

# Surgical Management of Auricular Infantile Hemangiomas

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**Objective:** To report our experience with surgical management of auricular infantile hemangiomas and reconstruction of the affected ear.

**Design:** Retrospective case series.

**Setting:** Dedicated Birthmarks and Vascular Anomalies Center in a tertiary pediatric hospital.

**Patients:** Ten patients with surgically treated, histopathologically confirmed auricular infantile hemangiomas.

**Main Outcome Measures:** Outcomes of surgical management.

**Results:** The case series included 5 male and 5 female patients (age range, 4 months to 4 years). Indications for surgery were pain, bleeding, infection, and cosmetic deformity. Four patients had failed prior medical treat-

ment, including pulsed dye laser, topical corticosteroids, and intralesional corticosteroids. Nine patients underwent single-stage resection. Otoplasty reconstruction was performed in 2 patients with hemangioma-induced deformities, while primary Z-plasty closure was performed in 2 patients with extensive lesions. No recurrence or complication has been reported to date.

**Conclusions:** Most infantile hemangiomas do not require treatment. Surgical excision of auricular infantile hemangiomas at any phase is effective in preventing fibrofatty scarring, reducing cartilage deformities, and treating complicated cases or patients who have failed medical management. Surgical excision with Z-plasty reconstruction is a viable option that should be considered to limit postoperative deformities.

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**I**NFANTILE HEMANGIOMAS (IHs) are congenital vascular tumors that affect approximately 10% of the population.<sup>1</sup> They are more common in female and premature infants and among those of white race/ethnicity.<sup>2</sup> In contrast to vascular malformations, which primarily consist of enlarging aberrant vessels or lymph channels, IHs are composed of rapidly dividing endothelial cells.<sup>3</sup> Infantile hemangiomas are not typically present at birth but are observed within the first year of life. Infantile hemangiomas manifest proliferative, involuting, and involuted phases. The proliferative phase typically lasts 6 to 12 months and is uncomplicated for most patients. However, involution can be a slow process that may last through the first decade of life.<sup>4</sup> Treatment is usually deferred unless there is ulceration, bleeding, functional impairment, cosmetic deformity, or shunting. Medical management includes the use of corticosteroids, pulsed dye laser, and  $\beta$ -blocker therapy.<sup>5</sup> These options have variable outcomes and unpredictable adverse effects. Propranolol hydrochloride therapy has been promising in reducing medical treatment of IHs,

but tumors in high-risk locations or patients in whom  $\beta$ -blocker therapy is contraindicated may require surgical intervention,

Surgical excision is a secondary treatment option in complicated cases or for large IHs that are expected to result in permanent deformities if allowed to follow their natural course. Approximately 80% of IHs involving skin and soft tissue are located in the head and neck region.<sup>4</sup> Auricular IHs deserve special attention because cartilage deformity caused by large tumors is permanent. The anatomy, location, and functional and cosmetic importance of the ear in development are considerations that may necessitate medical or surgical therapy of IHs before involution. Herein, we describe a series of patients with auricular IHs at different phases that were successfully treated with surgical excision and primary reconstruction.

## METHODS

This retrospective case series was approved by the Children's Hospital of Wisconsin institutional review board. We reviewed patients with auricular IHs who had been prospectively fol-

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**Table. Summary of Surgically Excised Auricular Infantile Hemangiomas**

Case No./ Sex/Age	Involved Anatomy	Prior Treatment	Indication for Surgery	Surgical Procedure After Excision	Histopathological Phase	Size, cm <sup>3</sup>	Blood Loss, mL
1/M/4 mo	Lobule, helix, postauricular skin	None	Recurrent bleeding, pain	CC	Proliferative	9.9	<5
2/M/7 mo	Postauricular skin	None	Pain, ulceration	Z-plasty	Proliferative	1.6	<5
3/M/9 mo	Lobule, helical rim, postauricular skin in stage 1 and helix in stage 2	Intralesional triamcinolone acetonide injection	Recurrent bleeding, pain, deformity, infection	Z-plasty in stage 1 and CC in stage 2	Proliferative	29.1 0.4	80 <5
4/M/10 mo	Postauricular skin, helix	None	Deformity	CC	Involuting	0.8	<5
5/F/15 mo	Postauricular skin, helix	None	Deformity	SC	Involuting	2.2	<5
6/F/15 mo	Postauricular skin, helix	None	Deformity	CC	Involuting	6.3	<5
7/F/19 mo	Postauricular skin	None	Recurrent bleeding, hypertrophic scar	CC	Involuting	6.0	<5
8/M/19 mo	Postauricular skin, helix	Pulsed dye laser	Cup-ear deformity	Otoplasty	Involuting	3.5	25
9/F/20 mo	Concha bowl, helix	Topical triamcinolone	Deformity	SC	Involuted	0.6	<5
10/F/4 y	Preauricular skin, tragus, lobule	Pulsed dye laser	Cup-ear deformity	Otoplasty	Involuted	8.5	<5

Abbreviations: CC, complex closure; SC, simple closure.



