

Surgical Treatment for Sequelae of Infantile Hemangiomas: Its Role Within the Therapeutic Management of These Tumors

Bulea Raluca¹, Enescu DM^{1,2}, Giuvelea Steluța², Stoicescu Simona^{1,2}, Alexandru Raluca², Ioniță D²

¹ Plastic and Reconstructive Surgery Chair, "Grigore Alexandrescu" Emergency Clinical Hospital for Children, Faculty of Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania

² Clinic of Plastic Surgery, Reconstructive Microsurgery and Burns, "Grigore Alexandrescu" Emergency Clinical Hospital for Children, Bucharest, Romania

Introduction: Infantile hemangiomas belong to the group of vascular anomalies. They have a unique evolution pattern: at birth they are usually unapparent, then an explosive growth follows (proliferative phase). For the next 5–7 years, the involutive phase develops, marking a slow regression of the tumor. The final stage is the involuted phase, which may present with residual scars or sequelae.

Material and methods: The purpose of the present study is to assess the place and role surgical treatment has within the complex therapeutic management of IHs in the stage of sequelae.

Results: During a period of 30 months, we selected 21 children that met our including criteria; the average follow up was of 9 months. Only three patients received no treatment at all during early childhood. Indications for surgical treatment in the stage of sequelae were alopecia, the presence of bulky masses, unaesthetic facial scars, retractile scars, ectropion, pain and functional impairment on the fingers and foot.

Conclusions: Our study has shown that surgical correction can lead to significant improvement of the patient's appearance and of the functions affected by the hemangioma's sequelae. For medium sized sequelae, the lenticular excision is the best way to diminish the residual scar. In the case of large sequelae, seriate excision represents a better approach, using sometimes more specific plastic surgery techniques, like local flaps, Z plasty or tissue expansion.

Keywords: infantile hemangiomas, surgical excision, sequelae

Introduction

Infantile hemangiomas (IHs) are a special group of vascular anomalies which affect about 10% of the newborns [1,2]. They can actually be defined as vascular tumors, having a unique evolution pattern: at birth they are usually unapparent, or present as hallmarks like telangiectasias or patches with lighter color than the surrounding skin. After the first two to four weeks of life, the hemangioma becomes visible, followed by an explosive growth, known as the proliferative phase, up to the age of 9–12 months, unusually 17 months [3]. For the next 5–7 years, the involutive phase develops, marking a slow regression of the tumor, which sometimes may completely disappear (about 50–70% of the cases) [4]. The complete involution has no relation with the hemangioma's size, location, presence of complications or other variables [5]. The final stage is the involuted phase, which may present with residual scars or sequelae or may appear as some capillary-like vessels and draining veins, surrounded by fibrofatty tissue admixed with dense collagen and reticular fibers [1,2]. Hemangiomas of the scalp and eyebrow often destroy hair follicles [1].

Hemangiomas are usually located in the craniofacial region (60%), followed by the trunk (25%) and the extremities (15%) [6]. The most controversial are facial hemangiomas because of their potential of causing a poor life quality due to distortion of the self image.

Most of the IHs have an evolution without complications, but approximately 10% of them may develop bleeding, ulceration, distortion of involved tissues, obstruction

of a vital structure (vision, airways) and congestive heart failure [7].

Treatment options go from the conservative approach – tumor observation – to various active measures, such as topical applications or injections (steroids, bleomycin, etc.), pharmacologic therapy (systemic corticosteroid, interferon α -2a, bleomycin, beta blockers, etc.), laser therapy sessions or surgical excision [8]. Most of them are used especially for complicated or rapidly growing hemangiomas. Regarding the right time for intervention, the opinions are very controversial, especially when we focus on the surgical removal of the hemangioma. Some specialists advocate for early surgical excision in most of cases, whereas others consider the plastic surgeon should intervene only after the hemangioma's natural, and prolonged, involution [9].

The purpose of the present study is to assess the place and role surgical treatment has within the complex therapeutic management of IHs in the stage of sequelae.

Material and method

This study was carried out over a 30 months period, with a mean follow-up of 9 months, ranging from 3 to 30 months. On this period of time, we enrolled a total of 21 children meeting the following inclusion criteria: being diagnosed with an IH during the first several months of life, and presenting any kind of sequelae of this tumor, either after an active treatment or after the spontaneous involution and regression of the hemangioma. The average age for these patients was of about 6 years, with limits from 15 months to 13 years.

