Safety and Feasibility of Same-day Discharge of Patients with Unresectable Hepatocellular Carcinoma Treated with Doxorubicin Drug-eluting Bead Transcatheter Chemoembolization

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ABSTRACT

Purpose: The aim of this study was to investigate the safety and feasibility of same-day discharge of patients with unresectable hepatocellular carcinoma (HCC) after doxorubicin drug-eluting bead (DEB) transarterial chemoembolization and to elucidate the factors predisposing to overnight admission.

Materials and Methods: Consecutive patients with unresectable HCC who underwent superselective 100–300 μm DEB transarterial chemoembolization were included. The parameters of same-day therapy (group A) were compared with those of patients admitted overnight (group B). A $\chi 2$ test and a t test were used to compare categorical and continuous variables accordingly.

Results: Seventy-six patients (mean, 61 y) received 110 DEB transarterial chemoembolization treatments over an 8-month study period. In 84.5% (93/110) of DEB transarterial chemoembolization procedures, the patients were discharged on the same day (group A). The causes of hospitalization included the worsening of comorbidities in 41.1% (7/17), pain control in 29.4% (5/17), and groin and closure device–related complications in 29.4% (5/17) of patients. The mean Charlson comorbidity scores in groups A and B were 6.96 (standard deviation [SD] $\pm$ 1.98) and 8.47 (SD $\pm$ 2.18) ($P = .0005$), respectively. All of the patients in group B had Barcelona Clinic Liver Cancer (BCLC) stages C and D HCC ($P = .024$). There were no Common Terminology Criteria for Adverse Events (CTCAE) grade III or worse adverse events (AEs). There was no mortality or emergency visits within 30 days of discharge.

Conclusions: Same-day discharge after superselective DEB transarterial chemoembolization for unresectable HCC is safe and feasible. BCLC C or D stage of disease, a higher Charlson comorbidity score, and groin or closure device complications are correlated with a greater likelihood for overnight admission.

ABBREVIATIONS

AE = adverse event, BCLC = Barcelona Clinic Liver Cancer, CLIP = Cancer of the Italian Liver Program, DEB = drug-eluting bead, ECOG = Eastern Cooperative Oncology Group, HCC = hepatocellular carcinoma, NCI CTCAE = National Cancer Institute Common Terminology Criteria for Adverse Events, PES = postembolization syndrome, PS = performance status, PVT = portal vein thrombosis, SD = standard deviation, TAE = transarterial embolization

Conventional transarterial chemoembolization provides a survival advantage for patients with unresectable hepatocellular carcinoma (HCC) when compared with the best supportive care (1,2). Immediately after the procedure, there is a decrease in vitality. Conventional transarterial chemoembolization can be associated with postembolization syndrome (PES), which consists of transient abdominal pain, nausea, vomiting, and fever. PES, for which hospitalization is necessary, can occur in 60%–80% of patients immediately after conventional transarterial chemoembolization (3,4). Most centers in which conventional transarterial chemoembolization is performed admit their patients

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Figure E1 and Tables E1 and E2 are available online at *www.jvir.org*.

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for at least 1 day for symptomatic treatment of PES (5,6). Prolonged hospitalization can be required to treat intense symptoms after embolization (5,7).

Doxorubicin drug-eluting bead (DEB) transarterial chemoembolization is a widely accepted recent locoregional treatment for HCC. Randomized, controlled DEB transarterial chemoembolization studies, using particles 300–500 μm and 500–700 μm in size, have shown improved tolerability, with significant reductions in liver toxicity and side effects compared with conventional transarterial chemoembolization (8,9). Little is known about the feasibility and safety of a same-day discharge of patients with unresectable HCC after DEB transarterial chemoembolization. The purposes of this study were to assess the safety and feasibility of a same-day discharge of patients with unresectable HCC after superselective 100–300 μm DEB transarterial chemoembolization and to elucidate the factors that necessitate overnight admission after DEB transarterial chemoembolization procedures.

