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DEVELOPMENT OF CRITERIA FOR CHOOSING CARE TACTICS FOR CHILDREN WITH EAR ANOMALIES

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Abstract: The article examines modern approaches to developing criteria for determining the management strategy of children with ear anomalies. Congenital malformations of the external and middle ear hold a special place among sensory organ pathologies, as they affect not only auditory function but also the psycho-emotional and social development of a child. The aim of this study is to systematize the key factors influencing the choice of management tactics, including the severity of the defect, the presence of concomitant hearing impairment, the child's age, and psychophysical development. Particular emphasis is placed on the interdisciplinary approach involving otorhinolaryngologists, audiologists, plastic surgeons, speech therapists, and psychologists. The necessity of individualized therapeutic and rehabilitative interventions is substantiated, including both conservative and surgical methods, as well as early hearing correction to ensure successful integration of the child into educational and social environments. The proposed criteria may serve as a basis for standardizing management strategies and improving treatment outcomes in children with congenital ear anomalies.

Keywords: Ear anomalies, children, management strategy, hearing impairment, rehabilitation, surgical treatment, selection criteria, interdisciplinary approach.

Аннотация: В статье рассматриваются современные подходы к разработке критериев для выбора тактики ведения детей с аномалиями уха. Аномалии наружного и среднего уха занимают особое место среди врожденных патологий органов чувств, так как они не только влияют на слуховую функцию, но и отражаются на психоэмоциональном и социальном развитии ребёнка. Цель исследования заключается в систематизации факторов, определяющих тактику ведения пациентов детского возраста с различными формами аномалий уха, включая степень выраженности дефекта, наличие сопутствующих нарушений слуха, возраст ребёнка и психофизическое развитие. Особое внимание уделено вопросам междисциплинарного подхода, включающего участие оториноларингологов, сурдологов, пластических хирургов, логопедов и психологов. В работе обоснована необходимость индивидуализации лечебно-реабилитационных мероприятий, включающих консервативные и хирургические методы, а также раннюю коррекцию слуха для обеспечения полноценной интеграции ребёнка в образовательную и социальную среду. Разработанные критерии могут служить основой для стандартизации тактики ведения и повышения эффективности лечения детей с врожденными аномалиями уха.

Ключевые слова: Аномалии уха, дети, тактика ведения, слуховые нарушения, реабилитация, хирургическое лечение, критерии выбора, междисциплинарный подход.

Introduction. Ear anomalies in children are one of the most pressing issues in modern pediatric otolaryngology and plastic surgery. These congenital conditions occur with a frequency of 1 to

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5 cases per 10,000 newborns and manifest as a variety of morphological and functional abnormalities, ranging from mild cosmetic defects of the outer ear to severe forms of microtia and atresia of the external auditory canal. Such anomalies are often accompanied by a decrease in hearing function, which significantly complicates the development of speech skills, cognitive development, and social adaptation of the child. Despite significant progress in diagnostics and surgical correction, choosing the optimal management strategy for children with ear anomalies remains a complex and multifaceted task. This is due not only to the variety of clinical manifestations but also to the need to consider the child's age, the degree of hearing loss, the presence of comorbidities, psychoemotional state, and social factors. In these circumstances, the development of clear and scientifically valid criteria for standardizing the approach to managing this category of patients is particularly important. Modern practice requires a comprehensive, interdisciplinary approach, involving specialists from various fields: otolaryngologists, audiologists, maxillofacial and plastic surgeons, speech therapists, and child psychologists. This approach ensures not only the restoration of anatomical integrity and hearing function, but also the full social and educational integration of the child. Therefore, the need to develop clear criteria for choosing treatment strategies for children with ear anomalies is driven by the high clinical and social significance of this problem. The development and implementation of such criteria will improve diagnostic efficiency, the timeliness of treatment and rehabilitation measures, and the quality of life of children with congenital auditory disorders.

Materials and Methods. The examination was conducted in the ENT Department of the Republican Specialized Scientific and Practical Medical Center of Pediatrics (RSSPMCPediatrics), and 70 children aged 7 to 18 years with congenital microtia or anotia were operated on.

