LEARNING OBJECTIVES

1) List 2 important recent publications in interventional oncology.
2) Explain the mechanism of one complication related to thermal ablation.
3) Describe 1 pitfall of radioembolization.
4) Outline 3 complications in combination therapy for hepatocellular carcinoma.
5) List three complications of chemo-embolization.
6) Describe rationale for and against training programs in interventional oncology.

Effect of Intra-Arterial Therapies to Treat Liver Cancer on Portal Hypertension: Non-Invasive Assessment of Surrogate Markers of Portal Venous Pressure

Rafael Duran MD (Presenter): Nothing to Disclose, Julius Chapiro MD: Nothing to Disclose, Ahmet Bas MD: Nothing to Disclose, MingDe Lin PhD: Employee, Koninklijke Philips NV, Ruediger Egbert Schernthaner MD: Nothing to Disclose, Jae Ho Sohn MS: Nothing to Disclose, Gayane Yenokyan PhD: Nothing to Disclose, Jean-Francois H. Geschwind MD: Consultant, BTG International Ltd Consultant, Bayer AG Consultant, Guerbet SA Consultant, Nordion, Inc Grant, BTG International Ltd Grant, F. Hoffmann-La Roche Ltd Grant, Bayer AG Grant, Koninklijke Philips NV Grant, Nordion, Inc Grant, ContextVision AB Grant, CeloNova BioSciences, Inc Founder, PreScience Labs, LLC CEO, PreScience Labs, LLC

PURPOSE

Theoretically intra-arterial therapies (IATs) are mainly targeting tumor tissue. However, part of the payload is inevitably delivered to non-tumoral liver tissue, thus potentially causing damage over time which in return may influence the portal venous pressure (PVP). The aim of this study was to investigate potential effects of IATs on PVP using non-invasive surrogate markers of portal hypertension.

METHOD AND MATERIALS

This retrospective analysis included 107 patients (57 in hepatocellular carcinoma (HCC) group and 50 in metastatic group) who underwent IATs and had longitudinal pre-/post- therapy contrast-enhanced (ce)MRI as well as blood work follow-up. Porto-systemic shunts, ascites, and vascular invasion were evaluated on MRI. In addition, splenic volumes were measured on portal-venous-phase ceMRI. Platelet count (PC; in 10^9/L) and liver function were evaluated. Generalized linear mixed effects models with random intercept for patient and random slope for time trajectory were used to assess associations between IAT and the outcomes adjusting for potential confounders and accounting for the longitudinal nature of the data.

RESULTS

A total of 291 IAT procedures (230 cTACE, 47 DEB-TACE and 14 Y90 radioembolization) were performed. Spleen volume showed a linear increase with additional IAT sessions by on average of 17 cm^3/session (95%CI:7-27, p< .0001) after controlling for IAT method, diagnosis, spleen volume and ascites status at baseline. Patients treated with cTACE or DEB-TACE showed an association with a higher PC as compared to Y90 radioembolization, with values of 51 (P=.02) and 75 (p=.005) units above radioembolization, respectively. There was no statistically significant difference in PC between cTACE and DEB-TACE. PC showed a decrease with each additional IAT session by 12 units (95%CI:3-20, p=.008) after controlling for IAT method, diagnosis and PC at baseline.

CONCLUSION

Preliminary results indicate that those IATs with larger embolic effects (cTACE/DEB-TACE) lead to a larger increase of PVP and higher PC over time as compared to procedures with less embolic effect (Y90).

CLINICAL RELEVANCE/APPLICATION

IATs seemed to increase PVP over time however with low complications-rate related to increased portal hypertension.
Safety of Radioembolization with 90Yttrium-microspheres Depending on Coiling or No-coiling of Aberrant/High-risk Vessels


PURPOSE

To evaluate the safety of radioembolization with 90Yttrium-microspheres depending on coiling or no-coiling of aberrant/high-risk vessels.

METHOD AND MATERIALS

The early and late toxicities of 566 radioembolization procedures were retrospectively analyzed according to the National Cancer Institute's Common Terminology Criteria for Adverse Events (CTCAE v3.0). In 240 procedures the aberrant vessels were coiled prior to radioembolization and in 326 procedures we chose a more peripheral position to treat the right or left liver lobe.

RESULTS

According to the CTCAE criteria clinical relevant late toxicities (= Grade 3) could only be observed in 1% of our patients. Furthermore our statistical analysis showed significant less "any" (p=0.0001) and "clinical relevant" (p=0.0003) early complications for no-coiling. There was no significant difference (p > 0.05) in delayed toxicities depending on actually recommended coiling of aberrant/high-risk vessels prior to treatment in comparison to choosing a peripheral treatment position. No radiation induced liver disease was noted in 566 procedures.

CONCLUSION

Radioembolization with 90Yttrium-microspheres is a safe and effective treatment option. Performing of radioembolization without coiling aberrant vessels prior to treatment could be an alternative option for experienced centers.

CLINICAL RELEVANCE/APPLICATION

Our findings could lead to a change of the pre-interventional radioembolization work-up.

