

Review paper

Surgical treatment of liver tumors – own experience and literature review

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Abstract

Despite advances, the treatment of focal liver lesions is still challenging. It requires the experience of a surgeon, improvement of existing and the development of new techniques. The aim of this article is to present a literature review and summarize our experience in liver surgery. Twenty-one patients with various liver tumors were treated in 2015 at the Department of Surgical Oncology of Bialystok Center for Oncology. Mostly patients were diagnosed with colorectal cancer liver metastases or hepatocellular carcinoma. Nine anatomical, 6 non-anatomical resections and 6 radiofrequency ablations were performed. Among 9 resections, 6 bisegmentectomies, resection of the 4b segment, and left-side and right-side hemihepatectomy were performed. Resections were associated only with minor postoperative complications. No perioperative mortality was noted. Preliminary outcomes of resections and radiofrequency ablations of liver lesions even in a low volume surgical center are promising and are associated with a relatively low rate of complications.

Key words: liver tumors, hepatocellular carcinoma, metastatic colorectal cancer, radiofrequency ablation.

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Introduction

Although much improved in less advanced focal liver lesions (FLL), current treatment options in advanced stages provide unsatisfactory outcomes, which is reflected in mortality rates. Within the past 20 years great progress has been achieved in the treatment of FLL, but this issue is still challenging and the improvement of existing methods and the development of new treatment modalities are necessary. Liver tumors are classified as either benign or malignant, but there is also a separate group of parasitic cysts. Benign lesions include haemangiomas, adenomas and focal nodular hyperplasia. Haemangiomas are the most common, usually asymptomatic benign liver tumors, and their surgical treatment is indicated in selected cases (large size, tumor rupture). Hepatic adenomas (HCA) are most frequently diagnosed in women aged 15 to 45 years. These lesions unlike the other benign tumors have potential for rupture/hemorrhage or malignant transformation. Hepatic adenoma diameter more than 5 cm

or exophytic character of the lesion is associated with higher risk of spontaneous rupture/hemorrhage. The risk of malignant transformation depends on sex (higher in men), size (higher in women with diameter of tumor ≥ 5 cm), rate of change (higher in the case of more than 20% semiannual diameter increase) and molecular subtype of HCA (higher in β -catenin activated HCA subtype). Due to the risk of malignant transformation in these groups of patients, surgical removal of the tumor is usually recommended [1]. Focal nodular hyperplasia is not classified as a liver cancer, and if the diagnosis based on imaging techniques is certain, it requires only periodic monitoring. Possible indications for surgery include hemorrhage caused by tumor rupture, and symptomatic compression of other organs caused by a large tumor [2].

Malignant neoplasms of the liver are classified as primary, i.e. tumors originating from hepatocytes and biliary tract, and secondary (metastatic). The most common primary tumors of the liver are hepatocellular carcinoma (HCC) and cholangiocarcinoma (CCC); other primary malignancies are relatively rare. The liver

is the organ most frequently affected by various types of metastatic cancer. To some extent this is determined by the inflow of blood from multiple organs through the hepatic portal system. By far the most common sources of liver metastases are colon, breast, ovarian cancers and melanoma [3].

Primary liver cancer accounts for about 7% of morbidity worldwide, and occurs 3 times more frequently in men than in women. In the last 10 years no significant reduction in the number of deaths from liver cancers has been observed, particularly among patients with HCC. About 750,000 new cases are diagnosed each year. In Poland in 2013, primary liver cancer was diagnosed in 1,505 cases, comprising 847 diagnosed in men (1.08% of all cases of malignant cancer), and 658 cases in women (0.84% of cases of malignant cancer). The mortality for malignant liver cancer in 2013 was 1,980 (male to female ratio 1.2 : 1), which is more than the number of new cases diagnosed yearly – 1,505 (the case-fatality ratio is 1.31). This suggests poor and late diagnosis of primary liver tumors. Most of the fatal cases concern patients older than 50 years (96% of deaths in men and 97.5% of deaths in women). A slight reduction in mortality from liver cancers has been observed in women in the last 10 years, but in men the mortality rate remains relatively stable (Fig. 1).

