

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



Login Screen



ROBIO WORKFLOW

5 Simple Steps



Transfer DICOM 3.0 CT
image to ROBIO Planning
Station



Plan and
confirm
for device
position



Prepare
patient for
procedure



Insert needle
through the
guide



Review needle
position with plan

ROBIO combined with CT





Patients information

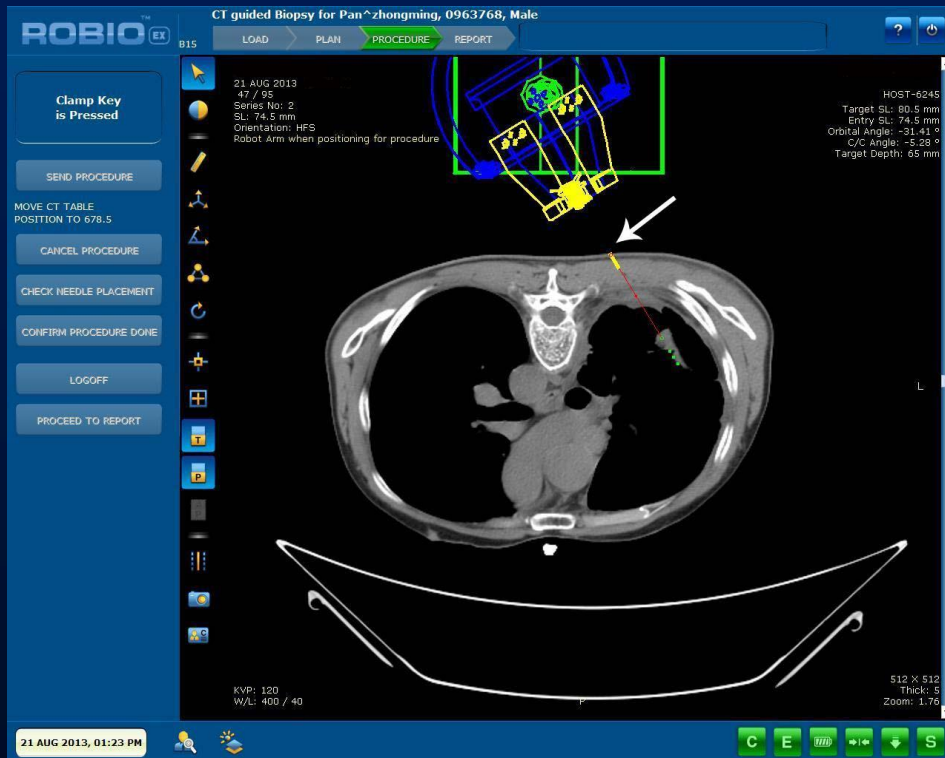
- 11 patients enrolled in this study
- 8 male and 3 female
- Mean age: 64y
- Single lesion, 9 in right lobe
- Diameter: 2~7cm



