Metastases of gastric cancer into the liver – the authors’ own experience and literature review

Marek Krawczyk, Michał Skalski, Michał Grąt, Piotr Krawczyk, Oskar Kornasiewicz

Department of General, Transplant and Liver Surgery, Medical University of Warsaw, Poland

Introduction. Synchronous metastases of gastric cancer to the liver occur in 3–14% of patients with this cancer, and metachronous lesions in 37% of patients after radical gastrectomy. Liver resections due to metastases of gastric carcinomas represent only 5–9% of resections due to metastases other than colorectal cancer. Until recently, patients with gastric carcinoma metastases to the liver were classified in the IV stage of cancer and the therapy was limited to chemotherapy or palliative treatment only.

Material and methods. The paper presents a current review of literature and the authors’ own experience with liver resection due to gastric cancer metastases into this organ. During 34 months, 488 patients with liver metastases were treated in the Department of General, Transplant and Liver Surgery, of the Medical University of Warsaw, in whom 426 surgical procedures were performed (87.3%). The types of surgical procedures are as follows: minor liver resections in 204 patients (47.9%), hemihepatectomies in 102 patients (23.9%), thermoablations in 86 patients (20.2%) and laparotomies in 34 patients (8.0%). Among patients treated for liver metastases there were 4 patients with metastases from gastric cancer (0.8%), which constituted 1% of patients operated on, but 6.8% of patients with liver metastases from organs other than colorectal cancer. The postoperative course and direct results in all patients operated because of gastric cancer metastases into the liver were very good.

Conclusions. In some patients (single metachronous metastasis, no extrahepatic lesions, no peritoneal lesions, with subsequent chemotherapy) liver resection due to metastases from gastric cancer provides a chance for a longer survival.

Key words: gastric cancer, metastases, liver, surgical treatment
cancer patients with single stage factor, i.e. a liver metastasis [10]. Since then, the approach of surgeons has been changing and they more and more often remove gastric cancer metastases from the liver [11–14].

### Material

At the Department of General, Transplant and Liver Surgery of the Medical University of Warsaw, 488 people were treated within 34 months due to liver tumor metastases. In the whole group, patients with gastric cancer metastases constituted 0.8% (4 patients) (Tab. I). After analyzing the number of patients with liver metastases only from organs other than colorectal cancer, it turned out that the percentage of patients with metastases of gastric cancer was already 6.8% (Tab. II).

Out of all 488 patients with liver cancer metastases, 426 patients (87.3%) received surgery (Tab. III).

#### Table I. Patients with liver metastases

<table>
<thead>
<tr>
<th>Primary lesion</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorectal cancer</td>
<td>429 patients</td>
<td>87.9%</td>
</tr>
<tr>
<td>Eye or skin melanoma</td>
<td>18 patients</td>
<td>3.7%</td>
</tr>
<tr>
<td>Kidney cancer</td>
<td>9 patients</td>
<td>1.8%</td>
</tr>
<tr>
<td>Ovarian cancer</td>
<td>9 patients</td>
<td>1.8%</td>
</tr>
<tr>
<td>Sarcoma (various primary locations)</td>
<td>8 patients</td>
<td>1.6%</td>
</tr>
<tr>
<td>GIST</td>
<td>6 patients</td>
<td>1.2%</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>5 patients</td>
<td>1.0%</td>
</tr>
<tr>
<td>Gastric cancer</td>
<td>4 patients</td>
<td>0.8%</td>
</tr>
<tr>
<td>Total</td>
<td>488 patients</td>
<td>100%</td>
</tr>
</tbody>
</table>

#### Table II. Patients with liver metastases only from tumors other than colorectal cancer

<table>
<thead>
<tr>
<th>Primary lesion</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye or skin melanoma</td>
<td>18 patients</td>
<td>30.5%</td>
</tr>
<tr>
<td>Kidney cancer</td>
<td>9 patients</td>
<td>15.2%</td>
</tr>
<tr>
<td>Ovarian cancer</td>
<td>9 patients</td>
<td>15.2%</td>
</tr>
<tr>
<td>Sarcoma (various primary locations)</td>
<td>8 patients</td>
<td>13.6%</td>
</tr>
<tr>
<td>GIST</td>
<td>6 patients</td>
<td>10.2%</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>5 patients</td>
<td>8.5%</td>
</tr>
<tr>
<td>Gastric cancer</td>
<td>4 patients</td>
<td>6.8%</td>
</tr>
<tr>
<td>Total</td>
<td>59 patients</td>
<td>100%</td>
</tr>
</tbody>
</table>

