

# ANALYSIS OF TREATMENT IN PATIENTS WITH INFANTILE HEMANGIOMA IN THE DEPARTMENT OF PEDIATRIC OTOLARYNGOLOGY, MEDICAL UNIVERSITY OF WARSAW

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## Summary

**Introduction.** Infantile hemangiomas in the region of head and neck are relatively common. When localized in the vicinity of vital organs, airways or the eye, they may cause a serious threat to the child's health and development, or even life. The recently discovered effectiveness of propranolol in treating infantile hemangiomas enabled the development of a fast and safe treatment methods of these lesions in laryngological patients.

**Aim.** The purpose of this study was to analyze the patients with infantile hemangioma and their treatment with a view to the latest findings and therapeutic standards.

**Material and methods.** Children hospitalized in the years 2013-2015 in the Department of Pediatric Otolaryngology at the Medical University of Warsaw with the diagnosis of infantile hemangioma of the head and neck were included in the study. Data concerning patients' age and sex, location of the lesion, any additional lesions and duration of the propranolol therapy, as well as the response to treatment, were collected for the study.

**Results.** We included 17 patients (12 girls and 5 boys) in the study. Hemangioma was located in the larynx in 8 cases, there were 3 cases of hemangioma of the tongue, 3 cases of hemangioma of the nasal cavity and 3 cases of a hemangioma in a different location: cheek, parotid gland and palate. In 3 cases, there was an additional hemangioma localized outside of the head and neck region. 11 patients were under one year old at the beginning of treatment. Treatment duration varied from 3 to 12 months. In all cases in which propranolol was introduced in infancy, we observed complete remission of the changes.

**Conclusions.** Propranolol treatment for infantile hemangioma is a very effective and safe way for reducing the mass of the lesion. It allows to reach complete remission when administered early enough.

Keywords: infantile hemangioma, propranolol, subglottic hemangioma

## INTRODUCTION

Nearly every pediatrician has seen a case of infantile hemangioma in their medical career. These lesions, often compared to strawberries because of their red color and uneven surface, can be found in as many as 10% of infants (1). They are benign congenital vascular tumors, and even though in most cases they disappear during the first years of childhood, some of them may pose a threat to the child's health or even life.

Names under which various vascular lesions were known throughout the years, changed many times as new classification methods were introduced. The first important classification was created in the 19<sup>th</sup> century and was based on pathological findings. Hemangiomas were divided into plaque-like and cavernous – a distinction which is still in use today. However, this classification did not take into consideration biological differences and dynamics of growth and involution of various types of vascular tu-

mors. In the 1980s, Mulliken and Glowacki distinguished two major groups of congenital vascular lesions: hemangiomas and vascular malformations (2), based on clinical presentation as well as on endothelial characteristics. This classification allowed to predict the natural development of lesions and to choose treatment options appropriately.

The most recent classification comes from 1996 and divides vascular lesions into vascular tumors (including infantile hemangiomas) and vascular malformations (1).

The most important difference between infantile hemangiomas and other seemingly similar lesions is their characteristic behavior in time. Infantile hemangiomas are almost never found at birth. They are noticed during the first weeks of the child's life and then continue to grow. The rapid onset of the disease and its fast growth usually prompt parents to seek medical attention. Infantile hemangiomas have a tendency to develop during the first year of life, with a following period of gradual

involution over the course of the next few years. Vascular malformations, on the other hand, are usually present at birth and grow proportionally with the child with no tendency to shrink or recede with time. This major difference allows the physician to accurately classify the lesion based on medical history and examination (1).

Infantile hemangiomas may present as bright-red lesions located on the very surface of the skin. Such hemangiomas are usually very characteristic and easy to recognize. Tumors located in the deeper tissues often require imaging studies for the accurate diagnosis. The skin over such fast-growing tumor is usually pale or with small telangiectasias, which may lead a less experienced physician towards a different diagnosis. In such cases, ultrasound and sometimes computed tomography provide sufficient information to make the right diagnosis.

Over two thirds of hemangiomas are localized in the head and neck region (1). Lesions in this area may influence both the physical and psychological development of a child. Hemangiomas localized near airways and natural body orifices may impair their patency: even a small hemangioma of the larynx, trachea or nasal cavity may obstruct the airways, leading to respiratory failure. Hemangiomas localized in the vicinity of the eyelid may impair both ocular mobility and proper eyesight. Large hemangiomas may cause problems with circulation and bleeding disorders. In preschool and older children, a lesion of the face that is still visible may lead to rejection and difficulties in bonding with peers.

Hemangiomas localized outside the head and neck region usually appear on the torso and upper extremities. Patients with such tumors are less likely to require medical intervention, as it is safer to wait for the lesion to recede on its own.

Most infantile hemangiomas are solitary, however, about one fifth of them are accompanied by other hemangiomas in a different location on the skin or in deeper tissues. A particular group of patients are children with multiple hemangiomas on the lower part of the face and the neck. Such hemangiomas are often an element of the PHACES syndrome, in which they are associated with central nervous system anomalies, cardiac defects, eye anomalies and sternal raphe.

