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TECHNICAL NOTE

Dealing with a soft tissue lesion that is scheduled for CT-guided biopsy and that has decreased in size on preprocedural planning CT

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ABSTRACT

On planning CT before CT-guided biopsy, the target lesion may have decreased in size compared to previous imaging. Radiologists frequently face the dilemma of whether to biopsy these shrinking lesions or not. There is currently a lack of literature on how often such a situation is encountered in clinical practice, how it is dealt with, and if the perceived lesion size reduction always implies benignancy. This information would be valuable to develop evidence-based strategies for this specific clinical situation. Therefore, this study aims at determining the frequency, radiologist’s management, and nature of lesions with size reduction on prebiopsy planning CT.

INTRODUCTION

CT-guided percutaneous needle biopsy is a well-established technique to acquire tissue for pathological examination. CT allows for visualisation of the location of the target lesion and its surroundings as well as stepwise controlling of instrumentation necessary for biopsy. Therefore, it is generally a safe and efficient procedure. In patients who are referred for CT-guided biopsy, the main purpose of the procedure is commonly to rule in or rule out a malignant diagnosis. In some instances, the target lesion may have decreased in size on preprocedural planning CT compared to previous imaging examinations, as determined by the attending radiologist. Radiologists frequently face the dilemma of whether to biopsy a shrinking lesion or not. While decreasing lesion size may be attributed to benignancy and technical difficulty with biopsy, time allocation and satisfaction of tissue acquisition for a gold standard diagnosis may encourage the radiologist to obtain the biopsy. However, there is currently a lack of literature on how often such a situation is encountered in clinical practice, how it is dealt with, and if the perceived lesion size reduction always implies benignancy. This information would be valuable to develop evidence-based strategies for this specific clinical situation. Therefore, this study aims at determining the frequency, radiologist’s management, and nature of lesions that decrease in size on prebiopsy planning CT.

METHODS AND MATERIALS

This retrospective study was approved by the local institutional review board (registration number 201800105) and the need for informed consent was waived. All patients who participated in CT-guided core needle biopsy of a soft tissue lesion at our academic tertiary care centre between January 2005 and December 2017 were eligible for inclusion. CT-guided cytological aspirations and CT-guided biopsies of bone lesions and (suspected) spondylodiscitis were excluded. A total of 1103 consecutive soft tissue biopsies were performed in 1027 unique patients (66 patients underwent biopsy on two different occasions, and five patients underwent biopsy on three different occasions) during this 13-year period. These 1027 patients consisted of 590 males and 437 females, with a mean age ±SD of 60.0 ± 15.8 years (range: 1–91 years). Biopsies were (scheduled to be) performed in the lung (n = 567), abdomen (n = 269), pelvis (n = 78), mediastinum (n = 57), paraspinal region (n = 48), chest wall (n
<table>
<thead>
<tr>
<th>Patient no.</th>
<th>Age</th>
<th>Gender</th>
<th>Location (lesion)</th>
<th>Working diagnosis before biopsy</th>
<th>Lesion size on previous imaging(^a)</th>
<th>Lesion size on planning CT(^b)</th>
<th>Days between previous imaging and planning CT</th>
<th>Biopsy done?</th>
<th>Final diagnosis</th>
<th>Reference standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>62</td>
<td>F</td>
<td>Abdomen (retroperitoneal)</td>
<td>Malignancy</td>
<td>10.1 cm(^b)</td>
<td>4.7 cm(^b)</td>
<td>81</td>
<td>No</td>
<td>Benign (probably haematoma)</td>
<td>7-month clinical and CT follow-up</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>M</td>
<td>Lung</td>
<td>Metastasis, infection</td>
<td>Num(^b)</td>
<td>Num(^b)</td>
<td>10</td>
<td>No</td>
<td>Benign (probably infection)</td>
<td>3-month clinical and radiographical follow-up</td>
</tr>
<tr>
<td>3</td>
<td>43</td>
<td>F</td>
<td>Lung</td>
<td>Malignancy, infection, inflammation</td>
<td>3.1 cm(^b)</td>
<td>1.6 cm(^b)</td>
<td>55</td>
<td>No</td>
<td>Benign (probably infection)</td>
<td>8-month clinical and FDG-PET/CT follow-up</td>
</tr>
<tr>
<td>4</td>
<td>52</td>
<td>M</td>
<td>Lung</td>
<td>Metastasis, infection</td>
<td>4.0 cm(^c)</td>
<td>2.6 cm(^c)</td>
<td>57</td>
<td>No</td>
<td>Benign (probably infection)</td>
<td>4-month clinical and FDG-PET/CT follow-up</td>
</tr>
<tr>
<td>5</td>
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<td>F</td>
<td>Lung</td>
<td>Malignancy, infection</td>
<td>3.9 cm(^c)</td>
<td>NV(^b)</td>
<td>59</td>
<td>No</td>
<td>Benign (probably infection)</td>
<td>7-month clinical and CT follow-up</td>
</tr>
<tr>
<td>6</td>
<td>81</td>
<td>M</td>
<td>Lung</td>
<td>Malignancy, infection</td>
<td>NRM(^c)</td>
<td>NV(^b)</td>
<td>20</td>
<td>No</td>
<td>Benign and malignant (infection and low-grade lymphoplasmacytic lymphoma)</td>
<td>Autopsy</td>
</tr>
<tr>
<td>7</td>
<td>38</td>
<td>M</td>
<td>Lung</td>
<td>Infection</td>
<td>Num(^c)</td>
<td>Num(^c)</td>
<td>8</td>
<td>No</td>
<td>Benign (probably infection)</td>
<td>6-month clinical and FDG-PET/CT follow-up</td>
</tr>
<tr>
<td>8</td>
<td>64</td>
<td>M</td>
<td>Lung</td>
<td>Malignancy</td>
<td>NRM(^a)</td>
<td>NRM(^a)</td>
<td>14</td>
<td>No</td>
<td>Unclear</td>
<td>Not available(^d)</td>
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<tr>
<td>9</td>
<td>79</td>
<td>M</td>
<td>Lung</td>
<td>Malignancy, infection</td>
<td>7.8 cm(^c)</td>
<td>49(^c)</td>
<td>42</td>
<td>No</td>
<td>Benign (probably infection)</td>
<td>1-month clinical and radiographical follow-up</td>
</tr>
<tr>
<td>10</td>
<td>69</td>
<td>F</td>
<td>Abdomen (perihepatic)</td>
<td>Metastasis</td>
<td>1.8 cm(^b)</td>
<td>NRM(^c)</td>
<td>46</td>
<td>Yes</td>
<td>Benign</td>
<td>Biopsy (no malignancy) and 49-month clinical and CT follow-up</td>
</tr>
<tr>
<td>11</td>
<td>60</td>
<td>F</td>
<td>Lung</td>
<td>Malignancy</td>
<td>2.8 cm(^b)</td>
<td>2.3 cm(^c)</td>
<td>19</td>
<td>Yes</td>
<td>Malignant (large-cell neuroendocrine carcinoma)</td>
<td>Biopsy</td>
</tr>
</tbody>
</table>

