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Post cryosurgical rehabilitation of ear chondroma. Case from practice

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Abstract

A typical place of localization of chondroma is the cartilaginous tissue of the auricle, which rarely develops and most often in people at a young age. Existing treatment methods are effective and widespread, however, any injury to the tumor accelerates its growth. Therefore, significant development of chondromas is observed after a trial excision or incomplete removal. Cryosurgical treatment refers to gentle, less traumatic methods. The authors describe a case from practice: removal of the chondroma of the outer ear using a CAO-2 cryoapparatus with an individual polyethylene cap, which allows for accelerating and simplifying the process of thawing and re of the instrument. This intervention is outpatient and does not require special preparation. Taking into account the undesirable complications after cryotherapy (swelling, pain due to increased tissue turgor, local deterioration of blood circulation) on the one hand, and taking into account the antitoxic, calming, relaxing, and analgesic effect of magnesium on the body as a whole, the authors used balneotherapy in the form of a course of applications with a natural balneological agent with a high content of magnesium chloride on the zone of cryotherapy, as well as its drinking course consumption. The observation showed that the intervention using a cryoapplicator is a gentle method, slightly damaging the surrounding tissues, minimizing the possibility of intraoperative bleeding, allowing to accelerate the operation process and healing time, and, accordingly,

reducing the patient's incapacity for work. Applying the results in clinical practice will significantly reduce the likelihood of deformation of the outer ear and maintain its primary functions.

Keywords: chondroma ear, cryosurgery, magnesium chloride.

Introduction

By localization, chondromas are typical; that is, they develop in places with a high content of cartilaginous tissue and are atypical, in which their appearance can be in the most unpredictable parts of the body [1–5]. Cartilaginous tissue of the auricle is a typical localization of the chondroma. The peak of the onset of pathology occurs in childhood and adolescence. This phenomenon is associated with active metabolic processes and increased division of cartilage cells [6]. The clinical picture of the growth of chondroma in places of typical localization is poor and can only be diagnosed after it reaches a significant size. In the case of an atypical location of the focus, more or less specific clinical manifestations may appear, accompanied by aesthetic discomfort, forcing patients to consult a doctor [7]. When localized in the auricle, especially when the chondroma reaches a large size, the neoplasm covers the auditory canal, the permeability of the sound wave is disturbed, the functioning of the hearing aid deteriorates significantly, and conductive hearing loss develops [8].

The chondroma of the ear is clinically a dense-tissue benign tumor formation located on a wide stalk, painless, with regular contours, covered with unchanged skin, morphologically formed from hyaline cartilage tissue [9]. Hyperplastic cartilage differs from normal cartilage in its characteristic features, consisting of the random arrangement of cells in the samples and sometimes occurring myxomatous changes and petrifications along the periphery of the tumor. Under the influence of trauma and some obscure constitutional problems, these rudiments can grow and lead to the tumor formation. It grows very slowly, it can take years to develop, but it is prone to recurrence and active growth after surgery. The starting factor for the appearance of the first altered cells may be injuries from which the chondroma develops. In addition, the factors provoking the appearance of chondroma of the ear are chronic inflammatory processes, hereditary predisposition, and surgical intervention that damage the integrity of the cartilage tissue [10].

Methods of treatment of chondroma of the ear. The method of treatment is usually chosen based on the results of the examination and analysis of clinical manifestations.

Operation. The operation to remove the ear chondroma is performed using a microscope, which allows you to excise the tumor with minimal damage to healthy tissues. During the procedure, tissue samples are taken for histology to determine the true nature of

the tumor. Tumor damage accelerates its growth. Therefore, a significant development of chondroma is observed after a trial excision or incomplete removal [11]. The most common surgical interventions are ultrasonic, laser, and radiofrequency scalpel. These methods have positive qualities, but their action is aimed at opening with high-temperature exposure, bleeding, the presence of a clot, necrosis, cell infiltration, granulation, and healing by either restitution or substitution with scar formation.

In clinical practice, apparatuses and devices are widely used that produce various physical factors of influence on biological tissues: electrical, magnetic, light or photo, and thermal effects. Depending on the pulse frequency, the duration of tissues exposure, and physical factors can produce a therapeutic or surgical impact.

Radio wave surgery uses high-frequency waves with an energy of 3.8 MHz [12]. The effect is achieved due to the heat generated during tissue resistance, boiling the intracellular fluid at a temperature of about 80 ° C, which leads to a soft wrinkling of the tissue and a decrease in its volume. There is no direct contact of the electrode with the cells; the electrode does not heat up. Apply cutting mode (high frequencies), coagulation (low frequencies), and mixed (modulated high frequency) effect similar to the surgical method but safer [13, 14, 15].

Cryodestruction (cryosurgery) has a fundamentally different, non-electric origin method of tissue damage using ultra-low temperatures. Surface layers are destroyed due the direct damaging effect of cold. In cryosurgery, liquid nitrogen cools tissue cells [16, 17]. Cryodestruction is used to destroy atypical tissues in the body and is indicated in treating small epithelial, connective tissue neoplasms. Ice crystals form inside the tumor tissue, in the intercellular space, which destroy the microstructure of tumor cells and blood vessels, which leads to malnutrition of the tissue, necrotization, restoration of the normal tissue structure, which prevents further accelerated division of tumor cells [18, 19, 20]. In the deep layers, there is a violation of microcirculation and tissue hypoxia; as a result, there is no concept of a typical wound with the further development of granulations and a scar. In the postoperative period, recovery occurs with tissues characteristic of this localization.

