RESEARCH PAPER

Outcomes of Intralesional Bleomycin Sclerotherapy for Treating Pediatric Orbital Lymphangiomas in Sana'a, Yemen: A Single-Center Case Series

Tariek Aldoais[1, 2]*, Amal Abdulwahed[3], Ali Mohammed Bin Mahfodh[4] and Mahfouth Bamashmus[5]

[1]*Department of Ophthalmology, Faculty of Medicine and Health Sciences, Amran University, Amran, Yemen*
[2]*Rowad Alnour Eye Hospital, Sana'a, Yemen*
[3]*Arab board of eye specialization*
[4] *King Abdullah Medical City Makkah, Saudi Arabia*
[5]*Department of Ophthalmology, Faculty of Medicine and Health Sciences, Sanaa University, Sanaa , Yemen.*
Correspondence author: *Tariek Aldoais/tariqaldoais@yahoo.com*

Received: 24th April, 2026; Revised: 20th May 2026; Accepted: 30th June, 2026; Available Online: 10th July, 2026

ABSTRACT

Orbital lymphangiomas in children are rare benign vascular malformations that can cause proptosis, ptosis, and vision-threatening complications such as compressive optic neuropathy. Managing these lesions is challenging, as surgical excision is often incomplete or impossible due to diffuse infiltration and carries a high risk of damage to vital orbital structures. Sclerotherapy with intralesional bleomycin injection (IBI) has emerged as a minimally invasive alternative to extensive surgery for these tumors. To evaluate this approach, we prospectively analyzed five pediatric cases (four males and one female aged two days to 12 years) of orbital lymphangioma treated at Rowad Alnour Eye Hospital in Sana'a, Yemen, between January 2023 and March 2024. Diagnosis was confirmed through clinical examination, imaging, and histopathology when available. All patients presented with severe proptosis and/or exposure keratopathy and underwent cyst aspiration followed by sclerotherapy with IBI, which precluded the need for surgical excision. Early outcomes were favorable, where all five children experienced substantial reduction or complete resolution of proptosis and related symptoms, with preservation of visual function. Bleomycin was well tolerated, with no procedure-related complications or adverse effects observed during follow-up. These early findings suggest that sclerotherapy with IBI is a safe, effective, and vision-preserving alternative to surgery for pediatric orbital lymphangiomas, achieving rapid symptom relief with minimal morbidity.

Keywords: *Lymphangioma; Sclerotherapy; Bleomycin; Children; Yeme*

How to cite this article: Aldoais T, Abdulwahed A, Bin Mahfodh AM, Bamashmus M., Outcomes of Intralesional Bleomycin Sclerotherapy for Treating Pediatric Orbital Lymphangiomas in Sana'a, Yemen: A Single-Center Case Series. Int J Drug Deliv Technol. 2026;16(7): 911-915; DOI: 10.25258/ijddt.16.7.98
Source of support: Nil.
Conflict of interest: None

INTRODUCTION

Lymphangiomas are rare benign tumors of lymphatic vessels, commonly occurring in children, especially in the head and neck region [1]. Orbital lymphangiomas in childhood typically present with proptosis, ptosis, and restricted eye movements, often leading to compressive optic neuropathy [2, 3]. They can represent up to 4% of all orbital lesions [4]. These lesions, which may be superficial, deep, or diffuse, often remain asymptomatic or exhibit slow progression. However, sudden intralesional hemorrhage can lead to rapid enlargement, resulting in globe displacement, strabismus, and compressive optic neuropathy [5].

Management of orbital lymphangiomas is challenging due to their proximity to vital structures [6]. Conservative approaches are preferred, including observation, sclerotherapy, and systemic corticosteroids [7]. Surgical excision remains the primary treatment for orbital lymphangiomas; however, complete removal is often impossible due to the diffuse infiltration of the lesion, and extensive surgery may lead to iatrogenic injury to vital orbital structures [8]. Although systemic corticosteroids have shown some efficacy in symptom relief [9], they may be ineffective in certain cases [10]. Alternative treatments such as sclerotherapy, intralesional bleomycin injections, and systemic therapies have shown promise in some cases [7, 11]. In this case series, we assessed the safety and effectiveness of intralesional bleomycin injection for treating orbital lymphangiomas among Yemeni children.