#### Table III. Types of surgeries in patients with liver metastases

<table>
<thead>
<tr>
<th>Surgery type</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor liver resection*</td>
<td>204 patients</td>
<td>47.9%</td>
</tr>
<tr>
<td>Hemipatectomy</td>
<td>102 patients</td>
<td>23.9%</td>
</tr>
<tr>
<td>Thermoablation</td>
<td>86 patients</td>
<td>20.2%</td>
</tr>
<tr>
<td>Laparotomy</td>
<td>34 patients</td>
<td>8.0%</td>
</tr>
<tr>
<td>Total</td>
<td>426 patients</td>
<td>100%</td>
</tr>
</tbody>
</table>

*According to the international classification – resection of < 2 liver segments

Four patients were operated on because of gastric cancer metastases. In three of them there were metachronous metastases, and in one – synchronous metastases. In one patient metachronous liver metastases occurred 27 years after gastrectomy. Polycyclic lesions were located at the border of segments II, III, IVA and IVB (Fig. 1). Metastatic lesions also appeared in the lymph nodes over the proper hepatic artery. A left hemipatectomy was performed in this patient (Fig. 2–4) and lymph nodes from the proper hepatic artery area were excised. In the postoperative course a short-term bile leak was observed.

In the second patient, the metastasis to the VI segment of the liver (Fig. 5) has occurred 3 years after gastrectomy due to cancer. In this case, the resection of the VI segment of the liver was performed (Fig. 6) and the postoperative course was free from complications.

In turn, in the third patient two metachronous liver metastases (first to IV segment, and the second to VI segment) appeared one year after gastrectomy due to cancer. Liver segment VI was removed and left hemipatectomy was performed. The postoperative course was also free of complications.

The fourth patient had a synchronous metastasis to the II and III segments of the liver. He underwent simultaneous gastrectomy and non-anatomic resection of the II/III segment of the liver. Postoperative treatment proceeded without complications.

Figures 1–4 show metastases of gastric cancer located on the border of segments II, III and IV of the liver.

If the tumor lesions are smaller and located more superficially, more limited liver resection can be performed with a sufficient oncological margin (Fig. 5–6). The scope of liver resection depended on the location of the metastatic lesion (Tab. IV). Moreover, all four patients received adjuvant chemotherapy.

Two of the operated patients are still alive – one with metachronous metastasis (15 months after liver resection) and the other with synchronous metastasis (14 months after gastrectomy and liver resection). However, the patient with liver metastasis and lymph nodes over the liver artery died 3 months after the operation. The patient with a single metastasis to the VI segment of the liver also died – 9 months after the surgery.

#### Discussion

Gastric cancer, especially in China, Japan and Korea, is a common neoplasm. It is less common in European countries and the United States, but, which is particularly important, many patients are diagnosed with advanced cancer because there are no characteristic early symptoms and screening outside Japan is not carried out. Gastric cancer often causes metastases to many organs and structures at the same time: peritoneum, liver, lymph nodes. As result, only a few patients with metastatic lesions to the liver can undergo liver resection.

Not all prognostic factors for patients with metastases of gastric cancer into the liver (especially for patients with syn-
**Figure 1.** Computed tomography of a patient with a gastric cancer metastasis on the border of segments II, III and IV of the liver.

**Figure 2.** Preparation – left hemihepatectomy (the same patient as in Fig. 1).

**Figure 3.** A cut-through preparation – left hemihepatectomy (the same patient as in Fig. 1).

**Figure 4.** Condition after left hemihepatectomy (the same patient as in Fig. 1).

**Figure 5.** Computed tomography of a patient with metastasis from gastric cancer to the VI liver segment.

**Figure 6.** Preparation after resection of a metastasis in segment VI of the liver.
chronous metastases) are known. It is known, however, that the prognosis for these patients is bad. There are two types of prognostic factors: the first is related to the primary tumor and the second to the liver factor. The well-known factors, which are associated with the primary tumor and influence the survival of patients with gastric cancer, include: the depth of gastric wall infiltration by the tumor tissue and the coexistence of lymph node metastases [15, 16]. However, there are publications that question the importance of these prognostic factors in patients with hepatic metastases [17].

One of the important prognostic factors for survival of patients with metastases to the liver is the number of metastases. In the case of single lesions the 5-year survival rate is as much as 55% [15], while at numerous metastases it is 0% [18, 19]. In several studies, in case of single metastases, the tumor size was also taken into account as a prognostic factor [16], but this observation was not confirmed by other authors [20].