MATERIALS AND METHODS

This was a single-institution prospective study (the clinical trial number is NCT0153999, registered on the www.clinicaltrials.gov website), approved by the local institutional review board, and was compliant with the Health Insurance Portability and Accountability Act. Informed consent was obtained from all of the patients.

Patient Selection and Outpatient Treatment Protocol

Seventy-six consecutive patients with unresectable HCC who were scheduled for doxorubicin DEB transarterial chemoembolization on an outpatient basis from November 2009 to June 2010 were included in this study. All of the patients had initial evaluations in outpatient clinics, and the pertinent medical and physical evaluations, laboratory data, and imaging studies were reviewed in detail. The functional liver status was determined by using the Child-Pugh criteria. The eligibility criteria included patients with HCC that was unsuitable for resection, transplantation, or radiofrequency ablation and tumors occupying less than 50% of the liver parenchyma. The outpatient DEB transarterial chemoembolization treatment protocol is shown in **Fig E1** (available online at *www.jvir.org*).

All of the patients were followed according to the protocol, and the complications that ensued during DEB transarterial chemoembolization were assessed. The patients who fulfilled the criteria for overnight hospital admission were admitted; otherwise, the patients were discharged on the same day. The overnight hospital admission criteria were as follows: (*a*) a pain score greater than 7 3 hours after the procedure, (*b*) a palpable groin hematoma within 3 hours after the procedure, (*c*) failure of deployment of the arterial closure device, (*d*) uncontrolled nausea/vomiting within the initial 3 hours of the recovery period, even after an intravenous dose of 4 mg ondansetron (Zofran; GlaxoSmithKline) (*e*) persistent fever of 38.3°C (101°F) or higher within the initial 3 hours of the recovery period, and (*f*) associated worsening of comorbid conditions, such as uncontrolled blood pressure or heart rate and diabetes mellitus. The parameters were compared between the patients who were discharged on the same day (group A) and the patients who were admitted overnight (group B). The parameters included the pain scores, Eastern Cooperative Oncology Group (ECOG) performance status (PS), tumor burden, Child-Pugh class, Okuda and Cancer of the Italian Liver Program (CLIP) staging, Barcelona Clinic Liver Cancer (BCLC) score, age-adjusted Charlson comorbidity index score, mortality within 30 and 90 days, and complications. The Charlson index (10) method was used to assess the effects of comorbidities.

Table 1. Medication Regimen before the Procedure and Discharge Medication

Preprocedural intravenous medications
50 mg diphenhydramine (Benadryl, McNeil Healthcare, Fort Washington, Pennsylvania)
1 g cefazolin (Ancef, GlaxoSmithKline, Triangle Park, North Carolina)
500 mg metronidazole (Flagyl, Pfizer, Collegeville, Pennsylvania)
4 mg ondansetron (Zofran, GlaxoSmithKline)
Alternative medication for the Ancef or for patient allergic to penicillin
500 mg intravenous levofloxacin (Levaquin, Ortho-McNeil-Janssen Pharmaceuticals, Inc, Raritan, New Jersey)
Discharge oral medications
Oxycodone 5 mg PO prn for pain every 4 h
Promethazine (Phenergan, Baxter Healthcare Corp, Deerfield, Illinois) 20 mg PO prn for nausea and vomiting
Docusate (Colace, Purdue Pharma LP, Stamford, Connecticut) 100 mg PO BID for constipation
Ciprofloxacin 500 mg BID for 7 days to prevent infection

BID = twice daily, PO = by mouth, prn = as necessary.

Procedure Details

On arrival for DEB transarterial chemoembolization on an outpatient basis, all of the patients (except the patients with congestive heart failure, moderate to severe ascites, and pleural effusion) were hydrated with normal intravenous saline. Three patients with congestive heart failure, three patients with moderate to severe ascites, and one patient with pleural effusion were not hydrated. The medication regimen used before the procedure is provided in **Table 1**.

All of the therapies were performed with moderate sedation and analgesia. Doses of 0.5–4 mg midazolam (Versed, Roche Laboratories, Genentech, South San Fran-