Management of cystic lymphangioma: experience of two referral centers

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Introduction/aim **Cystic lymphangioma is a benign rare malformation of the lymphatic system consisting of masses of abnormal lymphatic channels, occurring in one out of 2000–4000 live births. Conventional surgical excision remains the most popular method of treatment in many developing countries. Recent advances in sclerotherapy have expanded contemporary management options, particularly when complete surgical resection is difficult because of the presence of multiple loculi and extensive lesions. This study aims to present our experience in the management of these cases.**

Material and methods **Records of all cases of lymphangioma seen at the Pediatric Surgical Unit from Mansoura and Tanta University hospitals in the period from January 2007 to November 2010 were reviewed. Special charts were designed to retrieve the following data from records: age at presentation, sex, site of the pathology, clinical presentation, investigations, management modality, and outcome of treatment.**

Results **There were 93 children; 40 (43%) were males and 53 (57%) were females. Surgery was the line of treatment in 89 cases (one stage in 56 cases and two stages in 33 cases). Four patients underwent injection sclerotherapy as the primary treatment. Recurrence occurred in 16 cases. Other complications included a disfiguring scar in nine patients, seroma in seven patients, skin disruption, hematoma, and hypoglossal nerve palsy in two patients, facial nerve palsy in one patient, and cellulitis following a sclerosant injection in one case.**

Conclusion **A staged operative procedure may be necessary in order to reduce mortality, and sclerotherapy has almost the same efficacy as the first line of management as surgery, although it is not widely practiced in developing countries. There is a high postoperative complication associated with surgical excision, especially with head and neck cystic lymphangiomas. Anesthesia in these patients requires careful monitoring. Long-term follow-up is desirable after excision because of the possibility of recurrence.** ***Ann Pediatr Surg*** **8:123–128**

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Introduction

Cystic lymphangioma (CL) is a benign rare malformation of the lymphatic system [1], consisting of masses of abnormal lymphatic channels [2], occurring in one out of 2000–4000 live births [3].

The lesion can arise anywhere, but is usually found in the region of the neck and axillary. It may also arise from the abdominal wall, inguinal region, buttocks, anogenital region, and retroperitoneal areas [4]. Other rare sites include the tongue [5], parotid [6], mediastinum [7], spleen [8], and prostate [9]. The tissue of origin is usually the subcutaneous tissue, but it may also arise from muscles, bone, or rarely from internal organs [10].

CL usually presents in neonatal and infancy periods; however, it may present in adulthood, as mesenteric and/or retroperitoneal CL [11].

The condition presents with a soft partially compressible swelling in the affected area, and may have a bluish hue. Sudden enlargement may result from infections or intracystic hemorrhage. Patients could present with dysphagia or signs of upper airway obstruction (e.g. dyspnea, stridor, and cyanotic attacks), and tracheostomies may be required. Involvement of the skin (lymphangioma cutis) may produce puckering of the skin or vesicles that exude a clear yellowish fluid [12].

Microscopically, CL consists of multiple loculi filled with lymph. In the depth the loculi are quite large, but they decrease in size toward the surface [13].

Landing and Farber [14] classified lymphangioma into three groups: (i) lymphangioma simplex, composed of small capillary-sized, thin-walled lymphatic channels; (ii) cavernous lymphangioma, comprising of dilated lymphatic channels, often with an adventitious covering; and (iii) CL (cystic hygroma), consisting of multiple cystic cavities filled with a straw-colored fluid.

The terms 'cystic hygroma' and 'lymphangioma' are often used interchangeably, and it is the most commonly occurring lymphangioma in children [15].

Well-localized lesions are easily characterized by ultrasonography and computed tomography. MRI, however, provides the most reliable diagnosis of more complex lesions, and their macrocytic and microcytic components or a combination thereof provide diagnostic confirmation, delineate anatomical extension and relationship with surrounding vital structures, and document potential complicating factors such as an associated venous malformation component or prominent draining blood vessels [16–19].

Conventional surgical excision remains the most popular method of treatment in many developing countries

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despite the dangers associated with this treatment modality. Surgery may be multiple, complex, and may have to be staged before complete excision can be achieved [20].