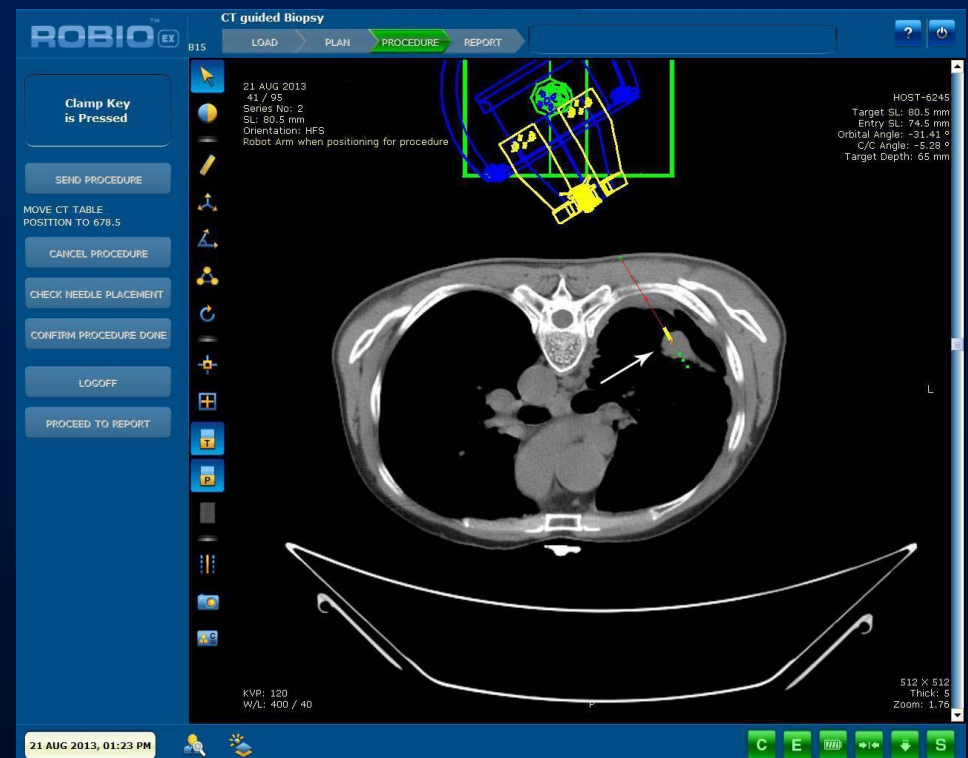
Data collected

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

Procedure planning

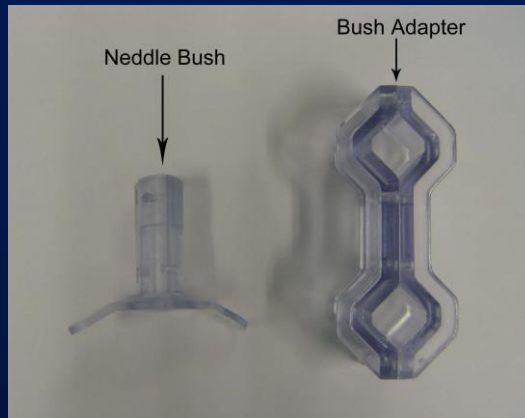


plan for the procedure, select the skin puncture point (white arrow)

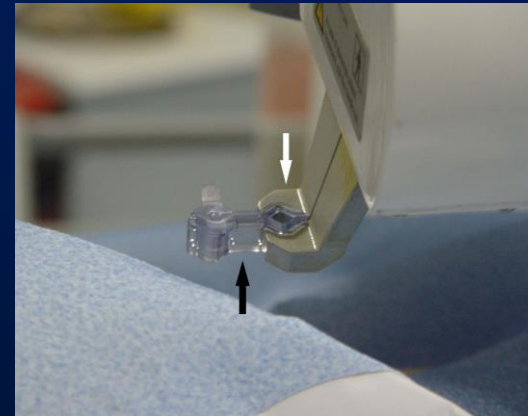


select the target point in the lesion (white arrow)

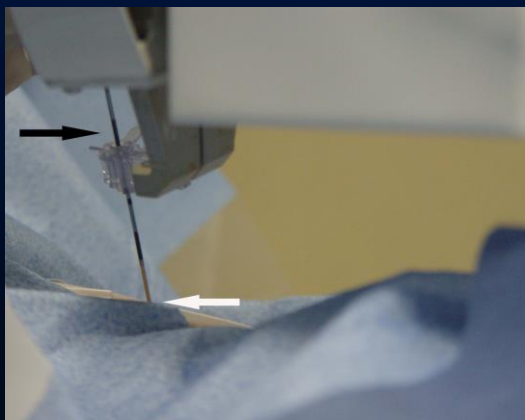
After planning



**Needle Bush can
be contained in
Bush Adapter**



**Bush Adapter
fixed by the
terminal
clamp**



**Insert needle
through Needle
Bush**



**Confirm
needle in the
target as
designed**



Results

| procedure time | localization time | puncture times | |
|--------------------------|-----------------------------|------------------------|-------------|
| $28.9 \pm 6.9\text{min}$ | $12 \pm 3.9\text{min}$ | 1.1 ± 0.3 | |
| scanning times | DLP value | needle aiming accuracy | |
| 3.5 ± 0.9 | 547.3 ± 187.6 mGy*cm | <5mm | 8 punctures |
| | | 5~10mm | 2 punctures |
| | | 12mm | 1 puncture |



Pathological result

| No | gender | age | pathological result |
|----|--------|-----|---------------------------------|
| 1 | M | 49 | poorly differentiated carcinoma |
| 2 | F | 48 | non-small cell lung cancer |
| 3 | M | 70 | adenocarcinoma |
| 4 | M | 82 | non-small cell lung cancer |
| 5 | F | 81 | adenocarcinoma |
| 6 | M | 59 | non-small cell lung cancer |
| 7 | M | 68 | adenocarcinoma |
| 8 | F | 52 | compound large cell carcinoma |
| 9 | M | 63 | poorly differentiated carcinoma |
| 10 | M | 47 | adenocarcinoma |
| 11 | M | 58 | adenocarcinoma |



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 ($<2\text{cm}$)

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Thank you!



Suzhou