Microwave ablation of hepatic cyst: A case report

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ARTICLE INFO

Keywords:
- Microwave ablation (MWA)
- Hepatic cystadenoma
- Malignancy risk
- Telomerase

ABSTRACT

Hepatic cystadenoma is an urgent problem due to the high risk of malignant transformation. There are both radical and minimally invasive methods of treatment. We present a clinical case describing the successful use of microwave ablation (MWA) in a 72-year-old woman with hepatic cystadenoma. The patient was admitted to the clinic with abdominal discomfort, dull pain in the right hypochondrium, and weight loss of 10 kg during the previous year. The patient had a past medical history of liver cyst in segment VII. Ultrasound scanning, computed tomography (CT) of abdominal organs detected an increase in the size of the cyst, heterogeneity of its structure; the contrast enhancement was noted in the cyst wall. We suspected hepatic cystadenoma in segment VII and performed cyst puncture under ultrasound control – the obtained fluid revealed the presence of cylindrical epithelial cells, mucin, and macrophages in large quantities, high telomerase activity, CA 19-9 levels were greater than 1000 U/mL. Surgery was accomplished using the MWA catheter. Biological and cytological examination of the fluid confirmed the presence of signs of liver cystadenoma with a high malignancy risk. On the 2nd day after surgery ultrasound imaging of the abdomen revealed the residual cavity of 2 × 1 cm in segment VII. The patient was discharged with recommendations to conduct ultrasound examinations every six months. The control CT scan in 2020 showed no focal or cystic formations in the liver. In what way, MWA under control of ultrasound is a promising method of biliary cystadenoma treatment with high malignancy risk.

1. Introduction

This work has been reported in line with the SCARE criteria [1]. Biliary cystadenoma represents a benign, multilocular cystic neoplasm which is often lined by glandular mucin-producing epithelium. Cystadenomas comprise 4–5% of all cystic lesions of the liver. Such cysts have a high malignant potential, and in some cases could cause cholestasis due to its size or position. Therefore, cystadenomas should be monitored in dynamics for timely surgical intervention if required. For many decades the segmental liver resection was considered as the treatment of choice for biliary cystadenomas but the appearance of the advanced methods, such as ablation (radiofrequency ablation (RFA), microwave ablation (MWA)), brought up doubts about previous treatment methods [2,3]. Researchers describing the advantages of minimally invasive techniques claim that in single-chamber small cysts in the liver, MWA is necessary, since in contrast to RFA, it creates a higher temperature and acts on a larger area, reducing the frequency of propagation of the process [4]. Numerous studies based on long-term results are required to compare the effectiveness of liver resection and ablation. Most scientists believe that surgical treatment cystadenoma liver depends on its size, multi-chamber, presence of telomerase activity (which indicates high risk of malignancy), diligence it to the major vascular structures of the liver and related diseases. The studies presented today demonstrate a small number of patients and the absence of long-term...
comparative results of microwave and radiofrequency ablation of the liver with high telomerase activity [5,6].

We present a ten-year follow-up of the patient after microwave ablation of biliary cystadenoma associated with the high risk of malignant transformation.

2. Case presentation

On March 16, 2011, the patient - a 72-year-old woman, was admitted to the Sechenov University Clinical Hospital No. 1 with abdominal discomfit, intermittent moderate dull pain in the right hypochondrium, and weight loss of 10 kg during the previous year. In 1991 the examination revealed a cyst with diameter of 1 cm in the hepatic segment VII. It also showed cholelithiasis; the cholecystectomy was performed the same year. Subsequent dynamic monitoring of the cyst was not performed. In the fall of 2010 ultrasonography and computer tomography (CT) of abdominal organs detected the dumbbell-shaped cyst of 4.3 × 3.1 × 3.7 cm with heterogeneous structure in the hepatic segment VII; the contrast enhancement was noted in the cyst wall (Fig. 1).

On March 28, 2011, we performed cyst puncture under ultrasound control. Biological and cytological examination of the obtained fluid revealed the presence of cylindrical epithelial cells, mucin, and macrophages in large quantities. We also detected high telomerase activity, CA 19-9 levels greater than 1000 U/mL, and proteins level of 48 ppm. Rivalta’s test was positive.

The diagnosis of biliary cystadenoma with high malignant potential was established. The patient was admitted to the Department of Surgery for the surgery.

Under intravenous anesthesia (Propofol 150 mg, Phentanylum 0.2 mg), an MWA catheter (MedWaves Incorporated, AveCure®) was inserted percutaneously into the cyst of the hepatic segment VII, accessing via the right anterior axillary line in the 10th intercostal space.

A percutaneous ultrasound-guided puncture of the biliary cyst of the hepatic segment VII was made using a 8 Fr stylet catheter. After removal of the stylet, about 70 ml of a yellow transparent liquid was evacuated, which was sent for biological and cytological examination.

Then, a radiopaque preparation (Urografin® 76% - 20 ml + NaCl 0.9% 50 ml) was injected into the cyst. During X-ray, a neof ormation of 5 × 6 cm with clear, uneven contours was determined at the hepatic segment VII. The contrast spread into the abdominal cavity or the vessels was not detected.

