Research Highlights

Chest x-rays as a routine follow up in testicular cancer patients: are they necessary?

Joshua Petersen
Year 5, Medicine, University of Exeter
Email: jp665@exeter.ac.uk

Abstract

The aim of this audit was to investigate if chest x-rays (CXR) are a useful routine follow up tool in patients treated for testicular cancer. It will investigate if guidelines are adhered to and how often the CXR detect metastases. During follow up the patients will receive blood tests for tumour markers, CXR and CT scans. Data for this audit was collected on 94 patients with testicular cancer who had completed their 5 year follow up from 2005 to 2010 in RCHT with 24 patients having to be excluded due to multiple factors. The results of this audit showed that of the 70 patients studied, 8 were found to have metastases with only one of these being found via CXR. All other metastases were discovered on CT scans or via the patient's tumour markers. On average the patients received 8.14 CXR over 5 years with only 62% of patients receiving the required amount during their follow up. There is evidence to show that guidelines could be changed to remove CXR from being part of a routine follow up as CT scans alone are good enough at detecting relapses. Removal of CXR from guidance will reduce the amount of radiation exposure and the possible increase in cancer risk later in life as well as helping to reduce the anxiety involved in extensive follow up treatment and reduce cost. Further research needs to be completed due to a small sample size in only one locality.

Abbreviations

CXR - Chest x-rays

Introduction

Testicular cancer is the most commonly diagnosed cancer in the UK in young men, with around 2200 new cases in 2017.[1] Incidence rates for testicular cancer in the UK are highest between the ages of 30-34.[1] However, survival rates for testicular cancer are very good with 91% surviving for 10 or more years and relapse rate being as low as 5% after 3 years.[1,2] Testicular cancers are classified by the type of cells they begin in, with the most common testicular cancer being a germ cell tumour.[3] Germ cell tumours can be subdivided into seminomas and non-seminomas with the latter group including tumours such as teratomas, carcinomas and yolk sac tumours.[3]

Current UK guidelines recommend that testicular cancer follow up should be for 5 years post radical orchidectomy and adjuvant chemotherapy with physical evaluation, tumour markers, chest x-rays (CXR) and CT scans of the chest and abdomen.[4] Over the 5 years, patients will receive between 6 and 11 CXR depending on the type of tumour and if they have had adjuvant chemotherapy.[4] This is equivalent to 60-110 days background radiation which has the possibility of increasing their risk of developing another cancer.[5] Furthermore patients will receive a CT scan of the chest and abdomen twice in the first year of follow up and once a year after that for 5 years, which is equivalent to another 2 years of background radiation per CT scan.[4,5]

This audit aims to investigate if CXR are a useful routine follow up tool in patients treated for testicular cancer by investigating if the guidelines are adhered to and how often the CXR detect metastases.

Methods

Initial information for this audit was found using PubMed. Searches were refined using certain keywords such as "testicular cancer AND chest x-rays", "seminoma AND chest x-ray" and "non-seminoma AND chest x-rays". Previously written systematic reviews and cohort studies were analysed.

Data was collected on 94 patients (mean age 50.14) with testicular cancer who had completed their 5 year follow up from 2005 to 2010 in RCHT. 24 patients had to be excluded due to multiple factors,

including the patient moving away during treatment, inability to access the patients notes, and the cancer being a relapse or not a primary cancer. The number of CXR patients received during their follow up was recorded, as well as whether any metastases were found and the method used to find them.

Results

Of the 70 patients studied, 50 had a seminoma of differing stages, 13 had a teratoma, 3 had a carcinoma and 4 had a mixed cancer. 8 patients (11%) were found to have metastases at some point during the 5 year follow up. 2 of these patients had teratomas, 2 had mixed tumours, 3 had seminomas and 1 had a carcinoma. Of those 8, only one of these was detected on CXR with the other 7 being detected on CT and via the patient's tumour markers. The single metastasis found on CXR was also detected on CT, therefore none of the metastases were detected on CXR alone (**Figure 1**). The metastasis detected was a single 5mm nodule in the patient's right lung, which was discovered on the first follow up visit and no treatment was given. The total number of CXR done during follow up in all 70 patients was 570 with metastases being detected on only 1. On average, patients received 8.14 CXR over 5 years (mode=5). At follow up, 44 out of 70 patients (62%) received the required amount of CXR (which depended on the type of tumour that they had).

