

Original Article

Is a routine chest X-ray indicated before discharge following paediatric cardiac surgery?

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Abstract In many paediatric cardiosurgical units, a chest X-ray is routinely performed before discharge. We sought to evaluate the clinical impact of such routine radiographs in the management of children after cardiac surgery.

Of 100 consecutive children, a chest X-ray was performed in 71 prior to discharge. Of these, 38 were clinically indicated, while 33 were performed as a routine. Therapeutic changes were instituted on the basis of the X-ray in 4 patients, in all of whom the imaging had been clinically indicated. No therapeutic changes followed those radiographs performed on a routine basis.

Conclusion: Routine chest radiographs can be omitted prior to discharging patients after paediatric heart surgery.

Keywords: Congenital heart disease; postoperative management; radiation

IN OUR SURGICAL CENTRE, WE CURRENTLY PERFORM chest X-rays on a routine basis in children prior to their discharge after cardiac surgery. This practice means the children are exposed to additional radiation. Mainly because of their longer life expectancy, children have higher radiosensitivity than do adults. Exposure to radiation in the first 10 years of life increases the risk for certain detrimental effects over a lifetime.¹ That is why several studies have been conducted in order to reduce doses of radiation in children.^{2–4} Thus, it is also of particular importance to also reduce the numbers of chest X-rays performed to a necessary minimum. This includes the constant questioning of the clinical and diagnostic value of each radiograph.

Several groups have questioned the benefit of routine chest X-rays after cardiac surgery, showing that they were not essential to monitor the satisfactory progress of adults recovering after

cardiac surgical procedures,⁵ and that no changes were caused in such patients by their elimination in the intensive care unit.⁶ The role of routine chest X-rays for children recovering after cardiac surgery, however, to the best of our knowledge, has not yet been discussed. With this deficiency in mind, therefore, we conducted this retrospective study to evaluate the clinical and diagnostic value of routine chest X-rays performed in children prior to discharge after cardiac surgery.

Methods

We identified 100 consecutive patients who underwent cardiac surgery for congenital cardiac disease from our database. Of these, we then excluded 29, 19 because they were adults, and therefore not treated on our ward, 8 who had been discharged without undergoing a routine chest X-ray, and 2 who were discharged early to a local hospital.

We evaluated the remaining 71 children, all of whom had undergone cardiac surgery between 3 August, 2007, and 13 December, 2007.

The cardiac procedures included corrective surgery for 10 cases of atrioventricular septal defects,

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10 ventricular septal defects, 10 aortic coarctations, 8 transpositions, 7 tetralogy of Fallots, 6 pulmonary stenoses or atresias, 4 aortic stenoses, 4 atrial septal defects, 3 double outlet right ventricles, 2 patent arterial ducts, 1 common arterial trunk, 1 tricuspid atresia, 1 totally anomalous venous connection, and palliative surgery for 10 cases of hypoplastic left heart syndrome and 2 double inlet left ventricles.

The notes were searched for clinical indications for the chest X-ray, such as respiratory distress, increased requirement for oxygen, removal of drains, or follow-up of consolidation shown in a previous chest X-ray. We also established whether the chest X-ray performed had any therapeutic consequences, such as changes in the dose of diuretics, insertion of chest drains, need for antibiotics, delay of discharge, and so on.

Results

The radiographs prior to discharge were performed on average 6.42 days after surgery, with a range from zero to 28 days, while the previous radiograph had been performed 2.89 days after surgery, with a range from zero to 15 days. On average, therefore, the delay between the radiographs was no more than 3.54 days.

We found that 33 of the studies (46.5%) had been performed routinely, without answering any specific question, while the remaining 38 (53.5%) were clinically indicated. The most common clinical indications were removal of lines and tubes, and the follow-up of consolidation seen in a previous film.

Only 4 out of all the radiographs performed immediately prior to discharge resulted in therapeutic changes (5.6%). All these investigations had been clinically indicated, accounting for 10.5% of the studies performed with such indications. None of the radiographs performed routinely resulted in any change in treatment.

Discussion

The Commission of the European Communities recommended,⁷ in order to protect children from high exposure to radiation, that any chest radiograph should not exceed an entrance surface dose of 0.1 mGy. Another study recommended even lower age-related reference levels for children, namely 0.07 mGy.² Even films exposed at this dosage subject children to relevant radiation. It has already been questioned whether there can be any justifiable clinical indication for routine chest radiographs,^{5,8} with studies in adults suggesting that this practice

should be abandoned, the impact on current therapy being minimal.⁹

Overall, we found that only a small number of clinically indicated chest X-rays influenced the therapeutic management of our patients, with routine chest X-rays performed prior to discharge after cardiac surgery having no impact on the treatment, thus endorsing the study performed in adults.⁵ The group studying the adults found that in only one-eighth of their patients having 3 consecutive routine studies after operation, and in only 3.4% of those having a solitary one chest X-ray on the fourth postoperative day, did the radiological findings assist in subsequent treatments or interventions.

We think, therefore, that X-rays performed as a routine at discharge should be eliminated. Only those studies clinically indicated should be performed. If any other imaging modality without radiation can be used to answer the clinical question, this should be preferred. Even if the number of patients included in our retrospective analysis is small, it shows clearly that chest X-rays performed routinely in children after cardiac surgery are of little diagnostic and clinical value. We recommend that, in future, chest X-rays should be performed only as required to provide satisfactory care.

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