METHODS

This prospective case series included five pediatric patients diagnosed with orbital lymphangioma and managed at the Oculoplasty Unit at Rowad Alnour Eye Hospital in Sana'a between January 2023 and March 2024. Diagnosis of orbital lymphangioma was established based on clinical evaluation, imaging studies, including computed tomography (CT) scans and magnetic resonance imaging (MRI), as well as histopathological analysis when available. Patients who demonstrated severe proptosis,

**Author for Correspondence: tariqaldoais@yahoo.com*

vision-threatening exposure keratopathy, or risk of disfigurement underwent aspiration of cystic fluid followed by intralesional bleomycin injection.

This study complied with the guidelines of the Declaration of Helsinki and was approved by the Ethics Committee of Rowad Alnour Eye Hospital. Written informed consent was obtained from the parents/guardians of the children for the inclusion of their children in this case series study, and permission was obtained to publish their images and clinical information in this publication.

RESULTS

Patient demographics and laterality of orbital lymphangioma

Case	Sex	Age	Laterality
1	Male	8 years	Right eye
2	Male	2 weeks	Left eye
3	Female	12 years	Left eye
4	Male	2 months	Right eye
5	Female	2 days	Right eye

Case summaries and response to sclerotherapy with IBI

Case 1

An 8-year-old boy initially presented with a poorly defined mass in the superior medial orbit of the right eye, persisting for six months. Six months later, he developed a sudden onset of progressive proptosis over a three-day period (Figure 1.A). Initial CT imaging revealed a poorly defined microcystic mass measuring 5×2 mm within the right orbit. Six months later, follow-up CT demonstrated a diffusely infiltrative mass involving both the intraconal and extraconal compartments of the right orbit. The case was resolved (Figure 1.B) after aspiration of 15 ml of blood under general anesthesia, followed by injection of bleomycin (1 IU per milliliter of saline) into the cyst wall through multiple punctures.

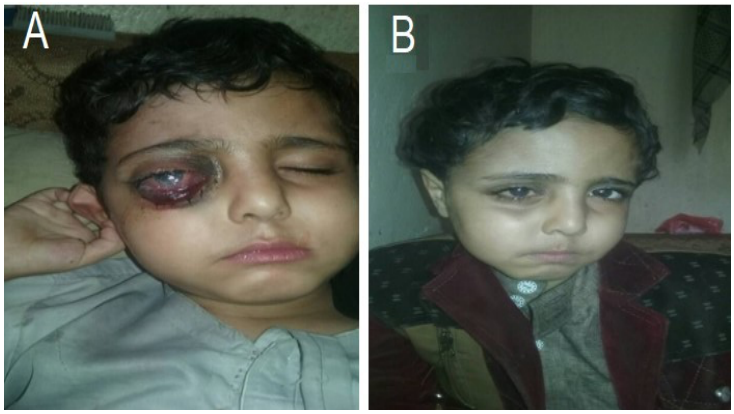

Figure 1: An 8-year-old boy before (A) and after (B) intralesional bleomycin injection.

Case 2

A 2-week-old boy presented with severe proptosis of the left eye, significant exposure keratopathy, and restricted ocular motility (Figure 2.A). MRI revealed axial proptosis with a multiloculated cystic orbital mass involving both intra- and extraconal spaces, characterized by multiple fluid levels. Post-contrast images showed heterogeneous enhancement, primarily along the margins of the cystic cavities. The case resolved (Figure 2.B) two months after aspiration of 12 ml of blood under general anesthesia, followed by intralesional injection of bleomycin into the cyst walls through multiple punctures.