Table 1.

Patient Distribution by Gender and Age

Gender / Age	7–10 years	11–14 years	15–18 years	Total (abstract	Total (%)
Male	12	15	15	42	60,0
Female	8	10	10	28	40,0
Total	20	25	25	70	100,0

All children underwent a comprehensive diagnostic test to assess the condition of the middle and inner ear, as well as hearing function. Surgical correction was performed by reconstructing the auricle using an autograft (cartilage graft taken from the 6th-8th ribs). The approach to reconstruction was individualized based on the severity of the anomaly (size and shape of the ear rudiment, skin condition in the area of the proposed implantation, and the presence of concomitant atresia). Most cases required staged surgical treatment: formation of a cartilaginous framework for the auricle and its placement under a skin flap, followed by correction of the ear position (distance) in the second stage. Postoperative observation was carried out in the hospital until the condition stabilized and then on an outpatient basis, with regular check-ups to monitor the healing process.

Among the 70 children operated on, partial underdevelopment of the auricle (microtia) was observed in most cases, which was significantly more common than complete absence of the ear (anotia). Unilateral forms of the pathology were more prevalent than bilateral ones. The distribution of cases by type of anomaly and affected side is presented as follows:

Nature of anomaly	Type of anomaly	Number of patients	Percentage (%)

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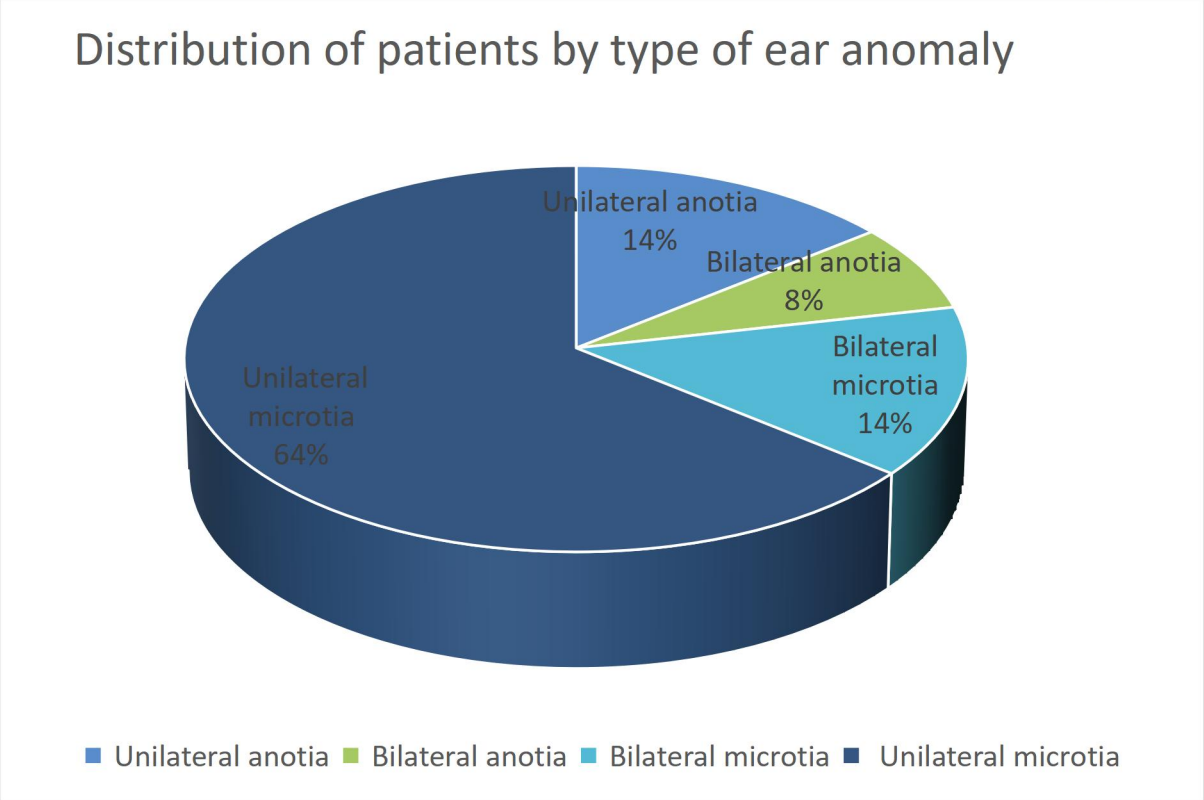
Unilateral	Microtia	45	64,3
	Anotia	10	14,3
Total		**55**	**78,6**
Bilateral	Microtia	10	14,3
	Anotia	5	7,1
Total		**15**	**21,4**
Total		**70**	**100,0**



