Introduction

Phantom Test

Clinical Experience

Conclusion
Introduction

- Gold Anchor™ Marker (RadiaDyne LLC. Houston, TX) is either a 10 mm or 20 mm long gold wire (0.28 mm in diameter) with notches every 2 mm

- Preloaded Needle
  - 22 GA: 0.7 mm, 20 cm
  - 25 GA: 0.5 mm, 12 cm
Introduction

- Advantage
  - Less risk of pneumothorax (2%), internal bleeding or infection
  - Less migration possibility
    - Lung
    - Breast
  - Less CT artifact
Final Shape Depends on Insertion Technique

- **Advance Stylet:**
  - Ball shape

- **Withdraw needle:**
  - Linear shape

- **Advance & Withdraw:**
  - Tadpole shape

Can Cyberknife track it?
Introduction

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Phantom Study

- 1 cm SuperFlab bolus on top of 10 cm solid water
- Multiple Gold Anchor markers were injected into a Superflab with different shapes, lengths, and directions
  - #1, #2: 10 mm Linear (Longitude and 45°)
  - #3: 20 mm Linear
  - #4: Ball shape
  - #5: Tadpole Shape
- Three regular gold fiducial markers were also injected into the superflab as reference to verify the tracking accuracy
- Phantom scanned by GE Lightspeed CT scanner with 1.25 mm per slice
Fiducial distribution in Phantom

- 10 mm 45° Linear-shaped gold anchor
- 20 mm Linear-shaped gold anchor
- Tadpole-shaped gold anchor with 5 mm tail
- 10 mm Linear-shaped gold anchor
- 0.8mm x 3.0 mm regular fiducial
- Ball-shaped gold anchor
- 0.8mm x 3.0 mm regular fiducial
- 1.2mm x 3.0 mm regular fiducial
Result

- Less CT Artifact?

1.2mm x 3.0 mm regular fiducial

Ball-shaped Gold Arch

0.8mm x 3.0 mm regular fiducial
10 mm Linear-shaped Gold Anchor Fiducial
10 mm 45° Linear-shaped Gold Anchor Fiducial
20 mm Linear-shaped Gold Anchor Fiducial
Ball-shaped Gold Anchor Fiducial
Tadpole-shaped Gold Anchor Fiducial
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Lung

Ball-shaped Gold Anchor fiducial

Regular fiducial
Lung

Synthetic Image A

Camera Image A

Synthetic Image B

Camera Image B
Prostate

Ball-shaped Gold Anchor
Adrenal Gland
Pancreas
Conclusion:

- It is feasible to use gold anchor marker for Cyberknife.
- Ball shape or Tadpole gold anchor markers are recommended.
- Visual confirmation of lock-on is important due to the irregular shape of gold anchor markers.
- More study is needed to evaluate clinical effect.
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