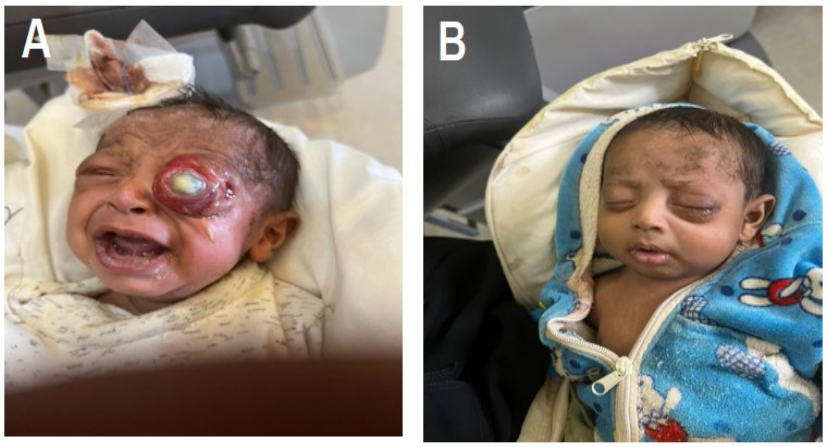

Figure 2: A 2-week-old boy before (A) and two months after (B) intralesional bleomycin injection.

Case 3

A 12-year-old girl presented with severe left eye proptosis, chemosis, and restricted ocular motility for two weeks (Figure 3.A). CT imaging demonstrated a solid, well-defined, lobulated, relatively hyperdense mass within the left orbit, measuring approximately 30 × 15 mm in axial dimensions and 20 mm in height. The lesion was located between the medial and inferior rectus muscles. The case resolved (Figure 3.B) after aspiration of 12 ml of blood under general anesthesia, followed by multiple intralesional injections of bleomycin into the cyst walls.

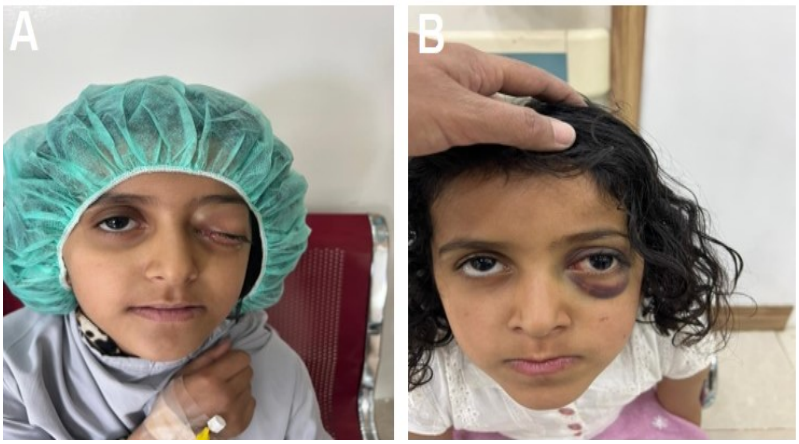

Figure 3: A 12-year-old girl before (A) and two months after (B) intralesional bleomycin injection.

Case 4

A 2-month-old male presented with severe proptosis of the right eye, exposure keratopathy, and restricted ocular motility for the past 10 days (Figure 4.A). Imaging revealed a well-defined mass measuring approximately 22 × 23 × 15 mm located in the superior intraorbital region of the right eye. On MRI, the lesion appeared hyperintense on FLAIR sequences and showed hypo- to isointensity relative to the extraocular muscles. The mass was associated with marked proptosis and compression of the optic nerve. The case resolved (Figure 4.B) one week after aspiration of blood under general anesthesia, followed by multiple intralesional injections of bleomycin into the cyst walls.

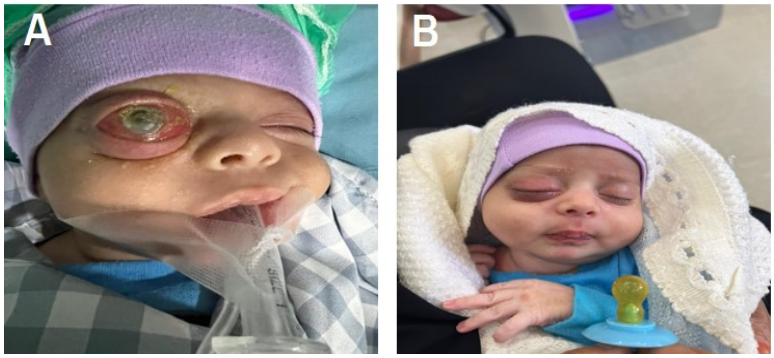

Figure 4: A 2-month-old boy before (A) and one week after (B) intralesional bleomycin injection.

