

Surgical Treatment of Patients with Bone Chondomas

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Abstract The article is devoted to the study of chondromas of limb bones, that takes first place (84.4%) in the structure of benign tumors and tumor-like diseases. The authors present the results of the analysis of 42 patients. In most cases, it was enchondroma (33 cases - 81%). Often, pathology was founded in the hand bones (78.8%). The choice of bone grafting method was determined using the computer “Program for the treatment of benign tumor and tumor-like diseases of the limb bones” DGU 20180831. Evaluation of the treatment results showed that the use of bone grafting using Collapan L material improved the consolidation of the bone defect in 82% of cases, which led to early patient mobilization, reduction of rehabilitation and disability periods, and ultimately improvement of treatment results.

Keywords Chondroma, Bone, Limb, Minimally invasive, Surgical treatment

1. Relevance

In the structure of neoplastic bone lesions 56.5% belongs to benign tumors and tumor-like diseases [12,15].

Chondroid neoplasms of the bones are the most common benign tumor of the bone system, the percentage of their occurrence reaches 84.4%. According to Vyrva, O.E. the incidence of bone chondroma ranges from 3 to 38% of cases. [1,2,3,26,27]. Pathology occurs in the form of various syndromes, most often multiple osteochondroma syndrome. All tumors of the musculoskeletal system, mainly appears in young people, in 80% of cases 20-30 years, with equal frequency of a female and male [2,25,26,27]. Analysis of the literature indicated that the authors are unanimous in the opinion that the most frequent sites of the tumor was small tubular bones of the hands [12]. Chondromas are borderline formations and have a potential malignancy and a pronounced ability to malignancy. Thus, according to various sources, up to 32% of cases with prolonged existence they were transformed into chondrosarcoma [4].

According to summary data, relapses ranged from 1.4% to 19% in the treatment of patients with bone chondroma of various locations even at the performing of wide or segmental resections, which undoubtedly indicates a pronounced aggressiveness of these neoplasms. Moreover, some data indicates a decrease in the time between relapses with each reappearance of signs of the formation of a pathological focus [22]. Differential diagnosis of small bone tumors has certain difficulties, since it is necessary to conduct a thorough diagnosis both between the benign pathological processes themselves, and with malignant neoplasms of the bones, and with soft tissue diseases of the

hand [7].

The problem of treating of benign tumors and tumor-like diseases of the bones of the skeleton is very relevant and insufficiently developed [5,7,25]. The difficulties of surgical treatment of this pathology are primarily associated with the blast nature of the lesion, difficulties in early diagnosis, as well as the existence of various types of surgical treatment. All of them creates certain difficulties in choosing an appropriate method of surgical intervention. In addition, it is necessary to take into account their ability to malignancy with inadequate and untimely 9 surgical procedure [16,25].

The improvement of the known methods of surgical treatment and replacement of bone defects and the choice of plastic materials used to replace bone defects for many years remains one of the main and urgent problems of oncoorthopedics.

In order to replace bone defects, use autografts, xenografts and allografts, artificial biomaterials even their combination is possible [13,23]. All known materials have certain advantages and disadvantages, and used strictly according to indications.

The aim of the research was to study the results of surgical treatment of patients with chondroma of limb bones in the early and late postoperative period.

2. Materials and Methods

42 (24.8%) patients with chondroma of various shapes and localizations were treated. Among them, the enchondroma was 34 (81%), the ecchondroma was 3 (7%), Olier disease was 5 (11.9%) cases (table 1).

By localization, the pathology was found in the bones of the hand - 34 (73.6%), hips - 2 (4.7%), lower legs - 1 (2.3%), feet - 2 (4.7%), as well as 3 (7%) cases revealed - polyfocal localization of the process (table 2).

Table 1. Amount of patients depending on the of growth type of chondroma

Pathology	Number of patients (n)	Present of patients (%)
Enchondroma	33	78,5
Olier disease	6	14,3
Ecchondroma	3	7,2
Total	42	100

Table 2. Amount of patients depending on process localization on limb parts

Process localization	Number of patients (n)	Present of patients (%)
Hand bones	34	81
Polyfocal	3	7,2
Foot bones	2	4,7
Shin	1	2,4
Hip	2	4,7
Total	42	100%

By age, patients were divided according to the WHO classification (2013) into patients of children 3-7 years old -2 (4.7%) patients, 8-11 years old -2 (4.7%), 12-15 years old -6 (14, 3%), 16-18 years old -3 (7.1%) and adulthood 19-24 years old -5 (11.9%), 25-44 years old -15 (35.7%), 45-70 years old -9 (21.4%).

The indications for the surgical method of treatment were the clinical manifestation of the disease in the form of a symptom complex - pain, deformity or palpable formation at the bone level, impaired function of the limb or nearby joint, pathological fracture.

All patients underwent general clinical and radiation studies.

X-ray studies were performed on digital low-dose X-ray equipment with standard cartridges. In order to compare the structure of the bone, as required, we applied the radiographs of the contralateral side.

The X-ray analyzing included study of the shape, size, contours of the bone, the morphology of the surrounding soft tissues, the presence of an endostal and periosteal reaction, the localization of the process, and the internal structure of the focus, and considered the age group.

By the assessing of revealed pathological formation, the size, shape, contour, extent, topographic localization, destructive changes, which are the signs for the differential diagnosis between benign tumor and tumor-like diseases of limb bones, were evaluated.

The X-ray picture of chondromas differs sharply depending on the type, localization and prevalence of education. In the initial stages of development, chondromas may not be determined. In this case, the tumor can be visualized when foci of calcification and ossification are appeared in it.

