

A Study on Cyst Volume Dependent Dose of 3% Sodium Tetradecyl Sulphate in Sclerotherapy of Orbitopalpebral Cyst Associated with Severe Microphthalmos/Anophthalmos

Apjit Kaur Chhabra^{*}, Sonal Bangwal, Nibha Mishra

Department of Ophthalmology, King George's Medical University, Lucknow, India

Email address

sonalbangwal25@gmail.com (A. K. Chhabra), sonalbangwal24@gmail.com (S. Bangwal), drnibhamishra@gmail.com (N. Mishra)

To cite this article

Apjit Kaur Chhabra, Sonal Bangwal, Nibha Mishra. A Study on Cyst Volume Dependent Dose of 3% Sodium Tetradecyl Sulphate in Sclerotherapy of Orbitopalpebral Cyst Associated with Severe Microphthalmos/Anophthalmos. *Open Science Journal of Clinical Medicine*. Vol. 3, No. 5, 2015, pp. 173-176.

Abstract

Aim: To evaluate the efficacy of 3% Sodium Tetra Decyl Sulphate as a sclerosant in treatment of orbitopalpebral cysts associated with severe microphthalmos/ anophthalmos. *Methods*: Prospective, interventional study on eight patients diagnosed as congenital orbitopalpebral cysts with severe microphthalmos/ anophthalmos, aged 2-24 years. After aspiration of the orbitopalpebral cyst, 3% sodium tetradecyl sulphate in dose of 0.5ml per 10 ml of aspirated fluid was injected into the collapsed cyst. Conformer was placed and bandage applied for one day. Patients were kept under antibiotic cover for five days. Follow up was done at the end of one, three, six and nine months following last dose to evaluate the regression of orbitopalpebral cyst. Sclerosant therapy was repeated if recurrence of cyst was noted. Regression of orbitopalpebral cyst to cosmetically acceptable level was the target. *Results*: Post sclerotherapy, all orbitopalpebral cysts underwent regression within a period of nine months. Three orbitopalpebral cysts underwent complete regression following a single dose of sclerotherapy, four required a repeat dose and one of the patients required a third dose of sclerotherapy. *Conclusion*: All 8 patients of unilateral congenital orbitopalpebral cyst with anophthalmos / severe microphthalmos treated with 3% Sodium tetradecyl sulphate attained regression of cyst size in one to three sittings over a period of nine months, without any adverse effects. Number of sittings required was less in orbitopalpebral cysts with lesser aspirate.

Keywords

SodiumTetradecyl Sulphate, STS, Sclerosing Agent, Orbitopalpebral Cyst, Anophthalmos, Microphthalmos

1. Introduction

Large orbitopalpebral cysts associated with anophthalmos / severe microphthalmos (Duke Elder Category III with no visual potential are subjected to therapy for cosmetic reasons [1] [2].

Sclerosing agents like ethanolamine [3] and sodium tetradecyl sulphate [4] have been tried as a treatment modality in orbital cysts [3] [4]. They act by causing thrombosis and endothelial damage, leading to endofibrosis [5]. Literature reveals evidence of use of several sclerosing agents for various diseases in the body. Based on the results of use of sclerotherapy in cases of varicose veins of the legs [6] [7] [8] [9], esophageal / gastric varices [10] [11], renal

cysts [12] [13] [14], lymphangiomas [15] [16] [17], thyroid cysts [18] and hepatic cysts [19]; it was hypothesized that intralesional injection of sclerosing agents may result in satisfactory regression of orbitopalpebral cysts associated with anophthalmos/severe microphthalmos.

Sodiumtetradecylsulphate,7-ethyl-2-methyl-4-hendecanolsodiumsulphate(C14H29NaSO4) is a synthetic anionic surfactant acting assclerosing agent that is available as 1% and 3% aqueoussolutions with 2% benzyl alcohol and is buffered to a pH of7.9 with sodium phosphate [20].

