

Early Surgical excision for Infantile Hemangioma: Indications and Efficacy

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Abstract

Infantile hemangioma (IH) is the most common type of benign tumor during infancy. Although medical treatment, primarily propranolol, has become the first line of treatment of infantile hemangioma, early surgical intervention is warranted in some cases for functional or cosmetic concerns. A retrospective chart review of 45 patients with cutaneous infantile hemangioma treated surgically in Sohag University Hospital from October 2010 to April 2015 was performed. Out of 45 patients diagnosed with infantile hemangioma (21 males and 24 females), head and neck lesions were found in 24 patients, trunk lesions in 12 patients and extremity lesions in 9 patients. In our series only 9 cases (20%) had functional indications while 36 cases (80%) had cosmetic concern. The modality of excision and reconstruction depended mainly on size and orientation of the lesion, where circular excision followed by purse string closure was used in 13 patients (28.9%) while elliptical excision followed by straight line closure deemed necessary in 27 patients (60%), open rhinoplasty approach was done for 2 cases of hemangioma at tip of the nose, in 2 patient excision of large ulcerated bleeding lesions followed by

reconstruction with skin graft was done while one patient had an expanded median forehead flap reconstruction of post-excision nasal defect. In the present study, we found that surgical excision of hemangiomas yielded acceptable outcomes in complicated lesions and lesions with functional or cosmetic concerns during both the proliferative and the involuting phases.

Keywords: hemangioma, surgical excision, purse string, infant, treatment.

Introduction

Infantile hemangiomas (IH) are the most common benign tumor of infancy that usually develop within the first month of life or, less commonly, are present at birth.¹ As the majority of hemangiomas will spontaneously “involute” by the age of 5 to 7 years, so watchful observation with no treatment was a traditional concept.² However, early surgical intervention is warranted for associated functional complications, including feeding difficulties, speech impairment, affecting visual axis and psychosocial manifestations,³ and also in cases of significant bleeding from ulcerated lesions, large lesions causing either heart failure or significant thrombocytopenia, or obstruction of the airway, gastrointestinal tract, visual or (bilateral) auditory axis.⁴⁻⁶ Some authors mentioned other redundant indication as psychosocial manifestations³ or hemangiomas leaving fibro-fatty residuum causing contour deformity that will require surgical debulking and recontouring, especially in conspicuous areas such as the head and neck region.⁷

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Patients and Methods

A retrospective chart review of 45 patients with cutaneous infantile hemangioma treated surgically in the proliferative or involuting phases in Sohag University Hospital from October 2010 to April 2015 was performed.

Reviewed data included sex, age at presentation, age at surgery, indication for surgery, previous non-surgical management, pre-treatment assessment (site and size of the lesion, functional consequences) technique of removal, complications (intraoperative, postoperative), follow up period, need for further management after surgery (other surgeries, laser, medical treatment).

Inclusion criteria included hemangiomas in earlier stages (proliferating and involuting) with the following indications: rapidly growing hemangioma, complicated hemangioma (ulcerated and bleeding lesion not responding to conservative measures and laser treatment), lesion likely to affect physiological functions or cause significant cosmetic deformity, lesion causing significant underlying facial growth disturbance and large lesion with family non-compliance with the medical treatment.

Results

This study included 45 patients (21 males and 24 females) with cutaneous infantile hemangioma. Lesions were located in the head/face/neck in 24 patients, (4 in the scalp, 6 in the forehead, 4 in Periorbital region, 2 lesions occupying the whole nasal dorsum, 2 in tip of the nose, 3 in the cheek and 3 in the lips) trunk in 12 patients and upper/lower extremity in 9 patients (Figure 1). Multiple hemangiomas were found in 5 patients. The mean age surgical intervention was 1.9 years (range; 3 months - 4 years). Pre-surgical treatment with propranolol was initiated for 27 case to stop the growth of the lesion during the proliferative phase to minimize future disfigurement where the treatment stopped because of family non-compliance in 9 patients, while moderate improvement was noticed at the end of the proliferative phase in other 6 patients and near complete resolution of hemangioma with residual involuting lesions resulted in the remaining 12 cases. Preoperative pulsed dye laser treatment was used in 2 patients with ulcerated hemangiomas to control bleeding and pain. Intra-lesional injection of steroid was tried in 4 patients.

