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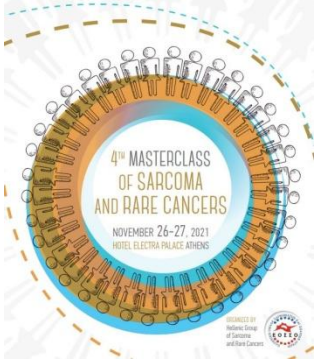

Interventional Radiology techniques for sarcoma metastatic disease

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SARCOMA

- **FINANCIAL DISCLOSURES**

- FOCUSED CRYO: Advisory Board
- IMACTIS: Advisory Board
- ECO MEDICAL, NANJING: Proctor
- MEDTRONIC: Advisory Board, Proctor
- CANNON: Advisory Board

SARCOMA

- Soft tissue sarcomas: rare and heterogeneous mesenchymal neoplasms - >70 histological subtypes; unknown etiology - several genetic syndromes and environmental risk factors
- Most powerful prognostic factors: Depth, size, histology
- Incidence: <6/100.000 cases (1–2% of adult / 15% of pediatric cancer) – 27.908 new cases per year in Europe

K. Bourcier et al.: Basic Knowledge in Soft Tissue Sarcoma Cardiovasc Intervent Radiol 2019

SARCOMA

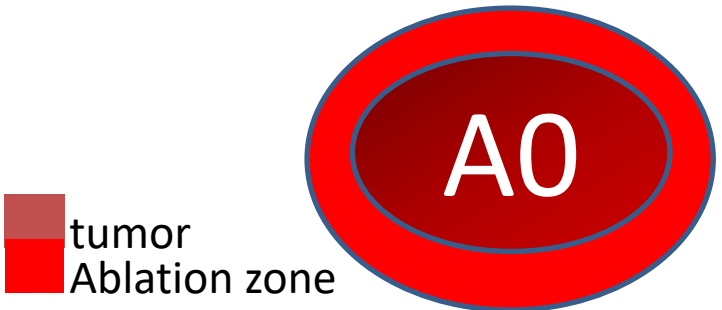
- Most common: undifferentiated pleiomorphic sarcoma, GIST, liposarcoma or leiomyosarcoma
- The 10-year relative survival rate for patients >20 years old was 70% - 50% of patients >65 years old
- Oligometastatic disease: surgery or interventional radiology improve local control and survival

K. Bourcier et al.: Basic Knowledge in Soft Tissue Sarcoma Cardiovasc Intervent Radiol 2019
NCCN Guidelines version 1.2021

DEFINING TERMS

- **Oligometastatic disease**
  - <3-5 lesions, <3-5cm diameter
    - » Gangi et al. Quality Improvement Guidelines for Bone Tumour Management. CVIR 2010 33:706–713
- the presence of 1 and 5 distant metastases in <2 organs, although the exact number of metastases that should be considered remains debatable
  - ➢ deSouza et al. Strategies and technical challenges for imaging oligometastatic disease. EJCANCER 2017; XX:1-11

- **Ablation with curative intent**
  - Ablation volume – Safety margin (A0)



SARCOMA

Electromagnetic - Thermal	• Radiofrequencies (RFA) • Microwaves (MWA) • Laser (LITT)
Mechanical - Thermal	• High Intensity Focused Ultrasound (HIFU)
Thermal	• Cryoablation (CWA)

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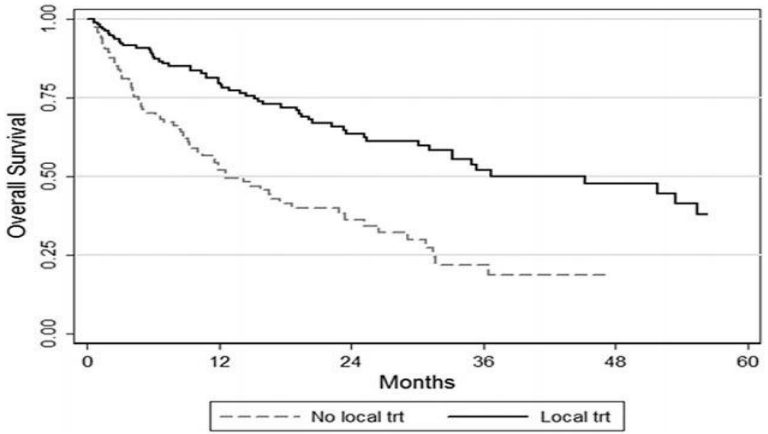
ABLATION FOR SARCOMA

Rational:

- Minimally invasive approach
- Well-tolerated even in patients with co-morbidities
- Overall morbidity of the procedure is low
- Preservation of long-term function with low damage to healthy parenchyma around the metastases

Falk et al. Effect on Survival of Local Ablative Treatment of Metastases from Sarcomas: A Study of the French Sarcoma Group



281 oligometastatic (at the onset) sarcoma patients (1-5 lesions)
pulmonary (71.5%), hepatic (10.6%)
extra pulmonary and extrahepatic metastases (19.2%)
164/281 (77.9%) local treatment incl. surgery
35 (16.4%) RFA
25.7 mo fu

paradigm shift regarding the treatment of oligometastatic cancer
supports the evidence for sarcomas

Original Article

Effect on Survival of Local Ablative Treatment of Metastases from Sarcomas: A Study of the French Sarcoma Group

A.T. Falk *, L. Moureau-Zabotto †, M. Ouali ‡, N. Penel §, A. Italiano ¶, J.-O. Bay ||**, T. Olivier ††, M.-P. Sunyach ‡‡, P. Boudou-Roquette §§, S. Salas ¶¶, C. Le Maignan ||||, A. Ducassou ***, N. Isambert †††, E. Kalbacher ‡‡‡, C. Pan §§§, E. Saada *, F. Bertucci †, A. Thyss *, J. Thariat * for the Groupe Sarcome Francais-Groupe D'etude Des Tumeurs Osseuses

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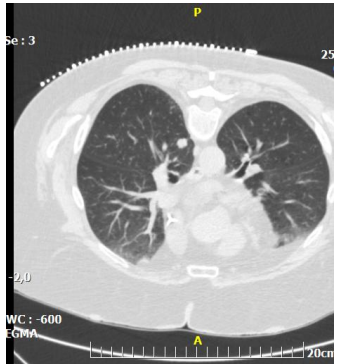
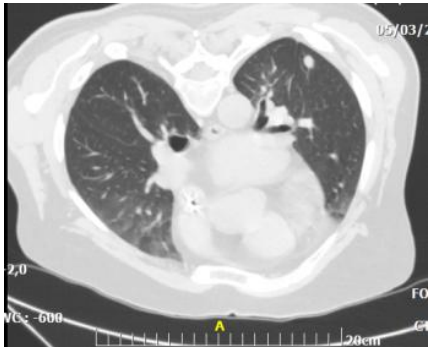
SARCOMA @ LUNG

- Pulmonary metastases in 20–50% of patients with soft-tissue and bone sarcomas

- Overall median survival with lung metastases: 15 months

S.M. Thompson et al.: Image-Guided Thermal Ablative Therapies in the Treatment of Sarcoma. Curr. Treat. Options in Oncol. 2017





SARCOMA @ LUNG

deBaere et al: Radiofrequency ablation is a valid treatment option for lung metastases: experience in 566 patients with 1037 metastases

- Mean diameter 17.4 mm - Median follow-up 35.5 months
- Median OS was 62 months, and 1-, 2-, 3-, 4- and 5-year OS rates were 92.4% [standard error (SE) = 1.2), 79.4% (SE = 1.9), 67.7% (SE = 2.4), 58.9% (SE = 2.8) and 51.5% (SE = 3.3), respectively
- Location of primary disease, disease-free interval (DFI), size >2 cm, and three of more metastases were associated with OS in univariate analysis and remained independently associated with OS in multivariate analysis.

