

# APPLICATION OF STANDARD CHEST X-RAY IN DETECTION OF HEART CONDITIONS

Rade R Babic <sup>1</sup>, Mirko Burazor <sup>2</sup>, Miroslav Krstic <sup>2</sup>, Sasa Zivic <sup>3</sup>, Natasa Markovic <sup>4</sup> and Ivana Burazor <sup>2</sup>

This paper focuses on heart conditions which can be diagnosed using a technically correct standard chest X-ray. The paper presents: dextrocardia, aortic coarctation, isolated stenosis of the pulmonary artery, Lutembacher syndrome, Fallot's tetralogy, Ebstein's heart malformation and the aneurism of the thoracic aorta. Standard chest X-ray is the method of choice in diagnostics of heart anomalies. *Acta Medica Medianae* 2007;46(1):48-51.

**Key words:** heart conditions, chest X-ray, radiograph

Institute of Radiology Clinical Centre in Nis, Serbia <sup>1</sup>  
Clinic of Cardiovascular Diseases Clinical Centre in Nis, Serbia<sup>2</sup>  
Clinic of Paediatrics Clinical Centre in Nis, Serbia<sup>3</sup>  
Clinic of Surgery Clinical Centre in Nis, Serbia<sup>4</sup>

Contact: Rade R Babić  
Institute of Radiology, Clinical Centre  
48 dr Zorana Djindjic Blvd.  
18000 Nis, Srbija

## Introduction

Pathologic conditions and malformations of the heart and large blood vessels (aorta and pulmonary artery) can be diagnosed by radiological exploration of the chest (1-12). The heart and large blood vessels are seen on a chest radiograph as a shadow, the so-called cardiovascular shadow (Figure 1).

This shadow has its specifics and its alterations may indicate certain heart and large blood vessel diseases. Most frequently, diseases of the heart and large blood vessels are clinically diagnosed at birth, but a smaller number of these conditions are asymptomatic and have clinical manifestations later in life, usually in puberty (1,5,8,9). The cardinal symptoms in these patients are cyanosis and heart murmurs. Most of these conditions require surgical treatment. For optimal visualization of the cardiovascular shadow a chest radiograph should be made in the following projections postero-anterior projection (PA), left anterior oblique (L.A.O.) view, lateral projection (2-4). For precise determination of the heart configuration, it is highly desirable that chest radiographs are made after swallowing barium based radio-opaque medium. Defects of the heart and great blood vessels can be diagnosed by angiocardiography with great certainty.

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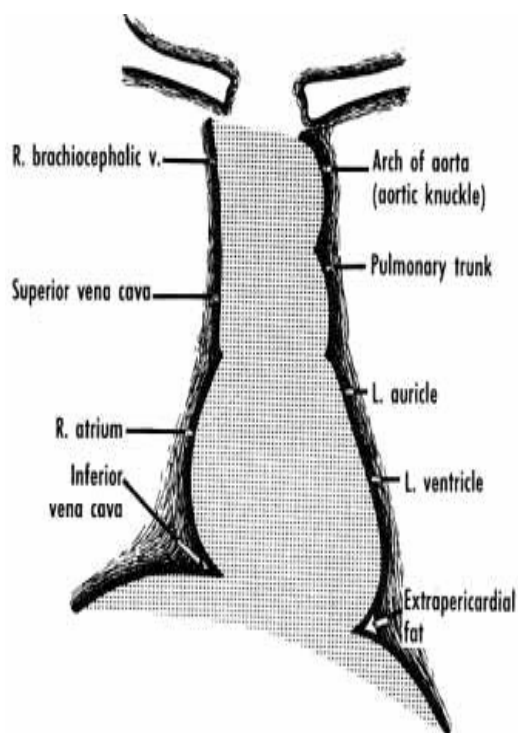


