

Explorations of the extent of peritoneal metastases

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Surgery can improve the life expectancy for cancer patients whose tumors have spread onto the abdominal lining, i.e., peritoneal metastases. This extensive surgical procedure removes all visible tumors on the abdominal lining and has a high risk of severe complications. More importantly, not all patients will benefit from this aggressive approach. Therefore, careful selection is necessary to provide the most optimal care to each patient. The extent of abdominal disease determines the potential benefit from surgery; more disease often means less local control after surgery. The problem is that CT cannot accurately depict PM. This means that the surgeon can only accurately determine the extent of disease either during open or minimally invasive surgery. However, surgical staging is invasive with risks of complications. In addition, the surgeon cannot always assess every abdominal region due to tumor lesions and adhesions.

Part 1 of this dissertation focuses on how surgeons best describe the extent of PM found in patients with ovarian cancer. A systematic approach could allow for uniformity among treating hospitals and provide valuable information to guide treatment decisions. An international standard has already been decided upon for PM of colon cancer, namely the Peritoneal Cancer Index. This scoring system could very well be used in ovarian cancer, but other systems are also used in ovarian cancer. We summarized the performance of all tested scoring systems and also evaluated the performance of the seven region count. We found that a greater extent of PM was associated with not achieving meaningful surgery and recurrence of disease and a lower life expectancy after meaningful surgery. This shows valuable information to be won by carefully describing the extent of PM from ovarian cancer in a scoring system.

Part 2 of this dissertation explores the possibility of obtaining detailed knowledge concerning the extent of peritoneal without the need to perform surgery. This would allow the operating physician and patient to make important decisions regarding treatment options without needing surgery first. From the literature, we compared the performance of three imaging techniques that could detect PM and found that magnetic resonance imaging (MRI) has the most potential. In a small group of ovarian cancer patients, we tested an MRI scan that was specifically tailored to detect PM, and we were able to be as accurate as surgery. In addition, we showed that the Peritoneal Cancer Index determined on MRI in colon cancer patients correlated with life expectancy, one of the reasons why this scoring system is routinely determined during surgery. We also demonstrated that we could use MRI to show distinct patterns of peritoneal metastases spread depending on the location of the original colon tumor in the abdominal cavity, which might explain the differences in prognosis between left and right colon cancer. Finally, we share the reasoning and methods of a clinical trial

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that will determine whether MRI effectively relieves the need for surgery to determine the extent of PM for patients with colon cancer.

In conclusion, MRI can effectively describe PM from ovarian and colon cancer. Therefore, MRI can play an essential role in clinical decision-making before surgery. This will likely prevent patients from receiving unnecessary surgery and allow surgeons to be better prepared for the extensive surgical procedure.

This research supports the use of MRI as a valuable addition to the diagnostic toolbox of a surgeon or gynecologic oncologist considering operating on a patient with PM. As a result, our research group has initiated further investigations towards the role of MRI for these patients. Two studies are ongoing in different hospitals around the Netherlands, one for ovarian cancer patients and one for colon cancer patients. If these studies show positive results, MRI will likely become part of the standard diagnostic workup of the patients in the Netherlands. The results will then also inspire other national or international guidelines as well. Furthermore, we have already had the privilege of sharing the research presented in this dissertation at national and international meetings in radiology, surgery, and gynecology, such as the European Congress of Radiology and the Peritoneal Surface Oncology Group International.

The research in this dissertation will hopefully lead to meaningful improvements in the diagnostic workup of patients with PM, open doors to new treatment decisions, and allow for more patient involvement in these decisions.