In Poland 3000-3500 new cases of HCC are diagnosed each year, and the incidence of HCC increases with the patient's age. Mortality from HCC in Poland has been estimated at 2000-2500 people per year [4]. Risk factors for developing HCC include liver cirrhosis of any cause, viral hepatitis (HBV, HCV, HDV), exposure to chemicals (alcohol, tobacco, androgenic anabolic substances, etc.), genetic disorders (deficiency of

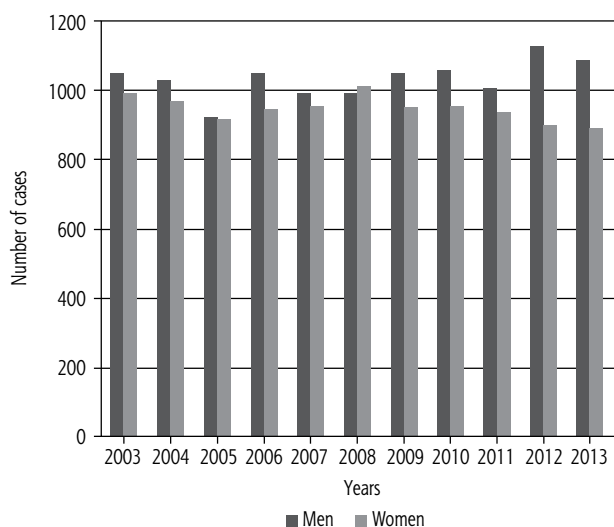


Fig. 1. Number of deaths caused by primary liver cancers according to data from Polish National Cancer Registry (KRN) [2]

alpha-1-antitrypsin, hemochromatosis), and chronic liver diseases (primary biliary cirrhosis, etc.).

Colorectal cancer (CRC) is the third most common malignancy in men worldwide (10%, 660 000 cases) and the second most common in women (9%, 570 000 cases). Data for Poland are similar – 17 450 cases of colorectal cancer were reported in 2013 (12% in men and 10% in women). The analysis of the post-operative course in patients after resection of colorectal cancer shows that liver metastases occur in 40-60% of patients, of which synchronous lesions account for 15-20%. The cumulated incidence of liver metastases has been estimated as about 15% at 5 years. As standard, all patients with metastases have stage 4 cancer in the TNM system, but only 20-30% of patients can be treated surgically at once. Another 10-15% of patients can be treated after special preliminary management, and the rest are treated with palliative chemotherapy alone. The estimated survival rate in patients receiving no treatment is about 12 months [5].

Diagnosics of focal liver lesions

Imaging tests play a crucial role in the diagnosis of focal liver lesions. Ultrasound examination helps to visualize and differentiate liver lesions, to determine their location and position with respect to the vascular system. However, its sensitivity is in the range of 40-60% for a tumor size under 2 cm, and 70-90% for tumors larger than 2 cm in diameter [6]. For patients with risk of HCC (mostly with liver cirrhosis) periodical semiannual ultrasound examination is the method of choice. It allows diagnostic HCC at an early stage and leads to higher uptake of curative therapies and better survival [7, 8]. Currently, contrast enhanced ultrasound (CEUS) employing intravenous agents to strengthen the ultrasonic signal is used to increase the diagnostic performance of this technique. Thereby, the role of CEUS in the diagnosis of focal liver lesions has increased significantly. The sensitivity of CEUS in the diagnostics of primary liver cancer is estimated at 94%, with specificity of 93%. Contrast enhanced ultrasonography is particularly useful in the detection of small liver metastases. The sensitivity and specificity of CEUS in the diagnosis of metastases is 77 and 93%, respectively [9]. The main limitation of CEUS is its low availability in Poland, and the fact that it requires a lot of experience from an operator.

Computed tomography (CT) with intravenous administration of a contrast agent is the primary diagnostic method for liver tumors. This method has high sensitivity (70-90%) and specificity (90-100%) [10]. However, it is important to correctly perform CT in

at least 3 time intervals after the administration of the contrast agent.

Hepatotropic contrast enhanced MRI has higher specificity than CT [11]. This results from a greater number of available parameters, enabling the accurate evaluation of the structure of the hepatic parenchyma. In addition to the standard parameters, such as tumor size and location, MRI can very precisely visualize neoplastic vascular infiltration, which largely facilitates the planning of further treatment.

