



Yttrium-90 Ablative-Selective Internal Radiation Therapy for Hepatocellular Carcinoma in Chinese Patients: A Case Series Study

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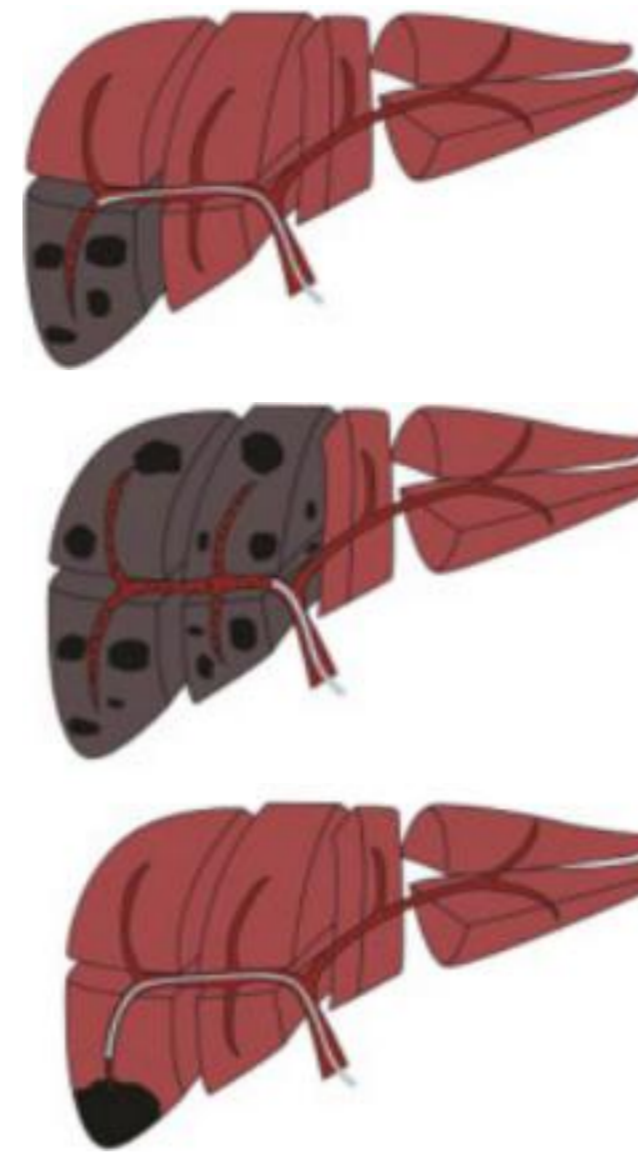
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1 Introduction

Ablative-selective internal radiation therapy (A-SIRT), also known as Ablative-transarterial radioembolization (A-TARE), has been demonstrated to be a safe and reliable therapy, delivering a high-dose of selective ablative radiation with curative-intent for the treatment of HCC. For patients with large or multifocal HCC confined to a single liver lobe or 1-2 segments, especially for those who are not candidates for or unwilling to undergo surgical resection or ablation, A-SIRT is an appropriate option. In the current study, we retrospectively reviewed HCC patients who received ⁹⁰Y A-SIRT at our institution. To our knowledge, this is the first case series reporting the efficacy, safety and sustained outcomes of A-SIRT for HCC from China.

A-SIRT



Radiation-Segmentectomy (RS)

Radiation-Lobectomy (RL)

High-dose of selective ablative radiation

2 Case description

10 unresectable HCC patients treated with ⁹⁰Y A-SIRT at our institution from August 2022 to March 2023 were consecutively reviewed. Patients were continuously followed up every three months after the A-SIRT treatment. The tumor response was assessed using the modified response evaluation criteria in solid tumors (mRECIST) 3 and 6 months after A-SIRT.

Table 1 A-SIRT treatment parameters and tumor response after A-SIRT

Patient No.	LSF(%)	Tumor target dose (Gy)	Lung target dose(Gy)	Tumor response on 3 months	Tumor response on 6 months
I	3.17	175	0.2	CR	CR
II	3.77	400	1.4	CR	CR
III	6.91	100	2.5	PR	PR
IV	11.76	800	2.9	PD	PD
V	2.16	125	0.8	CR	CR
VI	3.30	500	0.4	CR	CR
VII	10.46	700	11.8	SD	PR
VIII	1.83	220	1.2	CR	CR
IX	2.52	250	1.7	PR	CR
X	3.51	1500	2.0	PR	PR