Case 5

A 2-day-old male newborn presented with pronounced right eye proptosis and limited ocular motility, while the cornea appeared normal. Tarsorrhaphy was performed to prevent exposure keratopathy (Figure 5.B). CT imaging revealed a large retroocular soft tissue mass in the right orbit, measuring approximately 2.7 × 2.2 × 1.6 cm, consistent with features of a venous malformation or hemangioma, resulting in significant proptosis. There was no evidence of bone involvement or extension into adjacent sinuses or the nasopharynx. The case resolved (Figure 5.B) after aspiration of 5 ml of blood, followed by intralesional injection of bleomycin.

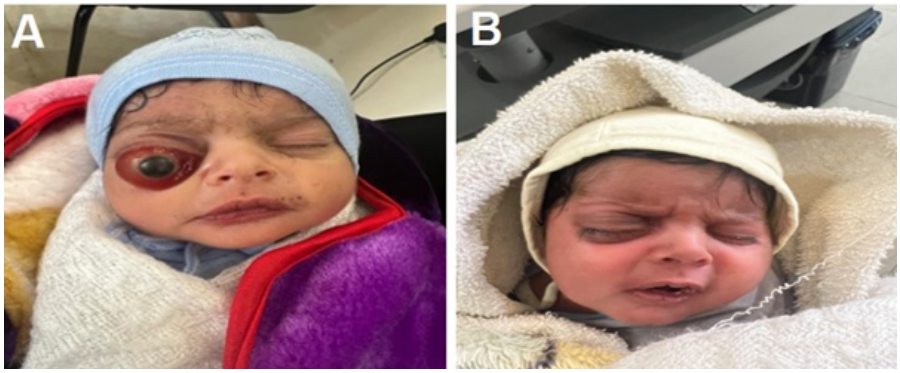

Figure 5: A 2-day-old male newborn before (A) and after (B) intralesional bleomycin injection.

DISCUSSION

Intralesional bleomycin injection has emerged as an effective treatment for orbital and/or adnexal venolymphatic malformations, often referred to as lymphangiomas, offering a non-surgical alternative with promising outcomes [8, 12]. Bleomycin induces DNA strand breaks via reactive oxygen species from bleomycin-iron complexes, triggering endothelial apoptosis and fibrosis [13]. Our case series demonstrates that sclerotherapy with intralesional bleomycin (IBI) is a feasible and effective option for orbital lymphangiomas, particularly in neonates and young children in resource-limited countries like Yemen. Sclerotherapy with IBI demonstrated notable efficacy in treating orbital lymphangiomas in our pediatric cohort, achieving marked reductions in proptosis, restoration of ocular motility, and prevention of vision-threatening complications in all five studied cases. This finding is consistent with earlier studies advocating bleomycin as a less invasive option compared to surgical removal in pediatric patients with marked reductions in lesion size and improvements in symptoms [8, 12, 14-16]. Intralesional bleomycin is recommended as a first-line treatment for orbital lymphangiomas, especially when complete surgical excision poses risks. Bleomycin has been explored as a treatment option for refractory orbital lymphangiomas, demonstrating favorable outcomes [12]. In addition, satisfactory responses after IBI have been found in patients with non-orbital lymphangiomas and in managing lymphangiomas affecting the face, neck and thorax [17, 18]. A systematic review and meta-analysis [19] have concluded that doxycycline had the highest complete cure rate among sclerosing agents, but its safety profile was less favorable, with higher rates of systemic side effects and permanent morbidity, indicating a need for further research to optimize its use compared to bleomycin and OK-432.