For many years, the treatment of infantile hemangiomas had consisted of watchful waiting in mild cases and steroids combined with surgery in more severe cases. With time, new methods, such as laser therapy, cryotherapy, embolization, administration of vincristine or interferon, were introduced (3, 4). Such procedures, although less invasive, still did not eliminate the need for general anesthesia and only partly dealt with the problem of dissatisfying cosmetic outcome. They were all associated with severe adverse effects (5). In 2008, Léauté-Labrèze et al. for the first time came across the surprising response to beta blocker treatment in a case of infantile hemangioma (6). Their patient, who devel-

oped cardiomyopathy as a result of steroid treatment for a hemangioma of the nasal cavity, required administration of propranolol. During the first day of beta blocker treatment, the doctors observed a sudden change in the tumor, as it became less tense and darker. Further studies confirmed this observation and showed that not only does this medication stop the growth of hemangiomas, but also it promotes their quick involution. Propranolol was found to be a very potent drug for treating infantile hemangiomas and, having been used for many years in pediatric cardiology, has a well-known risk profile. Over the course of the next 8 years, the effectiveness of beta blockers against hemangiomas has been proven in randomized studies and adverse effects have been rarely observed (7), however, the patient must undergo cardiologic assessment before starting propranolol treatment.

#### AIM

Our aim was to analyze children with infantile hemangioma hospitalized in the Department of Pediatric Otolaryngology at the Medical University of Warsaw in the years 2013-2015. Data concerning patients' age and sex, location of the lesion, any additional lesions and duration of the propranolol therapy, as well as the response to treatment, were collected for the study.

All our patients received oral propranolol. The therapy was conducted with accordance to modified guidelines established by the Great Ormond Street Hospital (8). The initial propranolol dose of 0.5 mg/kg/day was gradually increased up to 3 mg/kg/day divided to 3 doses. Before introducing the medication, each patient underwent a cardiologic examination and received an ECG and echocardiogram. Each patient underwent additional tests, such as fasting serum glucose, urea and creatinine levels and urinalysis. Heart rate and blood pressure were measured both before and after each dose of propranolol during the first few days of the therapy, during which the dosage was gradually increased. Cardiac anomalies and arrhythmias, as well as low blood glucose levels and a history of respiratory tract infections with bronchospasm, are contraindications for propranolol treatment. Such conditions are prone to be aggravated by propranolol use.

In each case, the treatment was introduced during hospitalization. The patient was released when the appropriate dosage of propranolol was reached and no adverse effects were observed. The therapy was supervised on an outpatient basis, with additional short hospital stays if required to assess the course of treatment. The first examination was performed 6 weeks after the introduction of the treatment, with next follow-up visits every 3 months. Additional examinations were performed, depending on the localization of the hemangioma: rigid endoscopy in laryngeal hemangiomas and ultrasound or computed tomography scans in other cases.

Treatment was ended after the complete disappearance of the lesion in imaging studies or endoscopy or af-

ter no change in two consecutive examinations with adequate propranolol dosage. Propranolol was withdrawn over 4 weeks, with gradual decreasing of the dose and monitoring of the heart rate and blood pressure.

## RESULTS

Among 17 children with the diagnosis of infantile hemangioma, in 8 (47%) cases, the lesion was localized in the larynx. 3 children (18%) had a hemangioma of the nasal cavity and 3 had a hemangioma of the tongue. There was one case of a hemangioma in the parotid gland, one localized on the palate and one localized in the soft tissues of the cheek. 3 out of 17 children had additional lesions outside of the head and neck area.

11 (65%) of the patients in our study group were less than 12 months old at the beginning of the therapy. 7 out of them were less than 6 months old. The youngest patient was 1 month old and the oldest was 12 years old. In the group, there were 12 (71%) girls and 5 (29%) boys. Therapy lasted from 3 to 12 months. One patient required a surgical excision of the residual lesion after the treatment.

The results of the treatment were very good. In all 11 children in which propranolol was introduced in infancy, we achieved complete disappearance of the hemangiomas. In all cases of children who were over 1 year old at the beginning of therapy, we observed shrinking and fading of the lesion.

In three patients undergoing propranolol treatment for a hemangioma of the larynx, tracheostomy was needed to ensure airway patency. Tracheostomy tube was removed after 8-12 months of the therapy. Other patients with laryngeal hemangioma did not require tracheostomy.

None of our patients presented adverse effects of beta-blocker therapy. Conservative treatment allowed to achieve very good cosmetic results.

## DISCUSSION

From 2008, many cases of infantile hemangiomas treated with propranolol have been reported. However, to this moment, there are no evidence-based guidelines for propranolol use in the treatment of infantile hemangiomas (7). The gradually reached dose of 3 mg/

kg/day is widely considered to be safe and effective (7, 9). In studies performed on bigger groups of patients, adverse effects of propranolol are noted, however, not significantly more often than in placebo groups (9). Effectiveness and safety of propranolol treatment in infantile hemangioma are widely acknowledged. This form of therapy, compared to previously popular methods gives less adverse effects and provides better outcomes (7, 10). Our experience with propranolol confirms the findings of other researchers.

## CONCLUSIONS

Propranolol as a way of treatment infantile hemangiomas can be administered easily in outpatient basis and is a good choice for children with lesions of the head and neck region, including the nose and larynx. In many cases it enables safe treatment without general anesthesia, surgery, tracheostomy. The use of more selective beta-blockers, less affecting the cardiovascular system, is yet being researched.

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## Conflict of interest

None

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