The authors report the use of 3% Sodium tetradecyl sulphate as a sclerosing agent in eight cases of large orbitopalpebral cysts with anophthalmos/severe microphthalmos with no visual potential.

2. Materials and Methods

A prospective, interventional study was undertaken and was performed in accordance to the tenets of the Helsinki declaration. Eight patients aged 2-24 years diagnosed clinico-radiologically as congenital orbitopalpebral cyst with anophthalmos / severe microphthalmos with no visual potential were enrolled for treatment with intralesional injection of 3% sodium tetradecyl sulphate. Clinical assessment of the patients was done by same surgeon. Informed consent regarding nature of study, availability of other treatment modalities, possibility of repeat injections, failure and complications was taken. Only cases with orbitopalpebral cysts without intracranial extension were included in the study. Under aseptic conditions, fluid was aspirated from orbitopalpebral cyst using 22 G needle mounted on sterile disposable syringe and amount of aspirate was noted. After disengaging the syringe 0.5 ml. of 3% sodium tetradecyl sulphate per 10ml of aspirate was injected into the cyst from the aspiration port. Conformer was placed and the affected eye was bandaged for one day. The patients were evaluated on first post-operative day for signs of local necrosis or inflammation and systemic complications. Oral broad spectrum antibiotic (Amoxyclav 30 mg. / body wt. in 3 divided doses) was prescribed for five days. Follow up was done at the end of one, three, six and nine months for evidences of cyst regression/recurrence. Regression was assessed clinically as shown in Fig. 1 and 2. The aspiration-injection procedure was repeated for cysts that showed recurrence.

Table 1. Treatment outcomes after sclerotherapy in our study.

S.No.	Patient	Age (years)	Anophthalmos/ Microphthalmos	Cyst Volume(ml.)	Pain (1 post op day)*	Regression at follow up			
						1 month	3 months	6 months	9 months
1	Patient1	2	Anophthalmos	10	No pain	Regressed	Regressed	Regressed	Regressed
2	Patient 2	6	Microphthalmos	10.5	No pain	Regressed	Regressed	Regressed	Regressed
3	Patient 3	6	Microphthalmos	12	No pain	Regressed	Regressed	Regressed	Regressed
4	Patient 4	3	Anophthalmos	14	No pain	Regressed	Regressed	Regressed	Regressed
5	Patient 5	11	Microphthalmos	16	No pain	Recurred	Regressed	Regressed	Regressed
6	Patient 6	24	Microphthalmos	16	No pain	Recurred	Regressed	Regressed	Regressed
7	Patient 7	4	Anophthalmos	16.5	No pain	Recurred	Regressed	Regressed	Regressed
8	Patient 8	5	Microphthalmos	22	No pain	Recurred	Recurred	Regressed	Regressed

* Wong Baker FACES Pain Rating Scale



Figure 1. Pre injection photograph and CT Scan of a patient 1 with orbitopalpebral cyst. Aspirated fluid and final cosmesis.



Figure 2. Pre injection photograph, CT Scan of other patient 8 and final cosmesis.

3. Results

Eight patients were enrolled in the current study. Age of the patients ranged between 2-24 years. Volume of the orbitopalpebral cyst ranged from 10 to 22 ml. The patients in whom volume of aspirate was 10, 10.5, 12 and 14 ml showed resolution with a single dose of sclerosant with no signs of recurrence till last follow up at nine months. Four patients with volume of aspirate 16, 16, 16.5, and 22 ml respectively showed incomplete resolution at one month. They were given a repeat injection of 3% STS (dose 0.5 ml for every 10 ml. of aspirate) following same protocol. Three out of these four patients showed no recurrence on subsequent follow ups. One patient (22 ml of aspirate at first sitting) was given repeat injection after one month, owing to unsatisfactory regression. Complete resolution was noted at the end of nine months. None of the patients showed evidences of pain, inflammation, necrosis or systemic complication on immediate first post injection day or further follow ups. Complete resolution was achieved in all eight cases at the end of study. Treatment outcomes of our study have been tabulated (Table 1).