Although complete CL excision is desired, subtotal or partial removal may be dictated by specific organ involvement or proximity to neurovascular structures [21] or in cases with diffuse infiltration with an obscured anatomy [22]. Although residual CL is left in such circumstances, incomplete excision does not absolutely imply recurrence requiring an additional therapeutic intervention [23].

The surgical procedure is sometimes complex and requires a multidisciplinary team for evaluation and management, particularly those cases with the involvement of the tongue, oral floor, and mandible [24].

The timing of surgery depends on the site of the lesion and its potential complications. In certain instances when lesions may potentially cause severe compression on the airway, surgery may even be indicated during pregnancy (ex-utero intrapartum treatment), which involves the partial delivery of fetuses at risk for postnatal upper airway obstruction by cesarean section and establishing airway control while maintaining placental circulation and oxygenation [25].

Recent advances in sclerotherapy have expanded contemporary management options, particularly when complete surgical resection is difficult because of the presence of multiple loculi and extensive lesions. Sclerotherapy provides a treatment option in such patients, offering a viable alternative to surgery [26–29].

The popularity of sclerotherapy in the treatment of CL is growing, and several substances are used as sclerosants. OK-432 (a lyophilized mixture of group A *Streptococcus pyogenes* and benzylpenicillin) is believed to exert its effect by inducing endothelial damage occurring secondary to the activation of the host immune system [30,31]. Bleomycin exerts a mild inflammatory effect on endothelial cells [32]. Other sclerosants in use are doxycycline (a broad-spectrum antibiotic) [33], acetic acid at a 40–50% concentration, absolute ethanol [34], and hypertonic saline [35].

This study aims to review our experience in the management of CL over a 3-year period in two referral institutes.

Patients and methods

This study is a retrospective file review. The records of all cases of lymphangioma seen at the Pediatric Surgical Unit from in Mansoura and Tanta University hospitals in the period from January 2007 to November 2010 were reviewed. Special charts were designed to retrieve the following data from the records: age at presentation, sex, site of the pathology, clinical presentation, investigations, management modality, and outcome of treatment.

A full informed consent was obtained from the patients' custodians, and those who agreed to injection sclerotherapy were injected; otherwise, surgery was performed. The study was approved by the ethical committee in both institutes.

Results

There were 93 children with CL within the 3-year period; 40 (43%) were males and 53 (57%) were females (M : F = 7 : 9) ranging in age from one month to 5 years. Their ages at presentation are shown in Table 1. Majority (92.5%) of the patients were younger than 1 year of age.

The cervical region (Fig. 1) was the most frequent site of involvement, followed by the axillary region (Fig. 2). In the patients with cervical CL, the lesion was on the left side of the neck in 20 cases. Other sites of involvement were the face (Fig.3), breast (Fig.4), abdominal wall (Fig.5), thigh (Fig. 6), mesenteric (Fig. 7), and retroperitoneal area (Fig. 8) (Table 2).

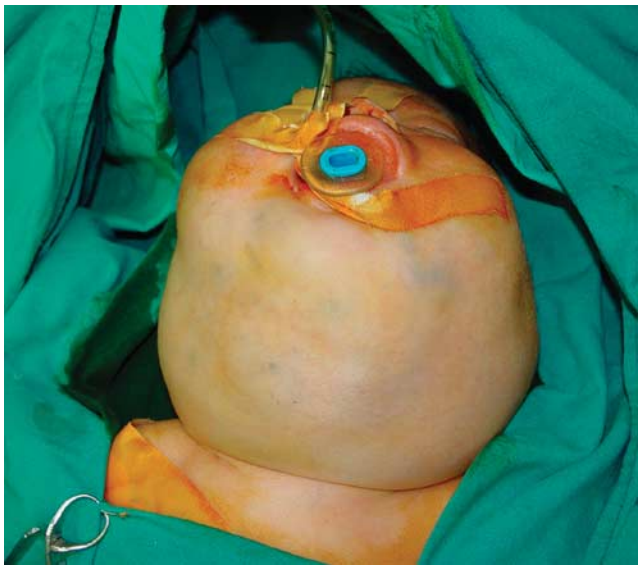
The diagnosis was made on the basis of the clinical characteristics and ultrasonography. In cases with cervicofacial or abdominal locations, MRI was used to accurately characterize the swelling with respect to extensions and in relation to nerves and major vessels. In the seven cases with abdominal locations, six cases presented with a palpable abdominal mass and were further investigated by ultrasonography, computed tomography, or MRI. In one case, CL was an incidental finding.

