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Clinical practice in radioembolization of hepatic malignancies: A survey among interventional centers in Europe

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ABSTRACT

Objectives: A survey was conducted to give an overview about the practice of radioembolization in malignant liver tumors by European centers.
Methods: A questionnaire of 23 questions about the interventional center, preinterventional patient evaluation, the radioembolization procedure and aftercare were sent to 45 European centers.
Results: The response rate was 62.2% (28/45). The centers performed 1000 (median = 26) radioembolizations in 2009 and 1292 (median = 40) in 2010. Most centers perform preinterventional evaluation and radioembolization on an inpatient basis. An arterioportal shunt not amendable to preinterventional embolization is considered a contraindication. During preinterventional angiography, the gastroduodenal artery is embolized by 71%, the right gastric artery by 59%, and the cystic artery by 41%. In case of bilobar disease, yttrium-90 microspheres are infused into the common hepatic artery (14%) or separately into left and right hepatic artery (86%). 33% prefer a time interval between right and left liver lobe radioembolization to prevent radiation induced liver disease. 43% of the respondents do not prescribe prophylactic medication after radioembolization. In case of iatrogenic manipulation to the biliary duct system most centers perform radioembolization with prophylactic antibiotics.
Conclusions: Despite standardization of the procedure, there are some differences in how radioembolization of liver tumors is performed in Europe.

1. Introduction

Radioembolization (RE) or selective internal radiation therapy (SIRT) is a new form of embolizing particle brachytherapy for treating primary and secondary liver malignancies [1]. RE is performed by transarterial administration of embolic radioactive particles for selectively depositing a high tumoricidal radiation dose in the target lesion, which is preferably supplied by arterial blood, while maximally sparing normal liver parenchyma, which is mostly supplied through the portal vein. Commercially two different microspheres for yttrium-90 RE are available: glass Y-90 microspheres (TheraSpheres®, MDS Nordion, Kantana, Canada), and resin Y-90 microspheres (SIR-Spheres®, SIRTEX Medical, Lane Cove, Australia). Both have the approval of the Food and Drug Administration (FDA) and European Authorities for treatment of primary (hepatocellular (HCC) and cholangiocarcinoma (CC)) and secondary hepatic malignancies (metastasis). Although one may assume that standardization of the logistic and technical procedure before, during, and after radioembolization has reached a high level by now [2], the complexity of the procedure has probably given rise to some differences as well. Modifications of therapeutic procedures can be expected to arise from different clinical experiences and attitudes of the interventional radiologists performing RE, the therapeutic focus of the center offering the procedure, and the legal or regional framework. To identify, analyze, and discuss such differences, we developed a questionnaire to collect data on how hepatic RE is performed in Europe. The questions relate to four issues: the center performing the intervention, preinterventional patient evaluation, the RE procedure itself, and patient aftercare. The questionnaire was sent to 45 interventional radiology centers in Europe. Here we present the results of our analysis of a total of 28 (62.2%) questionnaires that were completed and returned.

2. Materials and methods

2.1. The questionnaire

The questionnaire consists of a total of 23 questions on how RE is performed, covering the clinical procedure from preinterventional patient evaluation to aftercare (Table 1). The first set of questions

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Table 1
Short version of the questionnaire.

	Questions	Answers
	1: Questions concerning the department	
1	How many REs were performed at your department in…	2009: …… and 2010: ……
2	What are the most common indications for hepatic Radioembolization at your department (fill in 1, 2 or 3 in order of frequency)?	Hepatocellular carcinoma/ Cholangiocarcinoma/ Colorectal carcinoma metastasis/ Breast cancer metastasis/ Neuroendocrine tumor metastasis/ other
3	Which kind of microspheres do you use for Radioembolization?	SIR-Spheres/ TheraSpheres/ other
	2: Patient evaluation	
4	What is the common imagining modality you use for pretreatment staging?	CT/ MRI/ PET/ PET – CT
5	In cases of special conditions, which patients do you ex- or include for RE? Patients with… -Biliodigestive Anastomosis/ Biliary stenting/ Biliary drainage/ Condition after papillotomy	contraindication yes/no if not, prophylactic antibiotics? other protection?
	-Arterio-portal shunt	contraindication yes/no if not, previous embolization?
	-Previous bland or chemo-embolization/ Complete portal vein thrombosis/ Lobar portal vein thrombosis	contraindication yes/no/ according to circumstances
6	When do you consider lung shunting as contraindication?	shunt volume >___%/ radiation dose >___Gy/ other
7	How many patients do you exclude due to increased lung shunting?	____%
8	Do you evaluate your patients for radioembolization as…	in- (□) or out-(□) patients?
9	Which arteries do you embolize during diagnostic angiography? -Gastroduodenal artery (GDA) with antegrade flow/ retrograde flow -Right gastric artery -Cystic artery	always (if detectable)/never/sometimes
10	Accessory/Replaced hepatic arteries -Left hepathic artery derive from left gastric artery -Right hepatic artery derive from the superior mesenteric artery	contraindication/ no contraindication after deep catheter placement
	3: Patient treatment (application of spheres)	
11	Do you treat your patients as…	in- (□) or out-(□) patients?
12	Treatment premedication	Steroides/ Opioid/ NSAID/ Paracetamol/ Metamizole/ Antiemetics/ Proton-pump inhibitor/ other
13	What kind of catheter do you use for the application of spheres?	diagnostic catheter 4F/5F/microcatheter 2,5-3F
14	Have you ever seen vasospasm during the application of spheres?	yes/no
15	Do you give prophylactic medication to prevent vasospasm?	no/yes …….i.a.□ i.v.□
16	How do you treat vasospasm in case of appearance?	Arterial injection of lidocaine/ glyceryl trinitrate/ prostaglandin/ Verapamil
17	What is your preferred sphere application technique in case of bilobar manifestation of tumor?	Bilobar infusion in a single session via common hepatic artery or sequential microcatheter intubation of left and right hepatic artery or sequential right/left radioembolisation with a time gap of ……. weeks
18	What is your preferred infusion technique?	Sequential/ Sandwich technique with contrast medium (Coldwell)
19	How long is usually the time gap between chemotherapy offset/onset and Radioembolization for…	Bevacizumab/ Sorafenib/ FOLFOX/ FOLFIRI/ other
	4: Patient aftercare	
20	Where do your patients stay after spheres application?	nuclear ward/ standard ward/ out-patient
21	Post-interventional medication?	……weeks..…
22	When is the first radiological follow up after Radioembolization?	weeks……
23	What is the common imagining modality you use for radiological follow up?	CT/MRI/PET/PET – CT