Post Treatment Tumor Response

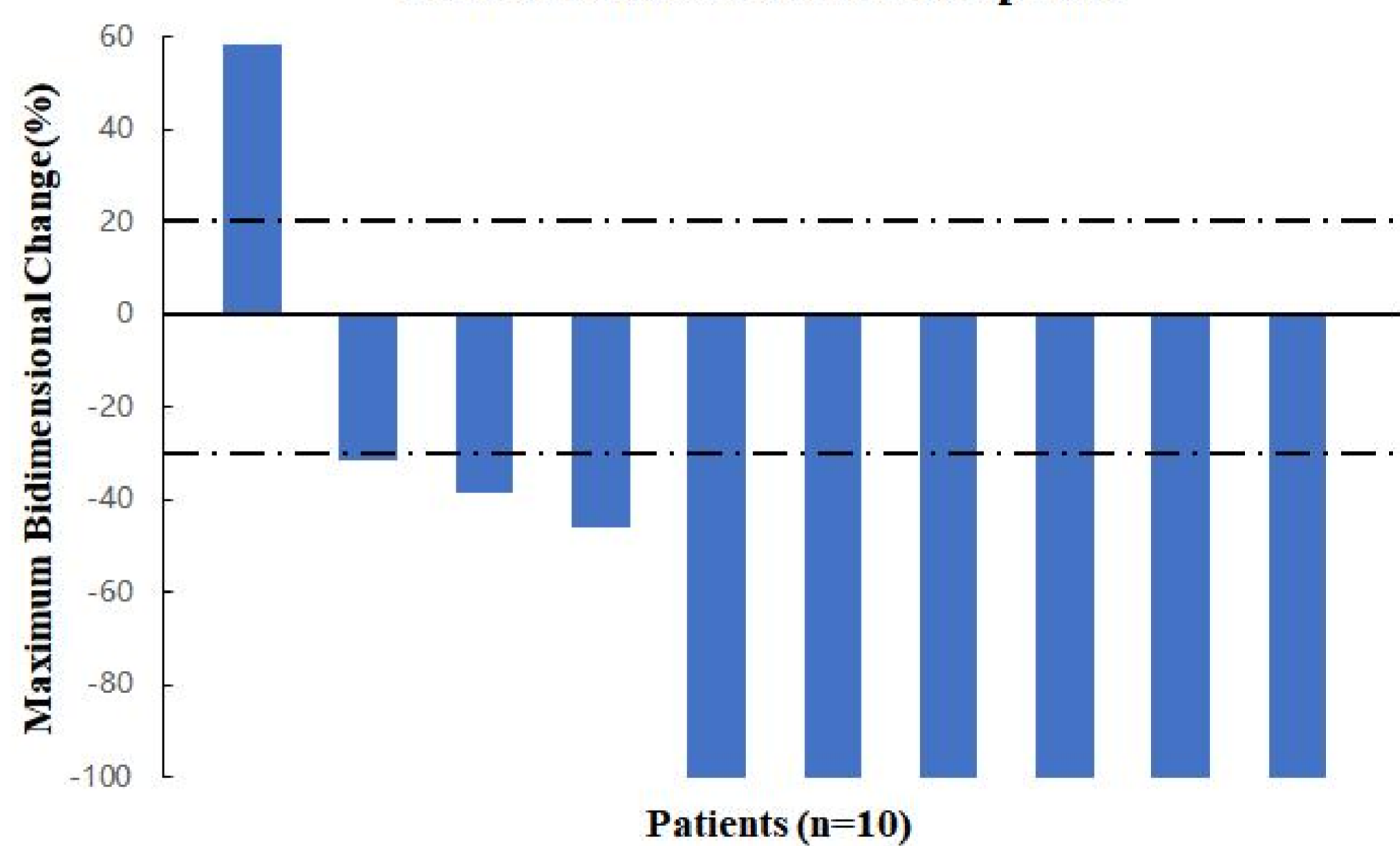


Figure 1 Tumor response presented as a waterfall plot

Selected case 1 (Patient II)