**Figure 1.** Complicated auricular infantile hemangiomas. A, Painful proliferative phase. B, With ulceration and recurrent bleeding. C, Fibrofatty scarring of the pinna after involution.

lowed up. Additional information was obtained from a clinicopathological database of patients treated in the Birthmarks and Vascular Anomalies Center between January 1, 2005, and September 30, 2010. Demographic details, clinical presentation, preoperative medical therapy, surgical treatment, and long-term follow-up results were reviewed. Cases without glucose transporter 1 immunoreactivity were excluded. Lesions involving the external auditory canal, tympanic membrane, or middle ear were excluded as well.

## RESULTS

Ten cases (5 male and 5 female) were identified. Seven were of white race/ethnicity, and 3 were Hispanic. The **Table** summarizes demographic details, clinical presentation, preoperative medical treatment, and indications for surgery. Four patients had received medical treatment, including topical triamcinolone acetonide (1 child), intralesional triamcinolone injection (1 child), and pulsed dye laser (2 children). Preoperative magnetic resonance imaging and angiography were performed in 1 patient.

Indications for surgery included cosmetic deformity, bleeding, pain, and infection (**Figure 1** and **Figure 2**). Five patients underwent surgery with complex closure, 2 patients required otoplasty to address cup-ear deformity, and 2 patients had Z-plasty closure. Representative Z-plasty closure is shown in Figure 2. The median and mean surface areas of lesions were 3.2 and 5.3 cm<sup>2</sup>, respectively. The median volume of lesions from histopathological reports was 4.75 cm<sup>3</sup>. There were no complications. Follow-up periods ranged from 12 to 48 months, and no recurrence or hypertrophic wound healing has been reported to date.

## COMMENT

The indications for surgery in this series were pain, recurrent bleeding, and gross cosmetic deformity with or without cartilage destruction. These occurred during proliferative and involuting phases. Surgical therapy for IHs has traditionally been reserved for



**Figure 2.** Nine-month-old boy with a large auricular infantile hemangioma (case 3 in the Table). A, Ulceration. B, Intraoperative Z-plasty reconstruction. C, Postoperative outcome.

postinvolution deformities. However, some advocate early intervention to limit potential morbidity from complications during the proliferative phase and to address postinvolution deformity.<sup>6</sup> Historically, available medical treatment tends to arrest growth rather than accelerate lesions toward involution.  $\beta$ -Blocker therapy has been effective, with few adverse effects, but surgical management has an important role among patients in whom medical treatment is complicated or who have IHs in high-risk locations. Surgical treatment accomplishes resolution of the tumor and addresses any existing cosmetic deformity.

Head and neck lesions are often candidates for intervention because they are conspicuous, represent high-risk locations for complications, and have a propensity to involve functional issues. Auricular IHs require a careful approach because they are vulnerable to bleeding from minor trauma owing to prominence and easy access. In addition, large auricular IHs can cause functional impairment and permanent deformity of the cartilaginous framework. Minor defects involving the helical rim, postauricular sulcus, and antihelix significantly alter shape, position, and contour of the ear.<sup>7</sup> Furthermore, the social effect of a normal-appearing ear should not be underestimated. Deformities of the pinna may occur after involution of auricular IHs, and parents may react with grief, psychological distress, and fear of social stigmatization.<sup>8,9</sup> Therefore, with the appropriate indication, excision and reconstruction beyond simple closure should be considered.