Thus, of the 70 patients, 55 (≈78.6%) had unilateral lesions, and only 15 children (≈21.4%) had bilateral anomalies. Partial auricular elements (various degrees of microtia) were observed in a total of 55 cases, which is approximately 3.5 times higher than the number of cases of complete auricular aplasia. This clinical group structure confirms the need for an individualized approach in each case, taking into account the type of anomaly. For example, in the case of bilateral anomalies, special attention is paid to early auditory rehabilitation, and in the case of unilateral microtia, to choosing the optimal age for surgery on the anomalous ear. Overall, the presented data on the distribution of pathology allow for more precise formulation of recommendations for postoperative care: given the predominance of unilateral microtia, the primary focus is on preserving the function of the healthy ear during rehabilitation, as well as on preventing asymmetry and repeat surgery on the side of reconstruction. Furthermore, the high percentage of autologous costal cartilage used in these cases confirms the effectiveness and feasibility of this method, which should be considered when developing standards for postoperative monitoring and patient care.

Reconstructive interventions in children were performed in two stages using autologous costal cartilage, using the Nagata technique. This technique involves using the patient's autologous costal cartilage to form a framework for the reconstructed auricle. Surgery is typically

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performed at the age of 8–10 years, when the auricle has reached a sufficient stage of development and the costal cartilage volume required for transplantation has already been formed.

In the first stage of the surgery, cartilaginous fragments (usually the sixth, seventh, and eighth ribs) are harvested and, using carving (filigree cutting), a three-component cartilaginous framework for the auricle is formed. This framework incorporates the basic contours of the ear—the helix, antihelix, crus, etc.—and is placed under a skin pocket in the temporomastoid region of the head. If the patient has a rudimentary earlobe, it is usually repositioned at this stage to form the inferior pole of the new ear. The framework is secured in the subcutaneous pocket, using skin tension to create a contoured shape for the future ear.

The second stage of reconstruction is performed approximately 6–12 months later, after the cartilaginous framework has healed. At this stage, the auricle is "detached"—that is, raised above the surface of the head to achieve a normal angle. A postauricular fold (sulcus) is formed by separating the skin behind the framework and placing an additional cartilaginous graft behind the auricle. The resulting space is covered with a split-thickness skin graft. As a result, the auricle acquires a natural projection from the head. If necessary, a third stage—corrective surgery—is performed to improve the cosmetic result. Although the classic technique allows for two surgeries, in some cases additional interventions are required to shape individual elements (e.g., the tragus) or correct minor imperfections.

Study Results. According to our study (n=70), two-stage reconstruction was performed in 25 patients (36%), while 45 patients (64%) required three-stage correction with separate earlobe shaping.

The need for a third stage was determined by the anatomical features of the ear region (unsatisfactory position of the residual earlobe in severe microtia) and the desire to improve the cosmetic result. This additional stage allowed for the shaping of missing elements (lobe, tragus) and correction of the shape to achieve better relief and symmetry with the opposite side.