Table I. Location of hemangiomas

Anatomical region	No. of hemangiomas
Eyelids	3
Periorbital	1
Intereyebrow region	2
Inferior lip	3
Superior lip	1
Cheeks	5
Frontal region	1
Scalp	2
Hand (finger)	3
Lower limb	2
Other regions	4
TOTAL	27

Table II. Surgical techniques used for sequelae correction

Surgical technique	No. of operations
Tissue expander	6
Direct closure	23
Local flaps, Z plasty and others	7
TOTAL	36

All patients were thoroughly assessed at the first consult in our clinic. We recorded their medical history, the evolution of the hemangioma, the treatment received during evolution and the treatment’s result. Clinical examination was performed in all cases, as well as blood workups. Every patient’s record included gender, age at inclusion in the study, age at the beginning of treatment, initial tumor location and size, number of tumors, complications during proliferative phase, functional compromise, extent of sequelae, diagnostic workup (where needed), previous treatment used and outcome (where applicable), indications for

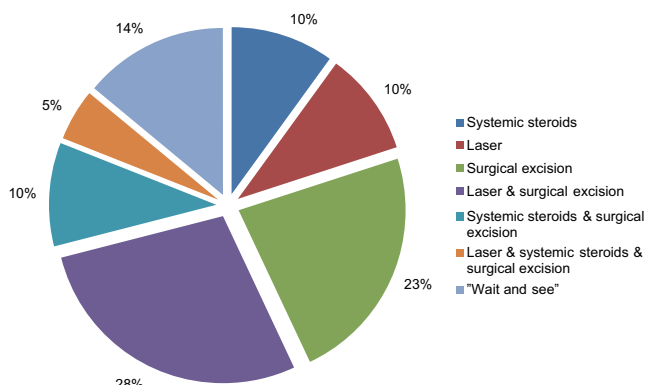


Fig. 1. Previous treatment for the cases included in the study. The “wait and see” approach refers to those cases where no therapeutic measure had been taken before.

surgical correction, surgical technique, operative and post-operative complications and reconstructive result.

Only three out of the 21 patients included in this study received no treatment at all during early childhood, and the sequelae referred to the remaining fibrofatty tissue after the hemangioma’s involution.

The patients were considered as healed once the post-operative wound was completely closed, without complications, with improved cosmetic appearance, the absence of pain and no remaining functional impairments.

All patients underwent one or more surgical corrections of their sequelae, all of them performed under general anesthesia.

Results

During the 30 months observation, we identified 21 patients who referred to our plastic surgery department with



Fig. 2. A male patient aged 1 year 9 months, who presented a scalp hemangioma, surgically removed, having a temporal alopecia



Fig. 3. Same patient, postoperatively, the wound being closed with direct suture



Fig. 4. A 6 ½ year old female with a residual face scar after a large hemangioma previously treated with laser and surgical excision



Fig. 5. Same patient, 18 months after the surgery (seriate excision of the scar)

sequelae after treatment or natural involution of IHs. They were aged between 15 months and 13 years, with an average age of 6 years, placing the moment of surgical correction in the involutive phase, around the moment of entering the school.

For the 21 patients enrolled, we registered a total of 27 hemangiomas. 17 cases had a single tumor (representing almost 81%) and from the remaining four cases one half presented two hemangiomas, and the other half had three tumors.

The intervention for hemangiomas' sequelae was made for a single tumor per patient, the rest of them did not rise

any functional impairment or cosmetic disturbance. The location of these tumors is presented in Table I.

The tumor size during proliferative phase varied (according to medical discharge notes and parents' statements) from diameters of 1.5–2 cm to 10 cm approximately, in one case the tumor having an extension that involved the entire left side of the face. The majority were medium to large sized hemangiomas, localized especially on the face – 60% of the cases (n=16).

