Biliary Tumor Ablation with Photodynamic Therapy and Radiofrequency Ablation

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KEYWORDS

• Biliary disease • Cholangiocarcinoma • Bile duct • PDT • RFA
• Radiofrequency ablation • Photodynamic therapy

KEY POINTS

- Most patients with hilar cholangiocarcinoma have unresectable disease and require palliation with biliary stenting.
- Photodynamic therapy (PDT) is a local ablative method that uses a systemic photosensitizing agent that preferentially accumulates in malignant cells and is activated by a nonthermal light causing destruction of the malignant cells through a process mediated by oxygen-free radicals.
- Potential treatment options for PDT include palliation in combination with chemotherapy, palliation in combination with stenting, postoperatively for recurrent tumor, or downstaging a patient for curative surgery.
- Radiofrequency ablation (RFA) using thermal energy is emerging as a potentially effective treatment of malignant biliary occlusion and has been used before insertion of biliary stents and as a treatment of metal stent occlusion.
- In the limited existing studies, RFA was effective in achieving local tumor control and may offer a therapeutic option for patients with recurrent or primary cholangiocarcinoma.

Funding sources: None.
Conflicts of Interest: M. Kahaleh has received grant support from Boston Scientific, Fujinon, EMcison, Xlumena, Inc, W.L. Gore, MaunaKea, Apollo Endosurgery, Cook Endoscopy, ASPIRE Bariatrics, GI Dynamics, and MI Tech, and is a consultant for Boston Scientific and Xlumena, Inc.
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Gastrointest Endoscopy Clin N Am 25 (2015) 793–804
http://dx.doi.org/10.1016/j.giec.2015.06.013 giendo.theclinics.com
1052-5157/15/$ – see front matter

INTRODUCTION

The incidence of cholangiocarcinoma accounts for 2% of all gastrointestinal malignancies, and fewer than 20% of patients are considered to have resectable tumors at the time of diagnosis.[1] Given that most cholangiocarcinomas are unresectable, the goal of intervention is biliary decompression.[2] Jaundice, pruritis, secondary biliary cirrhosis, cholangitis, coagulopathy, and weight loss are consequences of obstruction.[1] Recent data have suggested that it is useful to drain more than 50% of the liver volume for favorable long-term results.[3] Metal stents (bare metal mesh) are usually preferred and carry the advantage of longer duration of patency compared with plastic stents.[4] There is controversy over unilateral versus bilateral stents in unresectable hilar biliary obstruction, as only a portion of the liver will be drained with a single stent.[2] Tumor ablation combined with stenting can reduce cholestasis and improve median survival time in patients with cholangiocarcinoma.[5] Photodynamic therapy (PDT) and, more recently, radiofrequency ablation (RFA), have been used as adjuvant therapies to improve results of biliary stenting.[3] Ultimately, endoscopic biliary drainage may enable patients to receive additional chemotherapy.[2]

PHOTODYNAMIC THERAPY

Photodynamic Therapy Technique

Preparation

Antibiotic prophylaxis should be given to patients with anticipated incomplete biliary drainage. There are multiple photosensitizing agents available for cholangiocarcinoma, with hematoporphyrin derivatives (eg, Photofrin II, Photosan-3) being the most commonly used.[1] This intravenous agent preferentially accumulates in cancer cells.[6] For instance, Porfimer sodium (Photofrin; Axcan Pharma Inc, Birmingham, AL), which is the only photosensitizer approved by the Food and Drug Administration (FDA), is injected intravenously at a dosage of 2 mg/kg body weight 48 hours before laser activation.[7] All the procedures are done under general anesthesia. Considerations before ablation therapy include assessing resectability or not, determination of atrophic segments, antibiotic prophylaxis, and patient education (**Box 1**).

Patient position/approach

Patients are placed in the prone or supine position. Endoscopic retrograde cholangiopancreatography (ERCP) is performed as a standard of care at the time of PDT.

Box 1
Considerations before ablation

- Resectable versus unresectable disease
  - Surgery is indicated for resectable disease
- Determine what area of the liver is atrophic and not draining
- Liver metastasis versus cholangiocarcinoma
  - Patients with liver metastasis are not candidates for photodynamic therapy (PDT)
- Antibiotic therapy is required for prevention of cholangitis
- Patients need to be educated about PDT side effects: photosensitivity

Data from Kahaleh M. Photodynamic therapy in cholangiocarcinoma. J Natl Compr Canc Netw 2012;10(Suppl 2):S44–7; with permission.