The usefulness of the PET-CT test varies depending on the tumor type. For HCC the sensitivity of the glucose metabolism test is about 65%, so it is rarely used in patients with HCC (most often to detect extrahepatic lesions). For colorectal cancer one study demonstrated that the sensitivity and specificity in detecting colorectal liver metastases for CT is 87.9 and 16.7%; and for PET-CT 97 and 75% [12]. However, Yang *et al.* found no difference in the detectability of colorectal liver metastases between MRI and PET-CT [13]. PET-CT is very useful in identifying extrahepatic metastases of colorectal cancer, but its effectiveness is comparable to MRI.

Another useful tool for the detection of primary liver cancer, its recurrence or metastases to the liver, is tumor markers. For example, increased levels of alpha-fetoprotein (AFP) are found in approximately 60% of patients with HCC. The level of AFP > 400 ng/ml in patients with chronic liver disease and a tumor with dominant arterial vascularization in imaging studies makes the diagnosis of HCC much more reliable. The role of other AFP isoforms, such as AFP-L3, and additional markers such as des-gamma carboxyprothrombin (DCP) remains unclear and requires further investigation [14]. Plasma microRNA is a promising new marker in the diagnosis of HCC. Studies have demonstrated that the microRNA panel (miR-122, miR-192, miR-21, miR-223, miR-26a, miR-27a and miR-801) has a sensitivity of 82% and a specificity of 84% in the diagnosis of HCC [15]. Serum carbohydrate antigen 19-9 (CA19-9) is most commonly used in the diagnosis of primary tumors of the pancreas, liver, biliary tract and gall bladder. It is also used in predicting the recurrence of colorectal cancer. However, recent clinical studies have demonstrated that this marker has limited usefulness for the early detection of recurrent liver cancer [16]. The highest sensitivity in monitoring colorectal cancer was found for CEA. Determination of this parameter at 3-month intervals has nearly 94% sensitivity and 96% specificity in the diagnostics of colorectal cancer recurrence [17].

Treatment and prognosis of patients with HCC is variable for different stages and depends on patient health status, liver parenchyma functional condition,

size and number of tumors, absence of cancer-related symptoms and comorbidities. The Barcelona Clinic Liver Cancer (BCLC) classification is one of the most useful systems which considers all these data and relates it to the range of therapeutic options and prognosis (Fig. 2).

Surgical treatment

Resection is the basic method of treatment for primary and secondary liver tumors, and it offers the best long-term outcome. The resection range can vary depending on tumor location and size – from small, covering only hepatic parenchyma around the tumor, to extensive hepatectomy, covering almost 70% of the hepatic parenchyma. Liver resections are classified as anatomical and non-anatomical. Anatomical liver resections are performed in compliance with the Couinaud classification of the liver segments and are usually associated with a lower number of intra- and postoperative complications [18]. To date, most of these procedures have been laparotomic, but there is an increasing number of reports on laparoscopic hepatic resections. The authors of these reports prove that this method is safe, well tolerated by patients, and provides good outcomes in terms of cancer treatment [19]. Nowadays, we are observing a rapid development in the equipment that can be used in liver surgery. The hepatic parenchyma can be transected with a variety of electro-surgical instruments, depending on the surgeon's preference according to the comparable effectiveness. However, larger vessels of the hepatic parenchyma should be occluded with ligatures, vascular clips or staplers. The use of modern instruments for the transection of the hepatic parenchyma, such as a water or ultrasonic knife during resection, helps to save vascular structures and reduce blood loss. Another resection technique employs the Habib knife, a multineedle radiofrequency instrument coagulating a portion of liver and allowing its safe transection. The biggest disadvantage of these techniques is their high price. The easiest and most cost-effective way to resect hepatic parenchyma is the crash and clamp technique, which involves the separation of the parenchyma using forceps, with the selective ligation of vascular structures. This technique, although quite old, is still highly rated for its effectiveness [20].

So far, no clear consensus has been reached about the margin of surgical resection for colorectal cancer metastases. One study on a group of 557 patients demonstrated no significant differences in 5-year survival in patients who were subjected to R0 resection with a margin of 1 mm to 4.5 mm, 4.5 to 9 mm and above 10 mm [21]. This has been confirmed in other reports [22, 23].