Antenatal detection was carried out in seven cases with a large cervical lesion during an antenatal ultrasonographic examination.

Table 1 Age distribution

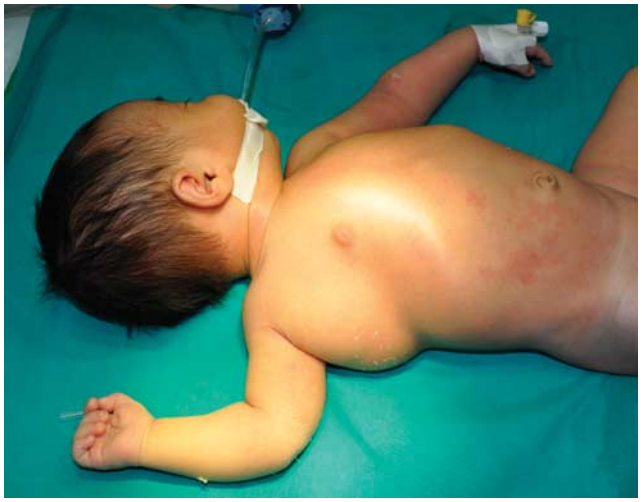
Age	*N* (%)
First month	47 (50.5)
>1–3 months	16 (17.2)
>3–6 months	13 (13.98)
>6–12 months	10 (10.75)
>1–5 years	7 (7.5)

Fig. 1



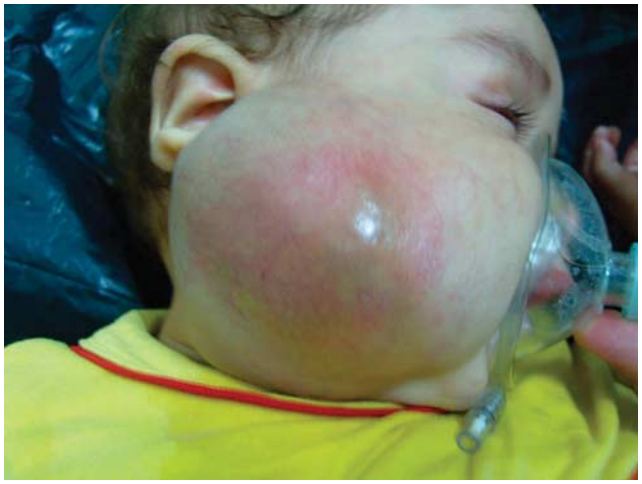
Cervicofacial cystic lymphangioma.

Fig. 2



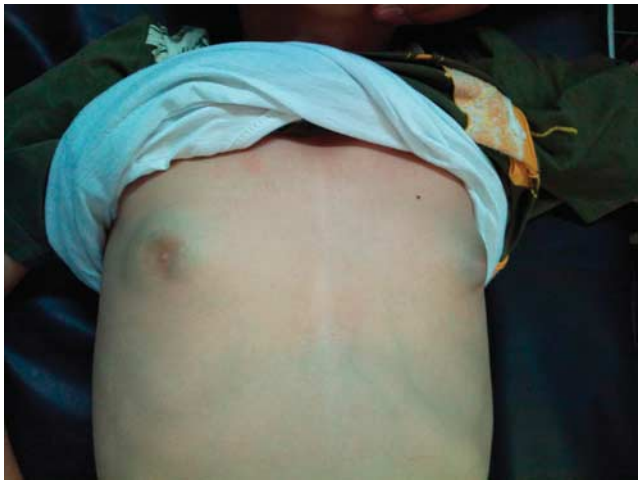
Axillary cystic lymphangioma.

