Initial experience of CT-guided percutaneous lung biopsy with assistance of a robotic guiding device

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• No Financial Disclosure
• No Off-label Use
Introduction

• CT-guided lung biopsy was first described by Haaga and Alfidi in 1976
• correct pathological result depends on accurate needle placement
• complications associate with puncture
Introduction

- Lung cancer: most common in lung space-occupying lesions
- First most frequently diagnosed cancer in men and second in women
Techniques for Guiding

- Regular CT
- Ultrasound
- X-ray
- 3D Laser Location
- Real-time CT fluoroscopic Guidance
- Electromagnetic Tracking
- **Robotic guiding arm**
Purpose of this study

• To estimate the feasibility and safety of CT-guided percutaneous lung biopsy with the assistance of an intelligent guiding device called ROBIO
Guiding device

• PIGA-CT

• used in 2013

• using now
Workflow of ROBIO

5 Simple Steps

1. Transfer DICOM 3.0 CT image to ROBIO Planning Station
2. Plan and confirm for device position
3. Prepare patient for procedure
4. Insert needle through the guide
5. Review needle position with plan

Login Screen
ROBIO combined with CT
Patients information

• 11 patients enrolled in this study
• 8 male and 3 female
• Mean age: 64y
• Single lesion, 9 in right lobe
• Diameter: 2~7cm
Data collected

- procedure time
- localization time
- puncture times
- scanning times
- radiation dose (Dose-length product, DLP)
- aiming accuracy
- complication rate
Procedure planning

plan for the procedure, select the skin puncture point (white arrow)

select the target point in the lesion (white arrow)
After planning

Needle Bush can be contained in Bush Adapter

Insert needle through Needle Bush

Bush Adapter fixed by the terminal clamp

Confirm needle in the target as designed
## Results

<table>
<thead>
<tr>
<th></th>
<th>Procedure Time</th>
<th>Localization Time</th>
<th>Puncture Times</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>28.9 ± 6.9 min</td>
<td>12 ± 3.9 min</td>
<td>1.1 ± 0.3</td>
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</table>

<table>
<thead>
<tr>
<th>Scanning Times</th>
<th>DLP Value</th>
<th>Needle Aiming Accuracy</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>3.5 ± 0.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>547.3 ± 187.6 mGy*cm</td>
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<tr>
<td>&lt;5mm</td>
<td>8 punctures</td>
<td></td>
</tr>
<tr>
<td>5~10mm</td>
<td>2 punctures</td>
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<tr>
<td>12mm</td>
<td>1 puncture</td>
<td></td>
</tr>
<tr>
<td>No</td>
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<td>age</td>
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<td>----</td>
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<tr>
<td>1</td>
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<td>47</td>
</tr>
<tr>
<td>11</td>
<td>M</td>
<td>58</td>
</tr>
</tbody>
</table>
Complication

• one patient had pneumothorax (9.1%)
• another one had pulmonary hemorrhage
• no serious puncture-related complications occurred
Advantage

• accurate needle placement
• short localization time and less scanning times
• low dose radiation exposure
• low complication rate
• satisfied pathological result
Disadvantage

- patient movement can lead to **dangerous** puncture (skin mark is helpful)
- loose matching affects the accuracy
Conclusion

• ROBIO-assisted CT-guided percutaneous lung biopsy is an effective and safe method due to the short localization time, high aiming accuracy and low complication rate, but more researches are needed in the future.
Limitation

- the number of cases is not enough
- lack of experience on small lesion (<2cm)
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Thank you!

Suzhou