Table 1. Rates (standard error) of overall survival, progression-free survival and treatment failure according to the primary

	Primary				
	Colon (N = 191)	Rectum (N = 102)	Kidney (N = 68)	Sarcoma (N = 51)	Other (N = 154)
Overall survival					
1 year	92.9% (1.9)	93.6% (2.5)	95.5% (2.6)	94.1% (3.3)	89.0% (2.6)
3 years	76.1% (3.7)	64.9% (6.3)	73.5% (6.5)	58.0% (8.2)	59.1% (4.6)
5 years	56.0% (6.0)	49.6% (8.4)	53.8% (9.1)	41.5% (9.3)	49.4% (6.4)
Progression-free survival					
1 year	37.6% (3.6)	30.4% (4.8)	39.7% (5.9)	43.0% (7.0)	49.0% (4.1)
3 years	17.0% (3.0)	8.6% (3.2)	13.8% (4.9)	26.5% (6.6)	17.6% (3.4)
5 years	14.8% (3.0)	6.4% (3.0)	9.2% (5.0)	15.9% (6.2)	7.6% (3.9)
Treatment failure					
1 year	10.9% (2.4)	14.5% (3.7)	7.4% (3.2)	6.1% (3.4)	9.9% (2.5)
2 years	16.2% (3.0)	30.7% (5.7)	13.0% (5.0)	8.3% (4.0)	16.4% (3.5)
3 years	16.2% (3.0)	30.7% (5.7)	25.1% (9.3)	8.3% (4.0)	16.4% (3.5)

Radiofrequency ablation is a valid treatment option for lung metastases: experience in 566 patients with 1037 metastases

T. de Baère[1*], A. Aupérin[2], F. Deschamps[1], P. Chevallier[3], Y. Gaubert[4], V. Boige[5], M. Fonck[6], B. Escudier[5] & J. Palussière[7]

Departments of [1]Image Guided Therapy; [2]Biostatistics, Gustave Roussy Cancer Campus, Villejuif; [3]Department of Imaging, Hopital Archet 2, Nice; [4]Department of Imaging, Hopital de la Timone, Marseille; [5]Department of Medical Oncology, Gustave Roussy Cancer Campus, Villejuif; Departments of [6]Medical Oncology; [7]Imaging, Institut Bergonie, Bordeaux, France

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SARCOMA @ LUNG

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- osteosarcoma oligometastatic lung metastases (post-surgical recurrences)
- 11 children - 26 lung metastases
- 2–16 mm (mean = 6.7 mm)
- 100% local control rate
- 5/11 patients remained in complete remission after median follow-up of 37.5 months
- 5/11 patients developed new metastases – 2/5 patients were retreated and are still in remission after subsequent treatment

TABLE 1 Patient demographics

Patient	Age (years)	Sex	Wt (kg)	Timing of metastases	Histological subtype	Progression on chemotherapy	Tumor necrosis (%)	Prior Thoracotomies	# Recurrence pre-ablation
1	12.5	M	34	Synchronous	Fibroblastic	No	100	1	2
2	12.8	F	31	Synchronous	Anaplastic	No	<90	4	3
3	8.0	F	31	Synchronous	Indeterminate	No	<90	2	2
4	13.6	M	40	Metachronous	Fibroblastic	No	99	1	2
5	9.8	M	26	Synchronous	Osteoblastic	No	92	3	3
6	16.4	F	49	Synchronous	Indeterminate	No	<90	4	5
7	15.5	F	47	Synchronous	Osteoblastic	No	90	2	3
8	12.4	F	35	Synchronous	Chondroblastic	No	91	1	2
9	17.6	M	53	Metachronous	Indeterminate	No	98	1	2
10	12.9	M	56	Synchronous	Osteoblastic	Yes	<90	2	3
11	7.1	M	19	Synchronous	Osteoblastic	Yes	92	2	3

M male, *F* female

TABLE 2 Percutaneous ablation treatment information

Patient	Modality	Nodules ablated	Laterality	Nodule size (mm)	Post-ablation imaging follow-up (months)	Post-ablation recurrence	Time to recurrence (months)	Post-ablation time to death (months)
1	RFA	1	Right	3	41.8	–	–	–
2	RFA	2	Right	9, 8	40.9	–	–	–
3	RFA	4	Right	3, 3, 3, 5	37.5	–	–	–
4	RFA	2	Left	5, 14	37.9	Cranium	9.5	–
5	RFA	3	Bilateral	3, 5, 16	5.6	Right lung	2.3	8.7
6	RFA	2	Bilateral	10, 16	4.8	Bilateral lungs	4.7	6.7
7	RFA	2	Left	5, 5	5.2	Bilateral lungs	5.0	8.8
8	RFA	2	Left	2, 3	24.7	–	–	–
9	RFA	1	Left	2	4.1	–	–	–
10	RFA	5°	Bilateral	5, 6, 8, 10, 11	8.8	Bilateral lungs	0.9[a]	–
11	Cryo	2	Bilateral	5, 9	0.7	Lumbar	0.7	1.0

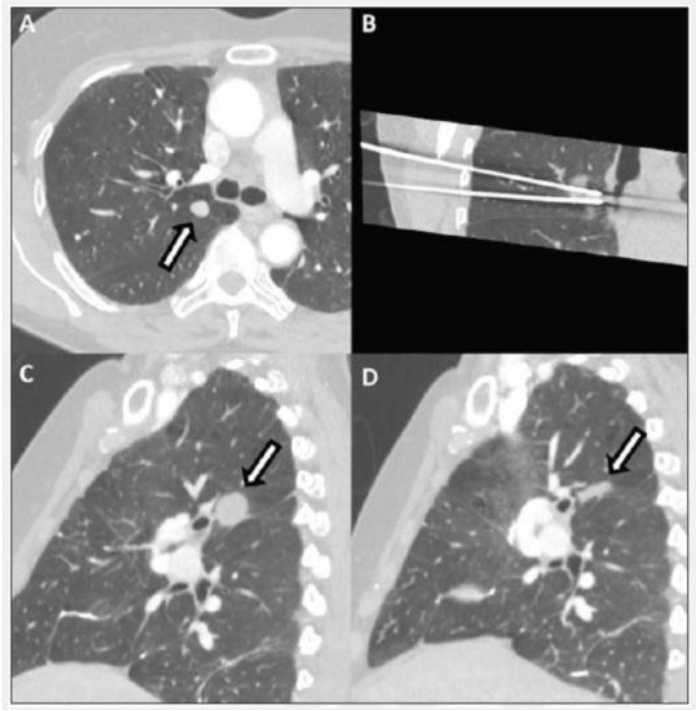
RFA radiofrequency ablation, *Cryo* cryoablation

S. Yevich et al.: Percutaneous CT-guided thermal ablation of pulmonary osteosarcoma metastases in children. Ann Surg Oncol. 2016

SARCOMA @ LUNG

Bourgouin et al: Comparison of Percutaneous Image-Guided Microwave and Cryoablation for Sarcoma Lung Metastases: 10-Year Experience

- 27 patients – 39 ablation
- 21 MWA, 18 cryoablation; 1-4 sessions per patient
- Primary technical success was 97% for both modalities
- Median follow-up was 23 months
- Tumor size ≤1 cm was associated with decreased cumulative incidence of local progression (p =.048)
- Ablation modality and tumor location were not associated with progression (p =.86; p =.54)



AJR Am J Roentgenol 2021 doi: 10.2214/AJR.21.26551. Online ahead of print.