The 5-year survival of patients with single metastases of gastric and colorectal cancer was compared to that of the liver. The results were very similar [21]. However, 5-year survival after liver resection due to multi-site metastases of gastric cancer is much lower than in patients with colorectal cancer metastases [22, 23]. It was also analyzed whether synchronous metastases to the liver should be considered as a contraindication to the resection of this organ. In the authors’ opinion, there are no grounds for this [22]. However, we should not overlook another publication the authors of which express the opposite opinion. It is justified by the findings that patients with synchronous metastases of gastric cancer to the liver also have extrhepatic metastases, and the disease itself is very advanced in the stomach [24].

The course of recurrent metastases of gastric cancer and colorectal cancer to the liver was also compared. It turned out that in the case of gastric cancer the recurrence of the disease occurred earlier than in colorectal cancer. In addition, the majority of patients with recurrent gastric cancer were not eligible for repeated surgery. On this basis, the oncological aggressiveness of gastric cancer metastases was estimated to be much higher than colorectal cancer metastases [25].

An important issue is also performing repeated liver resections in case of recurrence of metastases to this organ. To this day, however, there is no clear answer as to whether repeated liver resection prolongs the lives of patients with gastric cancer [26].

In one publication it was pointed out that the presence of a fibrous pseudocapsule around the metastasis is a beneficial prognostic factor in metastases of gastric cancer into the liver. This should be explained by the fact that it occurs as a defensive reaction of an immunological and inflammatory nature against a metastatic lesion. This, in turn, would serve to stop further infiltration of the cancer process [26].

Chemotherapy is a separate issue in patients with metastases of gastric cancer into the liver. Chemotherapy – as the only form of treatment of patients with liver metastases – gives worse results than the surgical treatment combined with subsequent chemotherapy. Adjuvant chemotherapy is considered mandatory after metastatic resection [27].

Some publications stress that patients who cannot have liver resection with a metastatic lesion of gastric cancer should undergo a tumor thermoablation. Such action gives patients a chance for longer survival [28, 29].

In 2017, a summary of a review-based work [30] concluded that liver resection with gastric cancer metastases gives a longer median of patients’ survival compared to palliative treatment. However, the authors stated that the final confirmation of such a position requires randomized studies.

A comprehensive summary of the knowledge on liver resection with metastases from gastric cancer is presented in several other publications from recent years [31, 32]. The authors emphasize that two types of prognostic factors should be taken into account: one concerns the primary tumor and the other the metastatic lesion in the liver. Factors related to the primary tumor include the stage of the tumor, which should not exceed the T2 stage of the tumor. On the other hand, the liver factor is connected with the number and size
of metastatic lesions. Patients with single metastases to the liver with a diameter of < 4 cm and metachronous metastases have the best prognosis.

A similar meta-analysis was presented in Annals of Surgery in 2016 [33]. It confirms that liver resection with single metastases of gastric cancer in patients without peritoneal spreading is a viable option: 1 year – in 68% patients, 2 years – in 31% and 5 years – in 27% patients. These results are more favorable than after treatment with cytostatic agents only, because in this group only 46% of patients experiences one-year survival. The same study emphasizes that the success of treatment depends on the oncological margin during liver resection, the severity of lesions in the lymph nodes and the presence of neoplastic lesions in venous blood vessels. In the majority of patients liver resections were of a minor nature (< 2 segments). The authors of this study also observed that in the Far East the results of resection treatment are better than in the West.

In another publication, a Korean group of surgeons evaluated the results of resection of metastases of gastric cancer into the liver in relation to the primary tumor. They showed that patients with type I or II according to pathomorphological classification of gastric cancer and intestinal form of gastric cancer have better prognosis [34]. Once again, it was pointed out that the results of liver resection are influenced by the type and degree of advancement of the primary tumor.

Conclusions

Finally, other publications [35, 36] and results obtained by our clinic (although they concern a small group of patients, as in other single liver surgery centers) indicate that in some patients (single metachronous metastasis, no extrahepatic lesions, no peritoneal lesions, with subsequent chemotherapy) liver resection due to gastric cancer metastases offers a better chance of survival than just chemotherapy.

Conflict of interest: none declared

Marek Krawczyk
Medical University of Warsaw
Department of General, Transplant and Liver Surgery
ul. Banacha 1a
02–097 Warszawa, Poland
e-mail: marek.krawczyk@wum.edu.pl

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