Our experience suggests that it is safe and prudent to intervene during the proliferative phases for patients in whom nonsurgical therapy is not achieving acceptable outcomes. However, the timing of surgery may be challenging for uncomplicated lesions that are expected to cause permanent deformity. In this series, 3 patients younger than 9 months had complicated proliferative lesions that required multiple visits to the hospital. Previous research has demonstrated that most IHs complete growth by 5 months and almost all cease to grow by 9 months.<sup>1</sup> Therefore, parents or guardians of a patient with auricular IHs should be counseled about the potential need for early referral to a surgeon as part of the patient's mul-

tidisciplinary team. The site involved may also influence referral for surgical consultation. Most tumors in this case series involved the helix, antihelix, lobule, and postauricular sulcus. These sites may increase the propensity for deformity, in contrast to loss of cartilage in the concha bowl, scaphoid fossa, and triangular fossa, where involuting IHs are less likely to permanently alter the anthropometrics of the pinna.<sup>7</sup>

Small superficial defects of the auricle and surrounding skin are amenable to primary closure with adequate undermining and tissue rearrangement. However, the deep nature of auricular IHs herein precluded primary closure of all lesions in this series. The lesions were entirely removed through dissection down to subcutaneous tissue and postauricular fascia (when applicable) without extensive cartilage removal. This curative approach left surgical defects that required reconstructive options. Although lesions on concave surfaces of the ear may heal well via secondary intention, the unacceptable cosmesis and potential for disfigurement due to wound contraction made secondary intention an unacceptable option in this population. Complex closure involves undermining, placement of deep sutures in subcutaneous tissue, and local flap reconstruction with or without excision of Burrow triangles. There are multiple options for tissue rearrangement in subsite sites of the pinna.<sup>7,10,11</sup> Of note, 2 patients herein required otoplasty owing to cup-ear deformity caused by postinvolution fibrofatty tissue. For otoplasty cases, the postauricular deformities were excised in a fusiform manner. This was followed by placement of conchomastoidal sutures to reduce the auricle-mastoid angle and then horizontal mattress sutures (Mustardé sutures) along the scapha to recreate the antihelical fold.<sup>12</sup> No lobule reduction or repositioning was performed. A similar approach was used in patients with single Z-plasty closure, where the surgical wound served as the central limb of the triangular flaps. These techniques should be considered when primary closure does not provide optimal results.

In conclusion, IHs spontaneously regress with time, and most patients do not require treatment. Surgical excision is effective in avoiding deformities, removing complicated IHs, and treating patients who have failed medi-

cal management. Z-plasty reconstruction yields an excellent cosmetic outcome.

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## REFERENCES

1. Chang LC, Haggstrom AN, Drolet BA, et al; Hemangioma Investigator Group. Growth characteristics of infantile hemangiomas: implications for management. *Pediatrics*. 2008;122(2):360-367.
2. Haggstrom AN, Drolet BA, Baselga E, et al; Hemangioma Investigator Group. Prospective study of infantile hemangiomas: demographic, prenatal, and perinatal characteristics. *J Pediatr*. 2007;150(3):291-294.
3. Buckmiller LM, Richter GT, Suen JY. Diagnosis and management of hemangiomas and vascular malformations of the head and neck. *Oral Dis*. 2010;16(5):405-418.
4. Jinnin M, Ishihara T, Boye E, Olsen BR. Recent progress in studies of infantile hemangioma. *J Dermatol*. 2010;37(4):283-298.
5. Akhavan A, Zippin JH. Current treatments for infantile hemangiomas. *J Drugs Dermatol*. 2010;9(2):176-180.
6. Williams EF III, Stanislaw P, Dupree M, Mourtzikos K, Mihm M, Shannon L. Hemangiomas in infants and children: an algorithm for intervention. *Arch Facial Plast Surg*. 2000;2(2):103-111.
7. Shonka DC Jr, Park SS. Ear defects. *Facial Plast Surg Clin North Am*. 2009;17(3):429-443.
8. Tanner JL, Dechert MP, Frieden IJ. Growing up with a facial hemangioma: parent and child coping and adaptation. *Pediatrics*. 1998;101(3, pt 1):446-452.
9. Williams EF III, Hochman M, Rodgers BJ, Brockbank D, Shannon L, Lam SM. A psychological profile of children with hemangiomas and their families. *Arch Facial Plast Surg*. 2003;5(3):229-234.
10. Olbricht S, Liégeois NJ. Closing surgical defects of the external ear. *Semin Cutan Med Surg*. 2003;22(4):273-280.
11. Holzmann RD, Guldbakke KK, Schanbacher CF. Bilateral advancement flaps with helical rim Z-plasty modification for management of ear defects. *Dermatol Surg*. 2008;34(3):374-377.
12. Mustarde JC. The correction of prominent ears using simple mattress sutures. *Br J Plast Surg*. 1963;16:170-178.