Cardiology in the Young (2011), **21**, 227–228
doi:10.1017/S1047951110001356

Brief Report

Brachial plexus injury as an unusual complication after aortic stent implantation

Robert Sabiniewicz, Jan Ereciński, Mariusz Zipser

Clinic of Pediatric Cardiology and Congenital Heart Diseases, Gdańsk, Poland

Abstract Aorta catheterisation can serve both diagnostic and therapeutic purposes in patients with aortic coarctation, especially when non-invasive evaluation cannot define severity of the abnormality. We report a case of bilateral brachial plexus injury due to standard positioning of the patient's arms during non-complicated aorta catheterisation and aortic stent implantation under general anaesthesia. In discussion, we consider our patient's predisposing factors, the understanding of which may be helpful in avoiding this complication in the future.

Keywords: Stent implantation; complications; brachial plexus injury; positioning

Received: 4 February 2010; Accepted: 21 August 2010; First published online: 1 December 2010

Aortography is an important part of clinical evaluation in children with untypical or uncommon aortic coarctation image in echocardiography. In addition, in some cases, this procedure gives an opportunity to correct the abnormality by implantation of intravascular stent. A necessity of using general anaesthesia during aortography in children can lead to unusual complications. It is known and widely reported that general anaesthesia during surgery can cause a brachial plexus injury in approximately 0.2% of cases.[1] This complication is a result of muscle hypotonia after anaesthesia as well as of the patient's malpositioning on the operating table. Such coincidence provokes the stretching and prolonged compression of nerves by the surrounding anatomical structures. A case of ischaemic injury of the brachial plexus related to an intervention as short as aortography has never been reported before. The shortness of procedure and bilateral presentation of this complication induced us to search for predisposing factors, which must have appeared in our case.

Correspondence to: Dr M. Zipser, MD, Clinic of Pediatric Cardiology and Congenital Heart Diseases, Dębinki 7 Street, 80-952 Gdańsk, Poland. Tel: (+48) 604 480 618, Fax: (58) 349 28 95; E-mail: akol@o2.pl

Case report

A 15-year-old girl was admitted to the hospital with aortic recoarctation. She had undergone a balloon angioplasty procedure 3 years earlier. The character of coarctation in two-dimensional and Doppler echocardiography determined the qualifications needed for aortography. After premedication, the patient was placed typically for aortography – in a supine position with arms raised over the head with shoulders flexed to 120 degrees and elbows flexed to 90 degrees (Fig 1). Subsequently, under general anaesthesia, the femoral artery was cannulated. The catheter was inserted into the aorta to visualise a region of stenosis and to measure systolic pressure gradient. The patient was qualified for intravascular stent implantation (type: Intrastent LD Double Strut 36 millimetres). Implantation was performed immediately and led to full stent expansion, which caused a drop in the systolic pressure gradient through the stenotic region. The length of aortography and implantation did not extend beyond 20 minutes and proceeded without complications. After the patient awoke from general anaesthesia, brachial plexus injury was noticed. Neurological consultation at that time revealed bilateral brachial plexus paresis in the upper part (roots C_5 and

Figure 1.

C_6 of the spinal nerves). Neurological examination showed muscle hypotonia, decreased muscle power, and sensory deficit – all more pronounced on the right side. The patient recovered fully after 6 months of typical treatment (injections of vitamin B_6 and B_{12}, non-steroidal anti-inflammatory drugs) and physical therapy rehabilitation.

Discussion

The brachial plexus, which supplies with motor and sense nerves most of the upper extremity and shoulder, is the most complex structure in the peripheral nervous system. A unique structure and superficial location between movable body parts – neck and arm – are the reasons for vulnerability to trauma. The most common type of injury occurs as an effect of ischaemic damage with subsequent disorders in circulation in vasa nervosum, nourishing the nerves of the plexus.[2] General anaesthesia is usually considered as a predisposing factor provoking plexopathy.[3] This causes muscle hypotonia leading to non-physiological shoulder positioning and to compression of the neighbouring skeletal structures on nerves. Similarly, an improper relationship between the patient's arms and neck may cause stretching, compression of related arteries, and subsequently ischaemic brachial plexopathy.[4] Another extremely important issue is the duration of procedure and immobilisation.[5] In previously reported cases of surgeries, which demanded raising the arms over the head, paresis appeared not sooner than after 2 hours of procedure.[3,5,6] In our case, plexopathia occurred after 20 minutes. Furthermore, it was bilateral, which suggests another factor that showed a significant predisposition to crucial ischaemia. On the basis of X-ray pictures, we excluded anatomical abnormalities and focused on a specific type of patient physique. The patient was 172 centimetres tall (93rd percentile) and weighed 52 kilograms (30th percentile). According to the World Health Organization-body mass index-for-age classification (tables of body mass index, gender- and age-specific, which are used to assess underweight, overweight, and risk of overweight in children and teenagers), our patient was on the 5th percentile. In our opinion, such a low weight in relation to height and asthenic physique increased the risk of brachial plexus injury caused by neighbouring skeletal structures. In these cases, it is impossible to reduce the pressure by adipose tissue or muscle tissue because of their impairment. This time it resulted in early ischaemia and a bilateral type of damage.

Nowadays, an increasing number of interventional procedures demand positioning a patient supine with arms overhead. This allows X-ray pictures to be made during the procedure at various angles, without changing the position, and helps to avoid beam-hardening artefacts from upper extremity bones. Paediatric interventional procedures are usually pursued under general anaesthesia, and therefore the awareness of risk of brachial plexus injury is necessary. Even a short time of immobilisation (20 minutes in our case) can become a reason for paresis, especially for patients prone to it. We claim that in case of extensive interventional procedures, children with asthenic physique and impaired adipose tissue should be given special attention. In improving the cure, either arm movements or temporary change of position can be helpful. Cooperation among the cardiologist, anaesthesiologist, and nursing staff is crucial to optimise patient care by avoiding brachial plexus injury. The cardiologist has the most significant role in the process as he decides the patient's position, which is essential to carry out the procedure and is able to predict the length of immobilisation.

References

1. Cooper DE, Jenkins RS, Bready L, et al. The prevention of injuries of the brachial plexus secondary to malposition of the patient during surgery. Clin Orthop 1998; 228: 33–41.
2. Desai DC, Uribe A, Lachman T. Brachial plexus injury due to compression: an alternative mechanism: case report and review of the literature. Am Surg 1997; 63: 487–489.
3. Kumar Pillai A, Ferral H, Desai S, et al. Brachial plexus injury related to patient positioning. J Vasc Interv Radiol 2007; 18: 833–834.
4. Sawyer RJ, Richmond MN, Hickey JD, et al. Peripheral nerve injuries associated with anesthesia. Anesthesia 2000; 55: 980–991.
5. Shankar S, vanSonnenberg E, Silverman SG, et al. Brachial plexus injury from CT guided RF ablation under general anesthesia. Cardiovasc Intervent Radiol 2005; 28: 646–664.
6. Brill S, Walfisch S. Brachial plexus injury as a complication after colorectal surgery. Tech Coloproctol 2005; 9: 139–141.

https://doi.org/10.1017/S1047951110001356 Published online by Cambridge University Press