

Evaluation of high-dose-rate intraluminal brachytherapy by percutaneous transhepatic biliary drainage in the palliative management of malignant biliary obstruction—A pilot study

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ABSTRACT

PURPOSE: To evaluate the role of high-dose-rate intraluminal brachytherapy (ILBT) through percutaneous transhepatic biliary drainage (PTBD) in patients with malignant biliary obstruction, in terms of improvement in symptoms, quality of life (QOL), and survival.

METHODS AND MATERIALS: From August 2004 to October 2006, 18 patients aged 30–70 years, who were found unsuitable for surgical resection or were inoperable because of poor general condition, were taken up for palliative ILBT through PTBD. All patients underwent PTBD followed by internal–external drainage. After a gap of 1 week, high-dose-rate ILBT was performed by delivering a dose of 800 cGy prescribed at 1 cm from the central axis of the catheter. Two such sessions were given 1 week apart.

RESULTS: The mean fall in bilirubin was 11.37 mg% after PTBD and further 2.94 mg% after ILBT. The overall response rates were 100% and 80% for pruritus and icterus, respectively. Improvement in appetite and weight gain was seen in 93.3% and 86.7% patients, respectively, at last followup. The median followup and survival duration were 7.3 and 8.27 months, respectively. Actuarial survival at 6 months was 61.11%. Treatment-related major complications were not seen in any of the patients. QOL showed significant improvement in global health status and most functional and symptom scales.

CONCLUSIONS: This prospective pilot study demonstrated that PTBD followed by ILBT is a feasible procedure with good symptom control, definite impact on QOL, and minimal complications in such patients. A prospective randomized study is required to more accurately assess the benefit of ILBT compared with biliary drainage alone. © 2013 American Brachytherapy Society. Published by Elsevier Inc. All rights reserved.

Keywords:

Malignant biliary obstruction; High dose rate; Intraluminal brachytherapy; Percutaneous transhepatic biliary drainage; Quality of life

Introduction

Malignant obstruction of biliary tree can be caused by primary cholangiocarcinomas, local obstruction because of tumors of gall bladder or pancreas, or from metastatic disease to nodes at porta hepatis (1). At the time of diagnosis,

only 7–20% of these patients are suitable for radical surgical resection and have a median survival time approaching 17–20 months. Approximately 65–70% of malignant biliary obstruction patients with unresectable disease are severely disabled because of jaundice, intense pruritus, loss of appetite, loss of weight, acholic stools, painful hepatomegaly, change in bowel habits, nausea, vomiting, and coagulopathies. Such patients have a median survival time of 2.7 months if no further therapy is given (2, 3). In this setting, given a short life expectancy, the therapeutic goal is often palliation of symptoms with major emphasis on quality of life (QOL). This is possible by drainage of the biliary system surgically, radiologically, or endoscopically.

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Technically, endoscopic decompression of the biliary tree is easier to perform than percutaneous drainage, but the percutaneous access to the biliary tree radiologically (ultrasound or fluoroscopic guided) is preferred over the endoscopic implantation in obstruction localized to the liver hilum or intrahepatic obstruction with little attendant morbidity (3). Percutaneous transhepatic biliary drainage (PTBD) alone, either externally or by the placement of an endoprosthesis to allow internal drainage, is able to palliate many patients with malignant biliary obstruction, but the effects are often limited with a median survival time of 6 months as these procedures do not provide effective treatment for underlying malignancy.

Radiotherapy and chemotherapy have been tried for tumor mass reduction, but bile duct patency cannot be achieved with these methods alone. Hence, the idea of combination therapy using drainage procedures and radiotherapy has come up (4). Various studies have shown that after combining intraluminal brachytherapy (ILBT) with PTBD, median survival time improved when compared to that with the drainage procedures alone (5–7). Also, ILBT is easier to perform through PTBD, and treatment can be safely adapted for lesions in right and left hepatic as well as common bile ducts. The primary objective was to reduce tumor stenosis and retard or avoid a renewed obstruction of the catheter by tumor ingrowth (3). Herein, we report our experience with high-dose-rate (HDR) ILBT through PTBD and its feasibility, safety, and efficacy in improving the symptoms, QOL, and survival in patients with inoperable malignant biliary obstruction.

Methods and materials

Eligibility

Between August 2004 and October 2006 (study period, 27 months), 18 patients with malignant biliary obstruction because of inoperable tumors of the bile duct, pancreas, and gall bladder; or metastasis to the nodes at porta hepatis, with histopathologic proof of malignancy as adenocarcinoma; and no previous history of surgical drainage procedure or treatment with chemotherapy or radiotherapy were treated with HDR-ILBT through PTBD. Patients with uncorrectable coagulopathies, multiple strictures, and stricture at the confluence of bile ducts were excluded from the study. Institutional ethical committee clearance was obtained before the commencement of the study, and written informed consent was taken from all patients before the procedure for the treatment.

Patient characteristics

Patient characteristics are presented in Table 1. Carcinoma gall bladder with nodes at porta hepatis was the most common cause of malignant biliary obstruction. At presentation, patients had main symptoms of jaundice, pruritus,

Table 1
Patient characteristics and laboratory findings

Patient characteristics	Number of patients (n = 18)
Sex	
Males (%)	11 (61.1)
Females (%)	7 (38.9)
Age (y)	
Median	46
Range	30–70
Cause of malignant biliary obstruction	
Carcinoma gall bladder with nodes at porta hepatis	10
Cholangiocarcinoma	3
Periampullary carcinoma	3
Carcinoma gall bladder	2
Laboratory findings	
• Serum bilirubin levels (before PTBD; mg/dL)	18.05 (7–31)
• Serum Alkaline Phosphatase levels (before PTBD; KAU)	43 (12–76)

PTBD = percutaneous transhepatic biliary drainage.

abdominal pain, weight loss, and loss of appetite. All patients had a Stage IV disease with elevated liver enzymes and serum bilirubin levels (Table 1).

Methodology

Each patient underwent a thorough evaluation, including history taking, complete general physical examination, and detailed systemic examination. Baseline investigative workup included complete hemogram, kidney function tests, assessment of liver function by the measurement of serum bilirubin and liver enzymes (serum transaminases and alkaline phosphatase) levels, coagulation profile, and chest X-ray. Histologic proof of malignancy was obtained in all the patients by ultrasound or CT-guided fine-needle aspiration cytology, and it revealed the presence of adenocarcinoma in all the patients. To evaluate the dilatation of intrahepatic biliary radicles and suitability for PTBD, ultrasound of the abdomen was done. CT or MRI scan of the abdomen was also done before PTBD to know the exact extent and site of obstruction by the tumor and assess the locoregional spread of tumor.

PTBD was done using combined ultrasound and fluoroscopic guidance, under the cover of antibiotics. The ductal approach in PTBD was left sided in 8 and right sided in 6 patients. Four patients with isolated biliary radicles dilatation underwent bilateral PTBD. After decompression of the biliary tree for 48–72 h, internal–external drainage was instituted (Figs. 1a and 1b). An interval of 7–10 days was given to enable the serum bilirubin levels to decrease and for improvement in the patient's general condition. The status of biochemical parameters (serum bilirubin and serum alkaline phosphatase) and symptoms including pruritus, weight loss, jaundice, color of stools, and anorexia was again documented.

PTBD gram was then performed; and under fluoroscopy, stricture was localized relative to bony landmarks and its

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