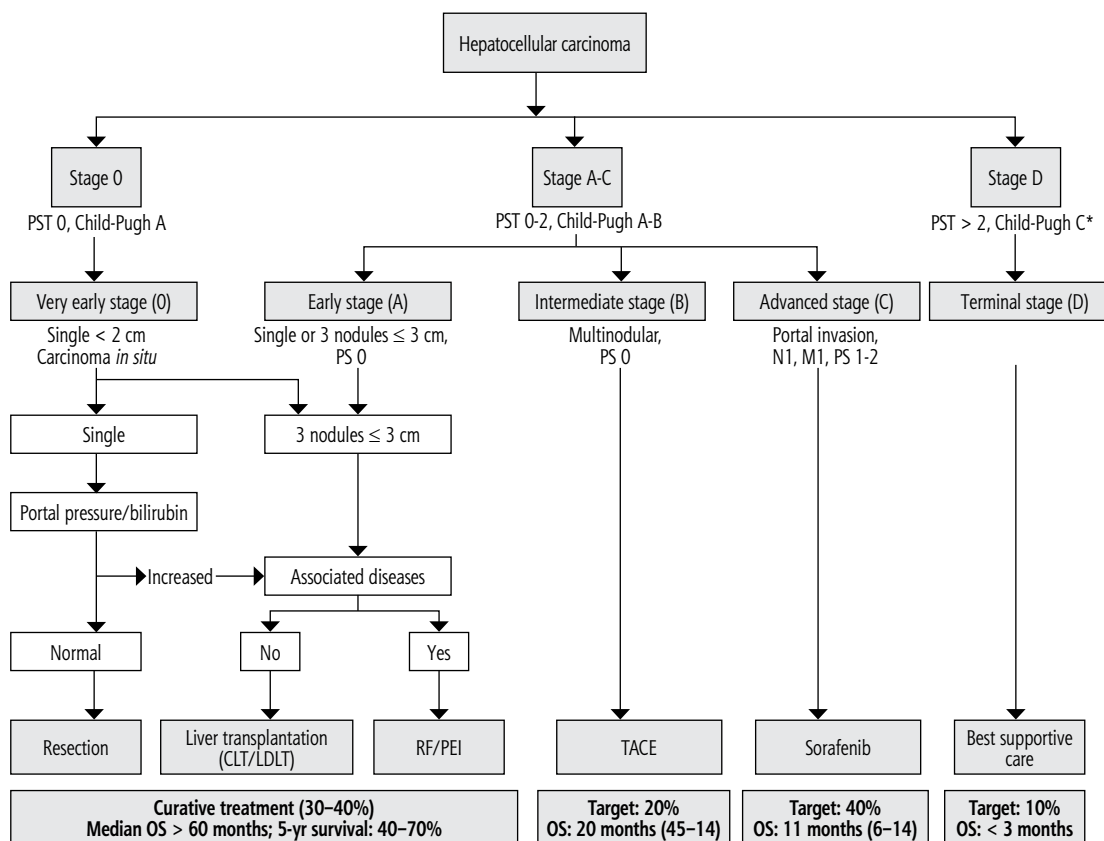


Fig. 2. Updated Barcelona Clinic Liver Cancer (BCLC) staging system and treatment strategy of HCC [7]

According to common practice, the surgical margin in patients with CRC metastases should be about 1 cm. In patients with HCC the recommended surgical margin is about 2 cm due to the possible presence of small satellite tumors around the major tumor. Given the fact that most HCC patients have cirrhosis and liver function disorders, resections with such a margin size are not always feasible. Moreover, a severe consequence of liver cirrhosis is portal hypertension, which results in a higher risk of intraoperative bleeding and perioperative complications, and excludes liver resection as a therapeutic option according to BCLC classification. Evaluation of this condition is very important for choosing the treatment strategy. There are few methods which can be used for that. Hepatic venous pressure gradient (HVPG) measurement is the best available method to evaluate the presence and severity of portal hypertension. The disadvantage of this method is invasiveness, a low acceptance rate among patients with chronic liver disease and technical requirements [24].