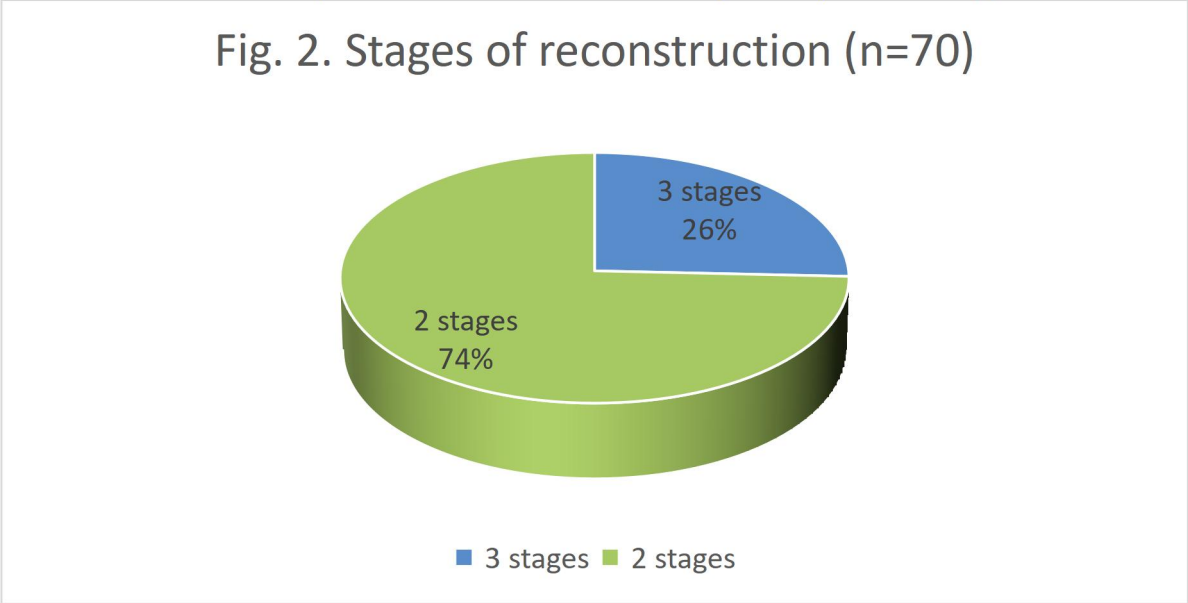

Fig. 2. Distribution of patients by reconstruction stage

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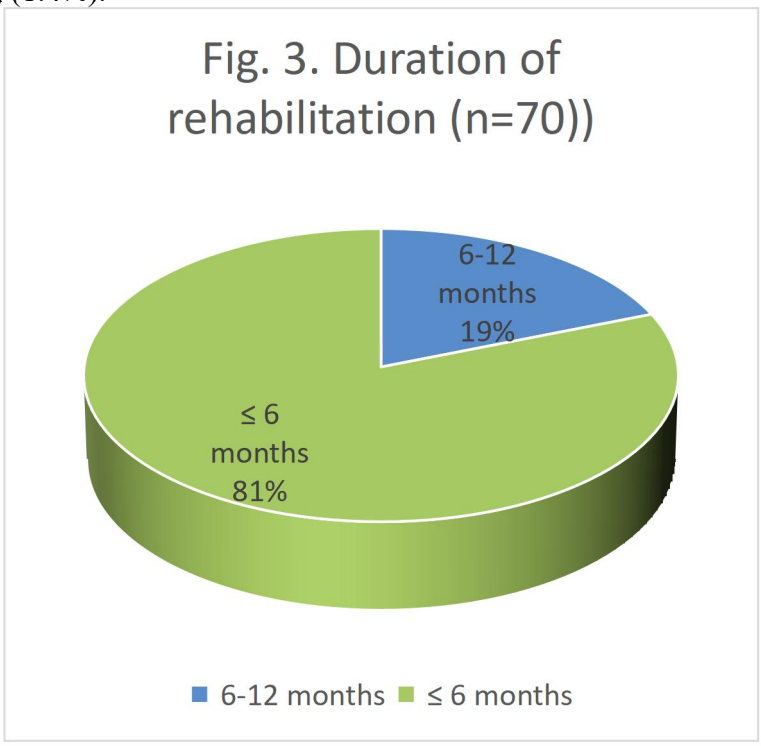
The duration of the recovery period after completion of all stages of the surgery varied depending on the complexity of the procedure and the presence of complications. In 57 patients (82%), full recovery took up to 6 months. In 13 patients (18%), recovery lasted from 6 to 12 months, which was associated with a more severe initial condition and the occurrence of postoperative complications.

