

Supplementary information

Hematoxylin and eosin (H&E) protocol. The samples were fixed with 4% neutral formaldehyde solution at room temperature for 12-24 h, were paraffin-embedded (FFPE) and cut into 5- μ m thick sections after deparaffinization and rehydration. The sections were stained with hematoxylin solution for 5 min at room temperature followed by 5 dips in 1% acid ethanol (1% HCl in 70% ethanol) and then rinsed in distilled water. After which, the sections were stained with eosin solution for 3 min at room temperature, followed by dehydration with graded alcohol and clearing in xylene. The mounted slides were then examined using an Olympus BX53 light microscope (Olympus Corporation).

Immunohistochemistry (IHC) protocol. Samples were fixed in neutral formaldehyde solution (4%) at room temperature for 12-24 h, paraffin-embedded (FFPE) and cut into 4- μ m-thick sections. The sections were dried, deparaffinized

and dehydrated in a graded ethanol series. The antigen was retrieved by a high-pressure method using alkaline pH (pH 8.0) for 1 min, and then washed by phosphate buffered saline (PBS) 3 times. After which, the tissue sections were treated with 1% hydrogen peroxide for 10 min to block endogenous tissue peroxidase activity and non-specific protein binding. The slides were incubated with primary antibodies including PAX8, SDHA, SDHB, CAIX, CK7, CD10, CD117, P504S, Vimentin, E-Cadherin, HMB45, Cathepsin K, Melan-A, S-100, TFE3, TFEB, fumarate hydratase (FH) and Ki67 (the detailed information was seen in Table SI) overnight at 4°C, followed by incubation at room temperature for 30 min with the Ultra-Sensitive S-P Kit (containing the secondary antibodies; Fuzhou Maixin Biotech Co., Ltd.; cat. no. KIT-9710). The slides were washed with PBS before color development using a 3,3'-diaminobenzidine substrate kit for 3-10 min and were then counterstained with hematoxylin at room temperature for 1-2 min, before visualization with an Olympus BX53 light microscope (Olympus Corporation).

Figure S1. Followed-up by CT examinations. CT scans in (A) January 2022, (B) July 2022, (C) January 2023, (D) July 2023 and (E) July 2024 showed no signs of recurrence or metastasis.