Equipment for cryosurgical treatment is a unique cryogenic system that uses liquid nitrogen at a temperature of -196 °C. For treatment, devices are used in which nitrogen circulates through a hollow instrument with a thin tip (cryoprobe), supplied to the applicator in contact with the tumor. At the point of impact, a temperature is created (- 180 °C). The cooling time and the number of exposure points depend on the tumor size. After the freezing procedure, the pathological tissue either completely resolves or is replaced by a physiologically complete tissue characteristic of a given localization. A scab may form on the

surface of the tumor [21]. In clinical practice, cryosurgical treatment of patients with chondromas improves the clinical outcome and reduces the likelihood of tumor recurrence and malignancy [22].

The purpose of the work is to evaluate the effectiveness of using balneotherapy and a balneological agent with a high content of magnesium chloride after cryosurgical treatment of ear chondroma.

Materials and methods of research

Under our supervision, there was a patient at the age of 22 years. A tumor-like formation appeared on the ear on the on the right upper edge of the curl and began to develop intensively within six months after the piercing. A histological examination of the formation revealed the diagnosis: chondroma of the ear. For the treatment of ear chondroma, we chose the method of cryodestruction using applicators of different sizes [23]. The applicator was covered with an individual polyethylene coating to prevent the formation of an ice plug on the instrument's surface and reduce the damaging effect on the epidermal integument,. We used a KAO-2 cryoapparatus with individual nozzles of various shapes and sizes and a cap-like coating made of food-grade polyethylene (such a coating makes it possible to speed up and simplify the process of thawing and remove the instrument) [23, 24]. Exposure was carried out with liquid nitrogen at $t (-196^{\circ}\text{C})$ for 2 minutes, and complete thawing lasted 1 minute. Immediately before cryotherapy, an aqueous solution (15 g/l) of the balneological agent "Magnesium oil" (MO) was applied to the surface of preoperative tissues for 15 minutes in the form of applications. After cryotherapy, similar applications were also carried out on days 3, 5, 7 and 9. In addition to the local effect, to obtain an antitoxic, calming, relaxing effect on the body as a whole, the drinking application of MO was prescribed. The patient for 10 days, three times a day, received a solution of MO at a concentration of 2.5 g / l (10 - 12 drops per 150 - 200 ml of drinking water), which corresponded to the daily magnesium intake for women.

Balneological agent "Magnesium oil" ("Doctor Magnesium", Chernivtsy, Ukraine) is a natural mineral complex obtained by purification from aggressive iron compounds from bromine magnesium chloride brine (total mineralization is 350 g/l, and the content of magnesium ions is 80 g/l). MO, in addition to an ultra-high concentration of magnesium ions, also contains a complex of other minerals that enhance its biological effect. These are chloride

ions, sulphate ions, sodium and potassium ions and microelements - bromine, iodine, boron and others. An aqueous solution of balneological agent "Magnesium oil" in a dilution of up to 15 g/l is characterized as a bromine chloride magnesium balneological agent of high mineralization.

Results and discussion

As can be seen on the pictures (Fig. 1 and Fig. 2), the tumor is located in the upper region of the helix of the auricle on the right. The epithelial cover over the tumor is not changed. The formation is dense to the touch, elastic, painless.



Fig. 1



Fig. 2

During cryotherapy (Fig. 3), at the point of contact of the cooled cryoapplicator with the tumor surface, there are areas of deep freezing and a temporary decrease in the volume of tumor tissue due to the formation of ice crystals in the intercellular and intracellular fluid.



Fig. 3

As a result of exposure, after 5 minutes (Fig. 4), 20 minutes (Fig. 5), and 30 minutes (Fig. 6), respectively, due to the developing local tissue edema, the tumor increases more than two times.



Fig. 4



Fig. 5



Fig. 6

On the 7th day after cryotherapy, we observed that the tumor decreased in volume, was painless on palpation, had a dense elastic consistency. Numerous hemorrhages were observed in the subepithelial layer (Fig. 7).



Fig. 7

On the 10th day after cryosurgical intervention, the tumor decreased in volume, the surface of the cryogenic burn was covered with a scab, and epithelization of the tissue was observed along the edges of the formation (Fig. 8). On palpation, the tumor is painless, soft elastic consistency.



Fig. 8

Fourteen days after the intervention (Fig. 9), the skin over the surface of the tumor fully recovered. A slight painless thickening remains along the edge of the auricle curl.



Fig. 9

Examination of the patient on the 30th day after the intervention showed a complete restoration of the structure of the auricle tissues and elimination of the deformity of the auricle curl on the right (Fig. 10). The patient is delighted with the cosmetic effect after the cryosurgical operation.



Fig. 10

Cryosurgical intervention is a sparing method that slightly damages the surrounding tissues, minimizes the possibility of intraoperative bleeding, speeds up the operation and the healing time and, accordingly, speeds up the recovery of the patient's ability to work. A gentle cold effect on hyperplastic cartilaginous tissue will significantly reduce the likelihood of deformation of the outer ear and preserve its main functions. The tissue changed under the influence of cryodestruction is quickly rejected.

Due to biochemical properties, the use of a solution of magnesium chloride in the form of applications, inhibits regressive processes and enhances the diapedesis of leukocytes. The functions of such dressings are fixing and holding a healing solution on the wound, the osmotic properties of which lead to a decrease in intoxication, a reduction in edema and tissue tension, an improvement in blood circulation, and, therefore tissue nutrition, protecting the wound from environmental exposure and infection. Drinking a magnesium chloride solution with a concentration of 2.5 g / l is especially effective in patients with a high level of psycho-emotional stress.

Conclusions

Cryosurgical treatment allows you to eliminate a benign auricle formation reasonably shortly without any special costs. The local application of a balneological agent with a high magnesium content accelerates the recovery processes in the postoperative period, and its drinking improves the emotional status of patients. The results will enable us to recommend the proposed method for widespread implementation in the practice of otorhinolaryngologists and cosmetologists.

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