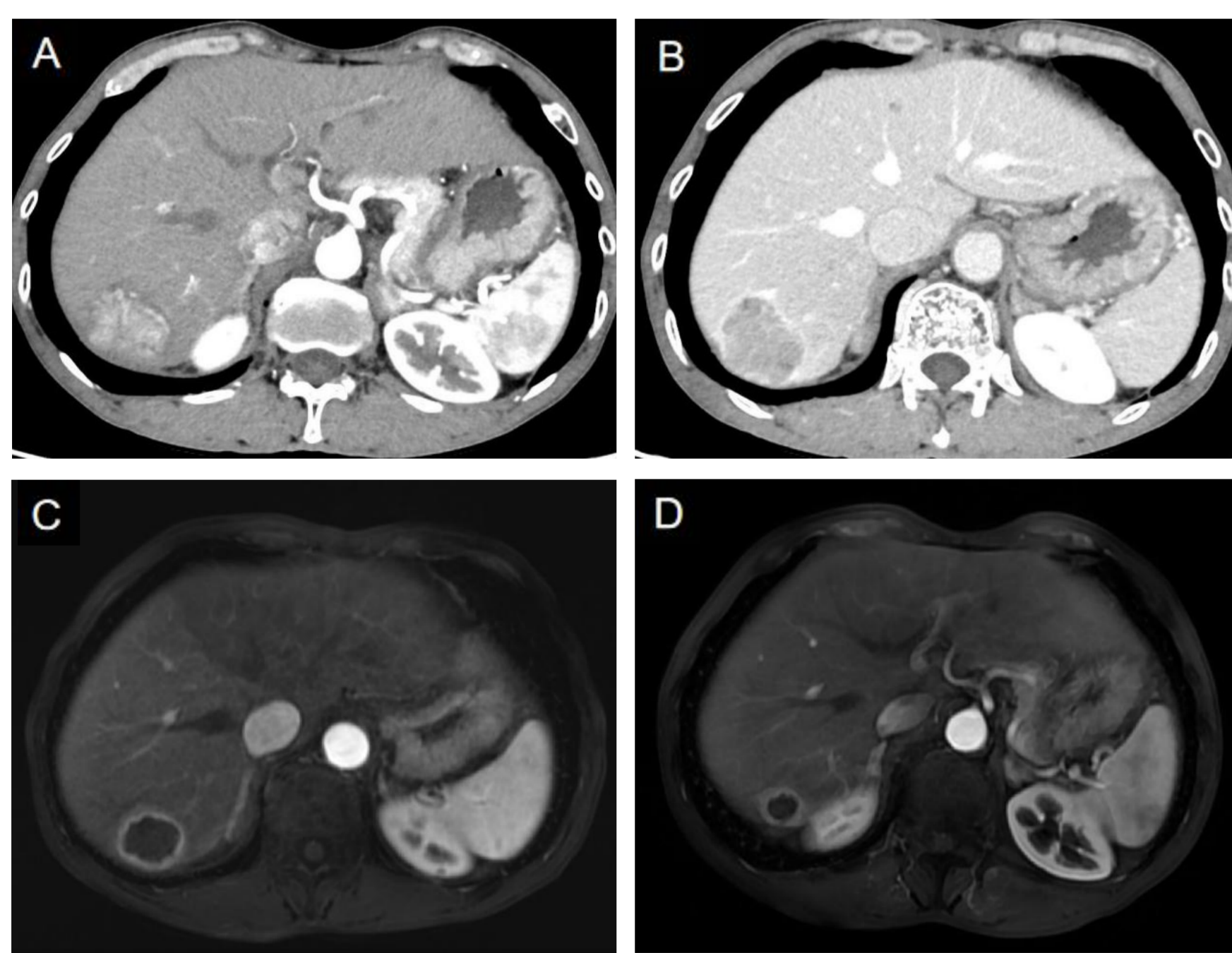


Figure 2 A 66-year-old male with HCC lesion. (A) Contrast-enhanced CT scans of the HCC in the arterial phase. (B) Contrast-enhanced CT scans of the HCC in the portal venous phase. (C) 35 days after A-SIRT (RS), contrast-enhanced MR scans showed shrunken tumor size and necrotic tumor tissues in segment 7 of the liver without enhancement. (D) 6 months after A-SIRT (RS), MR scans showed further shrinkage of the tumor volume.

Selected case 2 (Patient VIII)

