Image-Guided Cryoaiblation for Desmoid Tumors: Successes, Challenges, and Lessons Learned

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PURPOSE

In this exhibit, we review selected cases from our experience with treating extra-abdominal desmoid tumors with cryotherapy. Imaging and treatment outcomes of several illustrative cases will be highlighted, focusing on technical considerations and lessons learned.

BACKGROUND

- Desmoid tumors, or aggressive fibromatoses, are rare benign fibrous neoplasms originating from the musculoskeletal structures throughout the body, most commonly in the rectus abdominis.
- Although desmoid tumors have no metastatic potential, they are locally aggressive and recurrence is common following surgical excision, necessitating investigation of alternative forms of therapy.
- Aside from watchful waiting and surgical excision, alternative treatment methods include radiation therapy, chemotherapy, hormone therapy, and most recently, percutaneous and non-invasive ablation, including cryotherapy.
- While several groups have reported successful treatment of desmoid tumors with cryoaiblation, the literature remains limited.

WHAT IS CRYOTHERAPY?

- Utilizing rapid expansion of argon gas ( Joule-Thompson effect), multiple repetitive cycles of rapid tissue freezing (-40°C) followed by slow thawing result in cell death.
- At -40°C intracellular ice forms. As temperatures approach -70 to -10°C during thawing, ice forms outside cells creating a hypothermic environment. Reversing intracellular water out. With further thawing, extracellular ice temporarily melts creating a transient hypoxic environment and water re-enters and expands the damaged cells resulting in membrane rupture.
- With multiple freeze-thaw cycles, extracellular ice accumulates, cells shrink, and cell membranes and organelles are severely damaged.
- Ice also forms in small blood vessels feeding the tumor, resulting in compromised blood supply with tissue ischemia and cell death.

REFERENCES


CASE 1 - How to avoid nearby structures

- 16 year old male with enlarging superficial abdominal mass.
- T2FlAIR (left) showed a desmoid tumor that reached the kidney, with adjacent fat edema and mild extracellular edema. A contrast-enhanced imaging study showed no significant abnormal enhancement or mass effect present.

CASE 2 - Potential complication and re-treatment

- 17 year old male with enlarging left posturalateral ankle mass.
- 1.5 years later, smaller and with less bright T2 signal. The mass is less apparent, no signs enlarging. Second series (not depicted) continues to grow.

CASE 3 - Cure

- 69 year old female presents with worsening left shoulder pain.
- Axial T1 T2 FSE FLAIR (left) shows the left shoulder shows an enhancing mass adjacent to the supraspinatus and subacromial bursa. The most likely diagnosis is a desmoid tumor. The mass demonstrates no enhancement.

CASE 4 - Recurrence

- 53 year old female with shoulder soreness and palpable mass.
- Axial T1 T2 FSE FLAIR (left) of the left shoulder shows a nodular enhancing lesion arising from the middle and upper axillary fat consistent with a desmoid tumor. A correlative imaging study shows a mass in the axillary fat.

CONCLUSIONS/LESSONS LEARNED

- Percutaneous cryoablation is a potential alternative treatment, as a first line option for growing, symptomatic desmoids or for recurrent/ refractory cases as a salvage option.
- Patients may be predisposed to recurrence at the periphery of the treatment zone. Small lesions away from vital structures are most amenable to this modality.
- Following therapy, continued imaging surveillance is required as treatment related deservation of the lesion may mask early recurrence.
- Long-term treatment outcomes are unknown, further research is needed to determine the efficacy of this modality.