For chondromas, a radiological picture of a delimited area of "enlightenment" against a background of unchanged bone

structure around is more typical. As a rule, in this case, the bone is unevenly "swollen". Typically, a lesion with bone septa is determined. The internal structure of the tumor is usually "mottled", with focuses of ossification i.e. flaky shadows against a background of homogeneous enlightenment. The pathological region often has an oval-rounded shape with a clear scalloped contour and the presence of sclerosis around. The cortical layer is usually unevenly narrowed, but maybe thickened in some places with an eccentric location of the tumor, thinning of the cortical layer of the bone is observed, which is often the cause of a pathological fracture.

Chondroma has expansive growth and does not affect surrounding tissue. Although at the same time, tumor cells have a high ability to implant. This fact obliges the surgeon to adhere to a thorough surgical technique, observing the principle of radicalism and the rules of ablative and antitlastic [9,16,17].

The destruction of the affected segment, even with small loads, can be complicated by a pathological fracture. According to I. Matveev (1981), in such a situation, one should adhere to such tactics: immobilization of the limb until the fracture is repaired, and a rehabilitation course aimed at restoring limb function and then surgical treatment [7,9]. Cases of regression of the tumor process of bone chondroma after consolidation of a pathological fracture are described [6].

The indications for the surgical method of treatment were the clinical manifestation of the disease in the form of a symptom complex - pain, deformity or palpable formation at the bone level, impaired limb or nearby joint function, pathological fracture.

All 42 patients underwent surgical treatment using minimally invasive access under the control of the X-Ray. A tumor was enucleated, and the cavity was coagulated, then it was cleansed with hydrogen peroxide and bone wax.

15 patients were underwent plastic surgery with Collapan L, 10 patients were underwent plastic surgery with autobone graft, 12 patients were underwent combined bone grafting, and 5 patients were not underwent bone grafting. All x-ray studies were carried out in dynamics: at the initial examination, on the third day after surgery, after the end of the immobilization period - 1 month after surgery, 3 months after surgery to determine signs of bone marrow formation, 6 months after surgery to detect bone remodeling defect.

3. Results

Clinical analysis of patients determined that in most cases, patients complained of pain - 42 cases, of which 6 cases had constant pain, in 8 cases it was occurred during physical exertion, in 5 cases with passive limb movement, in 23 cases the pain was episodic and not associated with physical activity and time of occurrence.

At an external examination in 42 cases there was a thickening in 6 cases, deformation of the limb, and in 4 cases a pathological fracture was determined.

The x-ray pattern differed from the process localization, while localization at the level of short tubular bones (foot brush) determined the characteristic pattern with the presence of a bleeding site — a bone defect with uneven thinning of the cortical layer at a given level, while the internal structure was heterogeneous with areas of compaction — “mottling”.

When the process was localized in the area of the thigh and lower leg, the picture became less specific without a characteristic area of enlightenment with a definite shape; during the X-ray diffraction pattern, a section of a central location was often determined where alternation of areas of osteosclerosis and cartilage reconstruction was noted. As a rule, there were no signs of marked thinning of the cortical layer of the bone and thickening-expansion of the contours of the bone.

To evaluate the results of treatment, in addition to the radiological and clinical signs of bone consolidation, a questionnaire was used to assess patients for episodes of relapse of pain, specifying their nature, intensity and time of occurrence, restoration of limb function, and the degree of fulfillment of household duties.

As a result of the studies, 10 patients were identified as having episodic pain during the first week after the operation, in 28 patients the function was restored 7 days after the plaster cast was removed, and in 14 patients after 2 weeks.

4. Discussion

Several of the most common methods of surgical treatment have been proposed in the world literature [23]. The main provisions of which are exoculating followed by cryo-, electro- or chemical treatment of the cavity and replacement of the defect with alloplastic material, or resection of the (marginal, segmental) bone with removal of the pathological focus and subsequent allo- or autoplasty of the defect [28], and in advanced cases offer endoprosthetics [9] or amputation of the limb. However, a large number of studies of surgical procedures, techniques for filling a bone defect, the use or rejection of auto or alloplasty proved that there was no single protocol for the treatment of this pathology, which allows us to continue this topic.

In addition, the development of the Collapan implant, which is actively used in maxillofacial surgery and dentistry when filling small bone defects, is in time [10,11].

In the reconstructive treatment of bone pathology of various origins the considerable interest is Collapan L. The implant can be used in the treatment of bone defects using the principles of minimally invasive surgery. This minimizes the volume and risk of surgery. This is especially relevantly for the localization of pathological foci in children, even near the growth zone or with damage to it, as well as in inaccessible areas of the skeleton.

5. Conclusions

The study showed that the predominant number of benign tumors and tumor-like diseases of the limb bones was accounted for by bone chondroma (42 patients - 24%), in most cases, on enchondroma (33 cases - 81%). Often, pathology was found in the bones of the hand (78.8%).

There are no signs to determine enchondroma. A preliminary diagnosis is made on the basis of the presence of a symptom complex such as periodic pain more often during physical exertion, a claviform thickening when localized in the area of the hand or forearm (which again is more often combined with pain), the presence of an area of enlightenment on the radiograph, as well as possible fractures on level of a thinned cortical layer.

A distinctive feature of the diagnosis and treatment of tumor and tumor-like bone diseases is necessary for a mandatory multidisciplinary approach. This includes: collection of clinical data (patient complaints, clinical manifestations of the disease), adequate interpretation of data from radiation diagnostics and MRI studies, a careful assessment of the morphological picture and, if necessary, the use of other methods for making an accurate diagnosis.

Evaluation of the treatment results has showed that the use of bone grafting with the use of Collapan L material improves the consolidation of the bone defect area in 82% of cases, which leads to early mobilization of the patient, shortening the rehabilitation and disability periods and ultimately improving treatment results.

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