Folia Cardiologica 2019
tom 14, nr 3, strony 302–304
DOI: 10.5603/FC.2019.0063

ISSN 2353–7752

Double left brachiocephalic vein: a rare systemic vein anomaly and a potential source of complication during CIED procedures

Podwójna lewa żyła ramienno-głowowa — rzadka anomalia żył systemowych i potencjalne ryzyko powikłań procedur CIED

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Abstract

Abnormal systemic vein embryogenesis results in the development of anomalies which, in the case of the left brachiocephalic vein (LBCV), can manifest as a significant and morphometric deviation from the normal anatomy of the vessel.

One rare example of such an anatomical variation is the presence of a double LBCV. Depending on its nature and extent, this anomalous LBCV variation, which may be incidentally detected during an invasive procedure, can not only pose difficulties in terms of the successful completion of the procedure, but can also result in injuries to the vessel itself as well as to adjacent structures. We here present a case featuring such a congenital LBCV anomaly, which was discovered during a cardiac pacemaker implantation procedure.

Key words: anomalous left brachiocephalic vein, venography, cardiac pacing

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Introduction

Abnormal systemic vein embryogenesis leads to the development of vascular anomalies, which, in the case of the left brachiocephalic vein (LBCV), can manifest as significant topographic and morphometric deviations from the normal anatomy of the vessel. One rare example of such an anatomical variation is the presence of a double LBCV [1, 2]. Depending on its nature and extent, this anomalous LBCV variation, which can be incidentally detected during an invasive procedure, may not only pose difficulties in terms of the successful completion of the procedure, but may also result in injuries to the vessel itself as well as to adjacent structures [3, 4].

Case report

An 82 year-old woman was qualified to receive permanent cardiac pacing therapy due to presyncopal episodes induced by Mobitz II second-degree atrioventricular block. Since the course of her left cephalic vein was not conducive to cardiac lead insertion, the operator decided on

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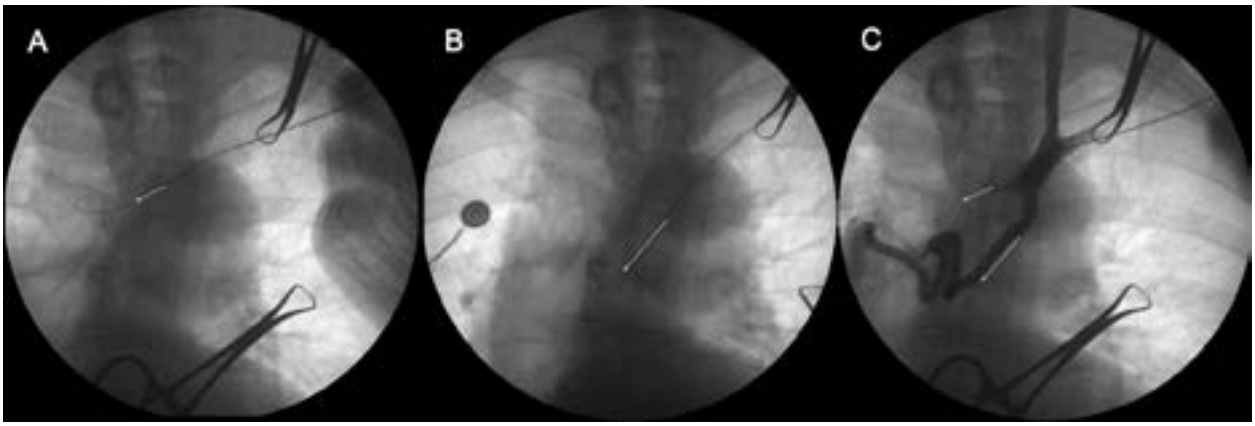

Figure 1A. A guidewire inserted into the left brachiocephalic vein (LBCV) suggests patency of the vessel; guidewire position at the level of aortic arch artery origins (short arrow) indicates a typical LBCV topography; the tip of the guidewire situated at the level of the LBCV ostium into the superior vena cava; **B.** An alternative position of the guidewire (long arrow): clearly below the level shown in panel A; **C.** Venography illustrating the causes of blocked guidewire advance in both locations, namely compression of the LBCV proper by an enlarged aorta in the vicinity of aortic arch artery origins (short arrow), and the presence of a tortuous, double LBCV (long arrow)

the axillary vein puncture approach, with the use of an appropriate kit. Despite successful guidewire insertion into the LBCV, attempts to advance it into the superior vena cava were ineffective due to unexpected resistance. The operator was unable to advance the guidewire even after several attempts; at the same time, fluoroscopy showed various topographic configurations of the inserted guidewire (Figures 1A and B). In order to find an explanation for this evident obstacle, an additional approach was attempted, which involved puncturing the venous angle downstream from a stenotic segment in the subclavian vein and selectively administering intravenous contrast. Fluoroscopy showed the presence of a rare double LBCV. Dynamic flow of contrast illustrated the morphometric parameters of both brachiocephalic veins: revealing a compressed LBCV proper and illustrating the topography of its doubled counterpart. In light of the mutual position of the two vessels and those of the adjacent anatomical structures, the operator decided to halt the procedure to prevent potential injury to the vessels.

A Medtronic Adapta ADD01 pacemaker was eventually implanted by inserting the CapSureFix Novus cardiac leads via the veins of the right clavipectoral triangle.

The prevalence of congenital LBCV anomalies depends on the assessed population and the employed imaging technique. Congenital LBCV anomalies constitute approximately 1% of congenital heart defects (such as tetralogy of Fallot, atrial or ventricular septal defects). The prevalence of congenital LBCV anomalies in populations without heart defects is estimated to be less than 0.4%. LBCV anomalies can occur as an isolated phenomenon or co-occur with variations of persistent left superior vena cava (PLSVC). The prevalence of such systemic vein anomalies in the general population is 0.3–0.5%.

Conclusions

Abnormalities in the typical anatomical LBCV structure can complicate the intravenous advancement of guidewires, catheters or leads, especially if they are of a large diameter, have high bending stiffness, or are used to forcefully push through the encountered resistance. In the case presented here, the morphometric parameters of both LBCVs posed a high risk of injury during lead advancement, which ultimately led to the decision to perform the CIED implantation using a different point of venous access, on the right side.

Streszczenie

Zaburzenie embriogenezy żył systemowych skutkuje powstaniem wad, które w przypadkach dotyczących lewej żyły ramienno-głowowej (LBCV) cechuje znaczna odmienność topograficzna i morfometryczna w odniesieniu do budowy anatomicznej typowej dla tego naczynia. Przykładem jest sporadyczne występowanie obserwowanej podwójnej LBCV. Charakter i zakres tak zaistniałej rozwojowej odmienności LBCV, doraźnie wykryty podczas wykonywania inwazyjnej procedury, niezależnie od trudności jej w realizacji, może sprzyjać traumatyzacji zarówno samego naczynia, jak i przyległych struktur. W opracowaniu zaprezentowano postać tej żylnej anomalii rozwojowej wykrytą podczas procedury implantacji stymulatora serca.

Słowa kluczowe: anomalia lewej żyły ramienno-głowowej, wenografia, stymulacja serca

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