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EDITORIAL

Preface to the Featured Topic "Image-guided Puncture"

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Image-guided puncture is a minimally invasive and fundamental technique used for various interventional radiology procedures, such as percutaneous ablation therapy [1-12], needle biopsy [1-5], and a variety of puncture and drainage procedures [13-25]. However, these procedures can still result in various complications at a certain frequency. Additionally, comprehensive review articles focusing on specific imaging modalities for performing percutaneous puncture are limited. Therefore, in this special issue, we have decided to focus on image-guided percutaneous puncture procedures, categorized according to imaging modality. Rapid advancements in imaging technology and medical devices have significantly enhanced our ability to perform safe and accurate procedures using various imaging modalities and tools, which are becoming increasingly integral to daily clinical practice.

One of the most remarkable features of magnetic resonance imaging (MRI)-guided puncture is the absence of radiation exposure to the operator [10, 11]. Understanding needle artifact characteristics is crucial for safe and accurate needle insertion. We are fortunate to have Dr. Uka contribute a comprehensive review on this topic [26], providing an in-depth exploration of the current state and potential applications of MRI-guided puncture procedures.

Computed tomography (CT)-guided puncture is distinguished by its ability to provide a clear view without any blind spots [2, 8, 12, 15]. This technique allows precise needle placement in areas that are challenging to visualize with ultrasound, such as lesions situated deep within the body or in regions obstructed by air. However, meticulous attention must be paid to radiation exposure by the operator, particularly during CT fluoroscopy-guided procedures. We have invited Dr. Takaki to provide a detailed review on CT-guided puncture [27], highlighting its strengths and the nuances of its application in complex anatomical contexts.

Ultrasound-guided puncture, known for its simplicity and real-time imaging capability, remains the fundamental technique for ensuring accurate needle placement [22, 25, 28]. However, since ultrasound images are not objective, the success of the procedure often depends on the operator's skill, including precise imaging and probe handling. Dr. Sato has been asked to author a review article on ultrasound-guided puncture [29], detailing the skills necessary to proficiently handle both the ultrasound probe and needle for effective procedural outcomes.

Despite the advancements of these image-guided puncture techniques, some challenging cases still remain mainly due to high risk and complicated anatomy. In the final article of this special issue, I discuss several adjunctive techniques and specific devices for successful procedures in challenging cases using a literature review. These adjunctive techniques include not only the techniques of puncture but also advanced image guidance. Knowledge of these modified/adjunctive techniques and their application must be useful in clinical practice [30].

It is imperative that interventional radiologists conduct safe and precise percutaneous procedures based on accurate imaging guidance. We hope that this collection of review articles will provide valuable insights and practical knowledge that will enhance readers' clinical practice and support their ongoing efforts to deliver high-quality care.

By featuring review articles categorized by each modality—MRI-guided puncture, CT-guided puncture, ultrasound-guided puncture, and image-guided puncture in challenging cases—we could contribute, even if only slightly, to standardizing these image-guided puncture techniques. We sin-

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cerely hope that this special issue will be a useful resource for our readers and will contribute to better patient care in their daily clinical practice.

Conflict of Interest: None

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