MWA of the cyst was performed using a MWA catheter placed in the cavity at the center of the cyst, with the frequency of 902–928 Hz delivered during 10 minutes. The inserted 8 Fr stylet catheter allowed the evacuation of the residual high temperature fluid during the MWA. Then the catheter and the needle were removed. Biological and cytological examination of the fluid obtained during the surgery confirmed the presence of biliary cystadenoma with a high malignancy risk. The postoperative period was uneventful, and no analgesics required. The abdominal ultrasound examination performed on the 2nd day after surgery revealed the residual cavity of 2 × 1 cm. The patient was discharged under the supervision of a general practitioner, with recommendations to refrain from physical activity for 3 months, and to conduct ultrasound examinations every six months. The patient underwent the control examination February 2020. CT scan of the abdominal cavity showed no focal or cystic formations in the liver (Fig. 2).

3. Discussion

Ultrasound-guided minimally invasive operations demonstrate high effectiveness for the treatment of malignant and benign tumors and gradually replace some open cavity operations. Such small interventions allow to achieve good treatment effects and positive long-term outcomes [7,8]. Recently, microwave ablation has drawn more attention as an effective treatment for malignant tumors smaller than 5 cm in diameter [9]. It was shown that MWA for hepatocellular carcinoma treatment demonstrated 43–60% 5-year survival rates and 24% 10-year survival rates [10]. MWA is considered as effective treatment for hemangiomas and non-parasitic hepatic cysts, since it allows to heat the cyst contents and its walls due to ultra-high-frequency (microwave) energy. This contributes to necrosis and sclerosis of the cyst walls. Moreover, by controlling the temperature and exposure time, using the generator it is possible to perform a complete destruction of the walls of the cyst [11]. Other advantages of MWA include the following: possibility to perform operation in open electrical circuit, without cooling (in contrast with RFA), and under local anesthesia; diminution in postoperative complications; and cost-efficiency due to the reduction in length of hospital stay.

According to the Liang P., Wang Y. clinical study of complications from percutaneous MWA, two deaths, found in a cohort of 1136 patients in 2009, were not directly related to MWA [12]. The main complications occurred in 30 (2.6%) patients and included liver abscess and empyema (n = 5), bile duct damage (n = 2), colon perforation (n = 2), tumor dissemination (n = 5), pleural effusion requiring thoracentesis (n = 12), hemorrhage requiring arterial embolization (n = 1), skin burn requiring resection (n = 3). Some minor complications did not require treatment. As a result, it was concluded that MWA is a well-tolerated technique.
procedure with an acceptably low level of major complications in the
treatment of malignant liver tumors [12].

Thus, taking into account positive, but few data on the effectiveness
of MWA for HCC, we decided to use this method for the treatment of
biliary cystadenoma with high malignancy risk. Microwave ablation
allows to achieve complete reduction of the epithelial lining of the cyst
walls, its chambers, and also contributes to an uncomplicated post-
operative period due to its minimally invasive and targeted technique of
destruction of the pathological focus. The duration of the postoperative
period is reduced and the positive long-term dynamics of patients
increases.

Ethical approval

The local ethics Committee of Sechenov University N10-19,
Department of Faculty Surgery N1 of I.M. Sechenov, decided to
approve the use of microwave ablation in a patient with liver cyst-
adenoa. The authors are accountable for all aspects of the work in
ensuring that questions related to the accuracy or integrity of any part of
the work are appropriately investigated and resolved. the local ethics
Committee N10-19 of Sechenov University, Department of Faculty
Surgery N2 1 of I.M. Sechenov.

Source of funding

No sources of funding.

Author contribution

All the authors made an equal contribution to the creation of the
presented clinical case. Daria Petrenko, Anna Saribekian, Andrey
Vedernikov and Muslim Magomedgaev, as 5th-year students, studied
the patient’s medical history in detail, analyzed the literature on
nonparasitic liver cysts with a high risk of malignancy and surgical
treatment options, compared the effectiveness of different methods of
treating this pathology, and participated in writing the text. A team of
surgeons from Sechenov University (Radmila Karpova, Andrey Gorbu-
nov, Yuri Pavlov, Rybin Vladislav Konstantinovich and Kirill Chernou-
sov) first applied the method of microwave ablation in the case of liver
cystadenoma with high telomerase activity, guided the patient from the
beginning of hospitalization and in the postoperative period, performed
a control diagnostic study 10 years later, and participated in the writing
of the article. Shiryaev Artem Anatolevich is surgeon and radiologist, the
specialist of mini-invasive surgical methods in oncology gave us
consultation and also participated in writing this article.

Research Registration number

1. Name of the registry:

2. Unique identifying number or registration ID:

3. Hyperlink to your specific registration (must be publicly accessible
and will be checked):

Guarantor

Karpova Radmila Vladimirovna.

Consent

Written informed consent was obtained from the patient for publi-
cation of this case report and accompanying images.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Declaration of competing interest

All authors have completed the ICMJE uniform disclosure form. The
authors have no conflicts of interest to declare.

Acknowledgments

Funding: None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.
org/10.1016/j.amsu.2020.11.058.

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