Fig. 3



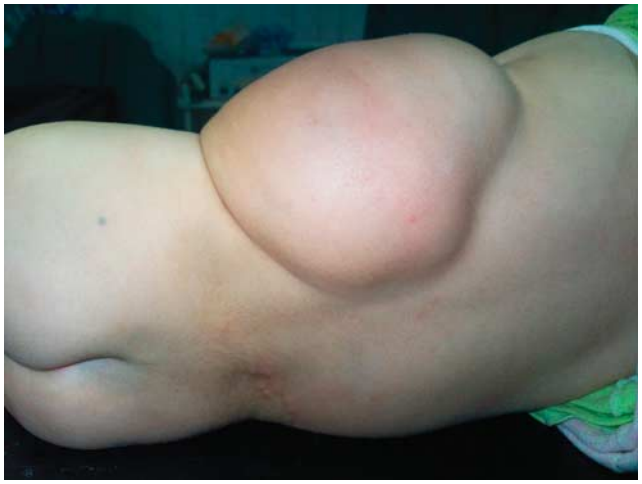
Facial cystic lymphangioma.

Fig. 4



Breast cystic lymphangioma.

Fig. 5



Abdominal wall cystic lymphangioma.

In 56 cases, the lesion was a well-localized lymphangiomatous malformation, and we decided on surgery to remove the entire lesion in a single setting (Figs 9 and 10). The remaining 33 cases, however, were complex, involving more than one anatomical region. For these cases, a staged approach was utilized, removing as much as possible from the lesion without injury to the neighboring vital structures.

For lesions that involved the parotid and cervicoaxillary regions, we used a nerve stimulator (Stimuplex DIG RC; B. Braun Co., Melsungen, Germany) to identify the related nerves and avoid injury to them.

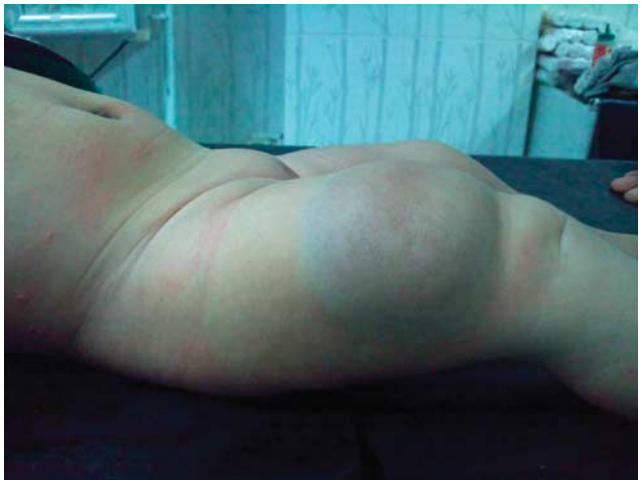
All of the abdominal cases were operated by a laparotomy incision; we did not use laparoscopy for any patient.

In four cases, we used sclerosing therapy for treatment using bleomycin injection as the primary intervention. In another five cases, injection was used for recurrence.

Under general or local anesthesia, depending on the patient's age, as much cystic fluid as possible was aspirated. After aspiration, bleomycin solution (at a concentration of 1 mg (1 U) in 1 ml normal saline solution) was injected into the cystic lesions at a dosage of 0.3–0.6 mg/kg depending on the size of the lesion, at a maximum dose of not more than 10 mg/injection.

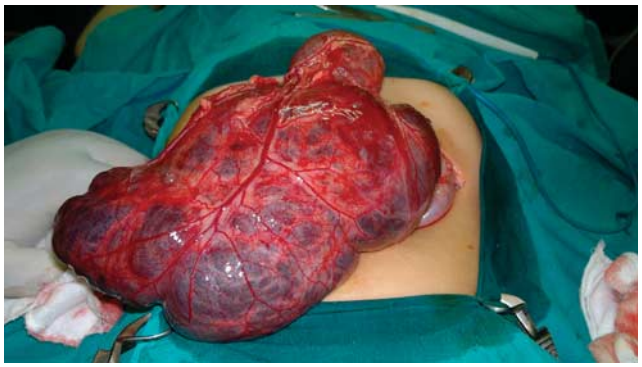
The patient was hospitalized for 24 h after injection to monitor any adverse reaction, and was then discharged to attend an outpatient counseling after 4 weeks. A radiograph was ordered 6 months after injection to detect any pulmonary complication. The results were classified as an 'excellent' response if the masses had disappeared

