



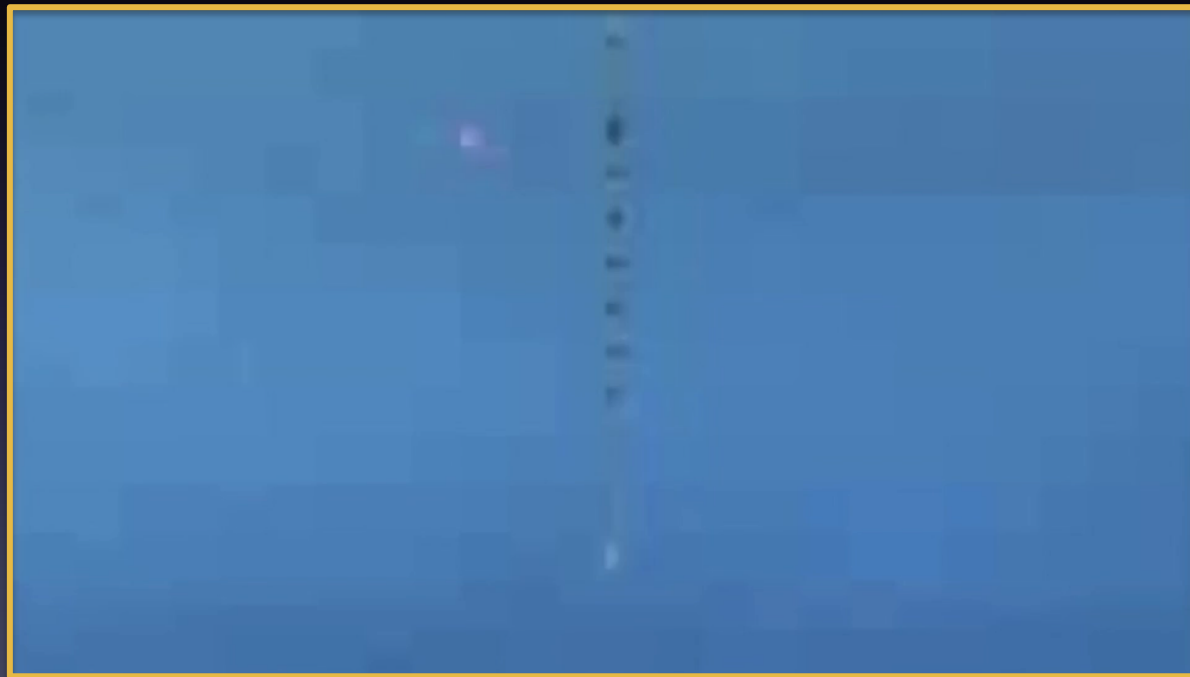
# Percutaneous bone tumor cryoablation: analysis of complications – A 10-year experience at a single center