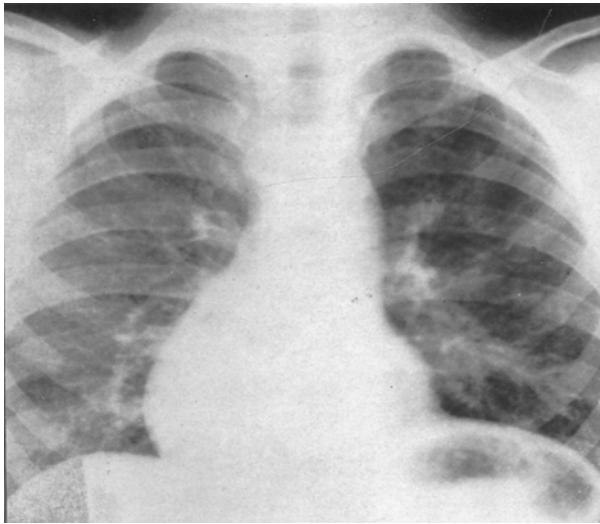
Figure 1. Cardiovascular shadow in chest X-ray PA projection

## The paper

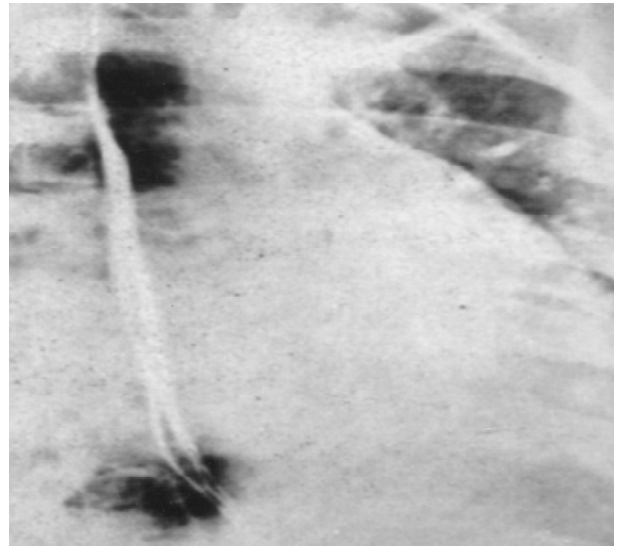
This paper is based on many years of material gathering and literary works and the aim is to point to heart conditions which can be diagnosed using a technically correct standard chest X-ray.

We illustrate the results of our work with the following pictures: 1,2,3,4,5,6,7.

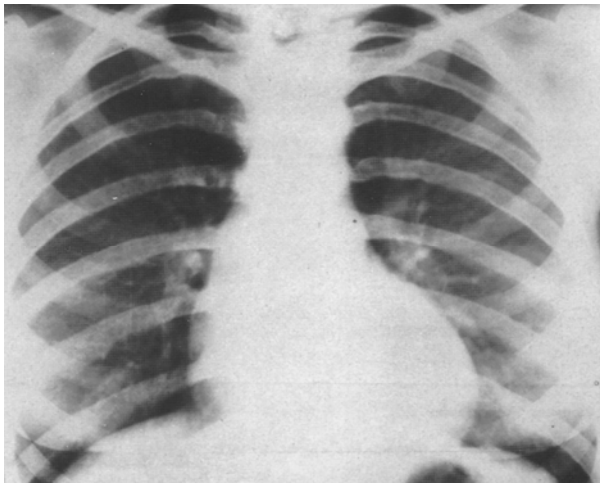
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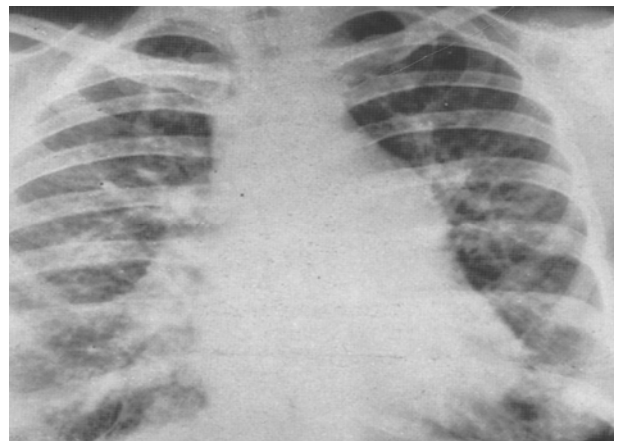
Picture 1. Dextrocardia. Radiograph of the heart and lungs in the postero-anterior projection. Cardiac apex is oriented towards right. Heart bay is on the right. Aortic knob is on the right. Stomach bubble is located subphrenically on the left indicating a partial situs inversus