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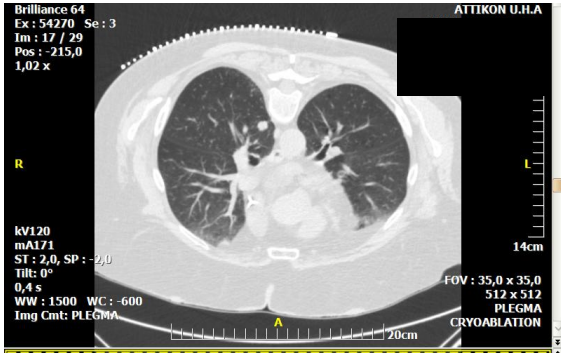
CASE EXAMPLE



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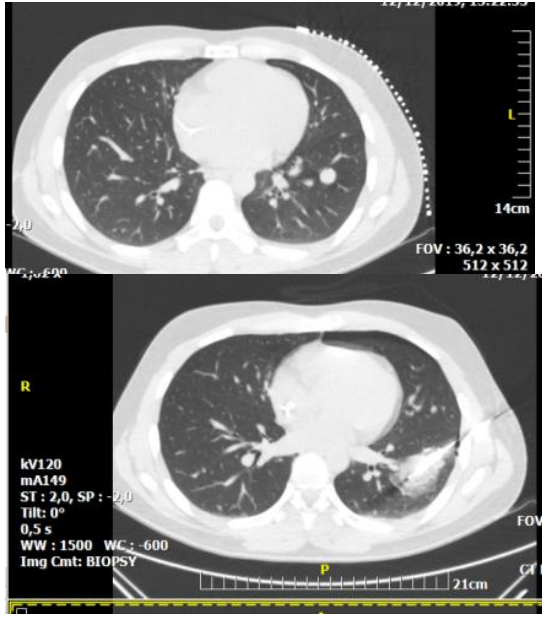
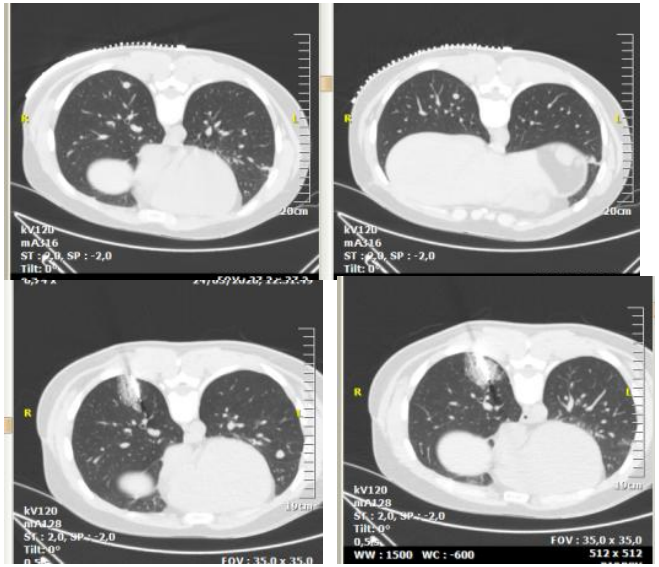
CASE EXAMPLE





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SARCOMA @ LUNG

Author	Type of ablation	Number of patients (N)	Mean size (mm)	Mean follow up (months)	Mean overall survival rate	Median progression-free survival rate	Complications
Koeblinger et al	RFA	22	9	20	2- and 3-year time were 94% and 85 % (51 months)	1- and 2-year were 53 and 23 %, (12 months)	2 pt with grade 3 complications
Nakamura et al	RFA	20	14 ± 9	18	1 and 3 year were 58% and 29% (12.9 months)		38% needed pneumothorax tube
Palussiere et al	RFA	29	9	50	1 and 3 year were 92.2% and 65.2%	7 months	68.7% pneumothorax
Sato et al.	RFA	46	13.5 ± 9.0	16.9	1-, 2-, and 3-year were 80.6, 70.1, and 47.1% (31.7 months)	Primary and secondary efficacy rates were 83.5 and 90.0% at 1 year and 76.3% and 81.4% at 2 years	73% grade 1 33% grade 2
Yevich et al.	RFA+ CRYO	11	6.7	16.7			3 pneumothoraxes
Saumet et al.	RFA	10		24		None had recurrence/ Seven patients were in complete remission	3 hemoptysis and pneumothorax
Gravel et al.	Percutaneous thermal ablation	30	18.2	34.6	48.3 months 1, 3 and 5-year overall survival rates were 96.7%, 62.0% and 28.3% respectively	Local control rate at 1 year was 95.2% and at 3 years was 89.4%.	

Thermal ablation of lung metastasis from sarcoma

SARCOMA @ LIVER

- Limited literature on percutaneous ablation: rarity of the disease - studies reporting data on diverse histologic subtypes without sarcoma-specific analyses

- Gastrointestinal stromal tumor (GIST) is the most common primary sarcoma to metastasize to the liver

- Imatinib mesylate, a selective tyrosine kinase inhibitor (TKI) targeting c-KIT, is the current standard of care for metastatic GIST tumors

S.M. Thompson et al.: Image-Guided Thermal Ablative Therapies in the Treatment of Sarcoma. Curr. Treat. Options in Oncol. 2017
G.D. Demeti et al. Efficacy and safety of imatinib mesylate in advanced gastrointestinal stromal tumors. N Engl J Med. 2002

SARCOMA @ LIVER

- adjuvant percutaneous RFA after TKI
- 17 patients – 27 GIST liver meta
- 2.5 ± 1 cm (range 0.9–4.5 cm)
- 100% technical success
- no local recurrences during a mean follow-up period of 49 months
- No major complications

Table 1 Patient and tumor characteristics

No	Sex/age (year)	Group	Primary site	Extrahepatic disease	No. of liver metastases treated by RF	Tumor maximum size	Complication
1	M/45	C	Small bowel	Peritoneal metastasis	1	17	No
2	F/57	A	Colon	No	1	30	No
3	F/65	A	Colon	No	2	18/45	No
4	F/66	A	Colon	No	1	27/29	No
5	M/53	A	Small bowel	No	2	15/23	No
6	M/40	B	Small bowel	No	3	12/25	No
7	F/65	C	Small bowel	No	1	42	No
8	M/50	C	Stomach	No	1	28	No
9	M/59	C	Stomach	No	1	36	Minor
10	F/63	A	Abdomen	No	1	11	No
11	F/52	A	Stomach	No	1	31	No
12	F/62	B	Stomach	No	3	9/23/37	No
13	M/42	B	Small bowel	No	2	29	No
14	F/72	B	Rectum	No	2	20/35	Minor
15	M/61	A	Stomach	No	1	26/36	No
16	F/45	B	Small bowel	No	3	10/18/41	No
17	M/51	C	Stomach	No	1	15	No

Table 2 Progression-free survival

	Progression-free survival rate (95 % confidence interval)				Median FU (mo)
	6 months	12 months	18 months	24 months	
Group A	58.7 % (49–97)	42.9 % (16–75)	28.6 % (8–64)	28.6 % (8–64)	74.5
Group B	100 %	100 %	100 %	75 % (30 95)	29.6
Group C	80 % (38–96)	60 % (23–88)	20 % (4–62)	20 % (4–62)	53.9

A. Hakime et al.: A Role for Adjuvant RFA in Managing Hepatic Metastases from Gastrointestinal Stromal Tumors (GIST) After Treatment with Targeted Systemic Therapy Using Kinase Inhibitors . Cardiovasc Intervent Radiol 2013

SARCOMA @ LIVER

- 2-year progression-free survival 75% in patients who continued TKI therapy post ablation
- <30% in patients who discontinued TKI therapy post ablation.
- Conclusion: adjuvant RFA of GIST liver metastases is effective at achieving local tumor control
- should be performed once the patient achieves best morphologic response on TKI therapy

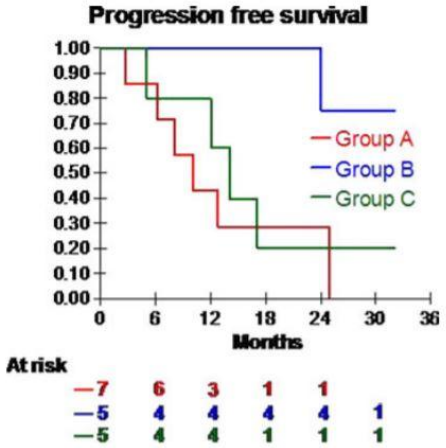

Fig. 4 Kaplan-Meier curve for PFS

A. Hakime et al.: A Role for Adjuvant RFA in Managing Hepatic Metastases from Gastrointestinal Stromal Tumors (GIST) After Treatment with Targeted Systemic Therapy Using Kinase Inhibitors . Cardiovasc Intervent Radiol 2013