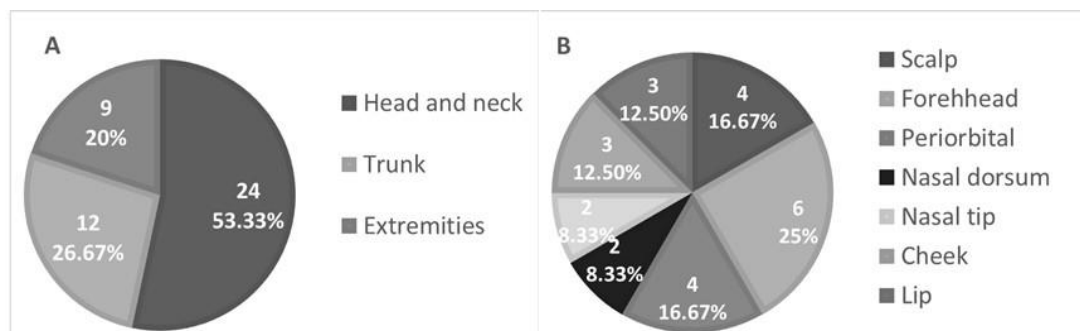


Figure 1: (A) Location of the hemangiomas. (B) Distribution of the hemangiomas of the head and neck area.

Of the 45 patients, 4 patients had periorbital lesions endangering the axis of vision, 3 patients had lesions complicated by ulceration and bleeding, 2 patients had lesions affected the tip of the nose, 2 patients with hemangiomas affecting the whole nasal dorsum (one of these lesions was also ulcerated), 12 patients had hemangiomas with disfiguring residual involuting lesions following medical treatment, 15 patients with rapidly growing lesions who showed mild to moderate response to medical treatment including those with family non-compliance. The remaining 7 cases were amenable for surgical excision of their lesions with expected better cosmesis with surgery than letting hemangioma to involute by its own.

In our series only 9 cases (20%) had functional indications while 36 cases (80%) had cosmetic concern (Figure 2).

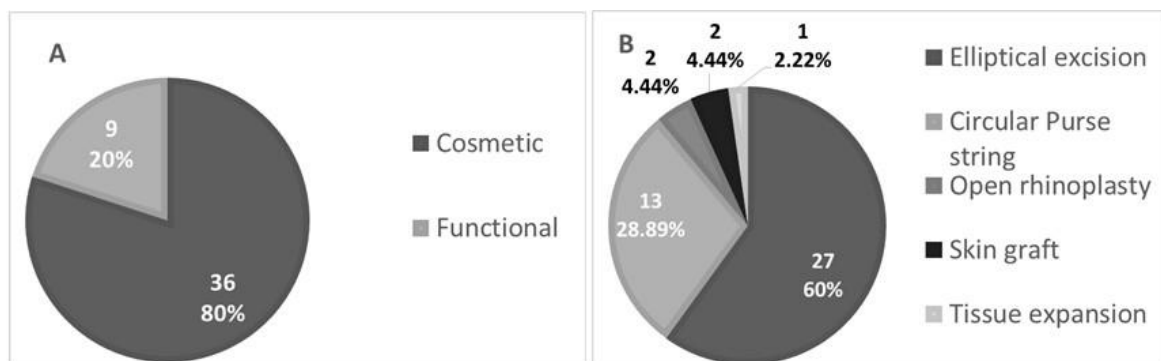


Figure 2: (A) Indications of early surgical excision. (B) Surgical techniques used.

Regarding the technique of excision it depended mainly on the size and orientation of the lesion (Figure 2); circular excision followed by purse string closure was used in 13 patients (28.9%) while elliptical excision followed by straight line closure deemed necessary in 27 patients (60%), 2 patients had open rhinoplasty approach for excision of

hemangioma at nasal tip (Figure 3), in 2 patients with large ulcerated bleeding hemangiomas (one of them with forearm lesion while the other had lesion occupying the middle one third of the forehead, most of the nasal dorsum and both inner canthal regions), excision of the lesion followed by reconstruction with skin graft was done and one patient had forehead tissue expansion followed by median forehead flap reconstruction of post-excision nasal defect.

Postoperatively, one patient needed further laser treatment for minute telangiectatic vessels. Staged excision was needed in two patients. Scar revision was done in one patient.

Average follow-up period after treatment was 23 months (6.5 to 36 months).



Figure 3: (A) Female patient, two and half years of age with involuting infantile hemangioma at tip of the nose. (B) Six months post-operative picture after excision of the lesion via open rhinoplasty approach.

