

RESULTS OF INTRAARTERIAL CHEMOTHERAPY INTO BRONCHIAL ARTERIES IN LOCALLY ADVANCED NON-SMALL CELL LUNG CANCER

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Abstract

Background: Lung cancer remains a pressing issue in modern clinical oncology worldwide. Approximately 60-70% of newly diagnosed lung cancers are inoperable, necessitating the search for alternative treatment methods, including drug therapy. However, the issue of sensitivity to existing treatment regimens remains a significant aspect and is a key factor determining survival and local control.

Keywords: primary lung cancer, locally advanced inoperable lung cancer, transarterial chemotherapy, targeted therapy

Abstract. Lung cancer, despite modern trends in the development of medical oncology and science, remains one of the key tasks of clinical medicine.

On the one hand, this is due to the fact that the overwhelming number of patients at the time of initial diagnosis have an unresectable/inoperable stage of the disease, on the other hand, the latest predictive indicators in the world still indicate a high incidence of morbidity and mortality in terms of the structure of cancer incidence.

In this regard, there is an urgent need to find alternative ways to treat the malignant process, including drug therapy. Drug therapy for lung cancer in the world today is represented by an extensive list of optional cytostatics, targeted agents, and immunoagents.

In the Republic of Kazakhstan, these data are statistically different from those of the Russian Federation in terms of the structure of cancer incidence per capita and amount to 3,615 new cases for 2021 and 3,925 identified new cases of lung cancer for 2022. [2,4].

Almost 40-50% of cases of verified lung cancer do not carry a detectable mutational load; accordingly, the targeted use of genetically modified therapy options with an inherent selective effect is not applicable in these cases, but is limited only by a combination of existing chemotherapy regimens, which also have an expected and very limited therapeutic effect [3,5,6,7].

In this regard, in a number of cases, we widely use the technique of loco-regional intra-arterial chemotherapy in the branch of the bronchial artery on the affected side of the right or left lung with an increase in the bio-availability of cytostatics with its local effect and minimal toxic effect in unresectable lung cancer.

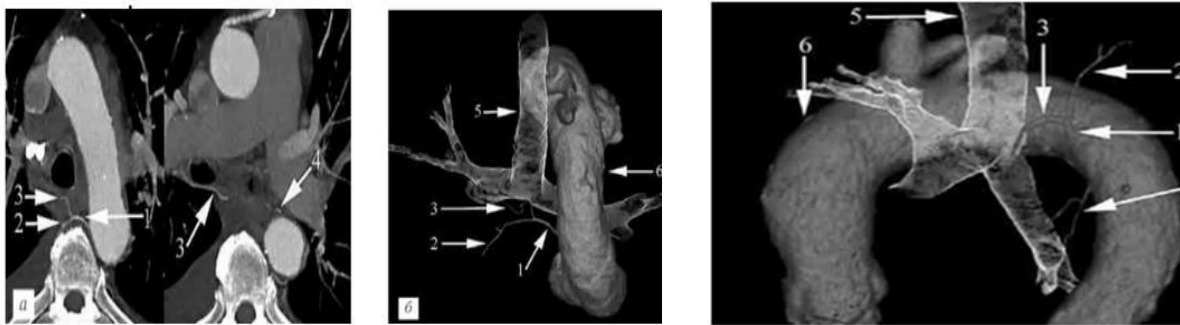
The purpose of the study was to evaluate the possibility of using intra-arterial treatment methods for unresectable locally advanced non-small cell lung cancer.

Materials and methods.

