated with repeated flexion of the wrist secondary to median nerve stimulation for SSEP monitoring and correlated with the stimulation frequency (~3 Hz) which was being used for SSEP.

Invasive arterial monitoring is a commonly used haemodynamic monitoring tool in the operating theatre and intensive care units and its signals are subject to artifacts arising from catheter clotting, transducer flushing, over- and under-damping, and various movements.2 Eipe and Bertram3 have reported similar interference to arterial line tracing from SSEP signals. In this particular scenario, the temporal association of the aberrant arterial and plethysmographic trace with the SSEP stimulation, approximation of the plethysmographic heart rate tracing with SSPE stimulation frequency, unaltered ECG trace, and stable haemodynamics all pointed towards a mechanical artifact rather than the unmasking of a potentially ominous clinical scenario (HOCM.
or aortic regurgitation being the most common differentials for the given trace). Artifacts can distort monitoring data and visual signals which are used to make clinical decisions; therefore, the information should always be interpreted in the correct clinical context. Clinicians should be able to identify this typical mechanical artifact in unparalysed patients undergoing IONM and distinguish it from other potentially dangerous situations which it may mimic.

Declaration of interest

None declared.

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Rare case of double aortic arch suspected by preoperative chest X-ray in a healthy woman

Editor—We experienced an adult case of silent double aortic arch (DAA).

A 25-yr-old healthy woman was undergoing dental extraction under general anaesthesia. Three months previously, she had been hospitalized for 7 days due to spontaneous pneumothorax. She had no other remarkable medical history. No abnormalities were found on preoperative spirometry or electrocardiography. Chest X-ray showed a slightly narrow segment at the middle portion of her trachea and absence of the typical left aortic arch (Fig. 1). However, she had neither respiratory symptoms nor difficulty in swallowing. We re-evaluated the chest computed tomography (CT) scan obtained during her previous hospitalization. It revealed an anomaly of the thoracic aorta in which two aortic arches were present. We referred her to a university hospital for further examination, including three-dimensional CT and cardiac catheterization. The ascending aorta divided into two arches bilaterally, and each distal vessel following the formation of the aortic arch joined to form one right descending aorta (Fig. 2). The diameter of each aortic arch and the intra-arterial pressure measured at each aortic arch were not different between the two vessels. Consequently, she was diagnosed with balanced type DAA with a right descending aorta.

DAA is a congenital anomaly with a reported prevalence of <1% among individuals with congenital heart disease. DAA is classified to three different types, namely right-dominant, left-dominant, and co-dominant (balanced), which account for 75%, 18%, and 7% of cases, respectively. Because DAA is commonly identified in childhood due to symptoms caused by vascular compression of the trachea, oesophagus, or both, this adult case of silent DAA is very rare. Although the patient currently has no symptoms, any symptom related to DAA may emerge when she becomes older and develops vascular sclerotic changes. Therefore, she is required to undergo a careful follow-up examination.

In this case, the equal sized right and left aortic arches were evident on three-dimensional CT. The left aortic arch was absent by the chest X-ray examination because it shifted medially from its original left-sided position and was concealed in the mediastinal shadows on the anteroposterior view.