Editorial

Ablation and the Art of In Situ Tissue Elimination

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Current oncologic practice has unambiguously incorporated the use of ablative technology as definitive therapy for both primary and oligometastatic malignancy. This is evidenced by the inclusion of multiple ablation modalities within international, societal, and interdisciplinary vetted guidelines. A welcome addition to the fight against cancer, ablation has had a long and impressive journey from its modest origins in rudimentary clinical practices to surpassing surgical resection as a first-line treatment in select patients.

Like any disruptive innovation, ablation was initially met with considerable uncertainty and skepticism by the oncology community. The notion of treating a tumor with curative intent while leaving it in the patient's body was not always as readily accepted as it is today. These hurdles were likely well placed, as there was much to learn regarding appropriate patient selection and both safe and effective use of ablation. Unlike surgery, which had a mature foundation of well-established principles, early ablation was propagated by a handful of dedicated champions but dabbled in by many with less experience. Thermal ablations were mistakenly viewed as mere replacements for the biopsy needle with little appreciation for granularities, such as tumor biology, which are essential to modern practice. As such, initial outcomes in widespread practice were not uniform and far from predictable, which amply refuted the potential capabilities of ablation. Results were further confounded by a meteoric rise in ablation technologies and a myriad of devices fueled by industry support.

Despite these obstacles, ablation advanced into its present-day position due to numerous irrefutable benefits in the eyes of both patients and physicians. Compared with surgery, ablation was cost-effective, safer, and offered shorter recovery times. It was easily repeatable and typically did not preclude other treatments. It could be performed in locations that were not amenable to resection with unrivaled parenchymal preservation. Data in support of ablation as comparable to resection in small tumors emerged and it eventually found use in various approaches to improve traditional surgical outcomes. These were all welcome additions to the fight against diseases notorious for tumor recurrence and in circumstances where quality of life was paramount.

As the discipline of interventional oncology developed, clinicians established groundwork to solidify best practices for ablation, set standards for both quality and research, and incorporate them into dedicated training programs. Critical elements for successful ablation such as thoughtful patient and device selection, staging, margin, mitigation of counteracting mechanisms, and avoiding collateral damage were incorporated into a reproducible procedural vernacular. These advancements demystified ablation, made it teachable, and improved data signal allowing for more confident scientific analyses.

As the spectrum of patients who were considered for ablation increased, so did the recognition of limitations, particularly those of its benchmark technology—radiofrequency ablation. Patients with early-stage tumors who were not candidates for surgery or thermal ablation created demands for alternative ablative technologies that could safely engage such tumors and expand curative potential. Although early in their development relative to their thermal counterparts, evolving nonthermal ablative modalities represent a promising addition to a fuller complement of personalized cancer treatments. Operators, interdisciplinary teams, and institutions should develop experience in parallel with these emerging technologies to remain agile and optimize patient care, regardless of disease presentation.

With the near explosive advent of immunooncology, it is becoming more evident that a sustained immune detonation may represent the closest that medicine has come to conceptually curing cancer. Although illusive to current efforts, future immune-based therapies may find tumor data too valuable to excise in lieu of the antigenic exposure made available by ablation.

Outside of oncology, ablation continues to broaden solutions to conditions which would otherwise be unobtainable, or come at increased morbidity. This includes standard of care treatments routinely used by the fields of cardiology, dermatology, gastroenterology, pulmonology, urology, gynecology, neurosurgery, vascular surgery, pain medicine, and many others.

Given these observations, it stands to reason that ablation has made incredible strides to its valued position in medicine today. Ultimately, the ability to eliminate tissue—without disturbing the natural state of the human body—will remain a perpetual aspiration in medicine which is perhaps best approximated with ablative science, at least for now.

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