Evaluation for Radioembolization in HCC: CT Predictors for High Hepatopulmonary Shunt Fractions and Changes Following Sorafenib Therapy


PURPOSE

A high hepatopulmonary shunt (HPS) fraction might represent a contraindication for Yttrium 90 radioembolization (RE) in patients with unresectable hepatocellular carcinoma (HCC). The protein kinase inhibitor sorafenib has been shown to possibly reduce the HPS in selected cases. Our aim was to assess if CT predictors for a high HPS exist and if these show changes after sorafenib therapy.

METHOD AND MATERIALS

CT images of 70 HCC patients (mean age 69.8y; 60m, 10w) scheduled for MAA scan were retrospectively evaluated by two radiologists in consensus. Two groups of patients matched for age and gender were evaluated: (a) increased HPS (>15%, n=35), (b) low HPS (≤15%, n=35).

RESULTS

In 16/35 patients with high HPS, early (arterial) enhancement of intrahepatic veins and/or tumor infiltration of liver veins could be appreciated; 9 more patients showed compressed/shifted liver veins. Very high HPS (>20%) was associated with early venous enhancement (n=9) more frequently than high HPS (15-20%; n=2). Patients with low HPS did not show these signs. Portal vein thrombosis occurred more often with high HPS (n=21) compared to low HPS (n=9). All other aspects occurred in both groups independent of HPS. Eight patients with high HPS received sorafenib in the aftermath, reducing early (arterial) enhancement of liver veins and/or enhancement of tumor parts infiltrating liver veins in 8/8 cases; additionally a reduction of the HPS in 7/8 cases allowed for Yttrium 90 therapy.

CONCLUSION

High hepatopulmonary shunts are associated with CT predictors which may be alleviated after sorafenib therapy in selected cases. Early (arterial) enhancement of liver veins is strongly related to very high hepatopulmonary shunts.

CLINICAL RELEVANCE/APPLICATION

Patients with increased risk for a high hepatopulmonary shunt might be identified in CT and could be pre-treated with sorafenib prior to the first MAA scan to prevent repetitive angiographies.

Comparative Study Evaluating Pain after Hepatectomy, Percutaneous Radiofrequency and Percutaneous Microwave Ablation in Patients with HCC or Metastatic Hepatic Lesions

Georgios Velonakis MD (Presenter): Nothing to Disclose, Dimitrios Filippaidis MD, PhD: Nothing to Disclose, Maria Alkiviades Mademli MD: Nothing to Disclose, Katerina Malagari: Nothing to Disclose, Alexis Keleki MD, PhD: Consultant, Benvenue Medical, Inc, Nikolaos L. Paprottka: Nothing to Disclose

PURPOSE

Nothing to Disclose

Nothing to Disclose

Nothing to Disclose

Nothing to Disclose

Nothing to Disclose

Nothing to Disclose
PURPOSE
To evaluate and compare post treatment pain in patients with HCC or metastatic liver lesions treated with surgery, percutaneous radiofrequency, or percutaneous microwave ablation.

METHOD AND MATERIALS
During 2 years, 103 patients treated for HCC or metastatic liver lesions were divided in three groups. 37 patients (Group A) underwent surgical operation (partial hepatectomy), 32 patients (Group B) underwent Computed Tomography (CT)-guided radiofrequency ablation (Leveen needle Radiofrequency electrode 5.0) and 34 patients (Group C) underwent CT-guided microwave ablation (16G Microwave probe). In Groups B and C ablation was performed under conscious sedation. Numeric Visual Scale questionnaire for pain was used to evaluate pain daily during follow-up. The required analgesics (type and dose) for all patients were recorded.

RESULTS
Mean pain duration post treatment was 10.76±2.80 days in Group A, 1.34±0.75 in Group B and 1.41±0.74 in Group C. Differences in mean pain duration between surgery and microwave ablation were 9.41 and 9.35 days respectively. These differences were statistically significant (p<0.001). There was no statistically significant difference in pain duration between Groups B and C. Mean pain scores in Group A were 7.68±0.884 NVS units in day 1, 7.43±0.929 in day 2, 6.97±1.118 in day 3 and 6.35±1.086 NVS units in day 4. The respective pain scores in Group B were 1.66±1.894 in day 1, 0.66±0.865 in day 2, 0.03±0.177 in day 3 and 0 in day 4. In Group C mean pain scores were 1.97±1.838 NVS units in Day1, 0.62±0.817 in Day 2, 0.03±0.172 in day 3 and 0 in day 4. Differences in mean pain scores were statistically significant between surgery and percutaneous treatment for each of the 4 first days (p<0.001), but there was no statistically significant difference between radiofrequency and microwave ablation. No clinically significant complications were noticed.

CONCLUSION
Pain is an important complication post hepatic resection. Both image-guided percutaneous microwave ablation and radiofrequency ablation seem to be correlated with clinically insignificant pain post treatment as opposed to hepatectomy.