Postoperative complications were reported in 11 of 70 patients (15.7%). The most common complication was perichondritis (inflammation of the auricular cartilage), diagnosed in 9 patients (12.9%), followed by one case of skin flap necrosis over the cartilaginous framework (1.4%), and one case of excessive scarring (1.4%).



Perichondritis is the most common complication of reconstructive auriculoplasty. In our study, it developed in 9 patients (12.9%). The clinical picture of perichondritis in the postoperative period was characterized by hyperemia of the skin over the auricle, edema, localized tenderness, and, in some cases, the formation of localized purulent foci with characteristic discharge. Therapeutic management included immediate systemic antibacterial therapy, primarily with broad-spectrum agents (third-generation cephalosporins, fluoroquinolones), in combination with anti-inflammatory agents.

If an abscess was present, surgical incision of the purulent lesion was performed, followed by debridement of the surgical wound and placement of a drain. Timely drainage is critical, as the accumulation of purulent exudate between the perichondrium and cartilage leads to ischemia, creating the risk of destruction and partial resorption of the cartilaginous framework. In some patients, severe perichondritis resulted in a disruption of the auricular architecture due to loss of definition and smoothing of contours. However, timely detection of the inflammatory process and comprehensive treatment prevented graft loss and preserved the anatomical shape of the auricle. In most cases, after treatment of the inflammation, additional aesthetic corrections were performed to restore the lost contour elements.

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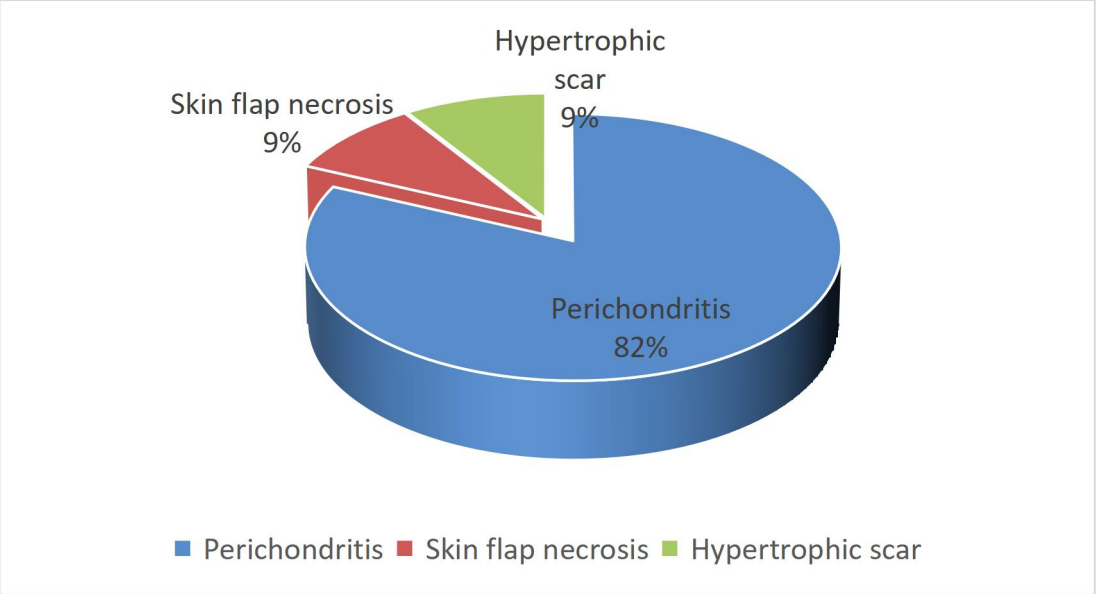

Fig. 4. Frequency of major complications after ear reconstruction.

Another, less common, but potentially serious complication was skin flap necrosis, detected in one case (1.4%). Pathogenetically, this condition is associated with impaired trophism in the skin flap covering the cartilaginous framework, which typically occurs due to excessive tissue tension, technical errors during mobilization, or infection. Clinically, necrosis was manifested by darkening of the skin, decreased skin turgor, and a lack of signs of capillary perfusion.