SARCOMA @ LIVER

Authors	Type of ablation	Type of sarcoma	Number of patients (N)	Mean lesion size	Mean follow up (months)	Median time to progression	Overall survival rate/time	Complications
Jones et al.	RFA	GIST Other sarcoma	13 7	-	21	28 months	2-year overall survival was 77%	3 patients with sepsis
Jung et al.	RFA	GIST	29	1.3 cm	33.1	6% showed local recurrence at 3.2 and 10.5 months	90.2 months	1 patient with bleeding at the ablation site & 1 peritoneal seeding near the ablation tract
Hakime et al.	RFA	GIST	17	2.5 ± 1 cm	49	Two-year progression-free survival (PFS) after RFA was 29 % in group A, 75 % in group B, and 20 % in group C.	Only two patients (both in group C) died at 20 and 48 months	11% minor complications

Thermal ablation of liver metastasis from sarcoma

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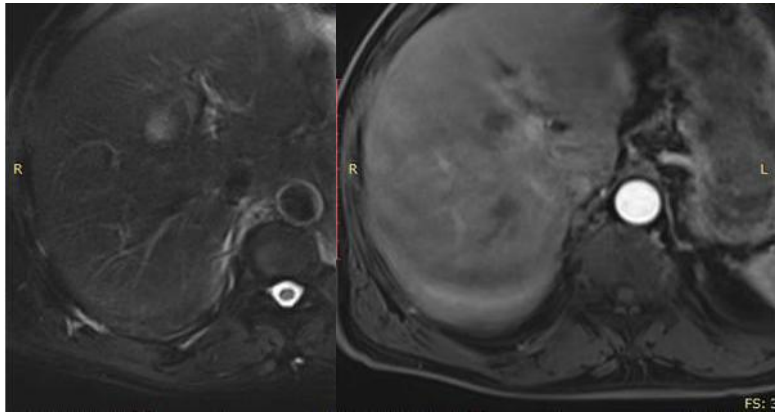
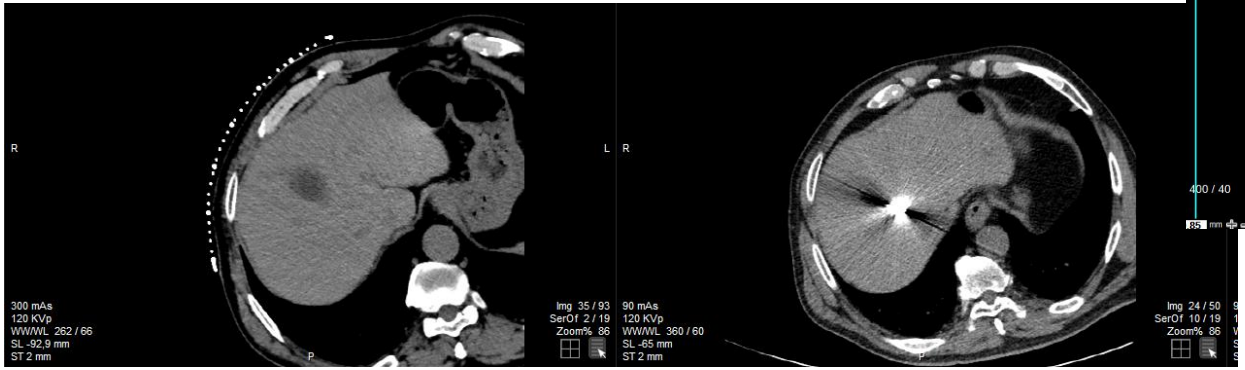
CASE EXAMPLE





leiomyosarcoma

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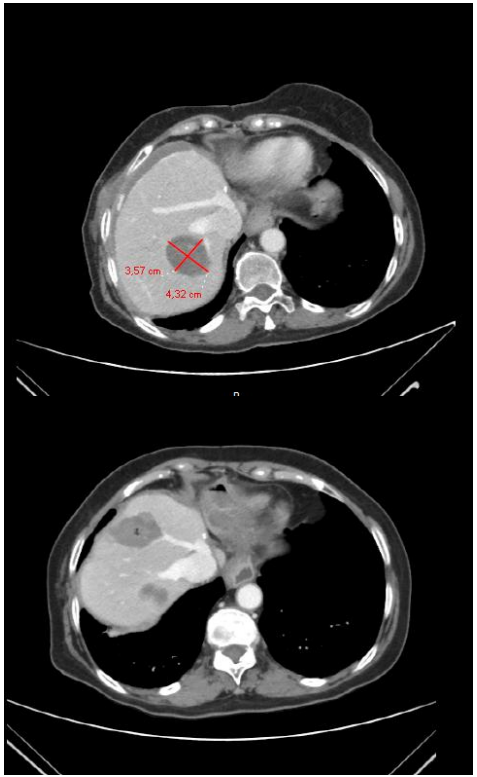
CASE EXAMPLE

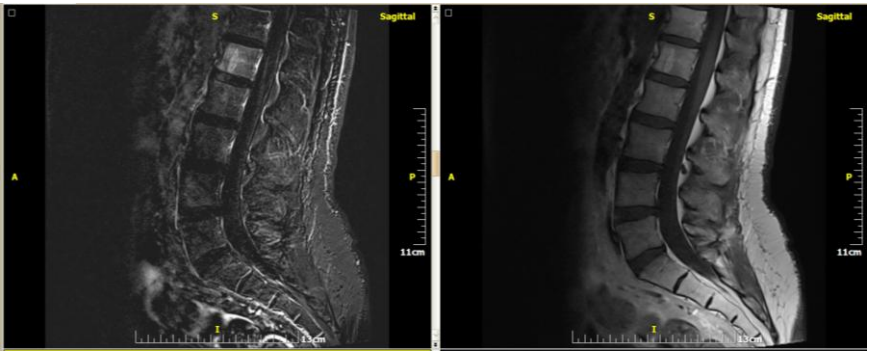


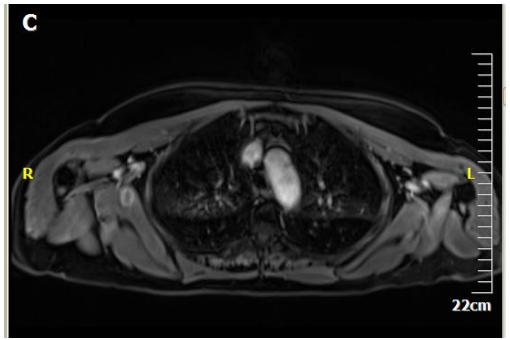
GIST META

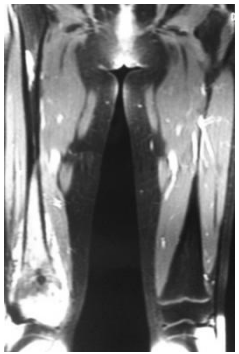
SARCOMA @ MSK

- Literature is scarce

- Series often combined sarcomas and non-sarcomatous bone tumours







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SARCOMA @ BONE/SPINE

- ablation for local tumor control and pain palliation of sarcoma MSK metastases
- 64 sarcoma meta; 13/64 oligometa
- average tumor volume 42.5 cm^3 (range 0.1–484.7 cm3)
- Max. tumor diameter 3cm in oligometa

	Widespread Metastases	Oligometastatic disease
Demographics		
Mean age		–80)
Sex		;
		)
Mean tumor volume		ge 2–36.3 cm^3)
Maximum tumor dian		1.7–5.5 cm)
% previous/concurrent		
Indications		
% Pain palliation		
% Local tumor contro		
% Both (pain and tum		
% at risk for patholog		

