Introduction: Postoperative management of patients with congenital heart disease requires imaging techniques to recognize complications like pleural effusions, pneumothoraces, pneumonia, atelectases or pulmonary venous congestion. Imaging techniques are as well used for verification of correct positions of chest tubes, central venous lines and endotracheal tubes. The most common technique to identify intrathoracic pathologies is chest X-ray, but particularly in pediatric patients radiation exposure is detrimental. Chest ultrasound is fast, repeatable and harmless, and has been increasingly used in pediatric patients in the last years. Yet it is unknown if ultrasound, for selected indications, is equivalent to chest X-ray. Prospective studies concerning this topic on pediatric patients following congenital heart surgery are still missing.

Methods: Prospective, blinded study on 50 pediatric patients following complex congenital cardiac surgery from May 2013 until February 2014. Evaluation of the chest ultrasound examination on first postoperative morning not knowing the corresponding, routinely performed, chest X-ray (Fig. 4: standardized examination sheet). Analysis of the findings of both imaging techniques according to the question whether the pathologies diagnosed by X-ray can adequately be seen by ultrasound. The diagnosis of a kind of pathology was set, if seen either in ultrasound or in X-ray. The purpose of our study is to find out if the number of X-ray images and thus radiation exposure to the patients may be reduced by the use of ultrasound. The study was approved by our local ethics committee.

Results: 50 Patients, 25 males, from newborn age to 4.5 years, all types of congenital cardiac surgery (Figs. 1-3). 32 pts. were mechanically ventilated on POD 1, 2 pts. required CPAP-Ventilation. 28 pts. with atelectases, 12 pts. with pneumothoraces, 25 pts. with pleural effusions and 5 pts. with infiltrations (Fig 4).
- Atelectases: 7/28 atelectases were diagnosed by X-ray and ultrasound, 12/28 only by ultrasound, 9/28 only by X-ray.
- Pneumothoraces: all 12 pneumothoraces were only diagnosed by X-ray, but of minor degree and without clinical relevance.
- Pleural effusions: 12/25 were diagnosed by X-ray and ultrasound, 7/25 only by ultrasound, 6/25 only by X-ray. Position of central venous lines were seen by X-ray in 40 cases, by ultrasound only in 1 case.
- Infiltrations: 5 cases, only diagnosed by X-Ray.

Discussion: Major postoperative problems as atelectases and pleural effusions were more frequently diagnosed by ultrasound than by X-ray. However, in some cases, especially in upper lobe atelectases in combination with pneumothoraces, diagnosis by ultrasound appears to be more difficult. Minor pneumothoraces may be missed in routine ultrasound. Pulmonary venous congestion and pneumonia still require chest X-ray, but correspond to clinical symptoms if relevant.

Conclusion: Chest ultrasound should be daily routine after congenital cardiac surgery to diagnose most common problems. Chest X-ray should be considered for special indications, if clinical symptoms appear. To verify positions of central venous lines, chest tubes and endotracheal tubes, chest X-ray should be done once on day of surgery.