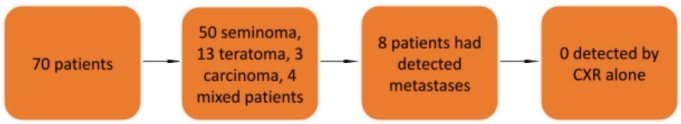

Figure 1. The number of patients, distribution of different tumours, number of patients with metastases, and metastases detected by CXR alone.

Discussion

These results provide evidence to show that CXR could be removed from being part of routine follow up. Testicular cancers have a very low relapse rate, with most relapses occurring in the first 2 years and the chance of a relapse after 3 years being as low as 3%.[3] Therefore, it could be argued that there is no need for patients to receive CXR on follow up.

According to UK guidance, one of the aims of follow up is "to detect relapse as early as possible in each stage".[4] When looking at the results it could be argued that CXR are unnecessary as CT scans detected 100% of relapses. This is limited by the small number of relapses and would be of interest to repeat the study on a larger scale. A study by Kollmannsberger *et al*. which looked at patterns of relapse in patients with stage 1 testicular cancer, found that CT and tumour markers were the best investigations to detect metastases and relapses.[6] In a study of 2483 stage 1 patients, they found that CT detected 63% of relapses, tumour markers detected 28% of relapses and CXR and physical examination detected 0.5% of relapses each.[6] From these results, we can see that almost all of the relapses can be detected by CT scan and via tumour markers alone. However, this study is limited by its single centre nature and the study only following stage 1 patients.

Further studies have investigated how often CXR detect relapses in patients being followed up.[7–11] De La Pena *et al*. investigated 1447 patients with stage 1 germ cell tumours in the Thames Valley and Mount Vernon Cancer Centre between 2003 and 2015.[7] Among the 1447 patients, they found 159 relapses with all relapses detected via follow up CT scans or rising tumour markers. None of the 159 relapses were detected by CXR. Gietama *et al*. investigated 290 patients with disseminated non-seminomatous testicular cancer between 1977 and 1999.[8] They found that 33 of the 290 patients relapsed; CXR was not involved in the detection of any of these relapses. Gels *et al*. investigated 154 patients with stage 1 seminomas between 1982 and 1992.[9] They found that 42 of the 154 patients relapsed with none of these relapses being detected on CXR. Rathmell *et al*. followed 29 relapse patients whose cancer recurred following treatment for germ cell tumours.[10] Tumour markers were found to be the first indicator of relapse in 55% of patients. They found that CXR discovered the first relapse in 2 (7%) patients. However, several of the patients that they followed had residual masses not removed post chemotherapy which may have influenced the value of CXR in their detection. Tolan *et al*. investigated 527 patients and found that of the 73 that relapsed, none of the relapses were detected on CXR alone.[11] From these studies we can suggest that CXR are not a good tool for detecting relapses in testicular cancer, and that CT scans alone would be enough to detect any possible metastases in patients with testicular cancer relapses, as long as they have had removal of all residual masses.[7–11] The studies also looked at different types of tumours at differing stages of disease and found that the results were the same.

Removal of CXR from routine follow up may help to reduce the anxiety of extensive follow up testing 5 years post treatment, as well as reducing the patient's X-ray exposure. Furthermore, eliminating CXR should result in a financial saving, as well as reducing the waiting times for CXR.