Table 2 Treated sarcoma subty

Histologic subtype		mal protection		
		modissection	Hydrodissection	Both
Epithelioid Hemangioendotheli			1	–
Leiomyosarcoma			–	1
Angiosarcoma			–	–
Ewing Sarcoma			–	–
Liposarcoma			–	1
Osteosarcoma			–	–
Hemangiopericytoma			–	–
Myxofibrosarcoma			–	–
Chondrosarcoma			–	1
Sarcomatoid carcinoma			–	–
Synovial Sarcoma			–	–

Thoracic spine	15
Ilium	11
Lumbar spine	9
Sacrum	6
Femur	4
Acetabulum	4
Scapula	3
Ischium	3
Upper Extremity/shoulder	2
Soft tissues	2
Rib	2
Pelvis	1
Tibia	1
Humerus	1

D. Vaswani et al.: Radiographic Local Tumor Control and Pain Palliation of Sarcoma Metastases within the Musculoskeletal System with Percutaneous Thermal Ablation. Cardiovasc Intervent Radiol 2018

SARCOMA @ BONE/SPINE

- Ablation is an effective option for local tumor control and pain palliation of MSK sarcoma meta
- Treatment in the setting of oligometastatic disease offers potential for remission

	≥3 months	≥6 months	≥9 months	≥1 year
Overall local tumor control (n = 64)	88% (35/40)	80% (24/30)	78% (21/27)	70% (19/27)
Local tumor control in the setting of oligometastatic disease	100% (12/12)	100% (11/11)	100% (10/10)	100% (10/10)
Local tumor control in the setting of chemoradiation	100% (10/10)	100% (6/6)	100% (6/6)	100% (4/4)
Total number of treated tumors with disease progression of untreated metastases	78% (31/40)	70% (21/30)	67% (18/27)	67% (18/27)
Local tumor control in the setting of progression of untreated metastases	84% (26/31)	71% (15/21)	67% (12/18)	67% (12/18)
Total cases without follow-up	24	10	3	0
Reason				
Death/Hospice	19	7	1	0
No clinical indication for imaging follow-up	1	1	0	0
Lost to follow-up	4	2	2	0

D. Vaswani et al.: Radiographic Local Tumor Control and Pain Palliation of Sarcoma Metastases within the Musculoskeletal System with Percutaneous Thermal Ablation. Cardiovasc Intervent Radiol 2018

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SARCOMA @ BONE/SPINE

Authors	Type of ablation	Primary Site	Number of patients	Follow up (months)	Outcomes	Complications
Yamakado et al.	RFA	Bone and soft-tissue sarcomas	52	25.5	Residual tumors were found in 59.6 % (31/52), Overall survival rates were 73.4 % at 1 year, 39.3 % at 3 years, and 34.3 % at 5 years in all patients	Major complications 0.9 %.
Saumet et al.	RFA	Osteosarcoma (pediatric population)	16 (7 with bone lesions)	14.9	Complete remission (N = 3) Local tumor control (N = 3) Pain relief (N = 1)	First-degree burn (N = 1) Soft tissue infection (N = 1) Tibial fracture 6-months post ablation in the treatment zone (N = 1)

Thermal ablation of bone metastasis from sarcoma

SARCOMA @ BONE/SPINE

Author (year)	Number sarcoma patients	Number of tumors	Age range	Sarcoma type	Sarcoma subtypes	Ablation device
Bone						
Li (2015)	12	12	11–24	Primary bone tumor	OGS—juxta-articular around knee	Adjuvant cryoablation + joint-preserving transepiphysis tumor resection
Li (2015)	11	11	9–16	Primary bone tumor	OGS—juxta-articular around proximal tibia	Adjuvant MWA + joint-preserving transepiphysis tumor resection
Saumet (2015)	7	>9	6–25	Primary bone tumor	OGS	RFA
Yu (2015)	27	27	11–56	Primary bone tumor	OGS	HIFU
Kurup (2012)	5	8	31–80	Primary bone tumor	Chordoma	Cryoablation
Chen (2010)	80	80	5–89	Primary bone tumor	OGS pOGS PS ChSA ES mGCT	HIFU ($N = 14$) HIFU + chemotherapy ($N = 66$)
Li (2010)	13	13	9–72	Primary bone tumor	OGS MFH	HIFU
Soft tissue						
Fan (2016)	39	50	25–73	Soft tissue sarcoma Recurrent retroperitoneal	LPS FS LMS MFH Meso	Cryoablation
Schmitz (2016)	18	26	9–77	Soft tissue sarcoma Desmoid tumor	EAD	Cryoablation
Jiongyuan (2014)	19	19	18–79	Soft tissue	DFSP	Cryoablation
Havez (2013)	13	17	15–74	Soft tissue sarcoma Desmoid tumor	EAD	Cryoablation
Bone/soft tissue						
Yamakado (2014)	16 (Bone) 36 (Soft tissue sarcoma)	1 ($N = 12$) 2–6 ($N = 18$) ≥7 ($N = 22$)	10–87	Recurrent bone and soft tissue sarcoma	LMS OGS LPS MFH ChSA Other	RFA
Littrup (2013)	Sarcoma ($N = 12$)	28 (sarcoma)	18–91		OGS	Cryoablation

S.M. Thompson et al.: Image-Guided Thermal Ablative Therapies in the Treatment of Sarcoma. Curr. Treat. Options in Oncol. 2017

