Osteophyte related fibrosis: an under-appreciated but common finding on high resolution computed tomography (HRCT)

INTRODUCTION
High resolution computed tomography (HRCT) has increased in the investigation and assessment of lung disease (e.g. Fibrosis, nodules). As technology and image quality improves, the detection of subclinical changes in the normal lung has also increased. In 2002, Olsaker et al. described sub-pleural changes adjacent to thoracic vertebral osteophytes. Post-mortem histology in 5 patients demonstrated fibrosis-like appearances with increased collagen and elastin fibres. This has been highlighted in various reviews of the aging lung, but has not been assessed since the advent of multislice HRCT.

We analysed a typical HRCT population, hypothesising that osteophyte size and patient age would be associated with focal lung changes, which we can term osteophyte related fibrosis.

METHODS
We retrospectively reviewed 100 consecutive HRCTs performed at the Royal Infirmary of Edinburgh, UK, from December 2016 to January 2017. Patients were referred from clinics or in-patient settings. All patients were imaged using the same Toshiba Aquilion CX scanner following a standard HRCT protocol: supine, 1 mm slices, 120kV. All scans were independently reviewed by two registrars (DAJS, AN) with any discrepancies adjudicated by a chest imaging specialist (JTM).

Presence of osteophytes was recorded, with largest osteophyte size (OS) determined as the largest distance protruding from the vertebral body on axial reformats.

Adjacent lung changes were reviewed using multiplanar reformats and the relation to adjacent osteophytes. Milder changes here should not be confused for active disease (e.g. alveolitis) or sinister pathologies (e.g. bronchoalveolar carcinoma).

RESULTS

100 patients were included (52% male) with a median age of 70 years (IQR: 17 years). Osteophytes were present in 79 patients. Most osteophytes (91%) were right sided with 96% on the left, 4% bilateral. Patients without osteophytes were younger than those with (median 59 years vs. 70 years). No focal changes were present in patients without osteophytes.

Lung changes were demonstrated in 58% with osteophytes (Table 1). 98% were isolated to the mediastinum and segments of the right lower lobe. None of these changes were felt to be clinically significant.

Larger osteophytes were associated with the presence of parenchymal changes (3.4 mm vs. 4.6 mm, p<0.02). However size did not correlate with the severity of changes (mild 6.2 mm vs. severe 7.9 mm, p=0.91).

Older age was predictive of osteophyte related fibrosis (66.4 years [no changes] vs. 72.0 years [changes present], p=0.01). Age was also related to severity of lung changes (groundglass / interstitial thickening 70 years, traction bronchiectasis / honeycomb 80 years, p<0.01).

Table 1: osteophyte related fibrosis with average osteophyte size and age

<table>
<thead>
<tr>
<th>Finding</th>
<th>Number of patients (total=79)</th>
<th>Osteophyte size (mm)</th>
<th>Age (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>nil</td>
<td>30</td>
<td>5.4</td>
<td>66.6</td>
</tr>
<tr>
<td>groundglass opacification</td>
<td>15</td>
<td>4.9</td>
<td>70.4</td>
</tr>
<tr>
<td>interstitial thickening</td>
<td>16</td>
<td>7.4</td>
<td>68.7</td>
</tr>
<tr>
<td>traction bronchiectasis</td>
<td>6</td>
<td>7.7</td>
<td>68.7</td>
</tr>
<tr>
<td>honeycomb</td>
<td>4</td>
<td>8.3</td>
<td>82.0</td>
</tr>
<tr>
<td>diffuse disease</td>
<td>8</td>
<td>6.9</td>
<td>77.4</td>
</tr>
</tbody>
</table>

DISCUSSION

The majority of patients with osteophytes had adjacent lung changes. No similar changes were seen in those without osteophytes. We are calling this spectrum of findings osteophyte related fibrosis.

Larger osteophyte size was associated with the presence of changes, but did not correlate with severity. Age however was a factor in the presence and severity of related change.

The underlying mechanism has not been established, but a form of repeated microtrauma or traction injury similar to ILO and asbestos plaque related change has been hypothesised (Olsaker 2002), with probable common inflammatory pathways. Even in patients with established ILO, discrete foci of change could be seen adjacent to osteophytes supporting a localised effect.

We found coronal MPR particularly useful to identify and illustrate parenchymal changes, and the relation to adjacent osteophytes. Milder changes here should not be confused for active disease (e.g. alveolitis) or sinister pathologies (e.g. bronchoalveolar carcinoma).

Although this relatively small cohort was imaged primarily for respiratory specialists, we believe osteophyte related fibrosis to be chronic and asymptomatic and will be common in our general population, particularly in the aging lung.

REFERENCES

• Olsaker S, Talakashki A, Moe WR, T: Focal Pulmonary Interstitial Opacities Adjacent to Thoracic Spine Osteophytes. AJR 2002
• Hantel DK. Thin-Section CT of the Lungs: The Hinterland of Normal. Radiology 2010

Figure 1: axial and coronal CT with groundglass opacification (56 years, OS 10 mm)
Figure 2: axial and coronal CT with interstitial thickening (71 years, OS 9 mm)
Figure 3: axial and coronal CT with focal honeycombuing (74 years, OS 11 mm)