Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Presumed pulmonary COVID-19 infection detected incidentally on breast MR

Adam Brown, BSc (Hons) MBChB*, Sam Dluzewski, BSc (Hons) MSc BM BS,
Anmol Malhotra, BSc (Hons) MBBS MRCP FRCR

Department of Radiology, Royal Free Hospital, Pond St, London, NW3 2QG, UK

ARTICLE INFO

Article history:

Received 24 April 2020

Revised 26 May 2020

Accepted 26 May 2020

Available online 1 June 2020

Keywords:

Breast

Covid-19

MRI

ABSTRACT

COVID-19 is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). A global pandemic was declared by the World Health Organization on 11 March 2020. Approximately 30% of infected individuals are asymptomatic. We present the case of a 68-year-old female who underwent outpatient breast magnetic resonance (MR) imaging for assessment of a left breast mass. The study demonstrated abnormal sub-pleural high T2 signal intensity change within the partially visualised lungs, which showed enhancement following administration of contrast. Concern was raised that the pulmonary changes may represent COVID-19 infection. The patient was urgently contacted and denied any current symptoms but reported suffering mild upper respiratory tract symptoms two weeks earlier. An outpatient chest radiograph demonstrated changes consistent with COVID-19 infection and the patient was treated as COVID-19 positive and advised to self-isolate for 7 days as per Public Health England guidance. Due to increasing breathlessness the patient presented to our emergency department the next day and underwent a CT pulmonary angiogram which demonstrated segmental pulmonary emboli and sub-pleural consolidation in keeping with COVID-19 infection. This represents the first case of COVID-19 identified on breast MR imaging that the authors have seen and highlights the importance of prompt identification and flagging of incidental pulmonary findings to minimise further transmission of the virus in asymptomatic carriers.

© 2020 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license.

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

COVID-19 is a global pandemic with prevalence increasing in Europe through the early months of 2020. Although COVID-19 is recognised to cause respiratory and systemic symptoms, many of those infected remain asymptomatic [1]. At the out-

break of the pandemic most institutions such as ours cancelled a large proportion of outpatient and non-urgent appointments. However, patients continue to attend for urgent investigations such as breast cancer imaging.

Given the predilection of COVID-19 for affecting the respiratory system, any imaging which encompasses all or part of the lungs could display incidental changes of the infection.

* Corresponding author.

E-mail address: adam.brown16@nhs.net (A. Brown).

<https://doi.org/10.1016/j.radcr.2020.05.059>

1930-0433/© 2020 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license. (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Fig. 1 – T2W TSE MR axial image showing incidental sub-pleural high T2 signal (red arrows).

Fig. 2 – T1-weighted post-contrast fat-saturated MR axial image demonstrating enhancing sub-pleural consolidation (red arrows).

Fig. 3 – PA erect chest radiograph demonstrating bilateral ill-defined air space opacification.

This includes MR imaging of the breast, which routinely includes the anterior portions of both lungs within the field of view. Florid consolidative changes commonly seen with pulmonary COVID-19 infection can be identified on the T2/STIR and post-contrast sequences of a breast MR study.

Case report

An asymptomatic 68-year-old female patient was referred to our hospital following routine screening mammography

which detected an abnormality in the left breast. She has a previous history of right-sided breast cancer treated with wide local excision in 2008. Stereotactic biopsy confirmed invasive lobular breast carcinoma and a subsequent local staging MRI was performed. The MRI study identified post-procedural changes from the recent biopsy and unifocal carcinoma within the upper outer quadrant of the left breast. In addition, incidental note was made of abnormal sub-pleural high T2 signal intensity in the periphery of the visualised lungs (Fig. 1). Post-contrast fat-saturated T1-weighted images demonstrated enhancement in the corresponding sub-pleural regions (Fig. 2).

Given the high prevalence of COVID-19 infection in the local community at the time, concern was raised that the incidental lung findings may be secondary to positive COVID-19 status. The patient was urgently contacted and denied any current symptoms. She did however report mild upper respiratory tract symptoms 2 weeks earlier, which had resolved. She had not undergone testing for the virus.