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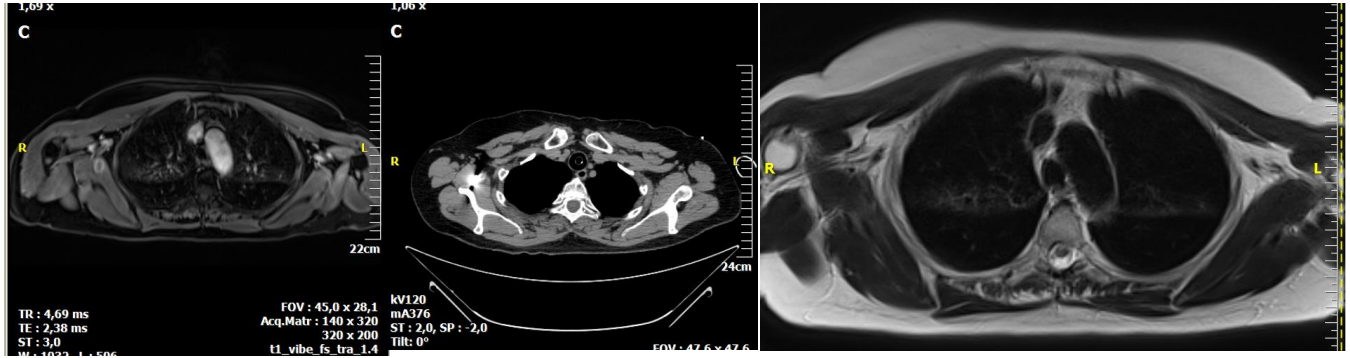
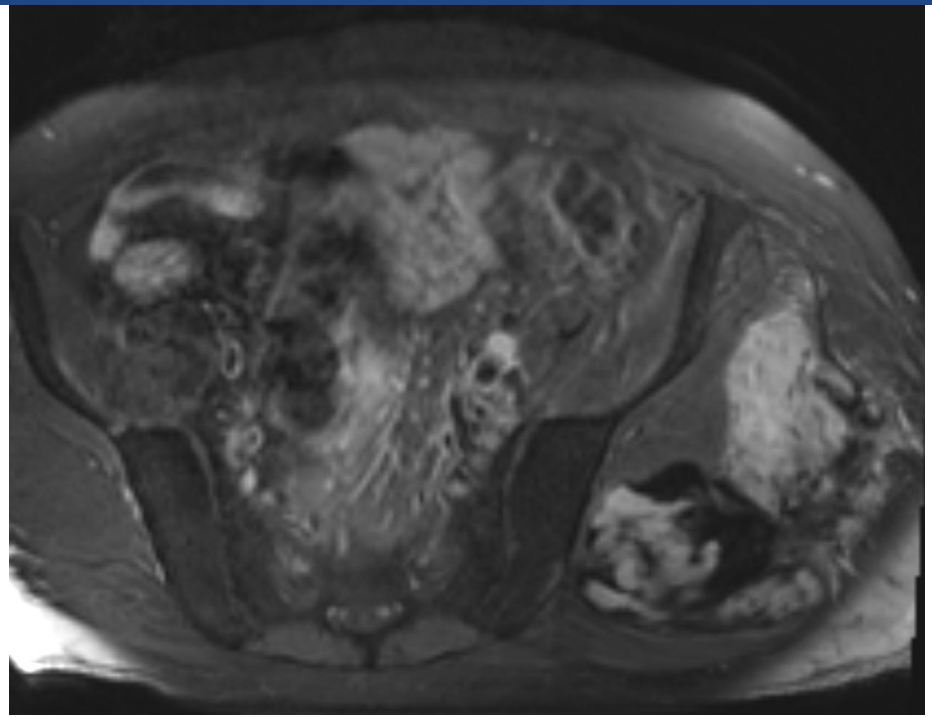
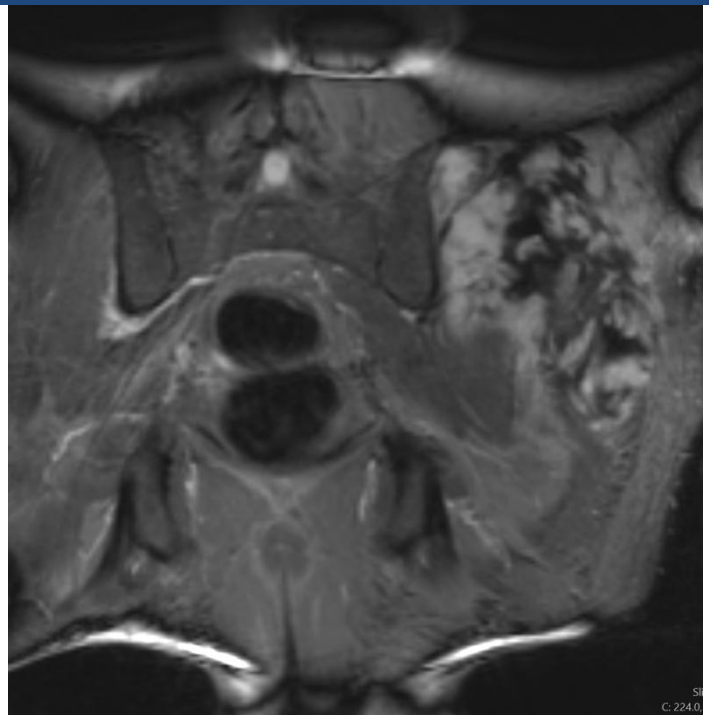
CASE EXAMPLE



DESMOIDS





48 yom with painful left gluteal desmoid tumor

DESMOIDS

First ablation (12 probes)

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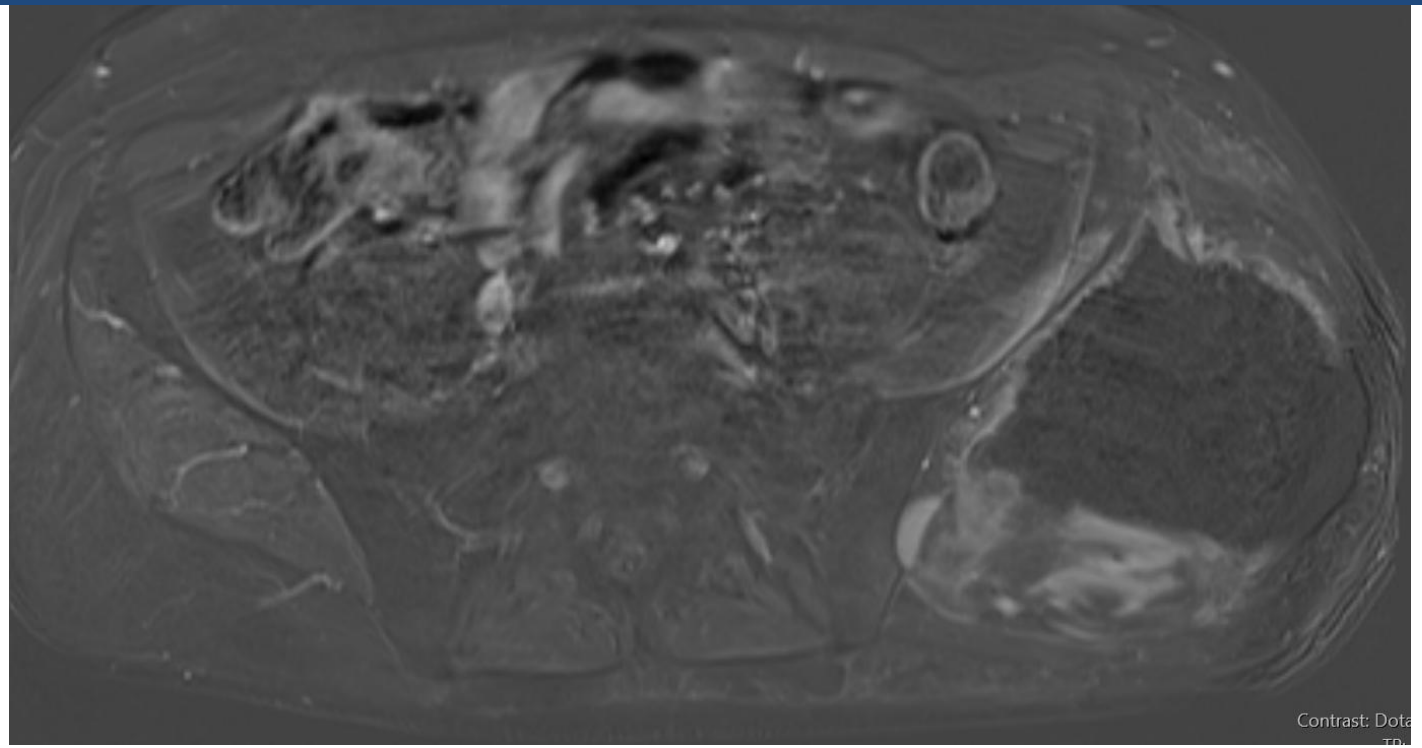
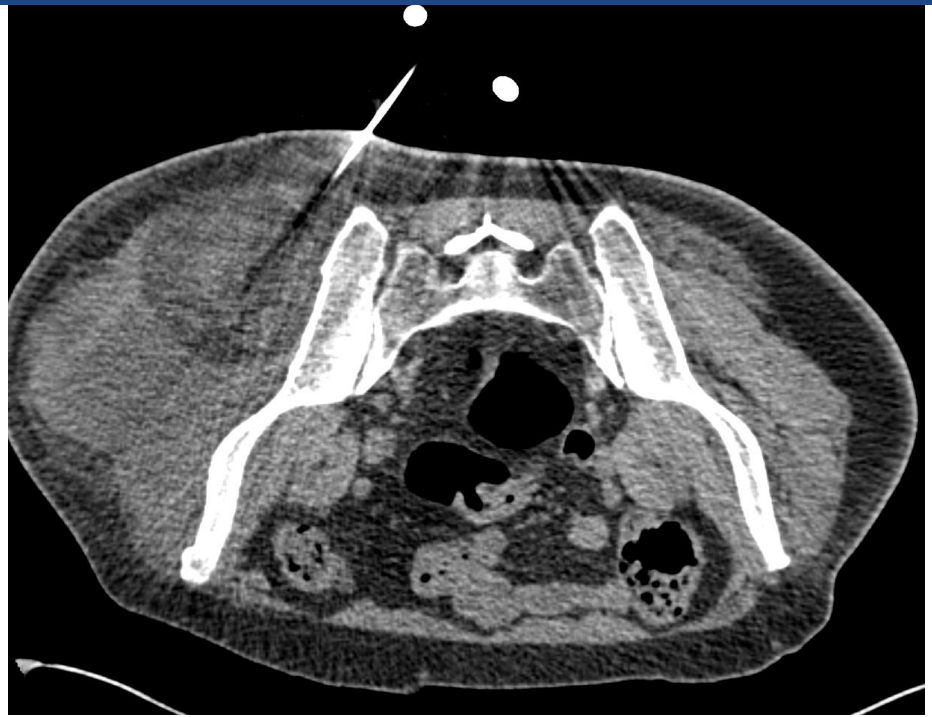
DESMOIDS



