To Roentgen or not to Roentgen: Real dilemma or much ado about nothing?

Chest X-rays (CXR) are routinely performed after pacemaker implantation on the premise that they can detect a pneumothorax which requires treatment, and that the lead position as seen on the CXR will identify patients who subsequently develop pacing failure. The authors of a retrospective analysis, published in this issue of the Journal, suggest that a routine CXR is not necessary after an uncomplicated pacemaker implantation.[1] This proposal needs careful evaluation.

The incidence of pneumothorax is less than 2% after subclavian puncture,[2] and those requiring intervention are even less frequent. Therefore, restricting the use of post-procedure chest radiography to patients with a high probability of pneumothorax seems reasonable. Extremes of body mass index (<20 and >30), number of needle passes, experience of the physician performing the procedure, previous subclavian catheterisation, and prior major surgery in the region, all increase the risk of complications.[2] It would be wise to factor in such objective predictors while deciding on the need for a CXR rather than simply rely on the “operator’s suspicion” alone. Routine CXR can probably be skipped after lead insertion by extrathoracic subclavian puncture.[1]

Fluoroscopy provides only a rough guide to lead positioning during pacemaker implantation. Lead “stability” and pacing parameters override any minor anomalies of position. Therefore, it is not surprising that the post-procedure CXR has generally not proven useful in predicting subsequent pacing failure. However, there are a few caveats. In children undergoing pacemaker implantation, serial post-procedure CXRs are invaluable in monitoring the “tightening” of the atrial loop with growth, and deciding on the timing of lead change. Another situation where the lead position on CXR can be useful is in patients receiving VDD pacemakers. It has been shown that atrial dipole position 6 cm or more below the carina predicts loss of AV synchrony.[3] In these cases an erect film is probably more relevant because the atrial dipole can move away from the superior vena cava-right atrial junction (site of the sinoatrial node) on standing and can result in reduced atrial sensed amplitude.[4]

And finally, a word in favour of the much beleaguered chest film is in order. A good quality CXR can rule out a significant pneumothorax with a high degree of certainty and adds little in terms of cost or radiation exposure to patients undergoing pacemaker implantation. Therefore there should be no hesitation in ordering one if it will help the physician (and the patient) sleep in peace.

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References

authors concluded that in this series of patients the need for patient intervention was governed by malfunction of the pacemaker system, and it was not influenced by the findings on routine and subsequent radiography. According to this report, “Immediate radiography may be reserved for those patients with at least moderate probability of iatrogenic pneumothorax.”

The conclusion from this report is the opposite of the current practice at my home institutions in Tucson, Arizona, USA, where chest radiographs are obtained after every cardiac pacemaker placement no matter the type or placement situation. It also is somewhat counter to my anecdotal experience of seeing 2-4 pneumothoraces per month in a population of patients receiving pacemakers from a busy cardiac specialty hospital and from patients receiving pacemakers from an active cardiology service at a university medical centre. The patients I am familiar with are a complex mix of those requiring elective pacemaker placement and those receiving a pacemaker in an emergency situation. The patients reported by the authors were admitted for elective day-case first endocardial permanent pacemaker insertion or revision of their system including new lead insertion.

The procedures were performed in a district general hospital in the United Kingdom. The interval between when the pacemaker was inserted and the chest radiograph was obtained was not specified in this report. It is well known that pneumothoraces resulting from lung biopsies or thoracentesis may be delayed in their presentations from 1-24 hours, and we routinely obtain post-procedural and 4-hour delayed chest radiographs in these situations. It has been my anecdotal experience that patient symptoms are an unreliable predictor for the presence of a pneumothorax. Of course, in these cases, there has been a direct violation of the pleural space.

The authors’ survey of the literature and my limited literature survey show that the post-procedural complication rate for elective placement of a cardiac pacemaker is low, and it is best determined by patient evaluation and by pacemaker monitoring. Pneumothoraces requiring treatment rather than watchful waiting occur less than 1% of the time. The question then remains that have the authors in their own practice stopped obtaining chest radiographs in asymptomatic patients after routine pacemaker placement? In other words, do they practice what they preach? The answer seems to be yes. According to the authors, “we perform post-procedural chest radiographs only in patients with moderate to high likelihood of pneumothorax.” They are also performing a prospective study to further look at this very question.

In our practice here we will continue to obtain post-pacemaker placement chest radiographs. Why? Because our patient population is different, and it probably consists of more difficult and emergent pacemaker placements. Also, we live in a land awash in malpractice litigation. Alas, the facts and the science often don’t often matter in this situation, but that is another story.

References


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