

**Research Article**

## **Clinic-And-Diagnostic Effects of the Direct Angiography at Medicamentous Osteonecroses of Maxillary Bones**

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### **ABSTRACT:**

The resection of the bone structures of the lower jaw involved in the pathological process developing owing to the progressing medicamentous osteonecrosis is the most widespread method of surgical treatment [6,7,11,12]. Scoping the resection tissues traditionally is based on data of the orthopantomography or multispiral computer tomography survey [4,5,13].

Besides, in the course of own clinical observations it is established that data of visual intraoperative inspection cannot always help define borders of an affected area and often demand expansion of volume of the planned surgical treatment [1,2,3]. In the available sources devoted to surgical ways of treatment and diagnostics, medicamentousosteonecroses clinic-diagnostic effects of a direct angiography are not described [8,9,10]. It is obvious that among the diagnostic tests given about results, methods of prevention and treatment, medicamentousosteonecroses of jaws there is a set of the unresolved questions needing further researches, basic of which search of low-invasive and high-informative diagnostic and surgical ways of treatment of this pathology are, as defined the relevance of the presented research.

**Keywords:** osteonecrosis, osteomyelitis, endovascular angiography, angiogram, surgical access.

### **INTRODUCTION**

Now bisphosphonate are used as chemotherapeutic treatment of malignant diseases, medicines enter intravenously for prevention of bone metastasis and complications [2]. Bisphosphonateis also used at pathology of metabolic processes and treatment of osteoporosis, Peget's disease, pediatric imperfect osteogenesis, as the means

interfering unbalanced work of the osteoclast splitting mineral structures of a bone [2, 4].

In recent years growth of number of patients with an osteonecrosis of facial bones at persons with drug addiction from desomorphine and pervitin at which production red phosphorus is noted.

In the territory of the Russian Federation the tendency to growth and distribution in various regions of the use of the handicraftmade desomorphine is noted in recent years: from 16 regions in 2006 to 60 regions in 2009 [4]. In the first quarter 2010 150 million doses of desomorphine are withdrawn that, by estimates of Federal Drug Control Service of the Russian Federation, corresponds to the annual need for desomorphine of 300 000 people [9, 10].

The most frequent symptom of metastasis in bones is pain. Refer increase in intra bone pressure, pressing of soft tissues and a mechanical compression of a bone to mechanical factors of a pain syndrome. To chemical factors prostaglandin E, the acidosis accompanying osteolysis and the factors produced or activated by a tumor are carried[5]. On early stages of metastasis development pain is caused by irritation of the intra bone and peristalticnerve terminals due to allocation of cytokine and increase in intra bone calcium.

Patogenetic features of interaction of the phosphorus which is contained in medicines for cancer patients treatment and medicines of the synthetic narcotic substances used at production with cellular and enzymatic systems now, are studied insufficiently [1, 6].

Research objective is the comparative analysis of diagnostic informational content and clinical efficiency of endovascular surgery of medicamentousosteonecroses and aseptic osteomyelitis of maxillary bones.

### **Research data and methods**

During the period from 2011 to 2016 in GBUZ SK SKKB under observation there were 15

patients with medicamentousosteonecroses and aseptic osteomyelitis of maxillary bones. In the anamnesis at most of patients existence of oncological diseases prostate or mammary glands is established on the basis of what various quantities of courses by medicines of Zelendronic acid according to the standard scheme is conducted.

At a stage of patienthospitalization in a surgical hospital with complications, frolicing after the chemotherapy which is carried out in the conditions of an oncological clinic, according to orders of health caredelivery, for all patients the multispiral computer tomography is done.

At most patients diffusion destructive changes of bone structures of jaws are noted. During the carried-out expeditious treatment it is established that the volume of the tissues planned to a resection based on data of three-dimensional reconstruction did not correspond to intraoperative data in this connection, there was a need of expansion of interventionvolume that promoted formation of rough cicatricial changes in soft tissues of the lower third of the person and the forward surface of a neck.

The formed cicatricial changes led to development of the phenomena of dislocation asphyxia and cachexy. The specified complications were observed by us earlier for patients after radical resections of the lower jaw concerning various oncological diseases, after radical neck dissection of the lymphatics of a neck, after the combined treatment with use of ionizing radiation and other means.