Discussion

Infantile hemangioma (IH) is a benign congenital vascular neoplasm composed of hyperplastic endothelial cells.⁸ IH has a characteristic natural history with a proliferative phase along the first 12 months of life, with the most rapid growth during the first 3 to 4 months, followed by a plateau and subsequent involuting phase over 1 to 7 years or longer.⁹

Most IHs can be left untreated if not complicated and classically the role of surgery is planned in the involuted phase to remove the remaining fibrofatty residue. However, earlier surgical intervention may be indicated for lesions in sensitive anatomical locations such as the face, hands, and perineum; lesions that are complicated by bleeding, ulceration, or infection; and lesions that have significant functional and aesthetic implications.^{10,11} In some cases, involuting process may result in scarring, telangiectasia, discoloration, anetoderma, or fibrofatty residuum which may persist in approximately 50 percent of cases and require surgical interference.^{2,12}

Choosing the best therapeutic option depends mainly on the age of the patient, location, and size of the hemangioma which affect also the anticipated complications.¹³ Because of their heterogeneity, the intervention decision should be individualized case by case.¹⁴

The purse string closure method has the advantage over the simple linear closure in that it results in the smallest possible scar (Figure 4). Moreover, in the facial region, the closure pulls the skin circumferentially around 360°, which pulls in a single direction, thereby minimizing distortion of surrounding structures. The pleating that results from the

purse-string closure flattens out over time, analogous to the resolution after vertical mastopexy.¹⁵ Furthermore, purse sting technique could be used for excision of hemangioma in any of its phases of life cycle.¹⁶



Figure 4; (A) Male patient, one year of age with hemangioma at the right eye brow. (B) Immediate post-operative picture after circular excision of the lesion and purse string closure.

The aims of intervention include: preventing or improving functional impairment or pain, preventing or improving scarring and/or disfigurement and avoiding life-threatening complications.¹⁷

In our series, 9 only out of 45 cases (20%) had functional indication for early surgical intervention where ulceration is an example in which intervention is indicated to prevent or improve functional impairment or pain. Improving pain and function is achieved through treatment with appropriate wound care techniques, systemic, laser, or surgical modalities.¹³ In our series, 3 patients had ulcerated bleeding

hemangiomas, 2 cases of them already had laser therapy which failed to completely alleviate pain and bleeding and to restore full function of the affected area, so surgical excision offered better and faster outcome (Figure 5).



Figure 5: (A) Male patient, six months of age with large ulcerated bleeding infantile hemangioma at the forehead, dorsum of nose and both inner canthal regions. (B) Immediate post-operative picture after excision of the lesion and reconstruction with full thickness skin graft. (C) The patient after one year of the first surgical procedure where he was prepared for scar revision.

A significant subset of hemangiomas are life altering (e.g. causing permanent visual loss), and a smaller subset are life threatening. Options for treating these cases includes medical treatment (glucocorticoids, interferon- α and vincristine), laser and surgical therapies. Interferon is no longer recommended in children less than 12 months of age because it can cause neurologic sequela, particularly spastic diplegia.¹⁷ Surgery is sometimes function-saving or lifesaving but may have a relatively limited role in larger, more problematic hemangiomas.¹⁸ We had 4 periorbital

hemangiomas obstructing the visual field and warranted early and rapid surgical intervention to prevent amblyopia. In this category of indication, the surgery is indicated in any of the phases of the hemangioma as it is urgent surgery.

Other rarer functional indication for earlier surgical intervention is when secondary underlying deformities are expected with the long no treatment waiting. One example in our series was presented in 2 cases where large dorsal nasal hemangioma which was found to depress the nasal bones and affecting its growth (Figures 5,6). The nasal bones look eroded and depressed in the CT scan. Waiting till complete involution after the age of 7 will further affect the nasal growth and the septum secondarily and will lead to the need of dorsal bony reconstruction. So excision of the hemangioma and resurfacing with an expanded forehead flap at the age of 3 years in one case and by a full thickness skin graft at the age of 6 months in the other would prevent the further deterioration of the nasal bone growth which could continue to occur for more years. Earlier surgery will prevent further deterioration and possibility of remodeling of the already occurred effect at that early age.

Of interest, most of the cases in our series don't have functional indication (36 out of 45 cases, 80%). In cosmetic sensitive areas like the face and if scarring or disfigurement is expected after involution, surgical intervention may be necessary to short cut year of living with the disfigurement.



Fig. (6): (A) Female patient at two years of age with segmental infantile hemangioma at dorsum of nose and right periorbital region after one year of propranolol therapy. (B) The patient at the age of three years after tissue expander insertion at the forehead. (C) Intra-operative picture after excision of nasal lesion, expander removal and paramedian forehead flap elevation. (D) Flap inset on the nose. (E and F) six months after the third stage operative procedure with separation of the forehead flap pedicle.

The location and size of the hemangioma can have dramatic impact on the management plan. For instance, more superficial hemangiomas with significant affection of the overlying skin are expected to have more skin scarring in the area of hemangioma after involution. This leads to waiting long time living with the hemangioma in the face with its psychological impact on the patient and their families. For these cases, earlier surgical excision is indicated mostly in the proliferative or involuting phase. Large number of patients is belonging to this category of indication (Figures 7,8).



