

# Transradial Versus Transfemoral Arterial Access in Liver Cancer Embolization: Randomized Trial to Assess Patient Satisfaction

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## ABSTRACT

**Purpose:** To determine whether transradial access (TRA) or transfemoral access (TFA) provides better patient satisfaction during intra-arterial therapy (IAT) for liver cancer.

**Materials and Methods:** This randomized, prospective, intra- and interpatient controlled trial compared TRA vs TFA accesses in patients with primary or metastatic liver cancer undergoing IAT. After having one of each type of access (1 TRA and 1 TFA), all patients selected their preferred access regardless of whether a third intervention was indicated. The primary endpoint was patient access preference; secondary endpoints were access-related complications, procedure time, contrast agent volume, and radiation doses to the patient and operator. Patients were evaluated on postprocedure days 1 and 30.

**Results:** Fifty-five patients with liver cancer (31 hepatocellular carcinoma, 24 metastatic disease) were enrolled, and 124 IAT procedures were performed. A total of 36 patients underwent at least 1 intervention each with TRA and TFA. Of those, 29 patients (81%) preferred TRA and 7 (19%) preferred TFA (ratio, 4:1;  $P < .001$ ). Median radiation exposure to the operator was significantly lower for TRA (5.5 mrem) vs TFA (13 mrem;  $P = .01$ ). Incidences of complications, procedure time, contrast agent volume, and radiation exposure to patients were similar between groups.

**Conclusions:** TRA was the preferred access for the majority of patients and was associated with less radiation exposure to the operator. No differences were detected in incidence of adverse events, procedure time, contrast agent volume, or patient radiation exposure.

## ABBREVIATIONS

HCC = hepatocellular carcinoma, IAT = intra-arterial therapy, TFA = transfemoral access, TRA = transradial access

Transradial access (TRA) has been used in cardiology interventions for the past three decades (1). Recent studies in cardiology (2–6) present strong evidence favoring TRA versus transfemoral access (TFA), such as lower morbidity and mortality rates, shorter hospital admission, and a superior cost/benefit profile. Patient preference and quality

of life were addressed in a randomized trial (7) favoring TRA over TFA during cardiac catheterization (87% of patients preferred TRA).

Shiozawa et al (8) were the first to retrospectively compare TRA with TFA in hepatic intra-arterial therapy (IAT), and demonstrated comparable efficacy (98.3%

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technical success with TRA). Although patient preference regarding access site was not addressed in a randomized, prospective fashion, preference for TRA in patients who had both accesses was reported, and there was a lower incidence of complications with TRA (4.5%) than with TFA (12.7%) (8). Recently, a large prospective cohort of more than 1,500 cases of noncoronary interventions via TRA confirmed the feasibility and safety of this approach, with a 98.2% technical success rate and an overall complication rate of less than 3% (9). Among the cases analyzed, 485 were transarterial chemoembolization procedures, confirming increasing use of this approach to perform IAT for liver malignancies.

The purpose of the present study was to define patient preference regarding arterial access for hepatic IAT and other potential benefits of TRA over TFA, including complication rate, procedure time, contrast media volume, and radiation exposures to the patient and operator, in a randomized controlled trial.

## MATERIALS AND METHODS

### Inclusion and Exclusion Criteria and Preoperative Assessment

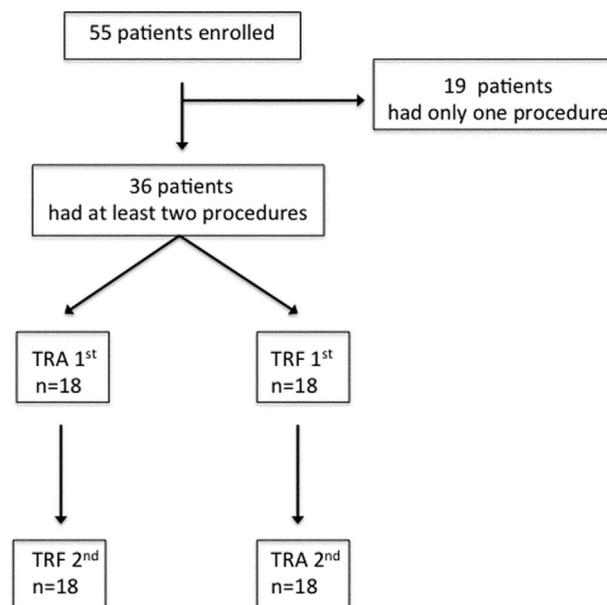
This study was a randomized prospective trial with intra- and interpatient controls approved by the institutional review board (protocol ID code NCT 03163186). Inclusion criteria were age > 18 years; performance status 0/1; radial artery with anteroposterior diameter  $\geq 2$  mm; type A, B, or C waveforms on Barbeau test; and diagnosis of primary or metastatic liver neoplasm amenable to transarterial bland embolization or chemoembolization. Patients were diagnosed with hepatocellular carcinoma (HCC) or metastatic neuroendocrine cancer. Patients were enrolled with the expectation of undergoing at least two of the three planned IAT procedures to obtain local tumor control. The Barbeau test was performed by using a pulse oximeter on the left second digit (10). Anteroposterior, inner wall-to-inner wall diameter of the radial artery was measured within 2 cm proximally from the styloid process under ultrasound (US) visualization.

Exclusion criteria were type D waveform on Barbeau test, radial artery anteroposterior diameter < 2 mm, history of stroke, presence of a heavily calcified aortic arch, and requirement for additional procedures during hospitalization.

A total of 55 patients with primary or metastatic hepatic tumors were enrolled. A total of 124 procedures were performed, and 36 patients underwent at least two procedures, one with TRA and one with TFA. Nineteen patients had only one procedure and were therefore not included in the access preference analysis (Fig 1). Demographic characteristics of the 36 patients who had at least two procedures are presented in Table 1.

### Randomization

The randomization process is demonstrated in Figure 2. Patients were randomly assigned by the study coordinator



**Figure 1.** Flowchart illustrating patient enrollment and allocation during the study.

**Table 1.** Demographic Data

Characteristic	Value
Sex	
Male	28 (77.8)
Female	8 (22.2)
Race	
White	26 (72.2)
Black	10 (27.8)
Tumor	
HCC	29 (80.5)
Neuroendocrine	7 (19.5)
Age (y)	
Mean	62.81
SD	6.81

Note—Values in parentheses are percentages.

HCC = hepatocellular carcinoma; SD = standard deviation.

to undergo the initial procedure via TRA or TFA. The second procedure was performed via the alternate access by default, ie, if the patient had a TRA first, it was mandatory that the second procedure be performed via TFA, or vice-versa. Randomization was constrained to ensure equal numbers of patients in each arm and that each physician treated the same number of patients in each arm. There were two primary operators. The study design was counterbalanced so that 50% of patients underwent TFA first and 50% underwent TRA first.

### Hepatic Arterial Embolization Techniques

**Femoral access.** —Percutaneous access to the right common femoral artery was obtained under US guidance with a micropuncture kit (Cook, Bloomington, Indiana). A 5-F

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