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# Background

- Cryoablation: tumor destruction
- Ice ball formation

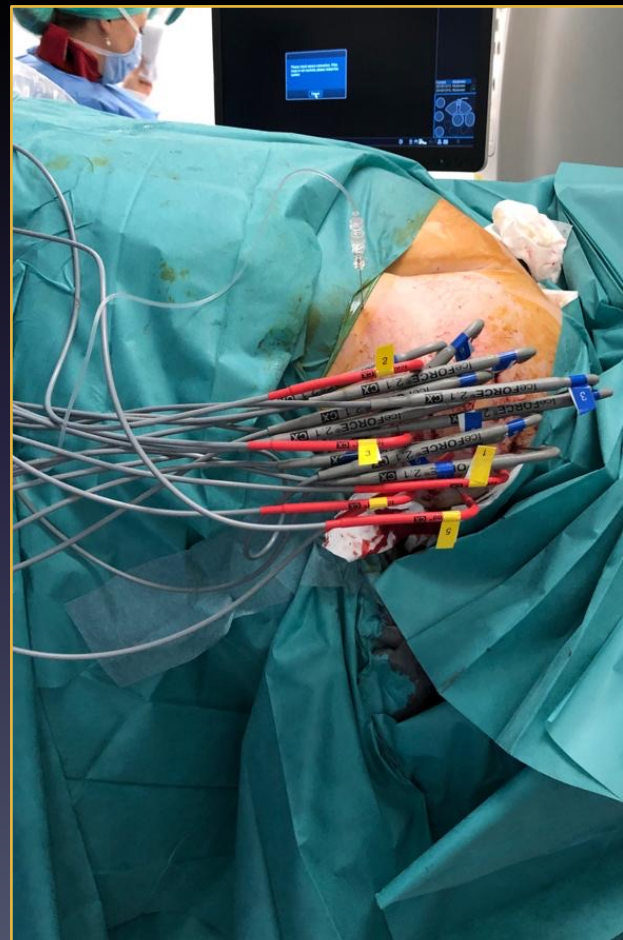
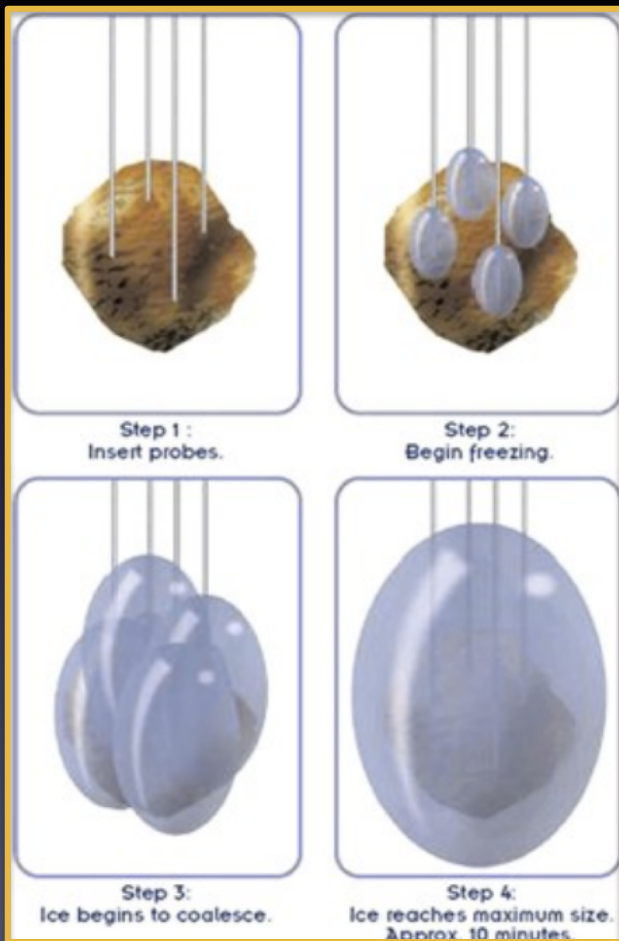


*Galil medical*

- Ice ball size: type and number of probes

# Background

- Ice ball size: type and number of probes



# Literature

Study	Nb of CA	Global complication rate	Major complication rate	Minor complication rate
Bang et al. ,2012	13	23%	7.7%	15.4%
Callstrom et al. ,2013	69	NR	2%	NR
McMenomy et al , 2013	19	NR	5.2%	NR
Tomasian et al. , 2016	31	6.4%	0%	6.4%
Whitmore et al. , 2016	29	21%	0%	21%
Gardner et al. , 2017	40	24%	16%	8%
Ma et al. , 2017	27	7.4%	7.4%	0%
Santiago et al. , 2018	21	14.3%	0%	14.3%

CA: cryoablation; NR: Not reported

# Objective

To assess complication rate and identify risk factors associated with percutaneous bone cryoablation