The treatment strategy in this case consisted of timely excision of necrotic tissue while preserving viable cartilage, and delayed revision skin grafting using a local rotation flap.

Prevention of skin necrosis relies on careful intraoperative planning: it is important to ensure adequate vascularization of the flap, avoid excessive flap tension, and ensure gentle postoperative care (including proper dressing placement, avoiding compression, and monitoring the skin's condition).

Furthermore, one patient (1.4%) experienced excessive scarring in the postoperative area, resulting in the formation of a hypertrophic scar. Such tissue reactions are typically due to an individual's predisposition to impaired regeneration processes, including a genetic predisposition to excessive collagen formation, as well as the possible influence of concomitant somatic pathology. The clinical presentation was dominated by thickening and hyperemia of the suture line, which negatively impacted the visual appearance of the reconstructed auricle.

Management of this condition was based on conservative therapy using silicone gels and ointments with anti-scarring properties. If conservative therapy was ineffective, surgical correction of the defect was considered. In our case, we limited ourselves to local therapy, which allowed for softening of the scar tissue and visual improvement of the surgical site without the need for repeat surgery.

The table below summarizes the main characteristics of the reported complications, the treatment approaches used, and their impact on the final outcome:

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Complication	Frequency (n, %)	Treatment tactics	Consequences for the auricle
Perichondritis	9 (12,9 %)	Systemic antibacterial therapy, local sanitation; in case of abscess – surgical drainage	Partial resorption of cartilage, smoothing of the relief in some cases
Skin flap necrosis	1 (1,4%)	Excision of necrotic tissue, repeated plastic surgery with a local skin flap	Additional intervention is required; if closure is successful, the relief is preserved.
Hypertrophic scar	1 (1,4%)	Conservative therapy (silicone gels, anti-scar preparations); if necessary, scar excision	Minor cosmetic defect of soft tissues; cartilaginous framework is not deformed

Subjective assessment by families was conducted based on the results of a parent survey. Complete satisfaction with the aesthetic result was reported by 61 families (87%), while partial satisfaction was reported by 7 families (10%); only 2 (3%) parents expressed dissatisfaction with the outcome.

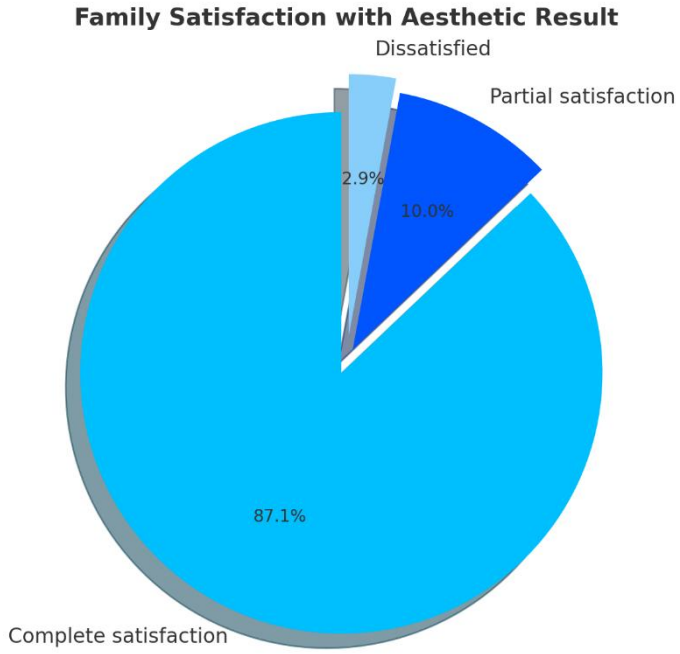

Fig. 5. Parental satisfaction with the reconstruction result.

It should be emphasized that the aesthetic success of the surgery is essential for the psycho-emotional state of the child and family: eliminating a noticeable defect reduces parental anxiety, increases the child's self-esteem, and facilitates social adaptation among peers.

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