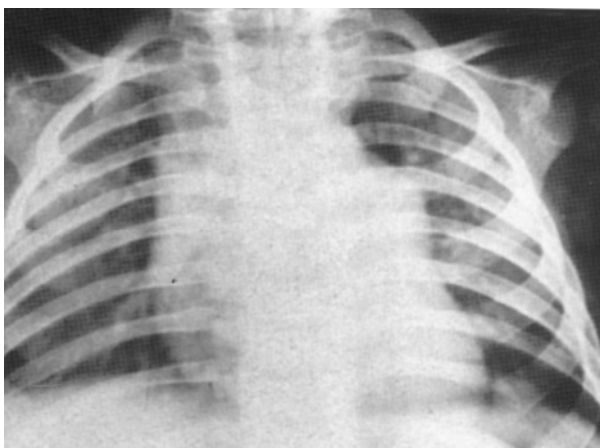
Picture 3b. Isolated stenosis of the pulmonary artery. Radiograph of the heart and lungs in the postero-anterior projection



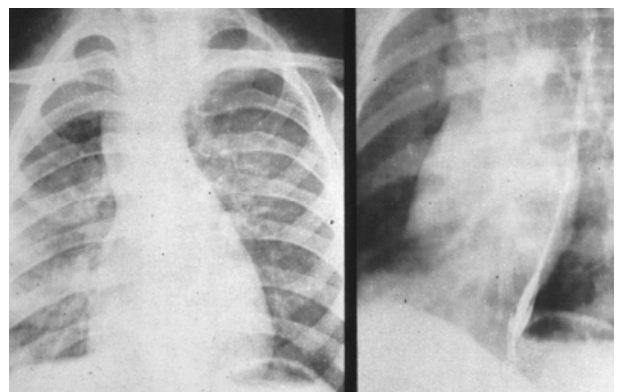
Picture 2. Aortic coarctation. Radiograph of the heart and lungs in the postero-anterior projection. Position of the heart normal. Rib notching is observed as irregularities and scalloping on the undersurface of the posterior ribs



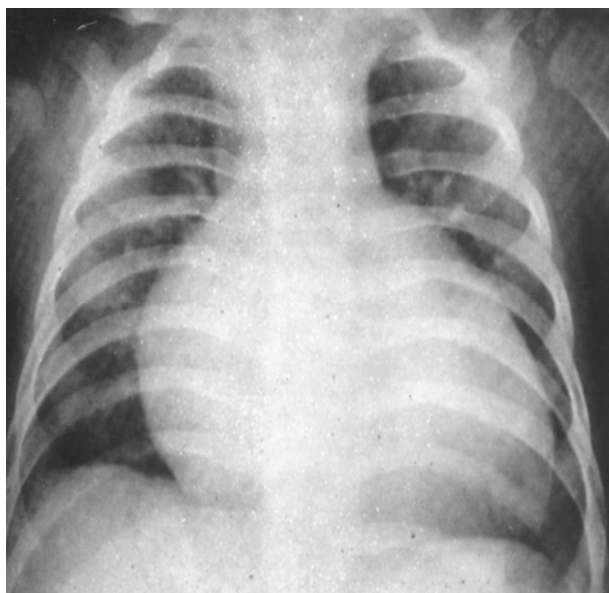
Picture 4. Lutembacher syndrome. Radiograph of the heart and lungs in the postero-anterior projection. Cardiovascular shadow is enlarged, but has a normal position. Heart bay is filled with the arc of the enlarged pulmonary artery. Pulmonary plethora due to left-to-right shunt