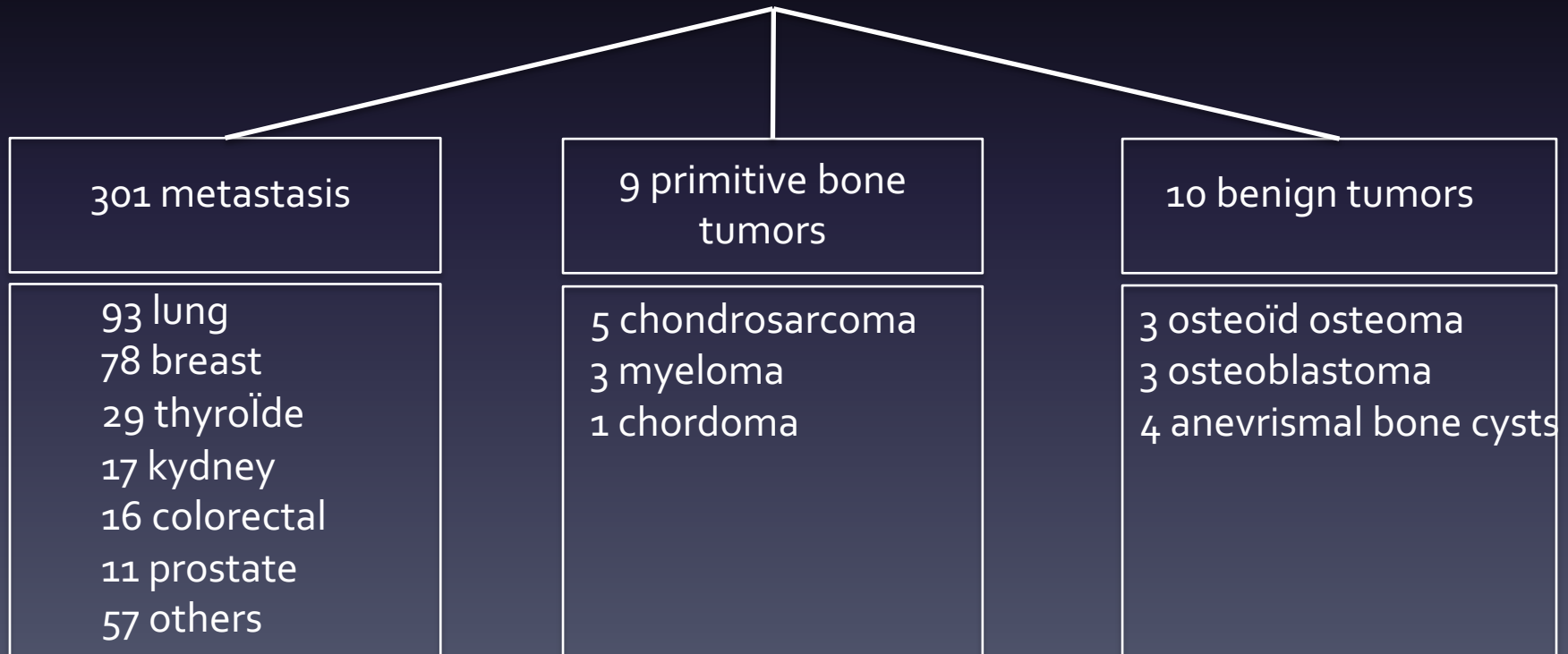
# Materials and methods

- Retrospective series

- ✓ 2008-2017

- ✓ 239 patients

- ✓ 320 bone tumors



# Materials and methods

- Complications

- classified according to the « common terminology criteria for adverse event version 5.0 »

- Statistical analysis

- To identify associated risk factors:
    - univariate analysis
    - multivariate analysis

# Results

- **Complication rate**

Complications	Rate (95% CI)
Global complications	9,1% ( 6 - 12,2)
Major complications	2,5% ( 2,8 - 4,2)
Minor complications	6,6% ( 3,9 – 9,3)