The technique of intra-arterial chemoinfusion is reduced to puncture and puncture followed by catheterization of the femoral artery using the Seldinger technique in the projection of the right/left inguinal fold. Selective catheterization of the bronchial artery is carried out by aortography of the thoracic aorta with identification of the branches of the bronchial artery (bronchial arteries arise at the level of ThV, ThVI, the so-called orthotopic option). In any variant of origin, the pulmonary arteries enter the parenchyma in the area of their roots and run parallel to the bronchi, located in their outer connective tissue layer. Cauldwell et al. [8] described four classic variants of the origin of the bronchial arteries from the aorta: (a) the first type (40.6% of cases), when two bronchial arteries arise from the aorta on the left, and one on the right from the intercostal-bronchial trunk (IRB); (b) the second type (21% of cases), when there is one bronchial artery on the left and one MRBS on the right; (c) the third type (20% of

cases), when two bronchial arteries arise from the left and two from the right, while one of the arteries on the right is presented as MRBS; (d) the fourth type (9.7% of cases), in which one artery is identified on the left and two on the right, while one of the arteries on the right is presented as MRPS. The left bronchial artery usually arises from the anterolateral surface of the descending thoracic aorta and follows the direction of the root of the left lung. On the right, the intercostal-bronchial trunk usually arises from the right posteromedial surface of the descending thoracic aorta and follows in a cephalad direction until it divides into the intercostal

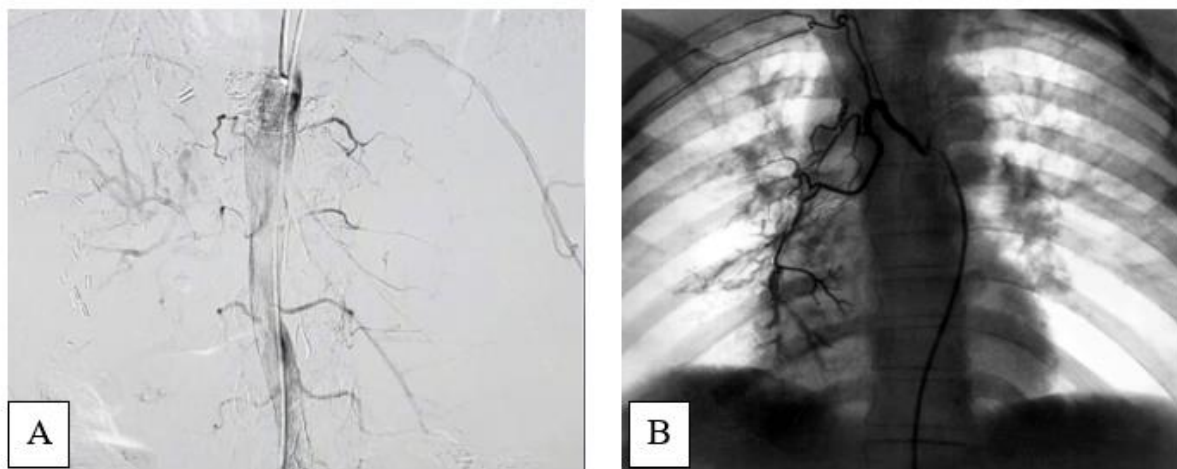
(or intercostal) artery and the right bronchial artery. The latter then turns in a caudal direction and follows along the right main bronchus. The duration of the procedure is 20-30 minutes. The procedure time from the beginning of the procedure when working in "4 hands" (2 angiosurgeons) is 25-35 minutes. (depends on the anatomy of the vessels). As the catheter is installed, the infusion of cytostatics continues for 60 minutes each, followed by compression of the femoral artery area until complete hemostasis (10-15 minutes) or suturing the puncture hole with an Angiosil device measuring 6-7 F.