During the same evolution stage, 18 out of the 21 patients presented one or more complications: visual impairment (9 cases), bleeding (8 cases), local pain (4 cases),



Fig. 6. A female aged 1 year 8 months, with sequelae of a giant ulcerated hemangioma of the left cheek, previously treated with systemic steroids for 9 months



Fig. 7. Same case, 3 months later, after 2 surgical interventions planned within the seriate excision of the remaining scar tissue



Fig. 8. Alopecia after surgical excision of a scalp hemangioma on an 3 ½ year old female



Fig. 9. Same case, postoperatively, the surgical wound being closed with direct suture after creating a healthy hairy flap by tissue expansion

interference with eating (4 cases), ulceration (3 cases), functional impairment (hand use, walking – 3 cases), others (amblyopia, etc. 1 case). These particular situations lead to an active approach for treating these patients at that time. The therapeutic means employed for them are presented in Figure 1. Only three cases had no treatment at all during early childhood. Therefore, we included them in the “wait and see” group.

Indications for surgical treatment in the stage of sequelae were alopecia (Fig. 2, 8), the presence of bulky masses (Fig. 10, 11), unaesthetic facial scars (Fig. 4, 6), retractile scars, ectropion, pain and functional impairment on the fingers and foot. The operative technique was chosen in accordance with the location of the hemangioma’s sequelae and the methods used are presented in Table II.

Where the situation allowed it, we planned to make the correction within one surgery alone. Eleven patients underwent lenticular excisions and direct closure on the

wound (Fig. 2, 3). For the other 10 patients we planned a staged resection of the scar. This was especially the case for extensive sequelae after laser therapy (Fig. 4, 5) and systemic steroid treatment (Fig. 6, 7). We also used special plastic surgery techniques (the Z plasty) or local flaps, simple or created after inserting, inflating for several weeks and removing a tissue expander (Fig. 8, 9). For the entire group, a total of 36 surgical interventions were performed during the study.

Since the hemangioma no longer existed, or it was in the involuted phase, intraoperative bleeding raised no special concerns. The hemorrhage was minimal and effectively controlled during surgery.

No major complications were registered in our patients. Two cases belonging to the group for which a tissue expander was employed presented with suture dehiscence several days after the expander had been inserted and inflated during surgery. This situation represents a common



Fig. 10. A 1 ½ year old female, presenting a bulky mass after laser treatment and started involution of a hemangioma on the right superior eyelid, with visual interference.



Fig. 11. Same case, two years later, after two surgical corrections of the eyelid.

minor complication of this technique and it was solved within the following days. Another case was noticed with periorbital edema, completely remitted after a week. There were no long term complications.

Discussion

Specialists usually focus on the early treatment of IHs, but the follow up in the late involution or in the involuted phase is just as important. Due to the involution pattern of IHs, which happens over a long period of time, the emotional impact on the family and on the patient himself can be great, especially in the case of children with facial hemangiomas [10]. This special location is more likely to receive any kind of treatment during the proliferative phase [11], as happened also with the patients from our group. This approach is given by the location itself, as well as by the presence of complications.

Children often try to hide their lesions from others, but they usually do not perceive the hemangioma in a negative sense until they are 4 years or older [10]. For this reason specialists advise for a more aggressive surgical approach after this age if the cosmetic outcome is not yet satisfactory [12], in order to improve it and it was our main goal for our patients.

Some of the treatment measures applied during early stages of IH's development may cause consequent scarring or hypopigmentation [1]. This occurs after laser treatment and sometimes after systemic steroid therapy, as we have seen in our cases. The best approach for extensive sequelae of facial hemangiomas is the staged resection of the damaged tissue [1]. This way distortion and scarring are minimized, and a better cosmetic result is expected. In order to achieve this, the plastic surgeon should use all the techniques at his disposal, since the quality of the final outcome depends on the correctness of their association [13]. For small sequelae, the choices range from excision and direct closure to local flaps and Z plasty. Probably the most complex of these techniques is the tissue expansion. It allows, after complete inflation of the expander for 1–3 months, the removal in one stage of extensive areas of damaged skin, while covering the defect with the newly created flap of healthy tissues [13,14].

Conclusions

The interest for the best therapeutic management of IHs remains the same also in the stage of sequelae. Our study has shown that at this point, the surgical correction can lead to significant improvement of the patient's appearance and of the functions affected by the hemangioma's sequelae. At the same time, we noticed that patients in need for active care and treatment during early childhood are the ones requiring further treatment also in the stage of sequelae. Most of the patients addressed our department for correction of facial sequelae of IHs. For medium sized sequelae, the lenticular excision is the best way to diminish the residual scar. In the case of large sequelae, seriate excision represents a better approach, using sometimes more specific plastic surgery techniques, like local flaps, Z plasty or tissue expansion.

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