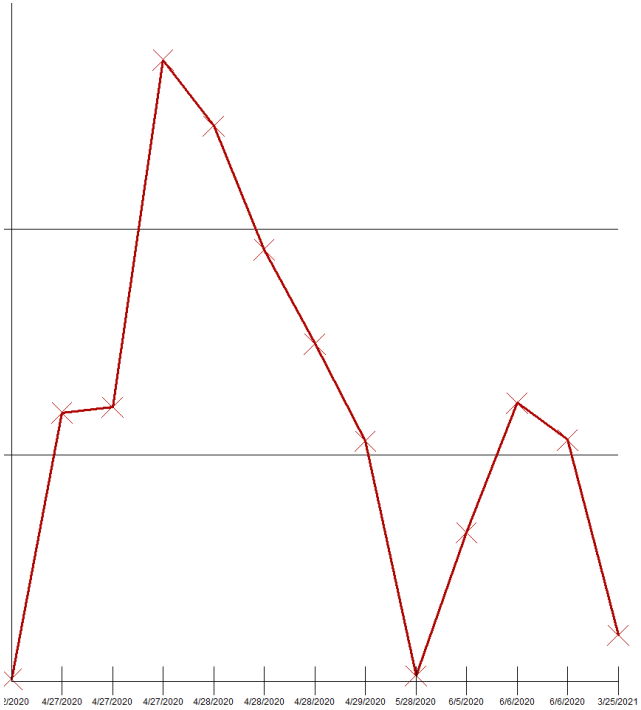
First ablation Post MRI (T1FS subtraction images)

DESMOIDS



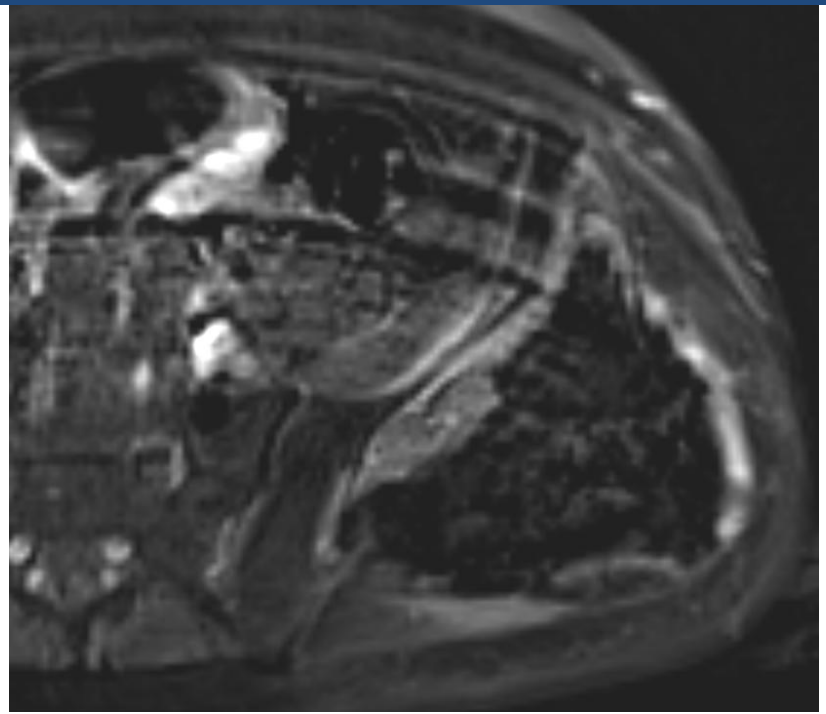
Second ablation (10 probes)

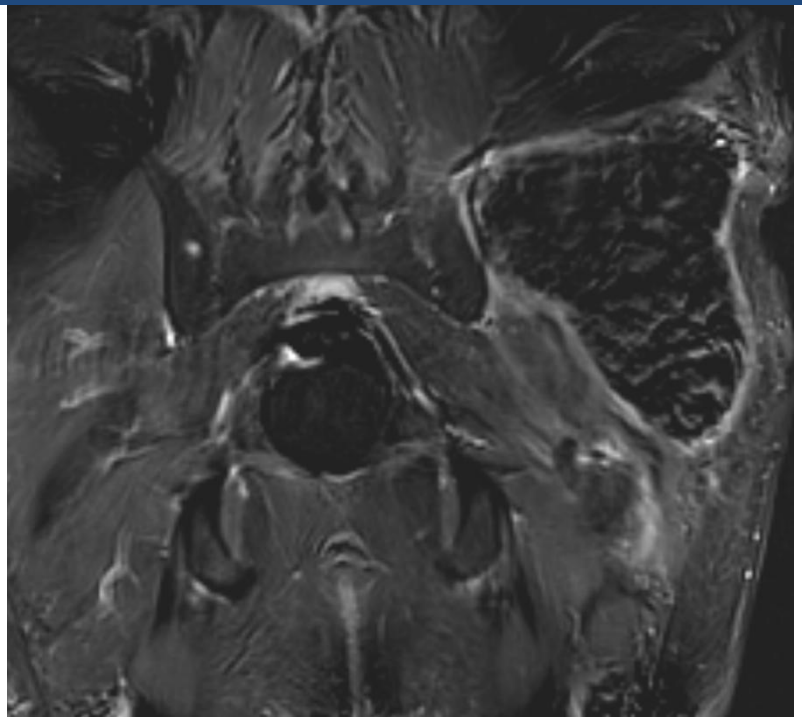
DESMOIDS



CK elevation with rhabdomyolysis (planned admission for IV fluids and Cr and CK monitoring)