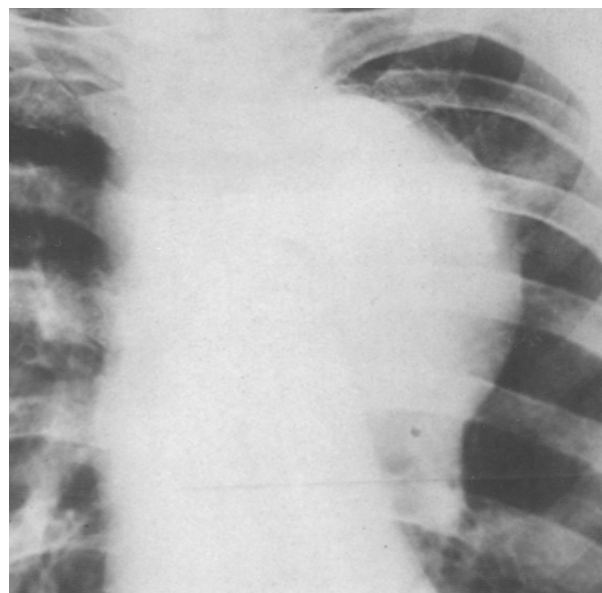
Picture 3a. Isolated stenosis of the pulmonary artery. Radiograph of the heart and lungs in the postero-anterior projection



Picture 5. Fallot's tetralogy. Chest radiograph in the postero-anterior projection (a) and in the lateral projection using a radio-opaque medium in the esophagus (b). The heart shadow is normal in size and position and resembles a wooden shoe. Apex of the heart is rounded and positioned above the hemidiaphragm. The arc of the right ventricle is elevated.



Picture 6. Ebstein's heart malformation. Radiograph of the heart and lungs in the postero-anterior projection. The heart shadow is enlarged and has a normal position. The heart shadow is bigger than the vascular stem. The arc of the left ventricle is elongated



Picture 7. Aneurism of the thoracic aorta. Chest radiograph in the postero-anterior projection. On the left, there is a shadow with soft issue intensity, around 8cm in diameter with sharp borders, right next to the vascular stem shadow

### Discussion and conclusion

It is estimated that the incidence of heart anomalies is 6 to 8 cases per 1.000 live born children (1,2). Around 25 per 30.000 children are born each year with congenital heart anomalies in the USA. If those children survive the infancy period, almost half of them will have either a ventricular septal defect or a pulmonary stenosis(1). Atrial septal defect and aortic stenosis are present in one third of the children and the rest of them have some other kind of heart anomalies.

When trying to estimate the condition of the heart, the examination should always start with a chest X-ray. Radiological examination of

the chest should always consist of radiographs in postero-anterior, I and II oblique and lateral projections.

A great help in viewing the configuration of the heart is a chest radiograph taken after oral administration of a radio-opaque medium; the best one is in the form of a barium paste. Angiocardiography is of exceptional value because it visualizes all four heart chambers and great blood vessels, using iodine based radioopaque medium.

The paper presents an overview of certain conditions of the heart and large blood vessels which can be diagnosed using a technically correct standard chest X-ray.

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## **BOLESTI SRCA DIJAGNOSTIKOVANE STANDARDNIM RENDGENOGRAMOM PLUĆA I SRCA**

*Rade R Babić, Mirko Burazor, Miroslav Krstić, Saša Živić, Nataša Marković i Ivana Burazor*

Radom se prikazuju bolesti srca koje se mogu dijagnosticirati na korektno načinom standardnom rendgenogramu pluća i srca. Radom se prikazuju: dekstrokardija, koarktacija aorte, izolovana stenoza plućne arterije, sindrom Lutembacher, tetralogija Fallot, Ebštajnova anomalija srca, aneurizma torakalne aorte. U dijagnostikovanju anomalija srca rendgendijagnostika je metoda izbora. *Acta Medica Medianae 2007;46(1):48-51.*

**Ključne reči:** *bolesti srca, rendgenogram pluća i srca, rendgenska slika*