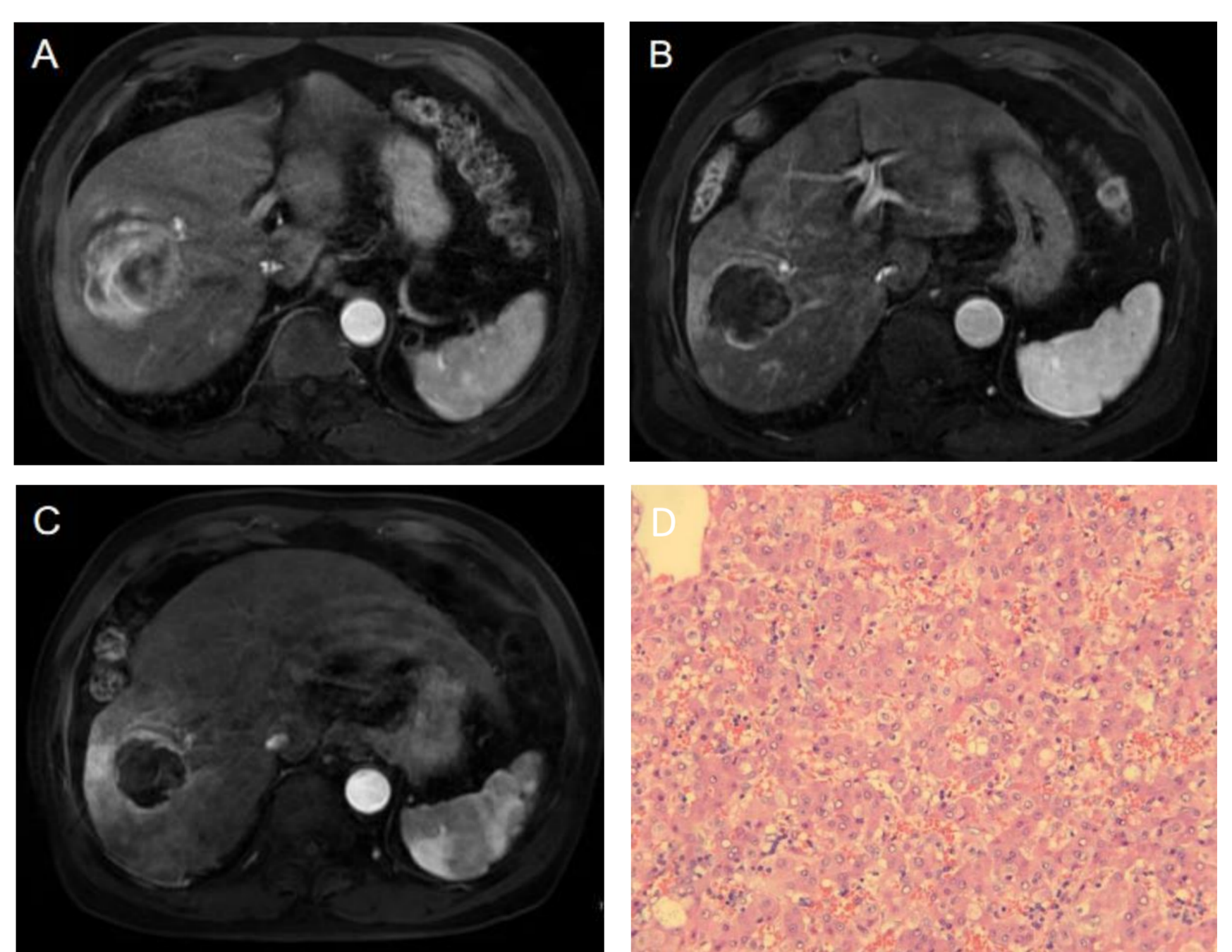


Figure 3 MR imaging of the 67-year-old male. (A) MR scans before A-SIRT (RL). (B) MR scans three months after A-SIRT (RL). (C) MR scans six months after A-SIRT (RL). (D) Postoperative pathology biopsy showed well-differentiated HCC with a tumor necrosis percentage of 70%, consistent with post-treatment changes. The surrounding liver tissue exhibited nodular cirrhosis, hepatocyte atrophy with sinusoidal dilatation and congestion, and mild steatosis.

3 Discussion

- SIRT with ⁹⁰Y resin microspheres has been used for over 20 years in the treatment of unresectable HCC, mainly as a salvage therapy in the past. New treatment strategies such as A-SIRT, are shifting the clinical application of ⁹⁰Y from palliative settings to downstaging and curative treatments.
- In our study, A-SIRT effectively meet the efficacy and safety needs of those patients. Indeed, imaging assessments at six months showed an ORR of 90%.
- Patient II initially eligible for surgery but opting for A-SIRT, who achieved continuous tumor shrinkage and necrosis with great safety, highlighting A-SIRT as a viable non-surgical curative option.
- Patient VIII with large HCC (7.6 cm) and PVTT underwent A-SIRT, resulting in continued tumor shrinkage to 4.2 cm and a 60% FLR increase, ultimately enabling successful surgical resection.

4 Conclusion

This is the first case series reporting the efficacy, safety and sustained outcomes of A-SIRT for HCC in China. The results of this case series suggest that A-SIRT is an appropriate option for patients with large or multifocal HCC confined to a single liver lobe or 1-2 segments, especially for those who are not candidates for or unwilling to undergo surgical resection or ablation. A-SIRT showed a high response rate and manageable side effects, making it suitable for various stages and scenarios of HCC. The study provides a promising outlook for future treatment approaches.