The patient was urgently recalled to the hospital and underwent chest radiography (Fig. 3) which demonstrated peripheral patchy airspace consolidation in keeping with presumed COVID-19 infection. The patient was given safety net advice and discharged. Her household contacts were given isolation advice in line with Public Health England guidance [2].

Due to increasing breathlessness, the patient re-presented to the emergency department the next day and underwent CT pulmonary angiogram. This demonstrated multiple right lower lobe segmental acute pulmonary emboli (Fig. 4), increasing the suspicion of positive COVID-19 status given the emerging link between the infection and increased incidence of pulmonary emboli [3]. On the lung windows of the CT pulmonary angiogram, bilateral sub-pleural ground-glass opacification with consolidation was seen (Fig. 5).

Fig. 4 – CT pulmonary angiogram demonstrating segmental right lower lobe pulmonary embolus (red arrow).

Fig. 5 – CT pulmonary angiogram lung windows demonstrating bilateral sub-pleural consolidation and ground-glass opacification (red arrows).

Informed consent for publication was obtained from the patient prior to submission.

Discussion

Following the outbreak of COVID-19 infection in Wuhan, China in December 2019, a global pandemic was declared on 11 March 2020 [4]. COVID-19 is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and typically presents with systemic and/or respiratory manifestations. A proportion of infected patients, thought to be as high as 30%, are asymptomatic and act as carriers [5].

The narrow field of view used in breast MR includes the lungs, mediastinum and bony structures which must be assessed for incidental extra-mammary findings including malignancy, infection and inflammation.

During the current pandemic special attention should be paid when analysing any imaging which visualises the lungs. Examples of this include breast MR, trauma imaging of the shoulder and abdominal CT or MR which includes the lung bases.

CT findings are typically characterised by bilateral pulmonary consolidations and are well described within literature [6]. MRI findings are less well documented, consisting of non-specific high T2 signal intensity with enhancement on post-contrast T1 imaging, as seen in other forms of pneumonia [7].

Identification of these findings in asymptomatic patients allows appropriate isolation measures of patient and household contacts to be commenced to minimise further spread of the virus and also allows safety net advice to be given to make the patient aware of any possible future deterioration.

Training of radiographers to identify suspicious lung changes at the time of image acquisition can allow for appropriate cleaning of equipment and surroundings to minimise risk of infection to subsequent patients.

REFERENCES

- [1] Gostic K, Gomez AC, Mummah RO, Kucharski AJ, Lloyd-Smith JO. Estimated effectiveness of symptom and risk screening to prevent the spread of COVID-19. *eLife* 2020;9:e55570. doi:10.7554/eLife.55570.
- [2] Public Healthcare England, Stay at home guidance for households with possible coronavirus infection, [updated 24 March 2020; cited 5/4/2020]. Available from: <https://bit.ly/2JVZsZD>. [Accessed 3 April 2020].
- [3] Bompard F, Monnier H, Saab I, Tordjman M, Abdoul H, Fournier L, et al. Pulmonary embolism in patients with Covid-19 pneumonia. *Eur Respir J* 2020:2001365. doi:10.1183/13993003.01365-2020.
- [4] WHO Director-General's opening remarks at the media briefing on COVID-19–11 March 2020, Ghebreyesus Tedros. *Who Int* 2020. doi:11/03/2020. <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>. [Accessed 3 April 2020].
- [5] Hu Z, Song C, Xu C, Jin G, Chen Y, Xu X, et al. Clinical characteristics of 24 asymptomatic infections with COVID-19 screened among close contacts in Nanjing, China. [published online ahead of print, 2020 Mar 4]. *Sci China Life Sci* 2020:1–6. doi:10.1007/s11427-020-1661-4.
- [6] Ye Z, Zhang Y, Wang Y, Huang Z, Song B. Chest CT manifestations of new coronavirus disease 2019 (COVID-19): a pictorial review. [published online ahead of print, 2020 Mar 19]. *Eur Radiol* 2020:1–9. doi:10.1007/s00330-020-06801-0.
- [7] Ekinci A, Yücel Uçarkuş T, Okur A, Öztürk M, Doğan S. MRI of pneumonia in immunocompromised patients: comparison with CT. *Diagn Interv Radiol* 2017;23(1):22–8. doi:10.5152/dir.2016.16055.