Foam Sclerotherapy for Periorbital Dermoid Cysts

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Purpose: To report nonsurgical treatment of periorbital dermoid cysts with foam sclerotherapy using sodium tetradecyl sulfate (STS).

Methods: Single-center, retrospective, interventional case series. Clinical records of all patients diagnosed to have congenital orbital dermoid cyst and treated with STS foam sclerotherapy between 2012 and 2013 were reviewed. The ectodermal contents of the dermoid cyst were aspirated through a stab incision with 18G needle, followed by saline lavage. Intraluminal foam sclerotherapy was then performed using STS (30 mg/ml) in a proportion of 10% of the total aspirate volume. Retrospective data analysis included demographic profile, clinicoradiologic findings, and treatment outcomes of foam sclerotherapy.

Results: Four patients were treated in the given period. Average age at presentation was 20.2 years. All cysts were reported to be congenital in nature, and the location was medial angular in 2 cases, lateral angular in 1 case, and lateral orbitotemporal in 1 case. The average aspirate of the pultaceous cyst content was 3.75 ml (range, 2–5 ml). Of the 4 patients, 2 dermoid cysts resolved completely within 8 weeks. Two cysts showed partial response and required a second foam sclerotherapy to achieve complete resolution. At an average follow up of 13.25 months (range, 11–16 months), complete cyst resolution was noted. No sclerotherapy-related complications were observed.

Conclusions: Foam sclerotherapy is successful in obliterating periorbital dermoid cysts and provides a minimally invasive nonsurgical approach to achieve an aesthetic result.

(*Ophthal Plast Reconstr Surg* 2014;30:267–270)

Angular dermoid cysts are common periorbital slow-growing tumors.[1,2] They arise along the bony sutures due to sequestration of ectoderm during embryonic development. The cyst is lined by stratified keratinized epithelium and contains mature ectodermal elements. The commonest location of orbital rim dermoid is either lateral or medial angular.[3]

For periorbital dermoid cysts, complete surgical excision has remained the mainstay of treatment. Several approaches, such as direct approach, lateral brow incision, and eyelid crease incision, have been described for aesthetic removal of dermoid cysts.[4,5] Recently, endoscopic techniques have been described as a minimally invasive technique for periorbital dermoid excision.[6,7]

Accepted for publication January 23, 2014.
The authors have no financial or conflicts of interest to disclose.
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DOI: 10.1097/IOP.0000000000000166

Sclerotherapy is an established treatment modality in the management of visceral cysts and cysts in the neck.[8–10] It has also been reported in the treatment of cystic lymphangiomas in the head and neck region.[11,12] Several nerve- and skin-related complications of sclerotherapy have been reported.[13] Sodium tetradecyl sulfate (STS) is an anionic surfactant commonly used in the treatment of sclerotherapy. Its mechanism of action in vascular lesions is believed to be a result of vessel thrombosis, erythrocyte sludging, intimal necrosis, adventitial fibrosis, and luminal collapse.

An extensive literature search revealed that sclerotherapy has never been attempted for dermoid cysts. Their superficial location and the confines of a closed cavity make orbital dermoids ideal for sclerotherapy, thereby making it truly minimally invasive. In this series, the authors report 4 cases of periorbital dermoid cysts that were treated with foam sclerotherapy using STS.

METHODS

Clinical records of 4 patients with congenital periocular dermoid cyst who were treated with cyst aspiration followed by sclerotherapy with STS were retrospectively reviewed. The study was approved by the Ethics Committee of LV Prasad Eye Institute, Hyderabad, India. Retrospective data analysis included demographic profile, complete ocular examination, location and size of the dermoid, CT findings of the cyst, and outcomes following foam sclerotherapy.

The diagnosis of a dermoid cyst was established clinicoradiologically. The inclusion criteria to consider foam sclerotherapy were as follows: patients with a cystic periorbital lesion with bony fixity, size more than 1 cm with resultant visible scar if the lesion were to be excised, and no history of spontaneous rupture or inflammation around the cyst. History and old photographs confirmed that the lesions were congenital in origin, with gradual increase in size. CT was performed in each case, which confirmed a well-defined cystic lesion with bony fossa formation.