Figure 7: (A) Female patient, eight months of age with well circumscribed infantile hemangioma at forehead near the hair line. (B) Two weeks post-operative pictures after elliptical excision and linear closure with the resultant scar being at hair line for better cosmetic outcome.



Figure 8: (A) Female patient, six months of age with well circumscribed infantile hemangioma occupying quarter of the lower lip. (B and C) One year post-operative pictures after excision of the lesion and primary closure.

In the present study, we found that surgical excision of hemangiomas yielded acceptable outcomes in complicated lesions and lesions with functional or cosmetic concerns during both the proliferative and involuting phases. With all treatment modalities for hemangiomas, surgery is still indicated for selected cases and more that it would be thought. Following the proper reconstructive options yield the best aesthetic outcome that satisfies both the surgeon and the patient.

References:

1. Mulliken JB, Glowacki J: Hemangiomas and vascular malformations in infants and children: A classification based on endothelial characteristics. *Plast Reconstr Surg* 1982; 69: 412-420.
2. Bowers R, Graham EA, Tomlinson KM: The natural history of the strawberry nevus. *Arch Dermatol* 1960; 82: 667-680.
3. Hynes S, Narasimhan k, Courtemanche D, Arneja JS: Complicated Infantile Hemangioma of the Lip: Outcomes of Early versus Late Resection. *Plast Reconstr Surg* 2013; 131(3): 373-379.
4. Werner JA, Dünne AA, Folz BJ, Rochels R, Bien S, Ramaswamy A, et al: Current concepts in the classification, diagnosis and treatment of hemangiomas and vascular malformations of the head and neck. *Eur Arch Otorhinolaryngol* 2001; 258(3): 141-149.
5. Bauman NM, Burke DK, Smith RJ: Treatment of massive or life-threatening hemangiomas with recombinant alpha (2a)-interferon. *Otolaryngol Head Neck Surg* 1997; 117(1): 99-110.
6. Achauer BM, Chang CJ, Vander Kam VM: Management of hemangioma of infancy: Review of 245 patients. *Plast Reconstr Surg* 1997; 99(5): 1301-1308.
7. Wu JK, Rohde CH: Purse-string closure of hemangiomas: early results of a follow up study. *Ann Plast Surg* 2009; 62(5): 581-585.
8. Smolinski KN, Yan AC: Hemangiomas of infancy: Clinical and biological characteristics. *Clin Pediatr (Phila.)* 2005; 44(9): 747–766.

9. Higuera S, Gordley K, Metry DW, Stal S: Management of hemangiomas and pediatric vascular malformations. *J Craniofac Surg* 2006; 17(4): 783–789.
10. Arneja JS, Chim H, Drolet BA, Gosain AK: The Cyrano nose: Refinements in surgical technique and treatment approach to hemangiomas of the nasal tip. *Plast Reconstr Surg* 2010;126(4): 1291–1299.
11. Arneja JS, Mulliken JB: Resection of amblyogenic periocular hemangiomas: Indications and outcomes. *Plast Reconstr Surg* 2010; 125(1): 274–281.
12. Chan YC, Giam YC: Guidelines of care for cutaneous haemangiomas. *Ann Acad Med Singapore* 2005; 34(1): 117–123.
13. Maguiness SM, Frieden IJ: Current management of infantile hemangiomas. *Semin Cutan Med Surg* 2010; 29(2): 106-114.
14. Grantzow R, Schmittenbecher P, Cremer H, Höger P, Rössler J, Hamm H, et al: Hemangiomas in infancy and childhood. S 2k guideline of the German Society of Dermatology with the working group pediatric dermatology together with the German Society for Pediatric Surgery and the German Society for Pediatric Medicine. *J Dtsch Dermatol Ges* 2008; 6(4): 324-329.
15. Wu JK, Rohde CH: Purse-string closure of hemangiomas: early results of a follow-up study. *Ann Plast Surg* 2009; 62(5): 581-585.
16. Mulliken JB, Rogers GF, Marler JJ: Circular excision of hemangioma and purse-string closure: the smallest possible scar. *Plast Reconstr Surg* 2002; 109(5): 1544-1554.

17. Barlow CF, Priebe CJ, Mulliken JB, Barnes PD, Mac Donald D, Folkman J, et al: Spastic diplegia as a complication of interferon-alfa-2a treatment of hemangiomas of infancy. *J Pediatr* 1998; 132(3 Pt 1): 527–530.

18. Frieden IJ, Haggstrom AN, Drolet BA: Infantile hemangiomas: current knowledge, future directions. Proceedings of a research workshop on infantile hemangiomas, April 7-9, 2005, Bethesda, Maryland, USA. *Pediatr Dermatol* 2005; 22(5): 383-406.