Thoracic Imaging in COVID-19 Infection

Guidance for the Reporting Radiologist
British Society of Thoracic Imaging

Background COVID-19

• First cases Wuhan City China December 2019
• Large outbreak Northern Italy February 2020
• First UK cases seen February 2020
• WHO Pandemic March 2020
13/03/2020

PCR

- Throat swab
- Concern re availability of testing kit. When the demand increases processing times may also significantly increase
- China - ran out of PCR testing kits so implemented CT scanning as a diagnostic tool
- PCR sensitivity 60-70% and can give a false negative result initially
- Retesting patients - precipitates further delays in turnaround of PCR results

Departmental Protocols

Standard operating procedures should be developed locally based around:

- Minimising risk to staff
- Infection control
- Portable CXR
- Standard departmental CXR
- Transferring patient to and from the Radiology department
- CT scanning & deep cleaning
Imaging Requests

Sufficient Information needs documenting on all Imaging referrals:

- Departments should work with local clinicians to ensure relevant clinical information is documented on radiology request for chest imaging:
  - Suspicion of COVID-19
  - Infection risk - impacts on how, where and when patients are imaged
  - Raised WCC / lymphopaenia - usually present in COVID-19
  - CRP - unusual to be COVID-19 +ve if CRP is normal
  - Relevant respiratory history
  - Smoking history

Imaging

- At time of writing there is timely access to PCR testing and rapid turnaround of results. Therefore there is no role for CT imaging in the diagnosis of COVID-19 unless the patient is seriously ill

- Imaging (CXR & CT) is likely to be used in the following situations: Guide clinicians in individual patient management decisions, dealing with complications or looking for an alternative diagnosis
Possible COVID-19 Infection

- Peripheral ground-glass opacities
- Crazy paving may be present
- Diffuse alveolar damage
- Organising pneumonia
Indeterminate for COVID-19

- Ground-glass / patchy / non peripheral changes
- Effusions
- Fibrosis with ground glass
- Lymph node enlargement
- Complex patterns

Alternative diagnosis

The following would be unusual in COVID-19 infection:

- Lobar pneumonia
- Cavitating infections
- Tree-in bud changes

Differentiating abnormalities in the presence of underlying emphysema or interstitial lung disease maybe difficult.
It is important to remember that a normal CT can be seen in early COVID-19 infection.

### CT pattern and quantifying disease

<table>
<thead>
<tr>
<th>Radiology</th>
<th>Parenchymal lung changes</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indeterminate (DD covid v other disorders)</td>
<td>Up to 3 focal abnormalities 3cm in max diameter</td>
<td>Mild</td>
</tr>
<tr>
<td></td>
<td>More than 3 focal abnormalities or max diameter &gt;3cm</td>
<td>Moderate / Severe*</td>
</tr>
</tbody>
</table>

* The difference between moderate and severe is subjective and will likely differ between reporters. This should be used in conjunction with clinical assessment.
## CT pattern and quantifying disease (2)

<table>
<thead>
<tr>
<th>Radiology in probable COVID-19</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure ground glass opacities</td>
<td>Up to 3 focal abnormalities &lt; 3cm in max diameter</td>
</tr>
<tr>
<td>Pure ground glass opacities</td>
<td>More than 3 focal abnormalities or max diameter &gt;3cm</td>
</tr>
<tr>
<td>Focal ground glass opacities mixed with early consolidation</td>
<td>Moderate / Severe*</td>
</tr>
<tr>
<td>Diffuse ground glass opacities or consolidation with signs of architectural distortion</td>
<td>Severe</td>
</tr>
</tbody>
</table>

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## What to report on CT

- Clinical details
- Describe features
- Distribution of changes: Lobes / anatomy/ peripheral vs central vs mixed - use axial and coronal images.
- Number of opacities and extent maybe helpful in categorising into mild moderate of severe involvement (See previous slides)
- Background lung conditions eg Emphysema (mild / moderate / severe), UIP
- Conclusion: Highly suspicious for viral pneumonia / possible viral pneumonia / other diagnosis is likely / normal. A comment regarding mild moderate or severe based on information in the previous slide may be useful for the clinical teams managing these patients.
Scenarios to consider

• Incidental or unexpected finding on CXR. Clear advice needs to be given to radiographers regarding who to contact and what to do next in such a situation

• Dealing with unexpected findings on CT e.g. abnormal lung bases on CT abdomen & pelvis

• Clinical teams are likely to require additional support from radiology, particularly on ITU & respiratory units

• Workforce planning: Departmental cover and on call provisions in the case of staff absence

Case Database


• Teaching Library:  https://bit.ly/BSTICOID19_Teaching_Library

• We will endeavor to keep you updated from a radiology perspective as the situation changes.

• Updates can be found on  www.bsti.org.uk  or via our facebook or twitter feeds.

The BSTI would like to thank Prof Nicola Sverzellati and his team in Parma Italy for sharing information and images.