

EUS -guided liquid fiducial placement for stereotactic radiotherapy in pancreatic cancer: Feasibility study

Dear Editor,

For patients with unresectable pancreatic tumors, stereotactic body radiation therapy (SBRT) has shown promising results for local control with reduced toxicity.^[1] Fiducials are used in SBRT to allow better localization of the tumor for adequate mapping. Despite the high success rates with metal fiducials,^[2] its placement can be technically difficult, particularly with lesions located in the head or uncinate process, and when the scope is torqued. Metal fiducials have limited visibility given their small size, requiring multiple fiducials for a single location, cannot be removed, and have high migration rates.^[3] Recent Food and Drug Administration approval of fiducial preloaded needles has overcome safety concerns when backloading fiducials into standard needles, allowing deployment of 1–3 fiducials per endoscopic passage.

A new injectable hydrogel made of iodinated polyethylene glycol particles (TraceIT Fiducial Marker, Augmenix Inc., Waltham, MA, USA) has been approved and used as a liquid fiducial on solid tumors.^[4] It is reabsorbable, has multimodal visibility, and can be easily injected through small needles into advanced cancer and surrounding soft tissue.^[5]

We recently reported (Poster Mo1992, presented at Digestive Disease Week 2016; San Diego, CA. Published at *Gastrointestinal Endoscopy* 2016, vol 83 (5): AB486-87) two patients with locally advanced pancreatic cancer, who were deemed not surgical candidates due to vascular involvement and performance status. Both patients underwent hydrogel fiducial placement for palliative SBRT. Procedures were performed under moderate sedation using a linear echoendoscope (GF-UCT180, Olympus, Japan).

A 19-gauge standard needle was first primed with the injectable hydrogel marker outside the echoendoscope. The hydrogel was injected in aliquots of 0.1–0.2 cc at a time without repositioning the needle until there was a clear endosonographic visualization of hydrogel blebs within the tumor. The hydrogel appeared hyperechoic on endoscopic ultrasound (EUS) imaging [Figure 1]. Although not visible on fluoroscopy, the hydrogel exhibits hyperenhancement on T2-weighted magnetic resonance imaging and reveals radiopacity of approximately 300 Hounsfield units on simulation with computed tomography (CT) imaging and cone-beam CT. All patients received periprocedural prophylactic antibiotics. No major complications were noted. The liquid fiducial allowed adequate radiation simulation, including motion studies. Onboard imaging during radiation treatment with cone-beam CT visualized the implanted hydrogel marker allowing real-time registration of images and accurate targeting of the tumor. Both patients successfully received a total of 33 Gray (Gy) under SBRT protocol.

EUS-guided delivery of a new liquid fiducial into pancreatic cancer appears to be feasible, providing adequate visualization of the marker during EUS placement and most importantly during mapping and image guidance during stereotactic radiotherapy. Compared to metal fiducials, it appears to have less artifact on cone-beam pretreatment mapping, it can be delivered with smaller gauge needles, and with one single puncture, the targeted area can be completely delineated with just needle repositioning within the tumor. This novel hydrogel fiducial can become an



Figure 1. Adenocarcinoma of the head of pancreas after injection of hydrogel. Noticed hyperechoic features of the hydrogel within the mass

alternative to metal fiducial to aid on SBRT. Further studies are necessary to assess long-term outcomes, safety, and cost, particularly when compared to standard metal fiducials.

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Conflicts of interest

There are no conflicts of interest.

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