Taking into account the predicted complications and according to a research objective for all patients at the first stage of

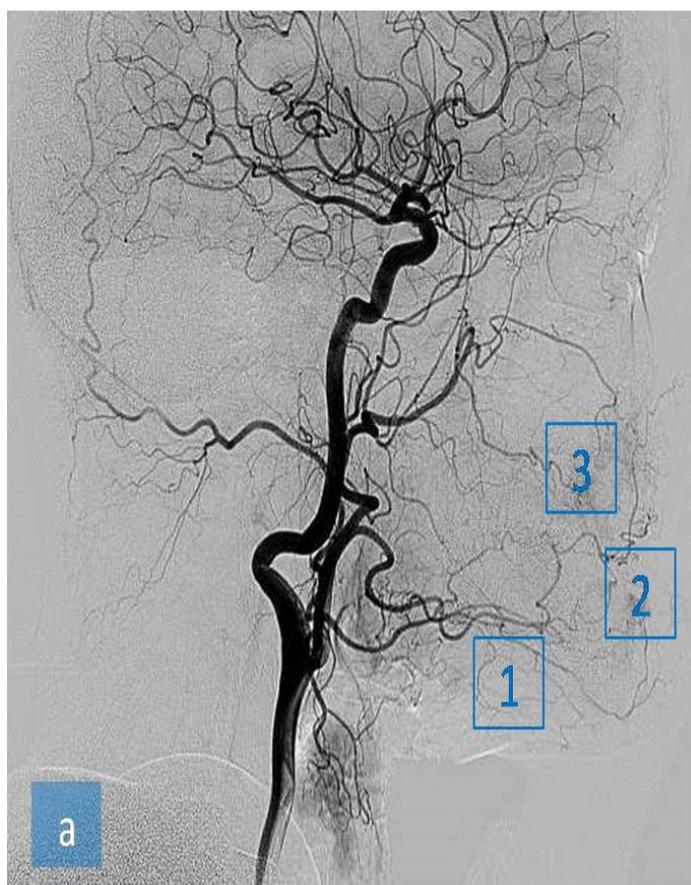
surgical treatment endovascular diagnostic testing on the Toshiba Infinix VC-i and Philips Allura Xper FD20 angiographs equipped with the universal detector and an opportunity to carry out a digital subtraction angiography and 3D reconstruction of angiographic images is performed.

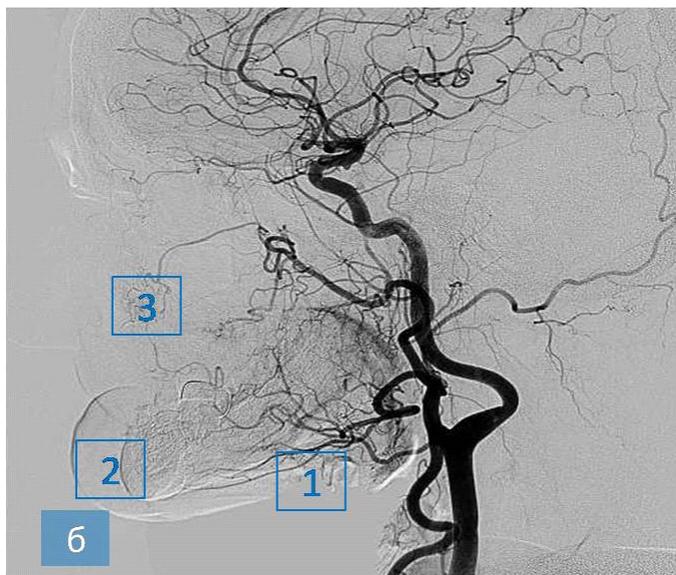
On the operating table local anesthesia of 5 ml - 0,5% of novocaine solution is carried out hypodermically to the right inguinal area with the subsequent skin puncture and introduction to the general femoral artery (by a standard technique of Seldinger) of introducer 5F. In the established introducer entered physiological solution the containing heparin (the total dose of heparin on operation made 5000 un.) (fig. 1).

Angiography from right and left general sleep arteries carried out with occupation of the pool of an external carotid with a speed of introduction of contrast substance 8-10 ml a second.

As contrast we used "Ultravist 370". According to a research objective for preservation of resection tissues volume, selective introduction was made of the prepared solution consisting of 1000 mg of amoxicillin and 200 mg of clavulanic acid in the center of bone tissue destruction according to the offered scheme.

Expedient treatment came to the end with removal of an introducer with a careful hemostasis of a femoral artery, overlaying the pressing bandage for 24 hours, a high bed rest within the first days.