Patients are qualified for surgical treatment depending on their overall condition, comorbidities, the volume of the liver left after resection, and the position of the tumor in the liver with respect to adjacent or-

gans and vascular structures. It is believed that up to 70% of the parenchyma can be resected from a healthy liver, but only approximately 50% if the liver is affected by cirrhosis, and it depends on the function of the liver. Resections of larger liver fragments are associated with increased risk of postoperative organ failure. Computed tomography volumetry (CTV) has been widely used as a method for the preoperative volumetric assessment of the liver. At present, CTV is still the preferred imaging technique for liver volumetry. CTV of the liver is important in the preoperative planning for major hepatic resection and in the determination of the future remnant liver volume [25]. To increase the size of the liver remnant that will remain after surgery, the portal vein embolization (PVE) technique is used. The aim of this technique is redirecting portal blood to segments of the future liver remnant, resulting in hypertrophy. PVE is a safe procedure that causes few adverse effects and can increase the number of patients eligible for curative resection [26]. Patients with cirrhosis are qualified for surgery only if they meet the criteria for the class A Child-Pugh score. The recommended interval between the final cycle of chemotherapy and hepatic resection is about 6-8 weeks. Obviously in patients with liver cirrhosis and HCC liv-

er transplantation (LTx) in accordance with Milano criteria is associated with the best prognosis and is the treatment of choice [27]. A detailed overview of LTx indications and methods can be found elsewhere [28].

Radiofrequency ablation (RFA) and cryotherapy are options for locoregional treatment of liver tumors, and have been rapidly developing in recent years. RFA is the most popular in the treatment of liver cancer. This method can be used for deep-seated single tumors, small tumors in other parts of the liver left after resection, and in the case of recurrence after resection in a spared lobe of the liver. It can also be used in extensive resection of the liver as a complementary method if lesions cannot be resected in the spared portion of the liver. RFA can be percutaneous with ultrasound or CT guidance, but in difficult cases it is necessary to perform laparotomic or laparoscopic control ablation.

The basic principle in performing RFA and liver resection is oncological completeness. In order to maintain an adequate surgical margin, the diameter of lesions treated with RFA should not exceed 2 cm. Currently, RFA is considered to be a curative treatment method for HCC, with comparative results with surgery if the tumor diameter is less than 2 cm [29]. Lesions larger than 3 cm require more than one RFA procedure or the use of several needles simultaneously, which is already associated with a higher risk of complications, higher costs of procedures, and an increased risk of local recurrence [30]. The location of the tumor within the liver also affects the results of RFA. The lesion's location near large blood vessels (≥ 1 cm) may reduce the efficacy of RFA due to heat sink effect of rapid blood flow. In this case percutaneous ethanol injection (PEI) may be used with comparable results for small (≤ 2 cm) tumors [30]. Moreover, percutaneous RFA of lesions that are located in the dome or along the visceral surface of the liver is limited for fear of diaphragmatic injury or intestinal perforation, but this lesion can be successfully treated by using open laparotomy or the laparoscopic approach.

Issues of non-surgical treatment of liver tumors are too extensive to be discussed in this article. Some aspects that should be mentioned, however, are the role of neoadjuvant chemotherapy in patients with CRC liver metastases and the use of TACE in the treatment of HCC. For initially unresectable CRC metastases the effectiveness of neoadjuvant chemotherapy has been clinically confirmed; about 15-30% of such lesions become potentially resectable after the use of this type of therapy. The recommended interval between the final cycle of chemotherapy and hepatic resection is about 6-8 weeks.

The role of transarterial chemoablation (TACE) in the treatment of HCC should also be emphasized. This method offers relatively good outcomes in patients

with large advanced or multiple tumors when surgical resection and radiofrequency ablation are unfeasible, group B according to the BCLC classification [31]. The best candidates for TACE are patients with unresectable liver tumors without signs of vascular infiltration and metastases to other organs, with well-preserved liver function (class A or B according to the Child-Pugh score). The big advantage of this method is its suitability for bridging therapy before liver transplantation. However, the use of TACE before surgery is associated with worse outcomes and higher 5-year mortality rates [32]. Transarterial radioembolization with Yttrium-90 can be used for treatment of this patient group. This method shows low morbidity and reasonable tumor control. However, due to its expense, radioembolization application is limited. New studies will be needed to compare the efficacy of this approach with other nonsurgical therapies.