4. Discussion

Choice of management has shifted from surgical removal to sclerotherapy, in eyes with microphthalmia / anophthalmos with orbitopalpebral cyst.

Ethanolamine oleate was used to treat orbitopalpebral cysts. Sclerotherapy provides a rapid, effective, and uncomplicated treatment modality for definitive therapy, and should be preferred in cases with no visual prognosis in the microphthalmic eye demonstrating adequate bony orbital expansion [3]. The use of 3% Sodium tetradecyl sulphate in renal cysts was reported. On comparison of 3% Sodium tetradecyl sulphate with ethanolamine oleate in cases of renal cysts, it was reported that 3% STS is better tolerated in terms of post procedure pain [12]. Owing to its lower density it is easier to inject and is 1.6 times cheaper than ethanolamine [20].

Based on pharmacodynamics and safety profile of 3% STS, the authors decided to use it for intralesional use in orbital cysts. Results of this study have been encouraging.

Safety of 3% STS for intravenous use has been well established. Experimental studies on mice have shown satisfactory sclerosis of veins with fewer injections of 3% STS as compared to ethanolamine. Comparison of mortality following intravenous injection of 3% STS with that following ethanolamine showed that both have a very wide therapeutic margin. The LD50 of intravenous STDS for a 70 kg man is 6.3g in 60 ml. These amounts are enormously larger than usual maximum dose in man which is 0.03 g in 1 ml. Mortality in mice was higher with ethanolamine [21]. For esophageal varices a maximum 10 ml of 3% STS can be given per session [20] which is 10 times more than the maximum dose given in our study.

Local side effects include pain, urticaria or ulceration at the injection site [22]. Literature describes few uncommon, but potentially serious adverse effects on intravenous use of sodium tetradecyl sulphate like anaphylaxis in less than 1 in 10,000 people [22]. However, as the use of this drug was done for an orbitopalpebral cyst, the fear of intravenous injection did not exist, adding to its safety profile for use in the current situation.

5. Conclusion

Sodium tetradecyl sulphate is a good therapeutic option for the treatment of orbitopalpebral cyst associated with anophthalmos / severe microphthalmos with no visual potential.

References

- [1] Duke-Elder S. Normal and abnormal development. *Congenital deformities. In: System of ophthalmology.* St Louis: CV Mosby, 1963; 3:483.
- [2] Chaudhry, Imtiaz A., Arat, Yonca O., Shamsi, Farrukh A. et al. Congenital Microphthalmos With Orbital Cysts: Distinct Diagnostic Features and Management. *Ophthalmic Plastic & Reconstructive Surgery* 2004 November; 20(6): 452-57.
- [3] Milind N. Naik, Ramesh K. Murthy, Kuldeep Raizada, Santosh G. Honavar. Ethanolamine Oleate Sclerotherapy in the Management of Orbito-palpebral Cyst Associated with Congenital Microphthalmos. *American Journal of Ophthalmology* 2005 May; 139(5): 939-41.