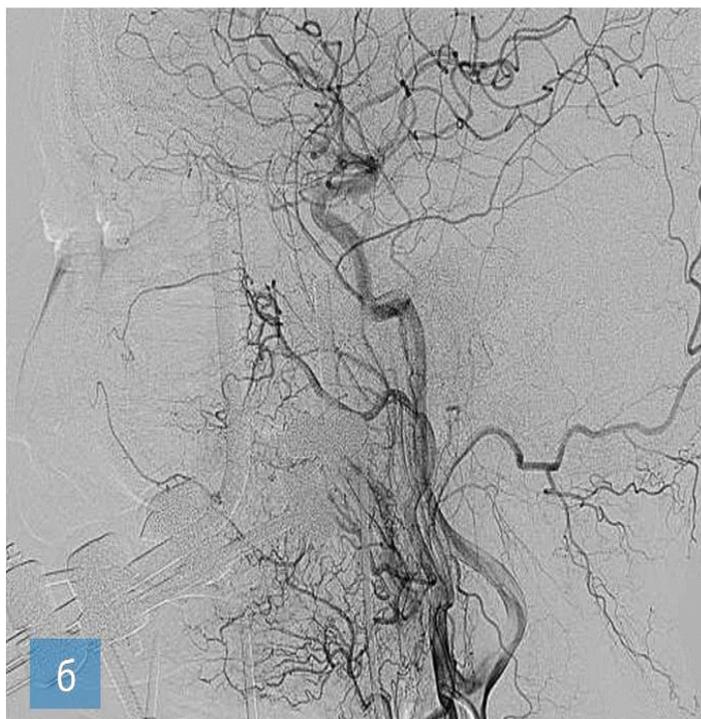


**Fig. 1** - the patient C. 56 years, after 18 courses of Zolendronov acidmedicines treatment with clinical signs of medicamentous osteonecrosis in a projection of the lower jaw body at the left, a chin segment and in a frontal segment of an alveolar shoot of the top jaw. A - the endovascular angiography of the right half of a facial skeleton, is visualized the expressed vascular network in a projection of a body (1) and chin (2) lower jaws and a frontal segment of an alveolar shoot of the top jaw (3) on the right; B - the endovascular angiography of the left half of a facial skeleton, is visualized absence of vascular network in a projection of a body (1) and chin (2) lower jaws at the left, in a projection of an alveolar shoot of the top jaw (3) at the left.

### Research Results

During resections of the lower jaw by the standard technique discrepancy of clinical and radiological data is revealed. At vast majority of patients the volume of resected tissues increased and in the postoperative period complications which demanded carrying out numerous repeated surgical interventions progressed. In the visual analysis of control digital subtraction angiograms restoration of the local rheological deformations which are shown stabilization of a blood-groove in hypo - and avascular sites of a mandibular bone is noted that was clinically shown by restoration of functional activity of teeth-jaw system (fig. 2).





**Figure 2** - the same patient, after 18 courses of Zolendronovy acid medicines with clinical signs of a medicamentous osteonecrosis in a projection of a body of the lower jaw at the left, a chin segment and in a frontal segment of an alveolar shoot of the top jaw (a control endovascular angiography).

A - The endovascular angiography on the healthy part, the expressed vascular network is visualized in a projection of a body and chin of the lower jaw and a frontal segment of an alveolar shoot on the right;

B - The endovascular angiography on the affected part, restoration of vascular network is visualized in a projection of a body, chin of the lower jaw at the left, in a projection of an alveolar shoot of the top jaw at the left.

At 92% of patients the positive clinical effect in the first days after operation which was characterized by improvement of the local and general status that considerably reduced terms of rehabilitation and duration of stay in a hospital for exhausted patients that also allowed to optimize use of resources of health care is noted.

#### **SUMMARY**

In clinical practice the new low-invasive way of endovascular surgery used as a landmark method of diagnostics and treatment of medicamentous osteonecroses and aseptic osteomyelitis of jaws is introduced. Its use

allowed adding an objective clinical picture of diffusion ischemia of the near jaw and bone tissues progressing against the background of the chronic inflammatory phenomena and medicamentous intoxication.

#### **CONCLUSION**

It is obvious that early diagnostics of rheological violations promotes selective impact on pathogenetic links of the progressing syndrome of the mutual burdening caused by local violations of geometry and tone of the vascular course and allows to minimize the volume of surgical intervention, terms of

patientrehabilitation, to use health care resources more effective.