Material and results

Resection

Surgical treatment of patients with liver tumors in the Bialystok Oncology Centre (BOC) began in 2015 after the opening of a new operating theatre and the modernization of equipment. Until the preparation of this article, 21 patients (13 men and 8 women) with various liver tumors were treated at the Department of Surgical Oncology, BOC. The mean age of patients was 64 years \pm 6 months. Most patients treated had CRC liver metastases ($n = 9$) and HCC ($n = 7$). One patient had cholangiocarcinoma, one metastatic ovarian cancer, one metastatic breast cancer, one hemangioendothelioma and one a hydatid cyst of the liver. Five patients had metachronous CRC metastases to the liver and had had a previous resection for colorectal cancer. Three patients had synchronous metastasis, while another one was treated for local recurrence of CRC metastasis to the liver. The mean time between the colon surgery and diagnosis of colorectal liver metastases in patients with metachronous tumors was 1.5 years. Before the surgery all patients were classified in ASA group A. Patients with HCC associated with cirrhosis were all in Child-Pugh class A. The main etiology of liver cirrhosis was hepatitis C viral infection. The most common comorbidities in patients operated on for liver tumors were hypertension ($n = 10$), obesity ($n = 8$), type 2 diabetes ($n = 4$), and chronic heart disease ($n = 5$).

All patients were scheduled for surgery on the basis of the CT/MRI results. Patients received standard anticoagulation prophylaxis (low molecular weight heparin) and perioperative antibiotics (second gener-

ation cephalosporins and metronidazole). On the first day after surgery pain was controlled with morphine, NSAIDs and intravenous metamizole. On the second postoperative day opioid analgesics were withdrawn and were used only as needed.

In 2015, we carried out 11 anatomical liver resections, 6 non-anatomical liver resections and 4 radiofrequency ablations of liver tumors (Table 1). Anatomical liver resections included 2 right posterior bisegmentectomies, 4 left bisegmentectomies, 3 segmental resection, and one left and one right hemihepatectomy. The mean size of resected tumors was approximately 34 mm (5-70 mm). The decision concerning the type of treatment depended on the type, size and location of the tumor, the patient's condition and age, the number of comorbidities, and the presence of cirrhotic lesions. In all cases except for one synchronous surgery, the abdominal cavity was accessed from the point under the right rib with an extension on the left side, depending on the size of the resection. Intraoperative USG of the liver was used in all cases to estimate the obvious borders of resection. Cholecystectomy was performed in four cases, in which the gallbladder bed was within the margins of the planned resection. The Pringle maneuver was used routinely, except for patients with cirrhotic liver remodeling and the operation of hemihepatectomy. We attempted to tighten the hepatoduodenal ligament for no longer than 15 minutes with a further release for 5 minutes. Drainage of the abdominal cavity was left after each resection for 5-7 days on average. The mean operative time was about 180 min. The mean intraoperative blood loss was about 400 ml. After liver resection, patients were extubated in the operating theatre. For the first 48 hours after the surgery patients stayed at the ICU and were continuously monitored for vital parameters. Activity of ALT, AST, GGTP and CRB increased after hepatic resection, but gradually returned to normal a few days after surgery. Postoperative bilirubin levels remained unchanged. On day 2 after surgery patients had a bedside abdominal ultrasound examination to assess the liver and perihepatic region. After hepatic resection at our department patients are given fluids by mouth on day 1 after surgery, and on day 2 they can eat if fluid intake is well tolerated. A nasogastric tube is generally not removed until 12 hours after the operation, and the catheter is removed from the bladder on the second postoperative day. Physical mobilization depends on the patient's condition; usually the patient is allowed to sit in bed and walk on day 2 or 3 after surgery.

The mean hospital stay after hepatic resection was 10 days. Postoperative complications were reported in 6 out of 17 patients. Three patients developed a perihe-

patic abscess: one patient received conservative treatment with an antibiotic, the second had an ultrasound guided percutaneous drainage, and the third patient was reoperated. One patient had a postoperative wound infection, which was treated with targeted oral antibiotics. Two patients with cirrhosis developed ascites after resection and received conservative treatment which involved the removal of the abdominal drainage, intravenous administration of diuretics and albumin, and a limited supply of fluids. Ascites resolved in both cases. There was no case of perioperative mortality.

After hepatic resection for colorectal metastases one patient developed new liver metastases 6 months after surgery. One female patient who had a hepatic resection for HCC in the right lobe of the liver was diagnosed with new foci of HCC in the other liver segments 6 months after surgery. One patient after left bisegmentectomy for cholangiocarcinoma has local relapse. Other patients had no signs suggesting cancer recurrence.