All 4 patients underwent foam sclerotherapy procedure under local anesthesia (Fig. 1) performed by a single surgeon (M.N.N.). A written consent was obtained from each patient, fully explaining the novelty of the procedure for this indication and a possible need for surgical excision in future if sclerotherapy fails.

After painting and draping, 0.1 to 0.2 ml of 2% xylocaine with 1:100000 adrenaline was injected intradermally overlying the most accessible part of the cyst. A 3-mm stab incision was made on the skin overlying the cyst (Fig. 1, top left). The cyst wall was then exposed, and an 18G needle mounted on a 10-cc syringe was inserted into the cyst, and the pultaceous material was aspirated until the entire cyst collapsed (Fig. 1, top right). For Case 1, a small 4 × 2-mm spindle of cyst wall was excised and fixed in 10% formalin for routine histopathological evaluation. If aspiration was difficult, manual expression of the ectodermal contents was obtained. A subsequent 0.9% normal saline wash was given to further empty the contents of the cyst. Dermoid hair protruded out of the stab incision in 3 cases, which were manually removed with a forceps.

One milliliter of 30 mg/ml STS (Samarth Life Sciences, Mumbai, India) was then prepared for injection to create a foamy solution. With

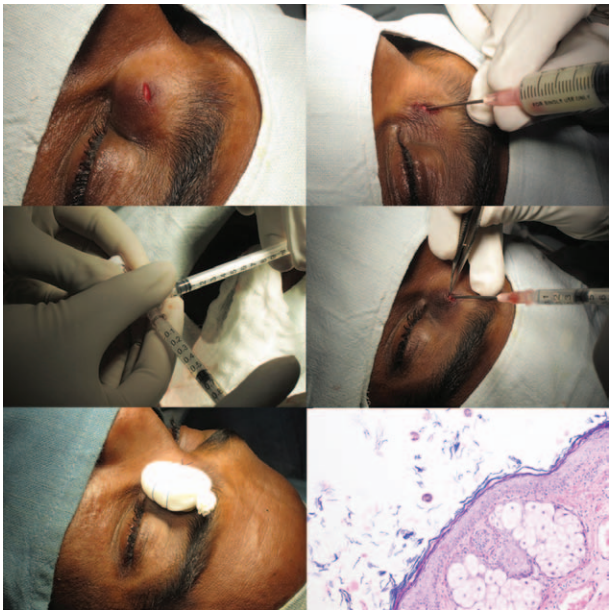

FIG. 1. Foam sclerotherapy technique for orbital dermoid cyst. A 3-mm stab incision is placed to expose the cyst wall (**top left**). Pultaceous cyst content is then aspirated with an 18G needle (**top right**). Sodium tetradecyl sulfate (STS) foam is created using 2 syringes connected via a 3-way connector (**centre left**), and STS is injected in an amount equal to 10% of total aspirate (**centre right**). The cyst wall and the skin stab is closed with single 6-0 vicryl suture, and a pressure dressing is applied (**bottom left**). Histophotomicrograph (hematoxylin and eosin, ×10) of the cyst wall in Case 1, showing adnexal structures within the wall, cyst epithelium, and keratin flakes as well as hair shafts on the luminal side (**bottom right**).

the help of two 1-ml tuberculin syringes connected via a 3-way IV connector, STS was vigorously swirled from 1 syringe to another for 1 minute to create frothing (Fig. 1, centre left). Room air drawn through

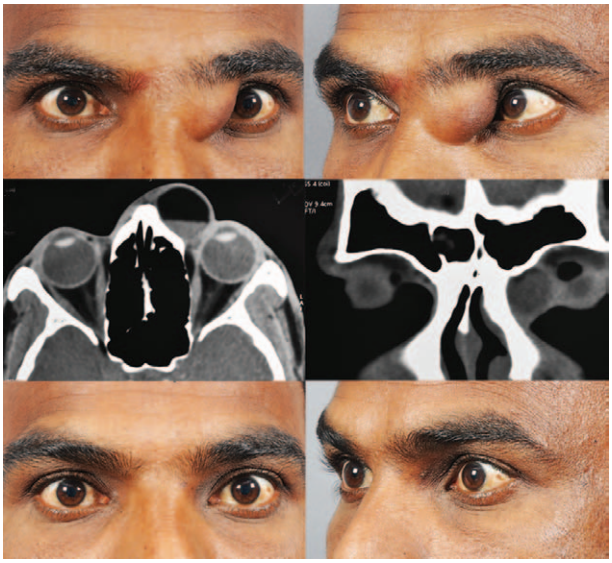

FIG. 2. Case 1: A 30-year-old man with left superomedial cystic swelling with bony fixity (**top**). CT scan of the orbit showed a well-defined cystic mass with bony fossa formation and a fluid level (**centre**). Same patient 3 months following foam sclerotherapy, showing complete resolution of the dermoid cyst (**bottom**).

