

# Assessment of subclavian arteries: Usefulness of coronal view in prenatal ultrasound diagnosis

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## Abstract

The axial view is the reference for the diagnosis of vascular anomalies, including affecting subclavian arteries, like the aberrant right subclavian artery (ARSA) or an aberrant left subclavian artery (ALSA). Although axial view allows us to distinguish vascular subclavian arteries anomalies in most cases, we can use the coronal view not only in cases of ARSA but also in cases of ALSA using the same methodology. Therefore, we can say that coronal view help us as an additional aid to support the diagnosis of both vascular anomalies.

## Introduction

The improvements in ultrasound's image quality and color doppler and the systematization of ultrasound views, especially in the axial, and in some cases, coronal for the fetal cardiovascular system study, as well as the advances in fetal anatomy study, have allowed a more precise diagnosis of vascular anomalies. Prenatal ultrasound assessment of subclavian arteries allow us to make a diagnosis of an alteration in his way, like the aberrant right subclavian artery (ARSA) or an aberrant left subclavian artery (ALSA).

The aberrant right subclavian artery (ARSA) is that right subclavian artery that, instead of originating from brachiocephalic trunk, it does it from the descending aorta in a retroesophageal path to the right shoulder, being the last of the four supra-aortic trunks.

The aberrant left subclavian artery (ALSA) appears in the context of a type II right aortic arch (type II RAA), that is the most common right aortic arch anomaly [1-3]. The ductus arteriosus is usually placed in the left position and thus close postnatally the vascular ring between the right aortic arch and left ductus arteriosus. The lusory artery arises independently from de Kommerell's diverticulum (partial remainder of the original fourth left aortic arch) from a backplane to the esophagus and crosses the midline towards the left shoulder [4-6].

## Prenatal ultrasound diagnosis

Both ARSA and various aortic arch anomalies have been correlated with increased risk of congenital heart disease and/or chromosomal abnormalities, so the prenatal ultrasound study of subclavian arteries is interesting [7,8]. Besides, the postnatal ultrasound study is more complicated because of the pulmonary air and a worse acoustic window. The ultrasound diagnosis of ARSA or ALSA is usually done in the axial view, being the Yagel's three-vessels view with color Doppler, adjusting the PRF application with a low-velocity range (10-15 cm/s), and the reference view [9-11]. Although sometimes doubts may arise

and there may be necessary views in another planes to support the diagnosis.

The true incidence of ARSA is unknown, but in the general population it seems to range between 0.4-2,2% being the most common aortic arch anomaly prenatally diagnosed [11]. Most references say that to identify we must perform an axial view with color-Doppler at the three-vessels level and then swing the probe upwards to the right fetal shoulder [12-14].

The three-vessels view is also the key for the diagnosis of right aortic arch anomalies. In type II, the trachea is located between the right aortic arch and left ductus arteriosus deforming the shape of "V" to "U" ("U sign"), forming a vascular ring, where we can also see ALSA leaving the Kommerell's diverticulum to the left shoulder [15].

Also Chaoui has described the longitudinal view of the aortic arch for the ARSA diagnosis. Thus we could see the four supra-aortic trunks instead of the usual three, being the ARSA the last branch of the aortic arch, below of the ductus arteriosus junction. Although this view seems to be more complicated to get, it is probably because the oblique course of the vessel makes it difficult to visualize the ARSA [11,16].

The coronal view with color-Doppler for ARSA and ALSA are "mirror images" because the ARSA goes to right side and the ALSA to left one.

In a coronal view of the thoracic aorta with color Doppler, we can see ARSA emerging independently of the other vessels (left carotid,

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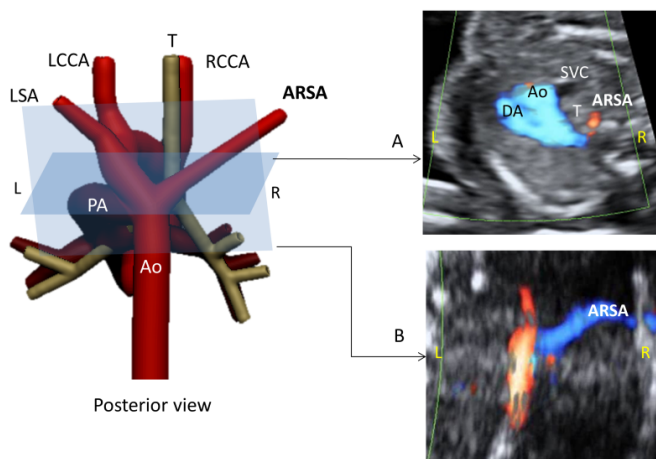
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left subclavian and right carotid) with a right direction [11]. This view, as described by Leon, allow us to distinguish ARSA from azygous draining into the right superior vena cava and thus avoid false positive [17] (Figure 1).

In the coronal view, using the same methodology as the ARSA, ALSA leaves at Kommerell's diverticulum level in the same plane than thoracic aorta, independently of the other vessels (right carotid, left carotid and left subclavian) with a left direction [18] (Figure 2).

## Conclusion

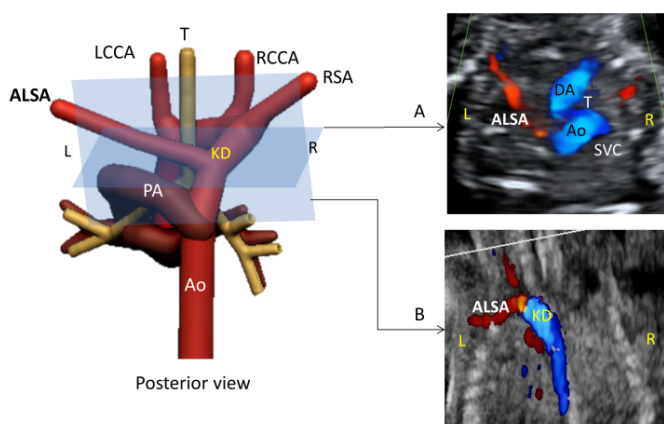
Although axial view allows us to distinguish vascular subclavian arteries anomalies in most cases, we can use the coronal view not only in cases of ARSA but also in cases of ALSA (in a RAA type II). Therefore, we can say that coronal view help us as an additional aid to support the diagnosis of both vascular anomalies.



**Figure 1. Case of aberrant right subclavian artery (ARSA).**

A) Three vessels-trachea view

B) Coronal view. Ao, aorta; PA, pulmonary artery; DA, ductus arteriosus; IV, innominate vein; L, left; LCCA, left common carotid artery; RCCA, right common carotid artery; LSA, left subclavian artery; R, right; ARSA, aberrant right subclavian artery; SVC, superior vena cava; T, trachea.



**Figure 2. Case of right aortic arch with aberrant left subclavian artery (ALSA).**

A) Three vessels-trachea view. Aortic arch appears to the right of the trachea forming a 'U'. B) Coronal view. Ao, aorta; PA, pulmonary artery; DA, ductus arteriosus; IV, innominate vein; L, left; R, right; LCCA, left common carotid artery; RCCA, right common carotid artery; RSA, right subclavian artery; SVC, superior vena cava; T, trachea; KD: Kommerell's diverticulum

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