Other sclerosing agents, including OK-432 (Picibanil) and doxycycline, have been used with variable success. Intralesional injection of OK-432 was found to effectively treat orbital lymphangiomas with minimal side effects, particularly in cases where patients experience severe symptoms like proptosis and exposure keratopathy due to recurrent bleeding within the tumor [20-22]. However, it is neither available globally nor approved by the U.S. Food and Drug Administration (FDA) [23].

In this study, no significant systemic or ophthalmic side effects were observed among treated children, making sclerotherapy with IBI a safe option. However, the follow-up period was short. It is noteworthy that previous studies have demonstrated the absence of recurrences or significant complications during longer follow-up [8, 12, 14, 24]. Immediate complications may include mild pain or edema at the injection site, but these are generally transient [12]. However, it is crucial to monitor patients for potential adverse effects such as pulmonary fibrosis.

The small sample size from a single center might limit the generalizability of the findings. Furthermore, follow-up periods were relatively short, precluding robust assessment of long-term recurrence rates. Future prospective studies with larger sample sizes, longer follow-up, and standardized protocols are necessary to better define the role of intralesional bleomycin in treating orbital lymphangiomas. Comparative studies evaluating bleomycin against other sclerosants would also provide valuable insights into optimal treatment strategies.

CONCLUSION

Sclerotherapy with IBI is a promising, minimally invasive treatment modality for orbital lymphangiomas in the pediatric population, offering rapid improvement with minimal morbidity. Early intervention may prevent vision loss and cosmetic disfigurement.

REFERENCES

1. Grasso DL, Pelizzo G, Zocconi E, Schleef J. Lymphangiomas of the head and neck in children. Acta Otorhinolaryngol Ital. 2008;28(1):17-20.
2. Tunç M, Sadri E, Char DH. Orbital lymphangioma: an analysis of 26 patients. Br J Ophthalmol. 1999;83(1):76-80. https://doi.org/10.1136/bjo.83.1.76
3. Mowatt L, Crossman G. Orbital lymphangioma in a child: a diagnostic dilemma. West Indian Med J. 2012;61(7):764-6.
4. Shields JA, Shields CL, Scartozzi R. Survey of 1264 patients with orbital tumors and simulating lesions: The 2002 Montgomery Lecture, part 1.

Ophthalmology. 2004;111(5):997-1008. https://doi.org/10.1016/j.ophtha.2003.01.002