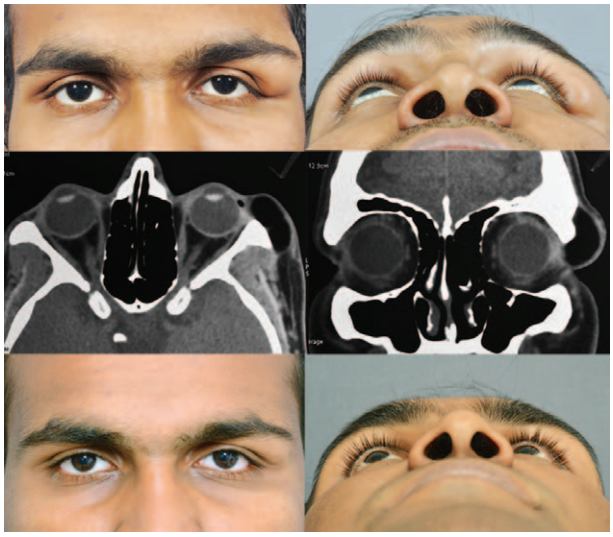

FIG. 3. Case 2: A 22-year-old man with left lateral orbitotemporal cystic swelling with bony fixity (**top**). CT scan of the orbit showed a well-defined cystic mass extending over the lateral orbital rim into the temporal fossa (**centre**) along with bony fossa formation. Same patient 9 months following foam sclerotherapy (2 sessions 3 months apart), showing complete resolution of the dermoid cyst (**bottom**).

a filter was used for frothing technique. The liquid:gas ratio obtained with the described foaming technique was 75:25%. While the assistants continued the frothing technique, the surgeon (M.N.N.) exposed the cyst wall and quickly injected the desired amount of STS foam into the cyst (Fig. 1, centre right). The sclerosant was injected in an amount equal to 10% of the total cyst aspirate. This ratio of aspirate to STS was based on the author's previous experience with orbitopalpebral cysts.[14] A single 6-0 polyglactin suture was then placed to approximate the cyst wall, and 1 more suture to approximate the overlying skin (Fig. 1, bottom left). The cyst aspirate was sent for cytopathological evaluation.

In 2 cases, a compression dressing was sutured in place for 48 to 72 hours that comprised a sterile gauze piece wrapped in a sterile surgical glove finger (Fig. 1, bottom right). Topical wound care with betadine 5% solution and ciprofloxacin 0.3% ointment twice daily was advised for a week. Skin sutures were removed after a week, and patients were subsequently followed up at 4-week intervals.

RESULTS

Four patients underwent dermoid cyst aspiration with STS foam sclerotherapy. The average age at presentation was 20.2 years (range, 14–30 years). Relevant demographic, clinical, and treatment outcome data is given in the Table. Average cyst aspirate was 3.75 ml (range, 2–5 ml). The aspirate was cheesy pultaceous in 3 cases and thick straw colored in 1 case. During the saline wash, 3 cases demonstrated dermoid hair protruding out through the stab incision in the cyst wall, which were carefully removed with a forceps.

At 1-week and 1-month visit, the cyst continued to be a collapsed yet minimally visible and cystic fluctuant swelling on clinical examination. The overlying skin was normal, except for the 3-mm scar. No patient reported pain or irritation during the postinjection period. Two patients demonstrated complete resolution of the dermoid at 8-week visit, with no palpable residual lesion. At 3 months postinjection, 2 patients demonstrated a considerably reduced but persistent cystic fluctuant bag indicating a partial response to foam sclerotherapy.

Repeat aspiration with foam sclerotherapy was performed for these 2 patients at 3-month follow up. In both cases, the second aspirate was considerably less in amount than the first (Table), and complete resolution was noted 1 month after the second sclerotherapy.