\(^a\)Axial long-axis diameter
\(^b\)On contrast-enhanced CT
\(^c\)On unenhanced CT
\(^d\)Ground-glass lesion decreased in size, but its nature could not be determined anymore on follow-up imaging due to the administration of chemotherapy for lung adenocarcinoma at another location.
Clinical and imaging follow-up. Lesions was determined based on available pathology reports and have decreased in size were retrospectively measured by a radiologist. Axial long-axis diameters of lesions that were reported to how it was subsequently handled in terms of non-execution of the biopsy. If the reporting radiologist mentioned a decrease in lesion size, and it was subsequently handled in terms of non-execution of the biopsy. Axial long-axis diameters of lesions that were reported to have decreased in size were retrospectively measured by a radiologist (‘blinded’), if possible. Malignant or benign nature of these lesions was determined based on available pathology reports and clinical and imaging follow-up.

RESULTS
11 out of 1103 soft tissue lesions that were about to undergo CT-guided biopsy had decreased in size on preprocedural planning CT compared to previous imaging according to the radiology report, which corresponds to a frequency of 1.00% (95% CI: 0.56–1.78%). These 11 soft tissue lesions were present in 11 unique patients (six males and five females, with a median age of 60 years [range: 7–81 years]). Retrospective review confirmed the decrease in lesion size in all 11 cases. In two cases, the lesions were not even visible anymore on prebiopsy planning CT. Nine of the lesions were located in the lung, one was located in the retroperitoneum, and one was located perihilar. Almost all of the lesions were suspicious of malignancy or metastasis at the time of (scheduled) biopsy. In nine cases, the attending radiologist decided to not perform the biopsy after consulting the referring physician. In two cases, the radiologist proceeded to perform the biopsy, without consulting the referring physician. According to available pathology reports in three patients, and clinical and imaging follow-up available in seven patients, eight lesions proved to be benign (the majority due to infection), one was malignant (pathologically proven pulmonary large-cell neuroendocrine carcinoma based on the CT-guided biopsy), one harboured both benign and malignant pathology (pathologically proven infection and low-grade lymphoplasmacytic lymphoma based on autopsy), and the nature of one lesion remained unclear. Further details of all cases are displayed in Table 1. CT-scans of four cases are shown in Figures 1–4.

DISCUSSION
Currently, there are no published protocols or guidelines advising on whether to biopsy a lesion that has decreased in size on prebiopsy planning CT. First, our results demonstrate that lesion size reduction on prebiopsy planning CT is relatively uncommon. Therefore, most radiologists will lack clinical experience in how to appropriately deal with such lesions. Nevertheless, in the majority of such cases, the biopsy is cancelled by the radiologist. This is particularly justifiable for lesions that have decreased in size to such an extent that biopsy is technically not possible anymore. In our series, the decision to not biopsy was always jointly made by the attending radiologist and the referring physician. This is particularly justifiable for lesions that have decreased in size to such an extent that biopsy is technically not possible anymore. In our series, the decision to not biopsy was always jointly made by the attending radiologist and the referring physician.
Figure 4. A 69-year-old female with a previous history of rectal cancer and a solitary liver metastasis (for which she was surgically treated) underwent routine follow-up CT (4A) on which a lesion (white arrow) measuring 1.8 cm in long-axis diameter (zoomed inset) was seen. On the prebiopsy CT scan (4B), which was performed 46 days later, the lesion (white arrow) had decreased in size and was not reliably measurable anymore. However, the attending radiologist decided to perform the biopsy anyway. Histopathology revealed muscle and fat tissue, and no malignant, inflammatory, or other lesional tissue. A 49-month clinical and CT follow-up (demonstrating complete resolution of the lesion) confirmed the benign nature of this lesion.

In conclusion, the incidence of lesions that decrease in size on prebiopsy planning CT is very low. The radiologist usually refrains from biopsying these lesions. Although most of these lesions are benign, lesion size reduction does not exclude malignancy. Therefore, clinical and imaging follow-up should be considered mandatory when biopsy cancellation is opted for.

**LEARNING POINTS**

- The incidence of lesions that decrease in size on prebiopsy planning CT is very low.
- The radiologist usually refrains from biopsying these lesions.
- Although most of these lesions are benign, lesion size reduction does not exclude malignancy. Therefore, clinical and imaging follow-up should be considered mandatory when biopsy cancellation is opted for.

**REFERENCES**