- [4] Naik MN, Batra J, Nair AG, Ali MJ, Kaliki S, Mishra DK. Foam sclerotherapy for periorbital dermoid cysts. *Ophthal Plast Reconstr Surg*.2014 May-Jun; 30(3):267-70.
- [5] Smriti Nagpal, Ruchi Goel, Sushil Kumar, Sonam Garg. Sclerosing Agents in Ophthalmology. *Delhi journal of ophthalmology* 2013; 23(3): 221-226.
- [6] Goldman MP. Sodium tetradecyl sulfate for sclerotherapy treatment of veins: is compounding pharmacy solution safe. *Dermatol Surg* 2004; 30: 1454-6.
- [7] Weiss RA, Dover JS. Leg vein management: Sclerotherapy, ambulatory phlebectomy, and laser surgery. *Semin Cutan Med Surg* 2002; 21(1):76-103.
- [8] Sadick N, Li C. Small-vessel sclerotherapy. *Dermatol Clin* 2001; 19(3): 475-81.
- [9] Kern P. Sclerotherapy of varicose leg veins. Technique, indications and complications. *Into Angelo* 2002; 21(2 Suppl 1):40-5.
- [10] Chiu K-W, Changchien C-S, Chuah S-K, et al. Endoscopic injection sclerotherapy with 1.5% Sotradecol for bleeding cardiac varices. *J Clin Gastroenterol* 1997; 24: 161-4.
- [11] Ravi M, Kate V, Ananthakrishnan N. Prospective randomized comparison of sodium tetradecyl sulphate & polidocanol for oesophageal variceal sclerotherapy. *Indian J Med Res.* 2001 Jun; 113: 228-33.
- [12] Demir E, Alan C, Kilciler M, Bedir S. Comparison of ethanol and sodium tetradecyl sulfate in the sclerotherapy of renal cyst. *J Endourol. 2007 Aug; 21(8): 903-5.*
- [13] Cho DS, Ahn HS, Kim SI, Kim YS, Kim SJ, Jeon GSet al. Sclerotherapy of renal cysts using acetic acid: a comparison with ethanol sclerotherapy. Br J Radiol. 2008 Dec; 81(972):946-9.
- [14] Long Li Cai-Chan Chen, Xin-Qiao Zeng. One-year Results of Single-session Sclerotherapy with Bleomycin in Simple Renal Cysts. *Journal of Vascular and Interventional Radiology* 2012; 23(12): 1651-56.
- [15] Alon Kahana, MD, PhD; Brenda L. Bohnsack, MD, PhD; Raymond I. Cho, MD; Cormac O. Maher, MD. Subtotal Excision with Adjunctive Sclerosing Therapy for the Treatment of Severe Symptomatic Orbital Lymphangiomas. *Arch Ophthalmol. 2011; 129(8):1073-10765.*
- [16] Churchill P, Otal D, Pemberton J, Ali A, Flageole H, Walton JM. Sclerotherapy for lymphatic malformations in children: a scoping review. *J Pediatr Surg.* 2011 May; 46(5):912-22.17. Saha K, Leatherbarrow B. Orbital lymphangiomas: a review of management strategies. *Curr Opin Ophthalmol.* 2012 Sep; 23(5): 433-8.
- [17] SR Jayesh, Pankaj Mehta, Mathew P Cherian, V Ilayaraja, Prashanth Gupta, K Venkatesh. Efficacy and safety of USG-guided ethanol sclerotherapy in cystic thyroid nodules. *Indian Journal of Radiology and Imaging 2009* July-September; 19(3): 199-202.
- [18] Jin Hong Yu, Yong Du, Yang Li, Han Feng Yang, Xiao Xue Xu et al. Effectiveness of ct-guided sclerotherapy with estimated ethanol concentration for treatment of symptomatic simple hepatic cysts. *Clinics and Research in Hepatology and Gastroenterology*2014 April; 38(2):190-194.

- [19] Sarin SK, Kumar A. Sclerosants for variceal sclerotherapy: a critical appraisal. Am J Gastroenterol 1990; 85: 641-9.
- [20] W. K. Blenkinsopp. Comparison of tetradecyl sulphate sodium with other sclerosants in rats. *Br J Exp Pathol.* Apr 1968; 49(2): 197–201.
- [21] Sodium Tetradecyl Sulfate (Sodium tetradecyl sulfate 0.2% solution for injection 5ml vials). http://www.nhs.uk/medicine-guides/pages/MedicineSideEffect s.aspx?condition=Varicose%20veins&medicine=sodium%20t etradecyl%20sulfate&preparation=