This audit found that only 62% of patients received the correct number of CXR for their type of tumour during the 5 year follow up period. This could be another sign that CXR are not considered to be vital in a patient's follow up. Furthermore, this shows that the guidelines are not being adhered to and this could potentially be a setback of this audit. If all the patients received the correct number of CXR then the results could have been different. Some patients received as little as 2 CXR during follow up, which thus had no effect on detecting any relapses. In particular, one patient with a malignant teratoma received 2 CXR during follow up and was found to have a mediastinal mass on CT which was not detected on CXR. This suggests that CT alone is enough to detect metastases and CXR are not a useful tool at follow up.

Conclusion There is evidence to show that the guidelines could be changed to remove CXR from being a part of the routine follow up of patients treated for testicular cancer. Due to a very low relapse rate for testicular cancers, especially in stage 1 seminomas with adjuvant treatment, it could be argued that there is no need to conduct CXR on patients during follow up. Furthermore, CXR detected a lung metastasis in only one patient, for whom no treatment was offered. As the patients in this study were already receiving at least 6 CT scans, with 4 being scheduled in the first 2 years, this may be sufficient to detect any possible metastases. Therefore, there may not be a need for the patient to also undergo CXR and, consequently, be exposed to more radiation than they need to be, which is associated with a possible increase in cancer risk later in life. Also, removal of CXR from follow up procedures may be helpful in reducing the anxiety associated with extensive follow up treatment and the costs for NHS trusts. Due to the small sample size of this audit, further research needs to be carried out to improve the validity of the results.

Contribution statement The author made substantial contributions to the conception or design of the work, drafted the work and gave final approval of the version to be included in Inspire.

References

1. Cancer Research UK (2021). Testicular cancer incidence statistics. Available from: https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/testicular-cancer/incidence. Accessed: 18 June 2021.
2. Shanmugalingam T, Chowdhury S, Rudman S. Global incidence and outcome of testicular cancer. Clin Epidemiol, 2013; 5:417–427.
3. NHS (2019). Treatment: testicular cancer. Available from: https://www.nhs.uk/conditions/testicular-cancer/treatment/. Accessed: 18 June 2021.
4. Porfiri E, Stevenson R, Patel P, et al (2016). Guidelines for the Management of Testicular Cancer. Available from: https://www.england.nhs.uk/mids-east/wp-content/uploads/sites/7/2018/05/guidelines-for-the-management-of-testicular-cancer.pdf. Accessed: 18 June 2021.
5. RadiologyInfo (2021) Radiation Dose in X-Ray and CT Exams. Available from: https://www.radiologyinfo.org/en/info/safety-xray?PdfExport=1. Accessed: 18 June 2021.
6. Kollmannsberger C, Tandstad T, Bedard PL, et al. Patterns of Relapse in Patients With Clinical Stage I Testicular Cancer Managed With Active Surveillance. J Clin Oncol, 2014; 33(1):51–7.
7. De La Pena H, Sharma A, Glicksman C, et al. No longer any role for routine follow-up chest x-rays in men with stage I germ cell cancer. Eur J Cancer, 2017; 84:354–9.
8. Gietema JA, Meinardi MT, Sleijfer DT, et al. Routine chest X-rays have no additional value in the detection of relapse during routine follow-up of patients treated with chemotherapy for disseminated non-seminomatous testicular cancer. Ann Oncol, 2002; 13(10):1616–20.
9. Gels ME, Hoekstra HJ, Sleijfer DT, et al. Detection of recurrence in patients with clinical stage I nonseminomatous testicular germ cell tumors and consequences for further follow-up: a single-center 10-year experience. J Clin Oncol, 1995; 13(5):1188–94.
10. Rathmell AJ, Brand IR, Carey BM, et al. Early detection of relapse after treatment for metastatic germ cell tumour of the testis: An exercise in medical audit. Clin Oncol, 1993; 5(1):34–8.
11. Tolan S, Vesprini D, Jewett MAS, et al. No Role for Routine Chest Radiography in Stage I Seminoma Surveillance. Eur Urol, 2010; 57(3):474–9.