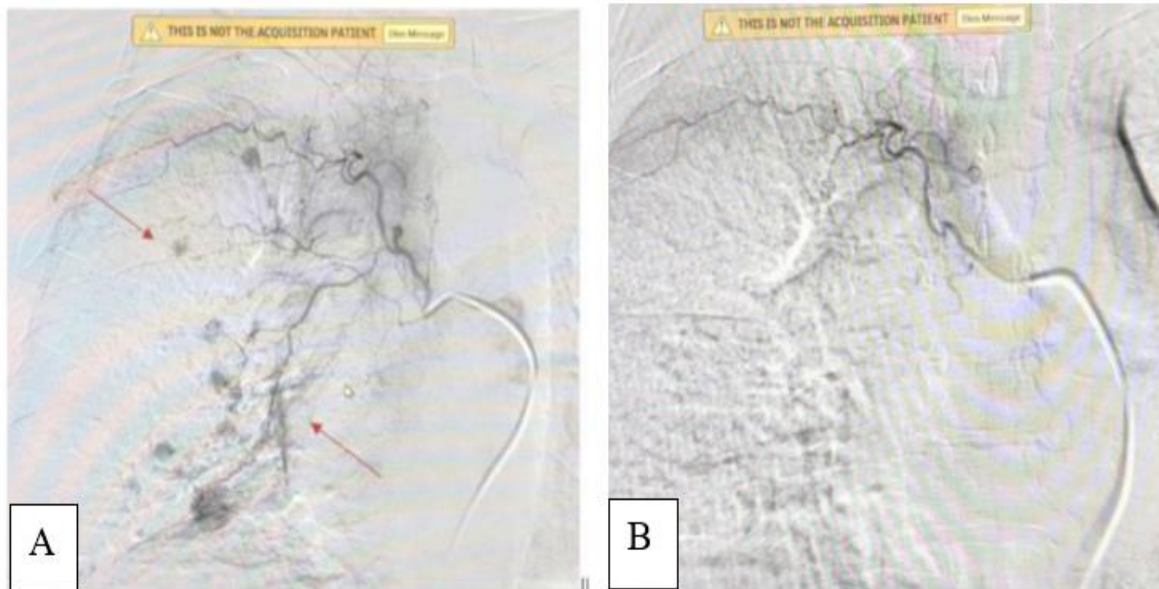
Pic.1 A typical variant of the origin of the bronchial arteries from the aorta (type 1 according to Cauldwell et al., type 2 according to Yoshiaki et al.). One right bronchial artery arises from the intercostal-bronchial trunk, two left bronchial arteries arise from the descending part of the thoracic aorta through a common trunk: and fragments of computed tomograms in MIR mode into three-dimensional reconstructions of bronchial arteries. 1 intercostal bronchial trunk, 2 intercostal artery, 3 right bronchial artery, 4 two left bronchial arteries immediately below the origin of the aorta, 5 trachea and bronchi, 6 larynx.

All of 52 patients aged 52 to 60 years were treated in the period from 2022 to 2024. In all patients, stage IIIa-IIIb of the process was established (T3N0M0 – T2-3bN1M0). All patients at the time of initial or repeated treatment (relapse) had a histologically verified variant of non-small cell lung cancer. Morphologically, lung adenocarcinoma was detected in 18 patients (28,1%), squamous cell carcinoma was detected in 46 patients (71,9%). In all cases, radiological confirmation of the local extent of the process was noted through CT/MRI/PET/CT examinations. All patients received

