Case Report

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Intraoperative Epiaortic Ultrasound for Traumatic Pseudoaneurysm of the Ascending Aorta

Michelle Eddins, MD[1], Marco Aguirre, MD[1], Jonathan Price, MD[2], Michael Wait, MD[2], Pietro Bajona, MD, FETCS[2]*

[1] Department of Anesthesia, University of Texas Southwestern Medical Center, Dallas, Texas, USA

[2] Department of Cardiovascular and Thoracic Surgery, University of Texas Southwestern Medical Center, Dallas, Texas, USA

Abstract

Epiaortic ultrasound is an imaging modality that is commonly used to evaluate the ascending aorta for atheroma and other mural lesions during elective cardiac surgery. Its use in contained aortic rupture has not been established. We present a case of thoracic trauma with contained pseudoaneurysm of the ascending aorta. At operation, the precise location of the aortic tear could not be identified by visual inspection, manual palpation, or transesophageal echocardiography. Epiaortic ultrasound was employed and the aortic defect was identified and successfully repaired. This intraoperative imaging modality may play an increasing role in the identification of aortic pathology when visual inspection and other intraoperative imaging is insufficient.

Key Words

Epiaortic • Pseudoaneurysm • Ultrasound • Trauma

Introduction

Intraoperative ultrasound examination of the ascending aorta is commonly used during elective procedures to detect intravascular lesions that are not easily identifiable during cardiovascular procedures, such as atheromatous plaques, which may contribute to significant postoperative morbidity [1]. For this purpose, epiaortic ultrasound has been shown to be superior to transesophageal echocardiography (TEE) and manual palpation [1, 2]. The use of epiaortic ultrasound in emergent procedures, such as those to treat thoracic trauma or acute ascending aortic dissection, is less well established. We present a case of contained ascending aorta pseudoaneurysm caused by blunt chest trauma that required direct aortic ultrasonography to identify the vascular defect.

Case Presentation

The patient was a 33-year-old Hispanic male. He had been a restrained passenger of a motor vehicle traveling approximately 60 miles per hour when a liquid-containing metal canister was dislodged from a truck in front of his vehicle and came through the front windshield, striking the patient in the face and chest. At the time of presentation, the patient was noted to have a mandibular fracture, sternal fracture, and multiple rib fractures. Due to the mechanism of injury, the patient underwent computed tomography (CT) angiography of the chest with 3-dimensional reconstruction which was significant for a 1.4 × 0.7-cm pseudoaneurysm above the sinotubular junction, projecting medially toward the lesser curve of the aortic arch. The pseudoaneurysm demonstrated

Fax +1 203 785 3552
E-Mail: aorta@scienceinternational.org
http://aorta.scienceinternational.org

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* Corresponding Author:
Pietro Bajona, MD, FETCS
Department of Cardiovascular and Thoracic Surgery
University of Texas Southwestern Medical Center
5959 Harry Hines Blvd., POB1, 10th Floor, Suite HP10.110, Dallas, TX, 75390-8879, USA
Tel.: +1 214 645 7761; Fax: +1 214 645 7701; E-Mail: pietro.bajona@utsouthwestern.edu

no evidence of rupture, and the patient remained hemodynamically stable.

The patient was taken electively to the operating room for definitive repair. Intraoperatively, TEE was used to visualize the pseudoaneurysm sac but the exact location of the tear in the aorta could not be identified (Figure 1). Due to the uncertainty of the location of the aortic defect, the necessary distal extent of our repair could not be determined. In addition, we were prevented from cannulating the aorta for cardiopulmonary bypass because it was unclear whether we would need to initiate deep hypothermic circulatory arrest and proceed with a more extensive arch repair.

Direct epiaortic ultrasonography was used to interrogate the lesion and identified a 1.6 × 1.0-cm pseudoaneurysm along the medial aspect of the ascending aorta, above the sinotubular junction, and between the aorta and main pulmonary artery (Figure 2). A full-thickness, oval-shaped defect was identified that traversed one-third of the aortic circumference. At this time, the decision was made to replace the ascending aorta with a supracoronary 24-mm Hemashield tube graft. The patient did not require vasopressor or inotropic support and was extubated in the immediate postoperative period. He was discharged on postoperative day four. Surveillance CT angiography performed at one-year follow-up demonstrated an intact graft without pseudoaneurysm.