## REFERENCES

1. Sirak S. V. A hardware method of treatment of fractures of the lower jaw at bisphosphonateosteonecroses<<http://elibrary.ru/item.asp?id=22515405>> / S. V. Sirak, A. B. Davydov, T. T. Meboniya, A. V. Arutyunov//Stomatology for all <<http://elibrary.ru/contents.asp?issueid=1348657>>. - 2014. - No. 2 <<http://elibrary.ru/contents.asp?issueid=1348657&selid=22515405>>. - Page 32-35.
2. Belokon O. S. Results of roentgen endovascular methods of diagnostics and treatment of patients with a hemorrhagic stroke of aneurismal etiology in hospital conditions <<http://elibrary.ru/item.asp?id=25952237>> / O. S. Belokon, R.A.Mozheyko, //Medical bulletin of the North Caucasus <<http://elibrary.ru/contents.asp?issueid=1574829>>. - 2016. - T. 11. No. 1 <<http://elibrary.ru/contents.asp?issueid=1574829&selid=25952237>>. - Page 90-92.
3. Bagan J.V. Jaw osteonecrosis associated with biphosphonates: multiple exposed areas and its relationship to teeth extraction/J.V.Bagan, Y.Jimenez, J.Murillo, S.Hernandez, R.Poveda, J.M. Sashis, et al.//Study of 20 cases. Oral; Oncol. - 2006. - Vol. 42, No. 2 - P. 327 - 329.
4. Merigo E. Bone necrosis of the jaws associated with bisphosphonate treatment: report of twenty-nine cases/E.Merigo, M.Manfredi, M.Meleti, et al.//Acta Biomed. - 2006 vol.77, No. 1. - p. 109-117.
5. Murad O.M. Bisphosphonates and osteonecrosis of the jaw: retrospective study/O.M.Murad, S.Arora, A.F.Farag, H.A.Guber//EndocrPract. - 2007. - 13(3):232-8.
6. Montebugnoli L. Biphosphonate-associated osteonecrosis can be controlled by nonsurgical management/L.Montebugnoli, L.Felicetti, D.B.Gissi, A.Pizzigallo, G.A.Pelliccioni, C.Marchetti//Oral Surg Oral Med Oral Pathol Oral RadiolEndod. - 2007. - Vol.104, No. 4 - P.473-7.
7. Kapitola J. Effect of pamidronate on bone blood flow. In ophorectomized rats/J.Kapitola, J.Zac//Physiol Res. - 1998.Vol. 47, No. 3 - P. 237-40.
8. Grimm W.D. Clinical, radiographic, and histological analyses after transplantation of crest-related palatal-derived ectomesenchymal stem cells (paldscs) for improving vertical alveolar bone augmentation in critical size alveolar defects <<http://elibrary.ru/item.asp?id=25754794>> / W.D.Grimm, W.A.Arnold, S.W.Sirak, M.A.Vukovich, D.Videra, B.Giesenhagen//Journal of Clinical Periodontology <<http://elibrary.ru/contents.asp?issueid=1566406>>. - 2015. - T.42. - No. S17 <<http://elibrary.ru/contents.asp?issueid=1566406&selid=25754794>>. - Page 366b-366.
9. SirakS.V.Prevention of complications for patients suffering from pathological mandibular fractures due to bisphosphonate-associated osteonecroses<<http://elibrary.ru/item.asp?id=25006887>> / S.V.Sirak,

- E.V.Shchetinin//Research Journal of Pharmaceutical, Biological and Chemical Sciences <<http://elibrary.ru/contents.asp?issueid=1440246>>. - 2015. - T. 6. - No. 5 <<http://elibrary.ru/contents.asp?issueid=1440246&selid=25006887>>. - Page 1678-1684.
- 10.Sirak S.V. Low-level laser irradiation (810 nm) with toluidinblue photosensitizer promotes proliferation and differentiation of human oral fibroblasts evaluated in vitro <<http://elibrary.ru/item.asp?id=26033660>> / S.V.Sirak, F.Entschladen, E.W.Shchetinin, W.D. Grimm//Journal of Clinical Periodontology <<http://elibrary.ru/contents.asp?issueid=1566406>>. - 2015. T. 42. No. S17 <<http://elibrary.ru/contents.asp?issueid=1566406&selid=26033660>>. Page 328a-328.
- 11.Srinivasan D. Orofacial pain - a presenting symptom of bisphosphonate associated osteonecrosis of the jaws/D.Srinivasan, S.Shetty, D.Ashworth, N.Grew, B.Millar//Br Dent J. - 2007.28; 203(2):91-2.
- 12.Firsova I.V.Clinical and experimental study of the regenerative features of oral mucosa under autohemotherapy<<http://elibrary.ru/item.asp?id=25012523>> / I.V.Firsova, Iu.A.Makedonova, D.V.Mikhailchenko, S.V.Poroiskii, S.V.Sirak//Research Journal of Pharmaceutical, Biological and Chemical Sciences <<http://elibrary.ru/contents.asp?issueid=1478169>>. - 2015. T. 6. No. 6 <<http://elibrary.ru/contents.asp?issueid=1478169&selid=25012523>>. Page 1711-1716.
- 13.Fournier P. Bisphosphonates inhibit angiogenesis in vitro and testosterone-stimulated vascular regrowth in the ventral prostate in castrated rats/P.Fournier, S.Boissier, S.Filleur//Cancer Research. - 2012.Vol. 62. - P. 6538-6544.