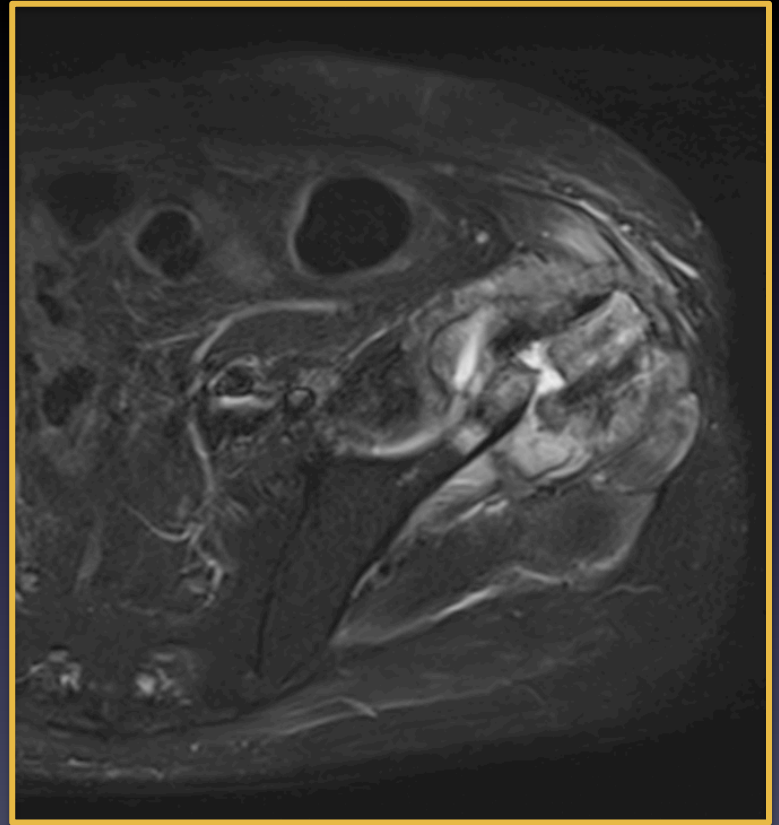
# Results

- Major complications

Complications	Grade, No. (%) of CA sessions	No. days until complication	Management
Fracture			
Acetabulum	3, 4 (1.2)	120	Screw
Acetabulum		103	Screw
Iliac wing		33	Cement + screw
Scapula		30	screw
Tumor seeding	3, 1 (0.3)	150	Surgery
Infection of CA site	3, 1 (0.3)	60	Surveillance
Arterial bleeding by trocars	3, 1 (0.3)	0	Hemostasis by cementoplasty
Hypotension	4, 1 (0.3)	0	Vasoactive drugs and intravenous fluid

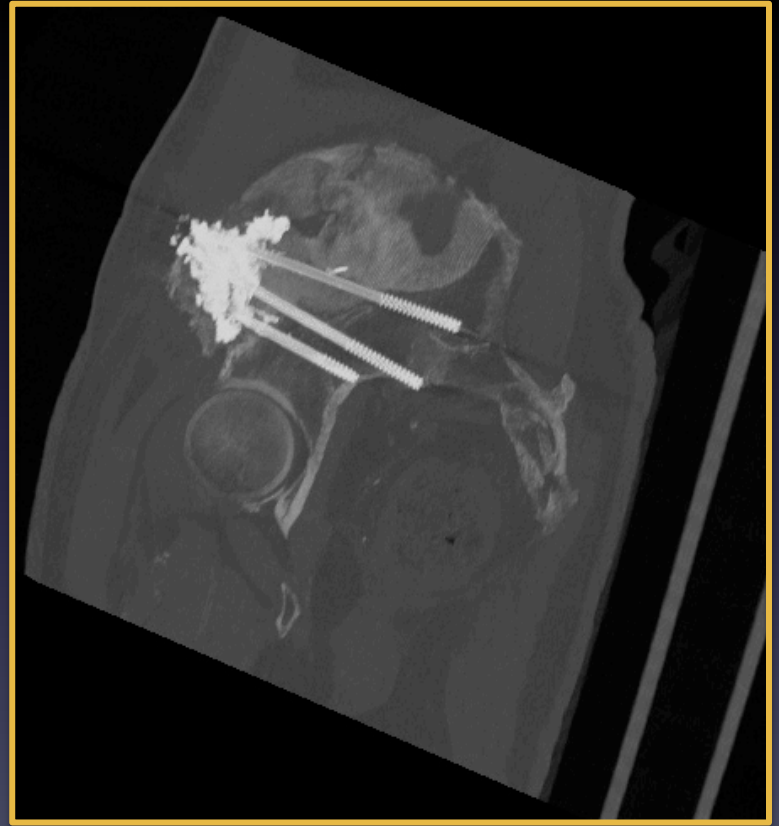
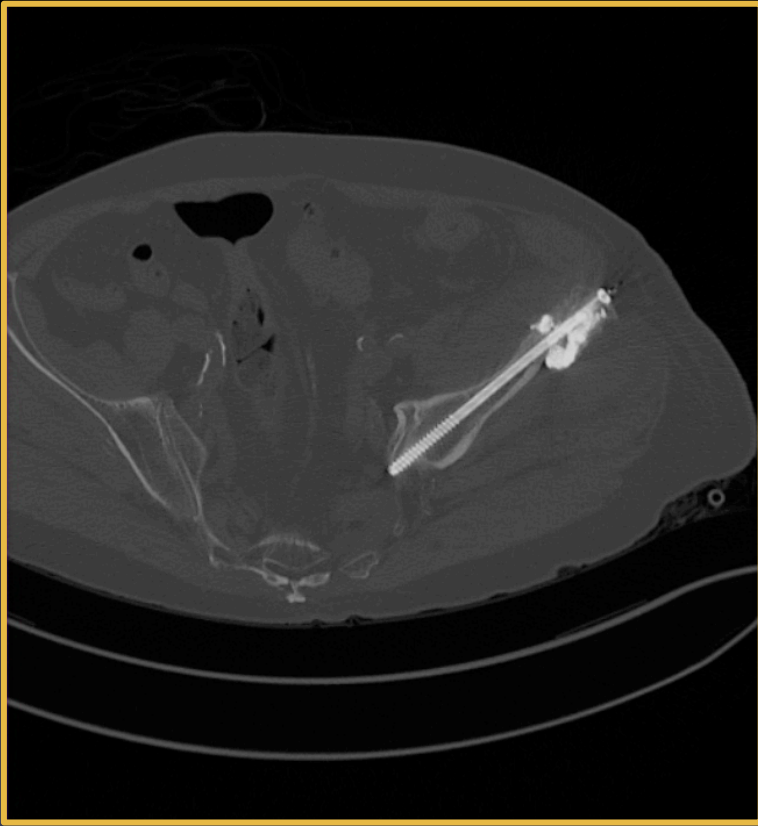
# Results

