

## REVIEW ARTICLE

# Pancreatectomy combined with multivisceral resection for pancreatic malignancies: is it justified? Results of a systematic review

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## Abstract

**Background:** Multivisceral resections combined with pancreatectomy have been proposed in selected patients with tumor invasion into adjacent organs, in order to allow complete tumor resection. Some authors have also reported multivisceral resection combined with metastasectomy in very selected cases. The utility of this practice is debated. The aim of the review is to compare the postoperative results and survival of pancreatectomies combined with multivisceral resections with those of standard pancreatectomies.

**Methods:** A systematic literature search was performed to identify all studies published up to February 2017 that analyzed data of patients undergoing multivisceral and standard pancreatectomies. Clinical effectiveness was synthesized through a narrative review with full tabulation of results.

**Results:** Three studies were retrieved, including 713 (80%) patients undergoing standard pancreatectomies and 176 (20%) undergoing multivisceral resections (MVR). Postoperative morbidity ranged from 37% to 50% after standard resections and from 56% to 69% after MVR. In-hospital mortality ranged from 4% after standard pancreatectomies to 10% after MVR. Median survival ranged from 20 to 23 months in standard resections and from 12 to 20 months after MVR, without significant differences.

**Discussion:** The current literature suggests that multivisceral pancreatectomies are feasible and may increase the number of completely resected patients. Morbidity and mortality are higher than after standard pancreatectomies, and these procedures should be reserved to selected patients in referral centers. Further studies on the role of neoadjuvant therapy in this setting are advisable.

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## Introduction

Surgical resection with adjuvant chemotherapy represents the only potentially curative treatment for pancreatic malignancies. Five-year survival approaches 25% for patients undergoing complete surgical resection, in combination with chemotherapy.<sup>1,2</sup> In recent time, several strategies have been tried in an effort to increase the proportion of patients with pancreatic

malignancies offered potentially curative surgical resection. These have included the use of neoadjuvant chemoradiation therapies based on the potential theoretical benefits of reduction of tumor volume and increase of complete resection rate.<sup>3–5</sup> Portal and mesenteric vein resections are recommended in patients with venous invasion.<sup>6,7</sup> Arterial resections have been also proposed to increase the R0 resection rate, but they are still controversial.<sup>8</sup>

Multivisceral resections have been proposed in selected patients with invasion of adjacent organs, in order to allow a complete tumor resection.<sup>9</sup> Some authors have emphasized the increase of postoperative morbidity and mortality after multivisceral resections during pancreatectomy,<sup>9</sup> whereas others have reported postoperative outcomes similar to standard resections.<sup>10</sup> Nevertheless, the utility of this practice is still debated. Neither meta-analyses nor randomized trials have been published on this subject. Therefore, the aim of this study was to perform a systematic review of the literature to evaluate the role of multivisceral resections combined with pancreatectomy for pancreatic malignancies based on the short and long term outcomes as compared to standard pancreatectomy.

## Methods

### Study selection

A systematic literature search was performed using Embase, Medline, Cochrane, and PubMed databases to identify all studies published up to and including February 2017 that analyzed the postoperative outcomes and the overall survival of patients undergoing pancreatectomy combined with multivisceral resection for pancreatic malignancies. The systematic review was conducted according to the PRISMA guidelines.<sup>11</sup> The following MESH search headings were used: “multivisceral OR extended OR adjacent organs”, “pancreatic cancer OR pancreatic carcinoma OR pancreatic adenocarcinoma OR pancreatic tumor”, “pancreatectomy OR pancreaticoduodenectomy OR pancreatoduodenectomy OR distal pancreatectomy OR duodenopancreatectomy OR pancreatic resection”. The “related articles” function was used to broaden the search, and all abstracts, studies, and citations scanned were reviewed. Using the criteria of the PRISMA statement, two authors (GG and ES) independently searched the literature for relevant studies. The abstract screening led to identification of the papers eligible to systematic review. A third author (NP) carried out conflicts.

### Inclusion and exclusion criteria

Studies included were required to compare characteristics, perioperative outcomes and/or overall survival of patients undergoing pancreatectomy with or without multivisceral resection for pancreatic malignancies. Multivisceral resections were defined as resection of one or more adjacent organs that are usually not resected during pancreatectomy. Splenectomy associated with distal pancreatectomy was not considered as a multivisceral resection. Venous resections were not considered as multivisceral resection. Only patients with pancreatic malignancies were included; patients submitted to pancreatectomy associated with multivisceral resection for tumors originating from other organs or for metastases to the pancreas from other origins were excluded from the analysis. Non-pancreatic cancers were excluded because comparison of survival data would be biased. Furthermore, also loco-regional spreading patterns are

different between different types of tumors (vascular invasion, nodal invasion), and may have an impact on perioperative decisions and outcomes.

The following types of studies were not considered for inclusion in the systematic review: (i) studies in which the outcomes of interest for pancreatectomies with multivisceral resections were not reported or were impossible to calculate; (ii) studies where no comparison with standard pancreatectomies was reported; (iii) “how I do it” articles, animal studies, case reports, and non-English language studies.

### Quality assessment

Three reviewers, according to the Newcastle–Ottawa Scale (NOS) for non-randomized studies,<sup>12</sup> reviewed all selected studies for methodological quality. Final scores were reached by general consensus. The Cochrane Collaboration’s tool for assessing risk of bias in individual studies was also used by three independent authors,<sup>13</sup> and conflicts were ruled out by discussion.

### Data extraction

Data were extracted on the base of a piloted form and registered in a spreadsheet for comprehensive analysis. Two reviewers independently extracted the following information from each study: first author, year of publication, study design, study population characteristics, tumors’ characteristics, surgical techniques, and survival outcomes, according to the magnitude of the surgery (standard or multivisceral pancreatectomy).

### Outcomes of interest and definition

All studies were abstracted for the following relevant data: patient baseline characteristics (age, gender), tumor characteristics (histology, staging, tumor volume), type of procedure and adjacent organ resection, definitive resection margins, lymph node involvement, postoperative morbidity and mortality, survival data. A meta-analysis was considered not appropriate because studies were heterogeneous. Clinical effectiveness was synthesized through a narrative review with full tabulation of results of the included studies.

## Results

### Study selection

Systematic search process is showed in Fig. 1. Three studies evaluating the outcomes of standard and multivisceral pancreatic resections for malignancies of the pancreas met inclusion criteria. The included studies were published between 2009 and 2015<sup>14–16</sup> and included patients accrued between 1992 and 2014. A total of 889 patients were included of which 176 (20%) underwent MVR resection. All the included studies were single institution retrospective reports, from Germany. New Castle–Ottawa scale score was 7 for each of the three studies. One study<sup>16</sup> matched patients with or without multivisceral resection using type of surgery, age, gender and histology.

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