Imaging diagnosis

3. Gall bladder cancer

[Progress]

He underwent endoscopic surgery. Pathological findings revealed moderate adenocarcinoma of the gall bladder. Rapid pathologic findings during operation reported atypical lymphoid proliferation. However, permanent pathology revealed small volume metastatic carcinoma in the margin (Fig. 2).

[Discussion]

Apparent diffusion coefficient (ADC) is a slope calculated by the signal intensity measured by logarithmic graph: longitudinal axis = signal intensity by logarithmic expression, horizontal axis = strength of motion probing gradient. Namely, it is calculated as formula: signal intensity at b0 (no MPG) – signal intensity at b2000 (MPG 2000)/ 0-2000 (1). The answer should be, minus but it is demonstrated as plus instead of minus probably easy to be accepted.

ADC values indicate the momentum of water molecule diffusion. Extracellular pure water owns the strongest momentum of water molecule, followed by intracellular water. Human body cells require water and tumor cells also do it for their survival. However, tumor cells proliferate at random which tend to induce the narrow extracellular space, indicating ADC values of tumor tend become lower than those of the surrounding body tissue. However, brain cells exist in densely compact, inducing low ADC values around 0.75, compared to glioblastoma and metastatic tumors, around 1.0. Then, the signal intensity of malignant tumors, irrespective of both tumors of primary and metastatic, does not elevate compared to brain parenchyma, inducing that clinical merits of DWI on demonstrating these tumors are limited (2).

Meanwhile, ADC values of liver are around 1.2 to 1.4, while ADC values of hepatoma, cholangiocarcinoma and metastatic tumors are around 1.0, 1.2, and 0.9, respectively. Then, Diffusion WI is useful to demonstrate these malignant tumors as high signal intensity (3).

Further, ADC values of prostate gland are around 1.2 to 1.5, while ADC values of prostate cancer are around 0.6 to 1.2, indicating a little wider range. It is reported that prostate cancer progress from atypical nodule, high grade differentiate carcinoma, moderate grade differentiate carcinoma, low grade differentiate carcinoma (4-7). Based on my experiences, Gleasson 6 to 9 corresponded to ADC value 1.2 to 0.6 (Gleasson 7 is corresponded to ADC value of 0.7). Then, Diffusion WI is useful for identifying prostate cancer since it demonstrate prostate cancer as high signal intensity compared to prostate gland.

ADC values of gall bladder cancer were around 1.0 in this series, those of our past case with gall bladder cancer (Case 353) was around 0.85 and those of liver metastases from gall bladder cancer was around 0.65. Gall bladder cancer progress from high grade-, moderate grade- to low grade-adenocarcinoma, inducing to make ADC values lower along with tumor grading (8-10). ADC values are reported to be useful to differentiate gall bladder cancer from xanthogranulomatous cholecystitis because ADC values of xanthogranulomatous cholecystitis are around 1.63 (11).

Of the six sequences, Diffusion WI is the best sequence to demonstrate the site of gall bladder cancer and metastatic lymph nodes followed by fat suppression T1WI.

【Summary】

We presented a seventy-five-year-old male whose gall bladder mural became gradually thickening as months progress. Endoscopic surgery revealed gall bladder cancer with lymph nodes metastasis. It is borne in mind that MRI diffusion WI was the best of the six MRI sequences to demonstrate the presence of the tumor with metastatic lymph nodes. ADC values of 1.1 or less of gall bladder mural thickness reflect malignancy, useful to differentiate from other benign gall bladder mural thickness such as gall bladder myosis or xanthogranulomatous cholecystitis whose ADC values of 1.2 or greater.

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