1 General introduction and outline of the thesis
The liver and lung are common sites of metastatic disease of haematogenous spread of solid tumours since all drainage from the portal basin is through the liver, and caval blood first passes through the lungs. Systemic therapy should be treatment of first choice in disseminated disease. Unfortunately, current systemic therapies rarely offers cure and have only minimal impact on survival.\textsuperscript{1-4} In some malignancies however, growth kinetics of metastases are slow, the occurrence of metastases is limited in numbers and spread initially only to a single organ. In this situation one could consider local therapy instead of systemic therapy. For justification and effectiveness of surgical treatment for metastatic disease, as a rule, three considerations are of paramount importance: absence of local relapse or persistence of the primary tumour, absence of disseminated disease other than the index lesions, removal of all gross tumour should be pursued with maximal conservation of functional tissue. Due to these starting points only a small number of patients are deemed suitable for surgical removal or other types of local or regional eradication of metastatic disease. Surgical management of hepatic and pulmonary metastatic disease is not a new concept. The first resection of a metastatic liver lesion was reported in 1888 by Garre and in 1882 Weinlechener published the first resection of metastatic pulmonary disease.\textsuperscript{5,6} Better knowledge of biologic determinants of malignant disease, improved understanding of functional anatomy and important advances in technology, surgical technique and postoperative care have improved the outcome of metastasectomy. Nowadays, 5 year survival rates up to 30-40\% after complete surgical resection of both hepatic and pulmonary metastases can be reached.\textsuperscript{1,2,7-13} The eligibility criteria for metastasectomy thus have been broadened in the last decades. However, surgery can only be justified if operative mortality remains substantially below anticipated 5-year survival rates with reasonable morbidity. Nowadays postoperative mortality and morbidity has decreased to less than 5\% and 25\% respectively.\textsuperscript{9,14} In this thesis we focus on several aspects of surgical management of hepatic and pulmonary metastases.

In chapters 2, 3, 4 and 5 aspects of surgical management of hepatic metastases are addressed. The aim is the surgical removal of all metastatic disease. If this aim is not achieved, survival will hardly be influenced and patients are faced only with morbidity or even mortality of the surgical procedure. Thus, part of success of surgical treatment is good patient selection. In chapter 2 an analysis of potentially prognostic factors for morbidity and mortality of liver resection for metastatic disease of all primaries is described. Identification of prognostic factors that determine outcome can help to categorize different patient groups. This can be helpful in choosing the optimal treatment for an individual patient. Of all metastatic liver malignancies colorectal metastasis is the most common indication for hepatic resection. In chapter 3 a determination of prognostic factors and outcome after partial hepatectomy for colorectal metastases is reported. Recently, more data of hepatic surgery in non-colorectal cancer has become available,
suggesting in selected cases a survival benefit with an estimated overall 5-year survival in most published series of approximately 20% \textsuperscript{15-18}. In chapter 4 our results of resection of liver metastases of non-colorectal origin are compared with those found in literature.

In the past few years new techniques for local management of resectable and unresectable liver malignancies have become available. These include thermoablation with either cryoprobes, interstitial laser coagulation and radiofrequency ablation devices. Chapter 5 reports on the initial experience with radiofrequency ablation for hepatic tumours in the Netherlands.

In chapters 6, 7 and 8 we focus on pulmonary metastases. The majority of these metastases are located in the periphery of the lung, frequently even immediately subpleural and thus can be easily removed by (multiple) small excisions \textsuperscript{19}. A deep-seated tumour or central lesion, on the other hand, may require lobectomy or even pneumonectomy. Principally, the latter procedure is in contradiction to the aim for an optimal functional result after surgery and therefore hardly ever indicated for metastatic disease.

The increasing enthusiasm with relation to minimally invasive techniques in the last decades has resulted in the emerge of a new therapeutic modality in thoracic surgery: thoracoscopic resection. Improvements in video camera technology and the development of percutaneous endoscopic instruments have created new possibilities for thoracoscopic resection of lesions in the lung parenchyma, for example lung metastases. The main advantage of the thoracoscopic technique lies in the limited surgical trauma with consequently decreased morbidity \textsuperscript{20,21}. The peripheral location of pulmonary metastases enables removal of the metastases by wedge resection with the stapling technique. Nevertheless, the main concern about this approach is that, although thoracoscopy allows an excellent exposure of the lung surfaces, it does not permit complete lung palpation to identify metastatic lesions not detected by radiologic imaging \textsuperscript{22}.

The objective in chapter 6 is to evaluate the results of thoracoscopic pulmonary metastasectomy controlled by a confirmatory thoracotomy in the same patients. Chapter 7 compares the outcome of metastasectomy by thoracoscopy with that of thoracotomy in patients who presented with a single lesion. In chapter 8 a case report of a patient presenting with a port-site recurrence after thoracoscopic pulmonary metastasectomy is described.

Based on the encouraging results of hepatic and pulmonary metastasectomy and the introduction of minimal invasive techniques, it seems plausible that there may be an indication for this approach in selected patients with both liver and lung metastasis. In chapter 9 our experience with metastasectomy in patients with synchronous liver and lung metastases is described.

In chapter 10 the respective findings are discussed and integrated.
References