CLINICAL RELEVANCE/APPLICATION
Image guided percutaneous microwave ablation and radiofrequency ablation of HCC or metastatic liver lesions are correlated with minimal pain, and they can be easily tolerated even if repeated sessions are required.
LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

Combination therapy utilizing both transarterial chemoembolization and thermal ablation will be discussed with an emphasis on complications. Different techniques of TACE will be shown, in combination with either radiofrequency ablation or microwave ablation. Management of complications will also be discussed.

Evaluation of an Experimental Thermoprotective Gel for Hydrodissection during Percutaneous Microwave Ablation: In Vivo Results


PURPOSE

Hydrodissection is an important technique to protect non-target structures during thermal ablation, but is hampered by the mobility of injected fluid. This study evaluated whether a thermoreversible poloxamer P407 (liquid at room temperature, gel at body temperature) can protect the diaphragm, body wall, and bowel adjacent to large microwave (MW) ablation zones in a porcine model.

METHOD AND MATERIALS

P407 was prepared in a 15.4% solution with 2% iohexol. Antennas were placed percutaneously into extremely superficial liver, spleen, or kidney (target tissues) under US and CT guidance in 5 pigs under general anesthesia such that the expected ablation zones would extend into adjacent diaphragm, body wall, or bowel (non-target tissues). For experimental ablations, P407 was injected into the potential space between target and non-target tissues, and presence of a gel barrier was verified on CT. No barrier was used for controls. MW ablation was performed using a single antenna at 65W for 5 minutes. Gross dissection was performed after sacrifice to inspect tissues for thermal damage, which was verified using a histologic viability stain.

RESULTS

Antennas were placed 7 ± 3 mm from the organ surface for both control and gel-protected ablations (p<0.05). The volume of gel deployed was 49 ± 27 ml, resulting in a barrier with a thickness of 0.75 ± 0.48 cm. Ablations extended into non-target tissues in 12/14 control ablations with a mean non-target tissue burn of 3.8 cm², but only 4/14 gel-protected ablations with a mean non-target tissue burn of 0.2 cm² (p<0.05). The gel stayed at the injection site throughout power delivery, with interval resorption of gel and accumulation of contrast in the bladder by 2.5h post-procedure.

CONCLUSION

In this extreme scenario, P407 demonstrates viability as a tool for percutaneous tissue hydrodissection, as well as efficacy in protection of non-target structures during microwave ablation.

CLINICAL RELEVANCE/APPLICATION

As a thermoreversible poloxamer being explored for many novel medical applications, P407 exhibits potential utility in percutaneous tissue hydrodissection, effectiveness in thermoprotection during microwave ablation, and ability for maintenance at the injection site for the duration of power application. Further comparison of P407 to existing hydrodissection fluids and continued investigations into pharmacologic properties appear warranted.

Percutaneous Ultrasound Guided Irreversible Electroporation in Locally Advanced Pancreatic Cancer: Short Term Complications

Anders K. Nilsson MD, PhD (Presenter): Nothing to Disclose, Christoffer Mansson MD: Nothing to Disclose, Brittmarie Karlson MD, PhD: Nothing to Disclose

PURPOSE

To determine if irreversible electroporation (IRE) can be used in patients with locally advanced pancreatic cancer without too many serious adverse effects.

METHOD AND MATERIALS

Between October 2011 and January 2014, 42 patients with locally advanced pancreatic cancer were treated with IRE, the primary goal being a locally complete ablation. All patients were discussed at a multidisciplinary conference and were determined to be unsuitable for surgery due to extensive vessel involvement and/or liver metastases. 3-6 IRE needles were placed in and around the tumour with distances not exceeding 20 mm. Ablations were performed until 90 pulses had been delivered between each relevant needle pair with a current of at least 30A. The aim was to create an ablation zone with a diameter of 4-5 cm. Clinical, laboratory and imaging data were recorded to detect complications.

RESULTS

Out of the 42 included patients, 27 no serious adverse effects. More serious complications occurs in
15 patients (33%) and included duodenal perforation (1), bile duct perforation (1), bleeding (2), portal vein thrombosis (2) and pain requiring more than basic pain relief and diarrhea (8). 1 patient developed a jaundice after the procedure and died during the subsequent ERCP.

CONCLUSION

Ultrasound guided percutaneous IRE ablations can be used in an attempt to achieve local tumour control in patients with locally advanced pancreatic cancer. The procedure offers a reasonable alternative when surgery is not possible but has a significant complication rate. The complications seem to be due to both the needle placement and the actual ablation.

CLINICAL RELEVANCE/APPLICATION

IRE ablation in the region of the pancreatic head is possible without damage to vessels and other vulnerable structures and can therefore be attempted when surgery is not possible. Furthermore, as ablations in this area will affect arteries and veins as well as nerves, bile ducts, bowel walls and pancreatic tissue, it can be seen as an indication that IRE can be used in other areas inaccessible to thermal ablations.

VSIR31-12 Tumor Board—Each Panelist Brings One Case for Discussion

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIR31-13 Literature Review: The Most Important IO Papers from 2013-2014

Charles E. Ray MD, PhD (Presenter): Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIR31-14 Wrap Up and Discussion

LEARNING OBJECTIVES

View learning objectives under main course title.