



CT and MRI of pancreatic cancer: there is no rose without a thorn!

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Pancreatic cancer (PC) has a very dismal prognosis, with an overall 5-year patient survival rate of 8% [1]. The only chance for cure is complete surgical tumour removal combined with neo- and/or adjuvant chemotherapy-based regimens. However, at diagnosis, only 15–20% of patients are surgical candidates, whereas approximately half of patients have distant metastases [1]. Furthermore, the probability of metastatic disease at diagnosis is 28% for 1 cm tumours and 94% for those of 3 cm [2]. Among the sites of distant metastatic disease, the liver is the most common.

Traditionally, the presence of liver metastases has been regarded as a contraindication for any potentially curative treatment strategy [3]. However, recently published retrospective data on improved survival of patients with oligometastatic disease who underwent liver metastasectomy compared to those without metastasectomy have revived the discussion [4]. Particularly in patients with tumours in the pancreatic head, the overall survival post metastasectomy of oligometastatic liver disease was significantly higher compared to standard care, whereas in patients with tumours in the body/tail there was no survival benefit post metastasectomy [4]. Thus, the detection of liver metastases in patients with potentially resectable PC—and to some extent even the disease burden—is of utmost importance for clinical decision-making.

CT is the recommended method for the evaluation of patients with PC since it provides information on the local extent of the primary tumour as well as on the presence of intra- and extra-abdominal metastases [3]. However, for the detection of

liver metastases, MRI with liver-specific contrast agent and DWI is, in general, the preferred option [5]. In an ideal world, all patients with potentially resectable PC should undergo liver MRI to investigate the presence of liver metastases and, thus, allow confident clinical decision-making. However, as a result of strained resources and limited availability, this option is not widely feasible.

Thus, the critical question is: in which subgroup of patients with potentially resectable PC would it be of value to add liver MRI in the diagnostic workup after performing a staging CT? Should only patients with indeterminate or suspicious metastatic lesions found on CT be referred for an additional liver MRI or do even patients with benign or even no lesions benefit from an additional MRI? The work by Jeon et al. [6] illustrates that the value of additional liver MRI with extracellular contrast agent and DWI is high in patients with indeterminate and suspicious metastasis on the initial staging CT. Two independent readers could identify that 11% and 13% of patients, respectively, with lesions indeterminate on CT corresponded to metastases. Furthermore, the two readers could correctly classify 8% and 27% of patients, respectively, with suspicious metastases on the initial staging CT as not having metastases, and this could have led to a potential change in treatment strategy (i.e. from palliation to potential curative treatment). In line with previous work on the use of gadoteric acid-enhanced MRI without DWI [7], lesions that were difficult to detect (false negative results) or characterise (false positive results) on the initial staging CT were smaller than 1 cm. Thus, if only sub-centimetre liver lesions are detected on the initial staging CT, further evaluation with liver MRI is beneficial since it is difficult to confirm or exclude metastatic disease. On the contrary, if metastatic lesions larger than 1 cm are detected, then the addition of liver MRI is of limited value.

Additionally, in 133 patients with benign or no lesions found with CT, the readers in the work by Jeon et al. could—after the addition of MRI—identify only two (1.5%) and three (2.3%) additional patients, respectively, with liver metastases [6]. Interestingly, in analogous evaluations of the adjunctive role of liver MRI and DWI in patients with potentially resectable

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cancer, 5–10% of patients with an initial CT negative for metastases were shown to have metastases after the addition of liver MRI [8, 9], a percentage two to four times as high as in the work by Jeon et al. [6]. Additionally, Kim et al. found that the risk of having liver metastases was higher in patients with borderline resectable (vs. upfront resectable) tumours, tumours larger (vs. smaller) than 3 cm and preoperative CA 19-9 greater than 1000 U/mL [8]. Thus, the probability of liver metastases in patients with potentially resectable PC and an initial CT negative for metastases is reported to vary between 2% and 10% [6, 8, 9]. This implies that for patients in whom a good quality initial staging CT shows benign or no lesions at all, the existing data that an additional liver MRI with DWI will be beneficial are contradictory. It remains to be seen whether or not a patient subgroup with specific characteristics as described in the work by Kim et al. (i.e. borderline and/or tumours larger than 3 cm and/or CA 19-9 greater than 1000 U/mL) may potentially benefit from the addition of a liver MRI to the negative-for-metastases staging CT.

Furthermore, the rate of false positive (for metastases) results of MRI including DWI in the current work by Jeon et al. was 1–2% (two and one of 133 patients, respectively) which is also in line with earlier reports [8–10]. This highlights the need to keep in mind the small—but still existing—risk of liver metastases overestimation with liver MRI, irrespective of the contrast agent characteristics (extracellular or liver-specific). In particular, small peripheral liver abscesses may simulate metastases. The presence of clinical and/or laboratory findings indicative of cholangitis plays a critical role in assessing the correct diagnosis.

The work by Jeon et al. has added valuable information to the very interesting and clinically relevant topic of the investigation of liver metastases in patients with potentially resectable PC. Initial staging CT is the undisputed method of choice (i.e. “the rose”) for the evaluation of local tumour extent as well as intra- and extra-abdominal metastases. However, in the evaluation of small hepatic lesions, liver MRI with DWI addresses the limitations of CT (i.e. “the thorn”) well, which illustrates the complementary role of CT and MRI in pancreatic cancer.

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