

Three-dimensional volumetric rendition of cannon ball pulmonary metastases by the use of 3D Slicer, an open source free software package

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DESCRIPTION

A gentleman treated 6 years ago for colonic carcinoma (stage-IIA) had been on regular follow-up for a span of 4 years, when he was apparently disease-free. After being lost to follow-up in the past 2 years, he was recently diagnosed with a pathological fracture of the seventh thoracic vertebra (figure 1) for which he underwent surgery

(vertebral fixation and cord decompression) on an emergency basis.

Postoperatively, he underwent a CT simulation of the thorax with the purpose of planning radiotherapy (RT) to the involved vertebrae. The CT-scan demonstrated multiple bilateral pulmonary nodules (figure 2). After palliative RT to the involved vertebral column, in the interest of academics, we utilised the CT-scan data for volumetric reconstructions to attempt a better depiction of the well-known phenomenon of 'cannon ball metastases'.^{1 2} This was achieved by the use of Slicer 4.2, an open source software package (distributed under a BSD-style open source license) intended for advanced visualisation and analysis of medical image datasets.³ This, to our knowledge, is possibly the first publication providing a three-dimensional depiction of 'cannon ball' pulmonary metastases (figure 3).

Slicer 4.2 is free to download and is available for use with the Linux, Mac and the Windows operating systems.⁴ While the package already contains numerous features, additional functionality can be via the in-built 'extension manager', which provides options to integrate various extra features. Though



Figure 1 CT scan demonstrating the fractured seventh thoracic vertebral body (white arrow).

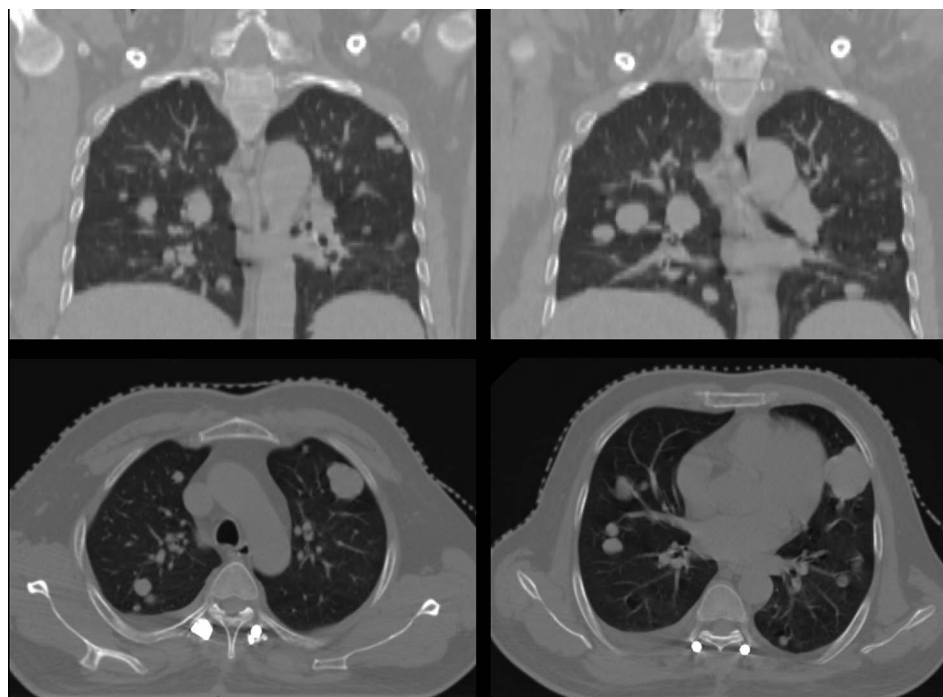


Figure 2 Multiple, bilateral pulmonary nodules ('cannon ball' metastases) on traditional axial and coronal slices.

To cite: Revannasiddaiah S, Susheela SP, Madhusudhan N, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2012-008248

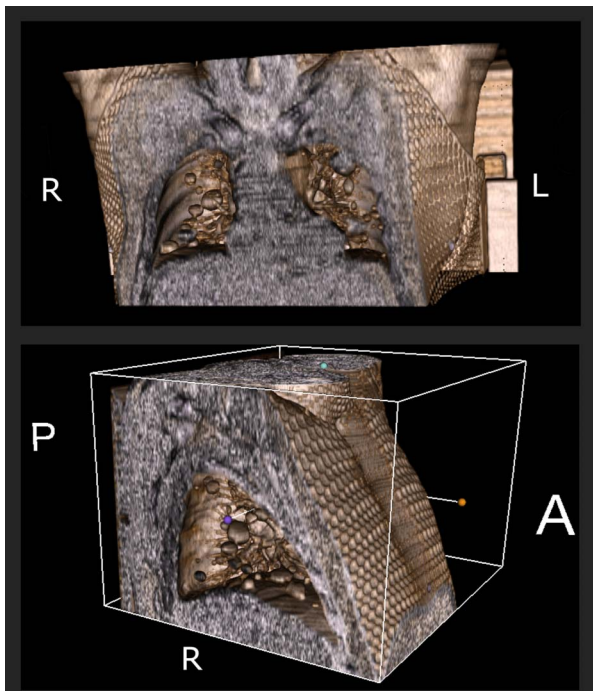


Figure 3 Three-dimensional rendition generated out of the thoracic CT-scan data, demonstrating 'cannon balls' within the lungs.

it is not currently approved for clinical use, it can, however, be used freely for academic research.

Learning points

- ▶ The importance of adherence to follow-up remains undiminished even after initial years of uneventful follow-up, regardless of the stage of cancer.
- ▶ Volumetric imaging data from sectional imaging can be digitally reconstructed to provide enhanced visualisation of normal and pathological anatomy.
- ▶ Slicer 4.2 can be downloaded freely from <http://www.slicer.org/pages/License>, and being a feature-rich open source alternative to expensive commercial software, it can handle complex functions such as tractography, multivolume processing, etc.
- ▶ Though not approved for clinical use, Slicer 4.2 can freely be utilised for research purposes.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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