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## Case Report

# Unilateral absence of an external jugular vein in two English bulldogs with pulmonary valve stenosis

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**Abstract** Two English bulldogs referred for interventional palliation of severe pulmonary valve stenosis were incidentally diagnosed with unilateral absence of an external jugular vein (left in one case, right in the other) by computed tomography and Doppler ultrasound. The right internal jugular vein also could not be visualized in the dog with absence of the left external jugular vein. Cervical venous anomalies can impact diagnostic or interventional venous catheterization procedures such as balloon pulmonary valvuloplasty. Additionally, absence of an external jugular vein may impact central venous catheter placement. Absence of an external jugular vein should be considered in dogs when the external jugular vein cannot be easily palpated. Ultrasound or computed tomography may help identify jugular venous anatomy and confirm anomalies.

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**Case 1**

A 2-year-old castrated, male English bulldog weighing 26.3 kg was presented to The Ohio State University Veterinary Medical Center for a second opinion of severe pulmonary valve stenosis (PS).

Pertinent diagnostic tests performed three weeks prior to referral included an echocardiogram performed by a board-certified cardiologist, electrocardiography, thoracic radiographs, complete blood count, and serum biochemistry profile including a total thyroxine level. The echocardiographic report described thickened and immobile pulmonary valve leaflets with secondary severe right ventricular hypertrophy (RVH), moderate tricuspid regurgitation (TR), and right atrial enlargement

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## Abbreviations

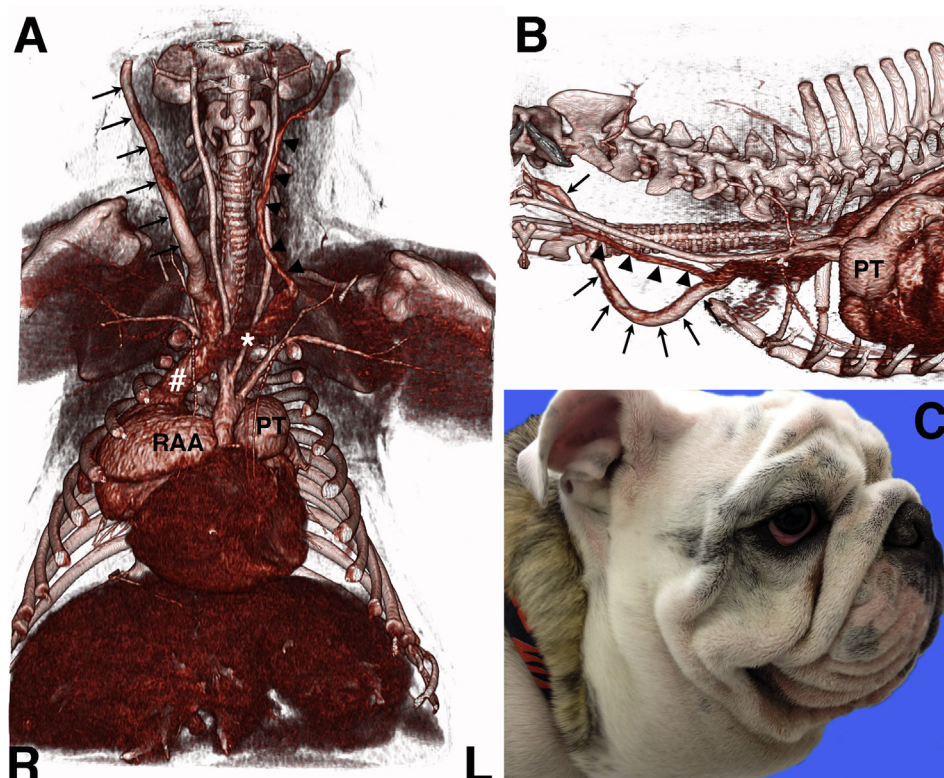
BPV	balloon pulmonary valvuloplasty
CTA	computed tomographic angiography
EJV	external jugular vein
IJV	internal jugular vein
PLCVC	persistent left cranial vena cava
PS	pulmonary valve stenosis
RAE	right atrial enlargement
RVH	right ventricular hypertrophy
TR	tricuspid regurgitation

(RAE). Single lead electrocardiogram showed a supraventricular tachycardia with a rate of 260 beats per minute and prominent S waves in lead II. A single lateral thoracic radiograph, which was not available for review, was interpreted by the referring veterinarian as having a cranial mediastinal opacity obscuring the cranial margin of the heart

and unremarkable pulmonary parenchyma. All laboratory test results were within reference intervals. The dog was diagnosed with severe PS with right heart failure and subsequently prescribed enalapril (0.36mg/kg/day) and furosemide (2.8mg/kg/day).

On presentation to The Ohio State University, the dog was overweight (body condition score of 4/5) with severe facial and ventral cervical swelling (Fig. 1). A grade III/VI systolic murmur was ausculted with the point of maximum intensity over the left heart base. The heart rhythm was irregular on auscultation with a rate of 90 per minute and the femoral pulse was also irregular and bilaterally synchronous. The remainder of the physical exam was unremarkable.

A six-lead electrocardiogram was performed, documenting atrial fibrillation and a right axis deviation. Three-view thoracic radiographs again showed increased soft tissue opacity within the cranial mediastinum as well as RAE and right ventricular enlargement. The cranial mediastinum



**Figure 1** Images from an English bulldog (case 1) with absence of the left EJV and pulmonary valve stenosis. Panel A: A volume-rendered 3-D reformatted image from a thoracic CT angiogram viewed from a ventral perspective showing a right EJV (arrows) with absence of the left EJV and a prominent left IJV (arrowheads) draining into the left brachiocephalic vein (\*) and the cranial vena cava (#). The right auricular appendage (RAA) is markedly dilated and there is post-stenotic dilation of the pulmonary trunk (PT). R = right side of dog; L = left side of dog. Panel B: A volume-rendered 3-D reformatted image from the same thoracic CT angiogram viewed from a left lateral perspective highlighting the ventral course of the right EJV (arrows) compared to the more dorsal course of the left IJV (arrowheads). Cranial is to the left of the image. Panel C: A photograph of case 1 showing severe cranioventral edema and facial swelling.

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