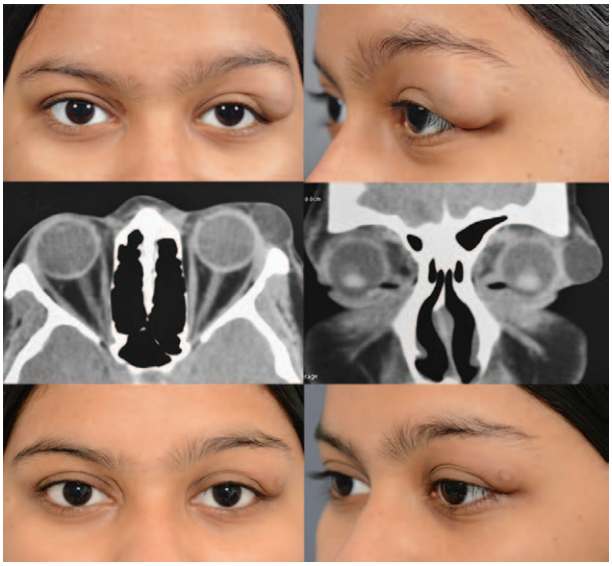

FIG. 4. Case 3: A 14-year-old girl with left superolateral cystic swelling with bony fixity (**top**). CT scan of the orbit showed a well-defined cystic mass superotemporally (**centre**). Same patient 8 months following foam sclerotherapy, showing complete resolution of the dermoid cyst but residual excess skin (**bottom**).

At final follow up of 13.25 months (range, 11–16), all patients demonstrated complete resolution of the cyst with no palpable mass (Figures 2-5). No procedure-related complications were noted, except for minimal pigmentation of the stab wound. Histopathological evaluation of the excised bit of cyst wall in Case 1 demonstrated cyst wall with adnexal appendages within its wall and keratin flakes and hair shafts on its luminal side (Fig. 1, bottom right). These findings support histopathological diagnosis of a dermoid cyst. Cytopathological evaluation of the cyst contents was also consistent with ectodermal contents found in a dermoid cyst.

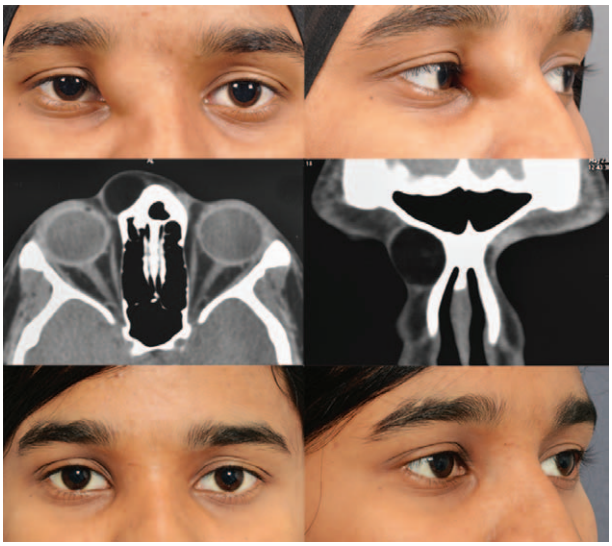

FIG. 5. Case 4: A 15-year-old girl with right superomedial cystic swelling with bony fixity (**top**). CT scan of the orbit showed a well-defined cystic mass superomedially with bony fossa formation (**centre**). Same patient 9 months following foam sclerotherapy, showing complete resolution of the dermoid cyst but residual asymmetry due to soft-tissue expansion (**bottom**).

The demographic profile and treatment outcome of 4 patients with periorbital dermoid cyst following foam sclerotherapy with STS

	Case 1	Case 2	Case 3	Case 4
Age at presentation (years)	30	22	14	15
Gender	M	M	F	F
Laterality	Left	Left	Left	Right
Cyst location	Medial orbital	Lateral orbital + temporal fossa	Lateral orbital	Medial orbital
Cyst aspirate (cc)	4	5	4	2
STS foam injection (ml)	0.4	0.5	0.4	0.2
Pressure dressing	4 Days	5 Days	Nil	Nil
Resolution	Complete	Partial	Complete	Partial
Second cyst aspirate (cc)		2		0.5
Final resolution	Complete	Complete	Complete	Complete
Final follow up (months)	16	14	11	12

F, female; M, male; STS, sodium tetradecyl sulfate.