- Major complication



# Results

- Major complication



# Results

- **Minor complications**

Complications	Grade, No. (%) of CA sessions	No. days until complication	Management
✓ Pain	2, 7 (2.2)	0	Analgesics drugs or injection
✓ Peripheral motor and sensitive neuropathy	2, 3 (0.9)	0	None or corticotherapy
✓ Paresthesia	1, 3 (0.9)	0	None
✓ Skin burn	2, 1 (0.3)	0	Paraffin gauze dressing
✓ Arthropathy	2, 1 (0.3)	180	Articular infiltration
✓ Asymptomatic fracture	1, 2 (0.6)	0	None
✓ Acute urinary retention	2, 1 (0.3)	0	Urinary catheterization
✓ Infection of puncture site	2, 1 (0.3)	2	Antibiotics
✓ Venous skin bleeding	2, 1 (0.3)	0	Stitches
✓ Blocked trocar	1, 1 (0.3)	0	Coaxial method with larger needle

# Results

- Risk factors for global and major complications

Variable	Odd Ratio [95% CI]	<i>P value</i>
Risk factors for global complications		
✓ Age > 70	2.53 [1.02, 6.28]	.045
✓ Number of probes > 3	2.41 [1.01, 5.78]	.048
✓ Long bone	28.97 [3.21, 261.81]	.021
✓ Adjacent critical structures	4.71 [1.32, 16.87]	.017
Risk factors for major complications		
✓ Age > 70	5.06 [1.12, 22.85]	.035
✓ Number of probes > 3	19.56 [2.33, 164.17]	.006

# Discussion

- Literature :

- Global complications between 6,4 and 24%
- Major complications between 0 and 16%

- Gardner CS, Ensor JE, Ahrar K, Huang SY, Sabir SH, Tannir NM, et al. Cryoablation of Bone Metastases from Renal Cell Carcinoma for Local Tumor Control: *J Bone Jt Surg.* 2017 Nov;99(22):1916–26.

- Tomasian A, Wallace A, Northrup B, Hillen TJ, Jennings JW. Spine Cryoablation: Pain Palliation and Local Tumor Control for Vertebral Metastases. *Am J Neuroradiol.* 2016 Jan 1;37(1):189–95.

- Risk factors:

- Age
- Number of probes >3
- Long bone
- Adjacent critical structures

- The main major complication:

- Post cryoablation fracture

# Conclusion

- Percutaneous bone cryoablation is a safe procedure
- Bone cryoablation can result in up to 2.5% major complications, especially in elderly patients and more than 3 cryoprobes are used. The most common major complication is secondary fracture.

Thank you