5. Graeb DA, Rootman J, Robertson WD, Lapointe JS, Nugent RA, Hay EJ. Orbital lymphangiomas: clinical, radiologic, and pathologic characteristics. Radiology. 1990;175(2):417-21. https://doi.org/10.1148/radiology.175.2.2326469
6. Patel SR, Rosenberg JB, Barmettler A. Interventions for orbital lymphangioma. Cochrane Database Syst Rev. 2018;2018(4). https://doi.org/10.1002/14651858.cd013000
7. Jafari N, Jafari R. Orbital lymphangioma: a case report and review of management modalities. J Pediatr Rev. 2021;9(4):321-8.
8. Nuruddin M, Roy SR, Mudhar HS. Results of Intralesional Bleomycin Sclerotherapy for Treatment of Orbital Lymphangiomas at a Tertiary Eye Care Centre in Bangladesh. Ocul Oncol Pathol. 2019;5(6):412-7. https://doi.org/10.1159/000495248
9. Sires BS, Goins CR, Anderson RL, Holds JB. Systemic corticosteroid use in orbital lymphangioma. Ophthalmic Plast Reconstr Surg. 2001;17(2):85-90. https://doi.org/10.1097/00002341-200103000-00002
10. Tawfik HA, Budin H, Dutton JJ. Lack of response to systemic corticosteroids in patients with lymphangioma. Ophthalmic Plast Reconstr Surg. 2005;21(4):302-5. https://doi.org/10.1097/01.iop.0000172179.15781.31
11. Gooding C, Meyer D. Intralesional bleomycin: a potential treatment for refractory orbital lymphangiomas. Ophthalmic Plast Reconstr Surg. 2014;30(3):e65-7. https://doi.org/10.1097/IOP.0b013e31829bb4a9
12. Murugesan S, Rangarajan V, Subramanian A, Ramakrishnan K. Intralesional bleomycin in treatment of orbital and/or adnexal venolymphatic malformations. Indian J Ophthalmol. 2024;72(12):1805-7. https://doi.org/10.4103/IJO.IJO_1691_23
13. Chen S, Wang Y, Gao Q, Cui J, Shen W. Bleomycin induces endothelial cell pyroptosis and regulates fibrosis by activating the NLRP3/caspase-1/GSDMD pathway: a possible mechanism contributing to the sclerotherapy of venous malformations. J Mol Histol. 2024;55(6):1239-50. https://doi.org/10.1007/s10735-024-10264-8
14. Raichura ND, Alam MS, Noronha VO, Mukherjee B. A prospective study of the role of intralesional bleomycin in orbital lymphangioma. J AAPOS. 2017;21(2):146-51. https://doi.org/10.1016/j.jaapos.2017.03.007
15. Muhammad Khuzaemah Saalim Hashmi SA, Hussain M, Ahmad S, Gillani K. Efficacy Of Intralesional Bleomycin Injection Sclerotherapy In Macrocystic Lymphangioma In Paediatric Patients. J Ayub Med Coll Abbottabad. 2020;32(1):42-5.
16. Dave TV, Madhuri BK, Kaliki S. Intralesional bleomycin for orbital lymphatic malformations: comparison of clinical *versus* radiologic regression by volumetric analysis. Ophthalmic Plast Reconstr Surg. 2021;37(3s):S85-s91. https://doi.org/10.1097/iop.0000000000001837
17. Rozman Z, Thambidorai RR, Zaleha AM, Zakaria Z, Zulfiqar MA. Lymphangioma: is intralesional bleomycin sclerotherapy effective? Biomed Imaging Interv J. 2011;7(3):e18. https://doi.org/10.2349/biij.7.3.e18
18. Kumar V, Kumar P, Pandey A, Gupta DK, Shukla RC, Sharma SP, et al. Intralesional bleomycin in lymphangioma: an effective and safe non-operative modality of treatment. J Cutan Aesthet Surg. 2012;5(2):133-6. https://doi.org/10.4103/0974-2077.99456
19. De Maria L, De Sanctis P, Balakrishnan K, Tollefson M, Brinjikji W. Sclerotherapy for lymphatic malformations of head and neck: Systematic review and meta-analysis. J Vasc Surg Venous Lymphat Disord. 2020;8(1):154-64. https://doi.org/10.1016/j.jvsv.2019.09.007
20. Laranne J, Keski-Nisula L, Rautio R, Rautiainen M, Airaksinen M. OK-432 (Picibanil) therapy for lymphangiomas in children. Eur Arch Otorhinolaryngol. 2002;259(5):274-8. https://doi.org/10.1007/s00405-001-0438-6
21. Yoon JS, Choi JB, Kim SJ, Lee SY. Intralesional injection of OK-432 for vision-threatening orbital lymphangioma. Graefes Arch Clin Exp Ophthalmol. 2007;245(7):1031-5. https://doi.org/10.1007/s00417-006-0510-4
22. Fasching G, Dollinger C, Spendel S, Tepeneu NF. Treatment of lymphangiomas by means of sclerotherapy with OK-432 (Picibanil®) is safe and effective - A retrospective case series. Ann Med Surg (Lond). 2022;81:104531. https://doi.org/10.1016/j.amsu.2022.104531
23. Patatas OHG, Goldenberg D, Gemperli R. Intralesional treatment of lymphatic malformations with emphasis on Picibanil (OK-432) sclerotherapy: a systematic review. Intr Rev Bras Cir Plást. 2016;31:405-16.
24. Chow KM, Sumugam K, Ahmad A. Intralesional bleomycin for orbital venolymphatic malformation. Cureus. 2024;16(12):e75613. https://doi.org/10.7759/cureus.75613