DISCUSSION

This study represents the first attempt to treat orbital dermoid cysts with foam sclerotherapy using STS. Orbital dermoid cysts commonly present in early infancy or childhood, and the average age at presentation in this series (20.2 years) is certainly higher. However, it is not uncommon to find such late presentation in developing nations, and large dermoids pose a bigger challenge in terms of size and location of the incision and its resultant scar. All 4 patients in this series had large dermoids that possibly could not have been excised comfortably through a hidden eyelid crease incision alone. A visible scar would have been inevitable in these cases if the surgical option had been chosen.

The authors realized several advantages of foam sclerotherapy over surgical excision. Foam sclerotherapy is a day-care procedure and can be performed in an office setup under local anesthesia. A single 3-mm stab incision is sufficient to perform the procedure, taking less than 15 minutes. The soft tissue around the cyst is not disturbed, thereby inciting minimal postprocedure edema. The procedure is easy to repeat, as was required in 2 cases in this series.

Two patients required repeat foam sclerotherapy in this series. However, both patients showed a significant reduction in the size of the lesion after first sclerotherapy. In Case 2, the initial aspirate of 5 cc had reduced to 2 cc in the second session. Similarly in Case 4, the initial aspirate of 2 cc had reduced to 0.5 cc in the second session. In both cases, the second aspirate was straw colored, probably indicating that it was residual secretion along with remaining STS. Both repeat sclerotherapy sessions were performed in a closed manner using a 24G needle. The same 10% ratio of aspirate to STS was maintained in the second session.

The authors used 3% STS in this series because of its easy availability in their country. Since 2 patients in this series needed repeat sclerotherapy, the authors believe that lower concentration of STS (1%) may be less effective that 3% STS. However, any other sclerosant that has been described for other

indications could possibly be equally effective. The effectiveness of sclerosing agent depends on its concentration, as well as mode of delivery and its spread within the cyst. The foam technique followed in this series has been described to prolong the contact of sclerosant with the recipient wall, thereby making it more effective.[15] The 10% ratio of aspirant to sclerosant was based on the initial experience with orbitopalpebral cysts.[14] It is possible that thick walled dermoid cysts may tolerate a higher amount or concentration of sclerosant, and this may reduce the chances of partial response. This can be studied in future.

It was unclear whether a pressure dressing is really necessary to obtain cyst collapse. The authors used it in 2 patients and avoided it in 2 cases. Of the 2 partial response cases, 1 had received pressure dressing. The authors believe that the single suture placed to approximate the cyst wall allows water-tight compartmentalization of the sclerosant, and pressure dressing is probably not required.

The lack of availability of the complete cyst (along with its contents) for histopathological examination can apparently seem as a disadvantage of this technique. The authors obtained a small bit of the cyst wall in 1 case as histopathological proof of the clinical diagnosis. However, they believe that it is more of a mind set that needs to change, rather than a true diagnostic dilemma that might have changed the management. Their congenital nature, classic location, bony fixity, CT findings, pultaceous ectodermal material within it, and expulsion of dermal hair during aspiration were indicators of the diagnosis of dermoid cyst. The aspirate sent for cytopathological evaluation was also consistent with ectodermal contents found in a dermoid cyst.

The authors believe that the typical clinicoradiologic findings along with the appearance of the aspirate (with dermoid hair) is diagnostic of a dermoid cyst. The authors realized that leaving a collapsed postsclerotherapy dermoid cyst wall within the tissue poses no functional or aesthetic blemish and is a perfectly viable treatment option. The minimal asymmetry noted in the patients in the final follow-up photos is due to the chronic soft-tissue expansion due to the long-standing nature of the cyst.

The authors agree that small early dermoids presenting in infancy could still be considered for a surgical excision via eyelid crease approach. However, for large dermoids, delayed presentation, or for dermoids where a hidden incision cannot be placed for its excision, foam sclerotherapy can provide a minimally invasive viable option for treatment. This treatment could also be extended to large orbital dermoids or recurrent dermoids after excision. Further refinements in the technique and knowledge about appropriate concentration of sclerosant can convert this technique into a first line of treatment for periocular and other dermoids.

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