Radiofrequency ablation

Radiofrequency ablation was performed in 4 patients with HCC. We used RFA in patients with tumors up to 3 cm in diameter, located in the central part of the liver and/or in patients for whom liver resection would be a strongly aggravating procedure. Ultrasound guided percutaneous RFA was performed in 3 patients under general anaesthesia in the operating theatre. Another one radiofrequency ablation procedure was performed on the open abdomen under intraoperative ultrasound guidance. In these cases RFA was chosen due to severe cirrhosis to prevent possible postoperative liver failure associated with a very extensive resection. The mean hospital stay was 2 days for patients undergoing percutaneous RFA. No complications were reported for patients treated with percutaneous RFA. The mean follow-up of patients treated with RFA was about 6 months. There was no cancer recurrence in that period.

Conclusions

Most focal lesions in the liver are detected at an advanced stage, which indicates low efficiency of screening procedures. Consequently, not all patients can receive treatment at the right time. The number of procedures carried out at our department is insufficient to form definite conclusions, and further long-term follow-up of patients is absolutely necessary. Since our department is not the highest-level referral center in Poland, we are very cautious when evaluating the eligibility of

Table 1. Clinical characteristics, type of surgical treatment and long-term outcomes of subjects included in the study

Patient	Age	Sex	Diagnosis	Tumor location (liver segment; diameter Ø)	Type of operation	Length of hospital stay	Long-term results	Postoperative complications
BA	56	M	Colorectal cancer metastases	VIII Ø15 mm and 5 mm; III Ø10 mm	Non-anatomical resection	10	Remission	None
BM	74	M	Colorectal cancer metastasis	IV Ø50 mm	Extended left hemihepatectomy	10	Progression	None
BO	66	F	Colorectal cancer metastasis	II-III Ø60 mm	Left lateral bisegmentectomy	6	Remission	None
JA	61	F	Hemangioendothelioma	IV-VIII Ø40 mm	Non-anatomical liver resection	8	Remission	Perihepatic abscess
JS	61	M	Liver echinococcosis	V Ø40 mm	Non-anatomical liver resection	9	Remission	None
KJ	72	M	Colorectal cancer metastasis	VII Ø61 mm	Right posterior segmentectomy VI-VII	8	Remission	None
LU	39	F	Breast cancer metastasis	V Ø35 mm	Segmentectomy V	9	Remission	Perihepatic abscess
RZ	55	M	Hepatocellular carcinoma	VIII Ø23 mm	Non-anatomical liver resection	15	Remission	Postoperative ascites
LH	69	F	Cholangiocarcinoma	II-III Ø35 mm	Left lateral bisegmentectomy	9	Local relapse	None
PA	82	M	Colorectal cancer metastasis	II-III Ø42 mm	Left lateral bisegmentectomy	25	Remission	Perihepatic abscess
PI	80	F	Hepatocellular carcinoma	VII Ø21 mm	Segmentectomy VII	20	Local relapse	Postoperative ascites
ZK	63	F	Ovarial cancer metastases	Multiple liver metastases, largest Ø25 mm	Non-anatomical liver resections	10	Remission	Wound infection
JM	56	M	Relapse of colorectal liver cancer metastasis	VI-VII Ø35 mm	Right posterior segmentectomy VI-VII	12	Remission	None
RN	76	F	Colorectal cancer metastasis	V-VIII Ø70 mm	Right hemihepatectomy	19	Remission	None
DN	50	M	Colorectal cancer metastasis	III Ø30 mm	Segmentectomy III	8	Remission	None
WW	73	M	Hepatocellular carcinoma	II Ø20 mm	Left lateral bisegmentectomy	8	Remission	None
OE	63	M	Colorectal cancer metastases	Multiple: V-VIII Ø25 mm, IVb Ø20 mm, III Ø5 mm	Non-anatomical liver resections	8	Remission	None
JK	56	M	Hepatocellular carcinoma relapse	VIII Ø30 mm	Percutaneous radiofrequency ablation	3	Remission	None
BS	66	M	Hepatocellular carcinoma	IVa Ø30 mm	Percutaneous radiofrequency ablation	2	Remission	None
VB	58	M	Hepatocellular carcinoma	V Ø25 mm	Percutaneous radiofrequency ablation	2	Remission	None
PD	80	F	Hepatocellular carcinoma relapse	VI-VII Ø30 mm and 20 mm	Laparotomy, radiofrequency ablation	9	Remission	None

patients for surgery, and in case of any doubt, we refer our patients to more specialized facilities. However, the preliminary outcomes of both resection and radiofrequency ablation of liver lesions are promising, and are associated with a relatively low rate of complications.

Disclosure

Authors report no conflict of interest.

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