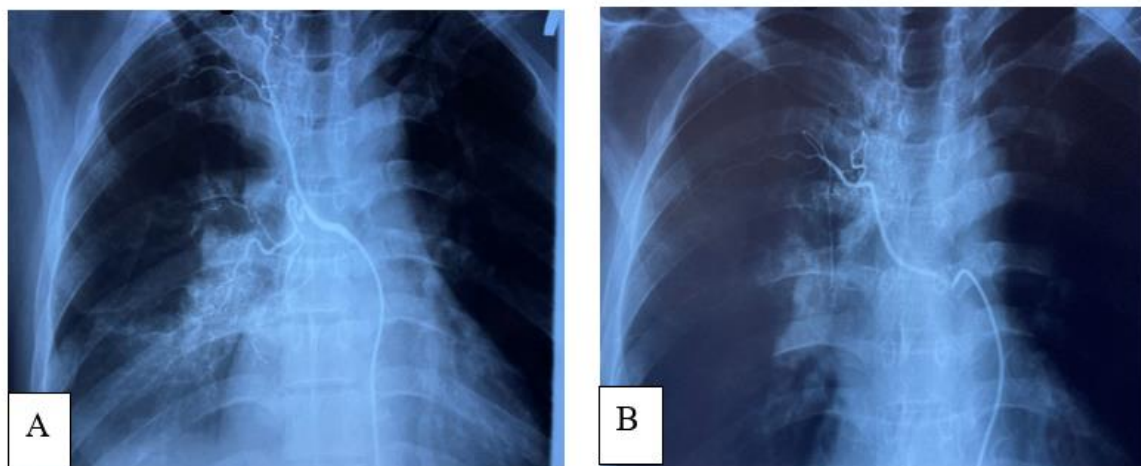
intra-arterial chemotherapy in the branch of the bronchial artery according to the "TR" regimen (Docetaxel 75 mg/m² + Cisplatin 75 mg/m²) in a standard therapeutic dose. The interval between courses of intra-arterial chemotherapy was carried out once every 21 days from the date of administration of chemotherapy. Among the side effects, one can note the inherent cytotoxicity of the drugs with manifestations of anemia, leukemia and thrombocytopenia, which were corrected through the use of L-CSF (leukocyte colony-stimulating factor), glucocorticoids and targeted symptomatic replacement therapy.



Pic. 1 Exploratory angiography at the stage of bronchial artery catheterization (A). Angiography of the right bronchialis artery, anatomy variations (B).



Pic. 2 Angiography a. bronchialis on the right.
Central cancer of the right lung with intraorgan metastatic foci.
Selective catheterization (A). Condition after 3 courses of HIBA (B)



Pic. 3 Arteriography a. bronchialis on the right.
Central cancer of the right lung with intraorgan metastatic foci.
Selective catheterization (A). Condition after 3 courses of HIBA (B)

Results. Analysis of the immediate results of treatment showed the effectiveness of the technique in 52 patients (81.25%). Thus, out of 64 patients, 34 primary patients (53.1%) with a clinical diagnosis of lung cancer after 3 courses of transarterial chemoinfusion with the “Docetaxel+Cisplatin” regimen, according to the control examination (FBS, CT), partial regression of the process was noted, 2 (3.1%) patients noted progression of the process due to a violation of the inter-course interval due to the duration of recovery of the blood picture after a course of chemotherapy. In 28 patients, stabilization of the process with positive dynamics was noted, which made it possible to transfer the unresectable stage of the disease to a resectable tumor process. All 52 patients, within an interval of up to 3 weeks after the third course of transarterial chemoinfusion, based on the results of control examinations, underwent radical surgical treatment. Thus, in 28 (43.7%) patients with partial regression of the process, forebrain

surgery and bilobectomy were performed, in the remaining 22 (34.3%) patients an extended combined pneumonectomy was performed.

Discussion. The effectiveness of the transarterial administration of cytostatics for primary non-small cell lung cancer was demonstrated by clinically significant tumor regression after 1 course of chemoinfusion in 12 patients (18.75%), stabilization of the process in 20 patients, progression of the process in 1 patient. Immediate postoperative complications were observed in 3 patients (hematoma of the puncture area of the femoral triangle according to Seldinger). The median follow-up in all patients in the postoperative period exceeded 18 months. According to various authors, it is quite variable [3,4,6,9].

Among the complications inherent in chemotherapy, we also noted grade 2-3 emetogenic reactions. All these phenomena were manageable with accompanying therapy and did not require blood transfusion additions.

Conclusions. The use of minimally invasive interventional regional methods for treating primary non-small cell lung cancer demonstrates a high overall response rate, a statistically significant median survival as part of complex therapy, and an improvement in the quality of life of patients.

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