

The Role of a Radiologist in Planning Surgical Treatment of Patients with Focal Liver Lesions within the Framework of a Multidisciplinary Approach. Analysis of the Results of In-house Computed Tomography and Development of an Adapted Algorithm of Reporting

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Abstract: Due to the implementation of transplantation technologies for combined liver resections in patients with liver lesions different etiologies, when planning surgical treatment the role of the radiologist as part of a multidisciplinary team is increasing. To reduce the burden on the radiologist when preparing for the consilium, the in-house report of the computed tomography (CT) should contain all the information necessary to determine the possibility and extent of liver resection. An audit of the quality of reports of in-house CT in 50 patients was conducted, based on the results of which an algorithm of reporting of CT was developed, adapted to planning combined liver resection. Widespread implementation of the algorithm in practice will reduce the burden on the radiologist in the hospital when preparing for the consilium.

Keywords: computed tomography, combined liver resection planning, algorithm of reporting, multidisciplinary approach

1. Introduction

As part of the implementation of a multidisciplinary approach, when determining the treatment tactics for a patient, a radiologist should be present at the consilium. The work of Sadaf Nasir et al showed that the necessity to report in-house computed tomography (CT) imposes a significant burden on the radiologist (1).

Due to the introduction of transplantation technologies during combined liver resection, the role of CT has increased as a method that provides large anatomical data necessary for planning the operation (2,3,4). Analysis of CT scans at the in-house stage, performed according to a certain algorithm, can lead to a reduction in the workload of the radiologist in the hospital.

Goal

To analyze the content of in-house CT reports for the presence of data necessary for planning combined liver resection. To develop an algorithm for preparing report, adapted to planning liver resection.

2. Patient and Methods

Retrospective analysis of medical records of 52 patients (29 men and 23 women), who at the FMBC named after. A.I. Burnazyan from April 2022 until December 2023 underwent combined



liver resections. Among them, with metastases of colorectal cancer - 15 (28.8%), with alveococcosis - 21 (40.4%), with cholangiocellular cancer - 13 (25%), with hemangiomas - 2 (3.8%) and hemangioendothelioma - 12%.

The reports of in-house CT of all patients were re-reviewed in the hospital by a radiologist at the request of the attending physician due to the lack of necessary information. Table 1 presents the results of the analysis of in-house CT reports according to the presence in them of information necessary for planning liver resection.

Table 1 Analysis of the quality of in-hose CT reports

Type of anatomical data	Data in CT report		
	present, (%)	not present, (%)	partially, (%)
Presence of preserved liver parenchyma (according to sectoral structure)	4 (7,7)	0	48 (92,3)
Volume of future liver remnant	2 (4)	50 (96)	0
Type of anatomy of magistral liver vessels	0	49 (94,2)	3 (5,8)
Analysis of relationships between lesion and magistral vessels of future liver remnant	8 (15,4)	0	44 (84,6)
Analysis of relationships between lesion and inferior vena cava	0	33 (63,5)	19 (36,5)

3. Results

As can be seen from Table 1, among all the revised studies, there was not a single in-house CT report that contained all the anatomical information necessary for planning a combined liver resection.

Traditionally, when analyzing a CT scan, a radiologist focuses on describing pathological changes. In particular, if there is a space-occupying lesion in the liver, the protocol will indicate its location, size and structure, as well as the vessels involved. However, when planning liver resection, the paradigm that characterizes the approach to the patient has now changed (2,4,7,9).

If earlier the surgeon was faced with the problem of how to properly perform a resection, now the question is what remains after resection. This is due to the fact that in surgical practice, transplantation technologies have become more often used, which make it possible to perform extremely large resections of the liver and magistral vessels with their reconstruction (2,4).

The main goal of operation is that the future liver remnant will be anatomically and functionally robust. In this regard, information about the remnant in the CT report is extremely important for the surgeon. Based on the requirements of surgeons and literature data, we developed an algorithm for CT reporting that includes a number of sequential stages of analysis which are adapted to planning combined liver resection. So, this algorithm includes the following points:

- to indicate the presence of preserved liver parenchyma, taking into account its sectoral structure; liver resection is possible if there is at least one preserved liver sector,
- to carry out volumetry of the future liver remnant,
- to evaluate the anatomy of the magistral vessels of the liver, taking into account well known classifications (Michels, Nakamura),
- to conduct a comprehensive assessment of the relationship of the liver lesion with the great vessels of the future liver remnant for their possible invasion, as well as with the inferior vena cava, including the extent of contact along its circumference and length (3,6).

4. Discussion

Omer Kasalak et al. showed that re-analysis of radiological studies led to a change in the originally planned treatment strategy in only 8% of cases (8). However, our experience demonstrates



another problem, which is that the quality of in-house CT reports is not enough to determine possible tactics of surgical treatment when planning combined liver resection, which in any case requires repeated analysis of the CT scan in preparation for the consilium. The widespread introduction into practice of the developed algorithm for describing CT examinations will allow avoiding or reducing the burden on the radiologist in the hospitals.

5. Conclusions

The analysis of the protocols of in-house CT demonstrated their poor quality, which in all cases required repeated consultation with a radiologist in the hospital. An algorithm for CT reporting has been developed, adapted for planning combined liver resection, which will avoid or reduce the cost of working time of a radiologist in the clinic in preparation for a consilium.

Application of artificial intelligence:

The article is written without the use of artificial intelligence technologies.

Conflicts of Interest: The authors declare no conflict of interest.

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