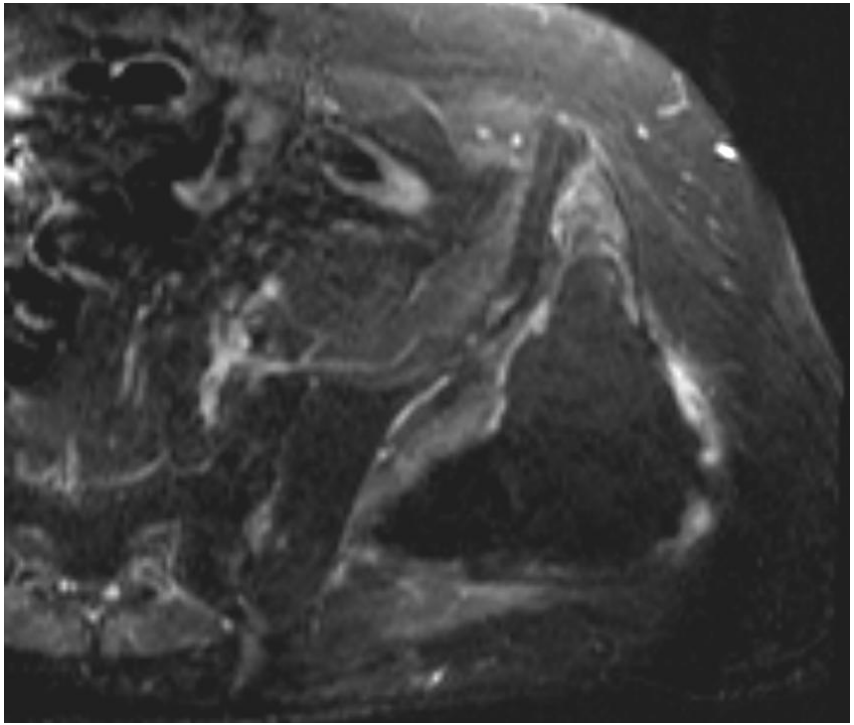
DESMOIDS

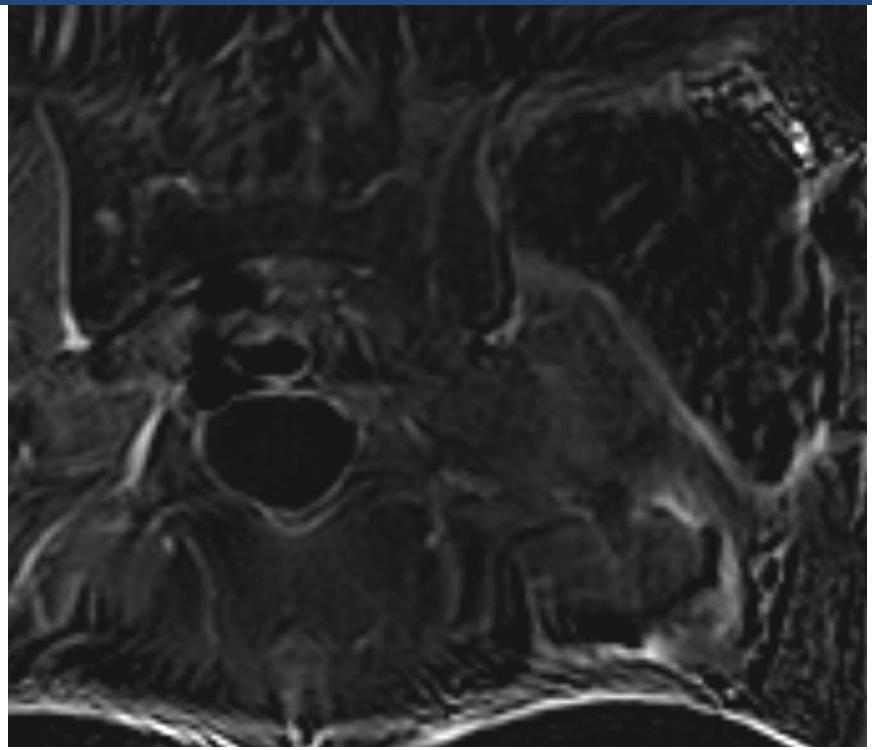




Post Second ablation 4 mos

DESMOIDS





Post Second ablation 10 mos

TAKE HOME MESSAGE….

- Focal treatment whenever possible should be recommended at tumour board discussion; ideally should be performed in referral centers - Ablation for oligometastatic disease of sarcomas in lung, liver, bone/spine and soft tissue appears safe and effective

- Comparison of results is challenging due to rarity of sarcomas and differences in studied patient population

- Personalized treatment and development of specific targeted therapy

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TAKE HOME MESSAGE….

Cardiovasc Intervent Radiol
https://doi.org/10.1007/s00270-019-02259-w

CIRSE

Check for updates

REVIEW

Basic Knowledge in Soft Tissue Sarcoma

Kévin Bourcier[1] · Axel Le Cesne[1] · Lambros Tselikas[2] · Julien Adam[3] · Olivier Mir[1] · Charles Honore[4] · Thierry de Baere[2]

Abstract Sarcoma is rare and heterogenous with various subtypes having a different prognostic. Desmoid is a tumour with a local aggressiveness; GIST with KIT mutation responds massively to target treatment as IMATINIB, whereas soft tissue sarcoma and leiomyosarcoma are very aggressive with poor response to systemic therapies. Interventional radiology plays an important role in the diagnosis of sarcomas with image-guided percutaneous core needle biopsy being the most commonly used biopsy technique in the diagnosis of sarcomas. Biopsy access routes discussed with the surgeon, and skin access is tattooed. Surgery is a mainstay of sarcoma treatment; the resection can be large. Indeed, resection objective is R0 because quality of surgical margins impacts local control and survival. Radiotherapy is possible in neoadjuvant or in adjuvant treatment to improve local control rate. Recently radiotherapy enhancer injected percutaneously in soft tissue sarcoma has proven benefit in increasing the rate of R0 complete surgical resection. Several studies showed better local control rate linked with post-operative radiotherapy. In patients affected by oligometastatic disease, complete surgical resection of all metastatic sites is in fact considered the primary treatment because complete remission is critical for cure. The decision making to use local therapies is complex, depends upon diverse presentations and histologies, and should always be taken in a multidisciplinary discussion. Today, percutaneous image-guided treatments with ablation technologies (radiofrequency ablation, cryotherapy, microwaves ablation) provide high rate of durable local control for small-sized malignant deposit in many organs including lung, liver and bones. Sarcoma must be managed by multimodality treatment in expert reference centres. Such management has a considerable impact on the prognosis.

Keywords Sarcoma · Soft tissue sarcoma · Stromal tumor · Interventional oncology

K. Bourcier et al.: Basic Knowledge in Soft Tissue Sarcoma Cardiovasc Intervent Radiol 2019 2019 Sep;42(9):1255-1261

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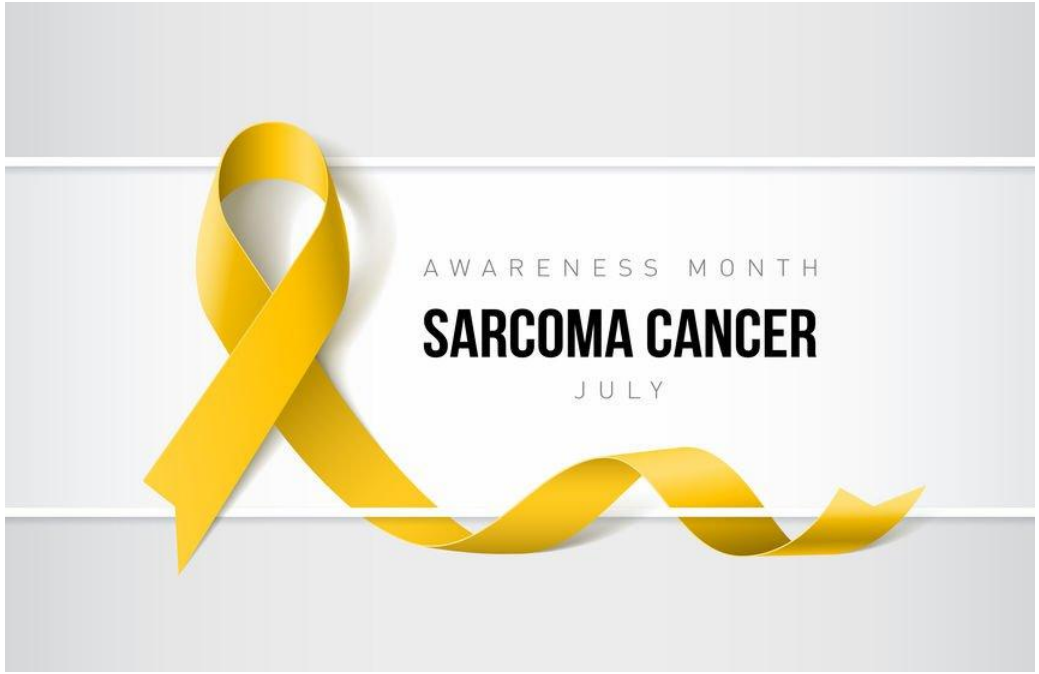
THANK FOR YOUR ATTENTION



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