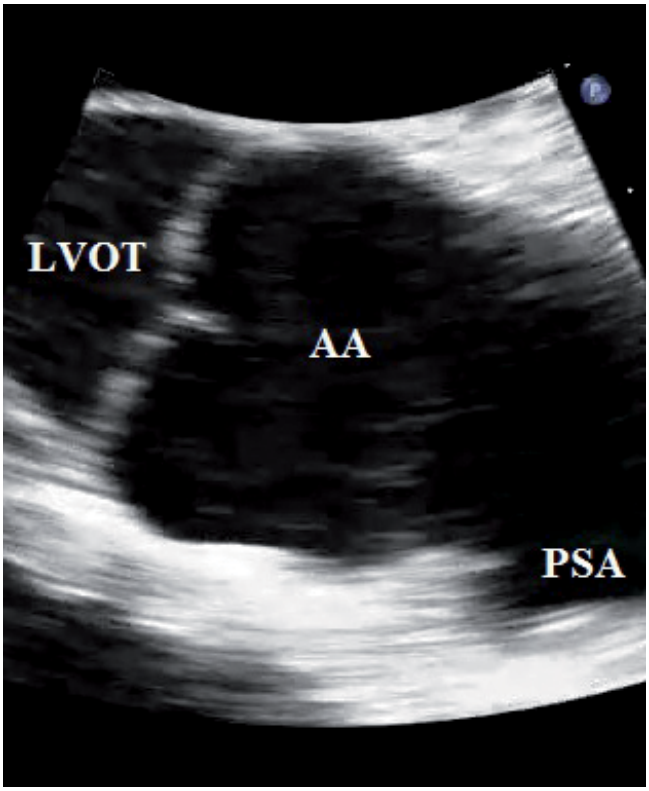

Figure 1. Transesophageal echocardiogram demonstrating the ascending aortic pseudoaneurysm. LVOT = left ventricular outflow tract; AA = ascending aorta; PSA = pseudoaneurysm.

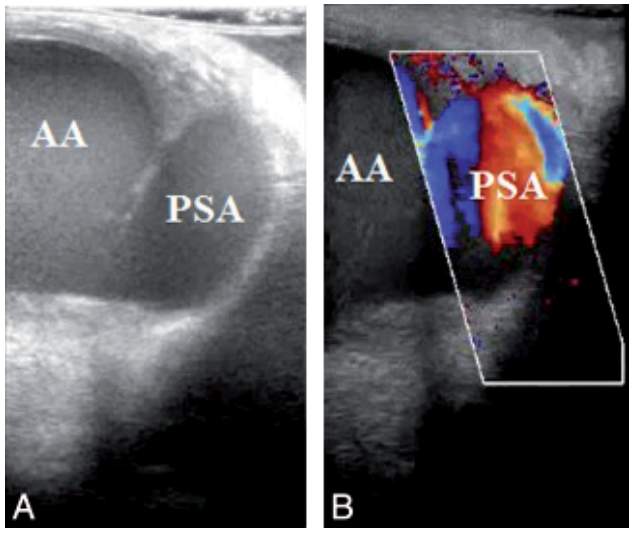

Figure 2. Epiaortic ultrasound demonstrating 1.6 × 1.0-cm pseudoaneurysm along the medial side of the ascending aorta. *Panel A*. Ultrasound image alone. *Panel B*. Ultrasound with color Doppler. AA = ascending aorta; PSA = pseudoaneurysm.

Discussion

TEE is the modality of choice to detect intravascular and transmural defects of the ascending aorta, specifically ascending aortic dissection and aortic pseudoaneurysm [3]. However, views of the distal ascending aorta and proximal arch are limited due to the interposition of the trachea and right main bronchus, with the air-filled structures causing a 'blind spot' when using TEE [4]. When one of these air-filled structures is superimposed, identification of the precise location of vascular pathology may be difficult. When TEE fails to enable an accurate diagnosis that may affect surgical decision making, immediate availability of other imaging modalities may be useful [3-5]. In this case, the ascending aortic defect could not be identified

by inspection and digital palpation as it was directly covered by the main pulmonary artery. The mediastinum had an otherwise normal appearance, and TEE did not show the exact location of the aortic tear due to the interposed airway. Epiaortic ultrasound is a readily available and inexpensive imaging modality that does not increase morbidity for the patient. Epiaortic ultrasound provided rapid intraoperative identification of the aortic lesion that was otherwise missed using direct inspection and TEE. This method of rapid intraoperative assessment of the ascending aorta may have further use in elective and emergent settings when conventional imaging fails.

Conflict of Interest

The authors have no conflicts of interest to disclose.

Comment on this Article or Ask a Question

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