Fig. 6



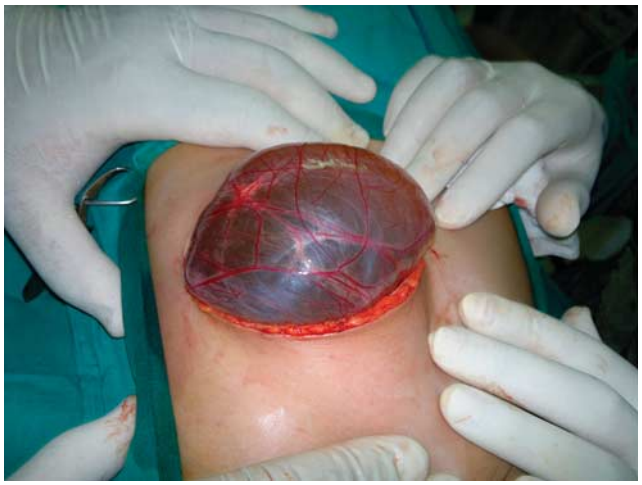
Thigh cystic lymphangioma.

Fig. 7



Mesenteric cystic lymphangioma.

Fig. 8

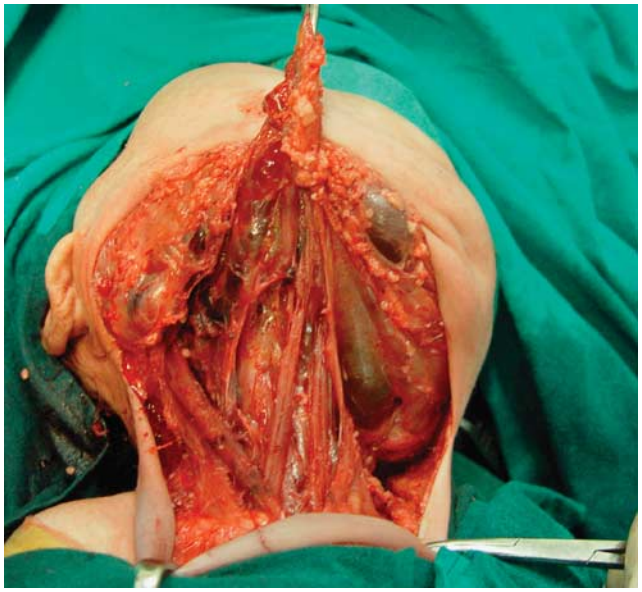


Retroperitoneal cystic lymphangioma.

Table 2 Sites of involvement

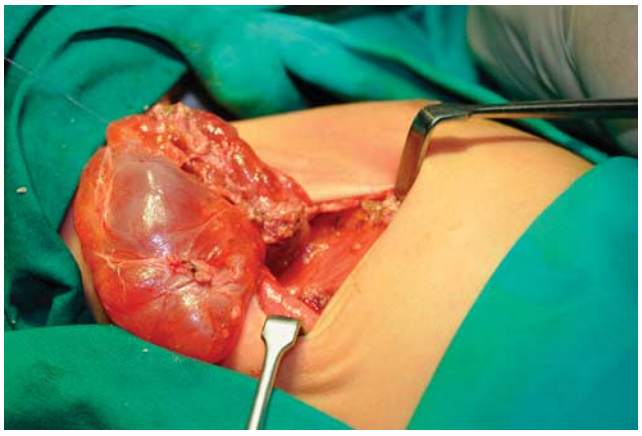
Sites	*N* (%)
Cervical	28 (30.1)
Axillary	22 (23.66)
Parotid	10 (10.75)
Breast	5 (5.38)
Gluteal	5 (5.38)
Abdominal wall	6 (6.45)
Intra-abdominal	7 (7.53)
Thigh	2 (2.15)
Facial	8 (8.6)

Fig. 9



Dissection of a cervical lymphangioma from neck structures.

Fig. 10



Dissection of an axillary lymphangioma from neck structures.

completely, as a 'good' response if the masses had reduced considerably (over 50% reduction) with some residual lesions, and as a 'poor' response if the masses reduced only slightly (< 50% reduction) or did not change in size.

In cases where injection was the primary line of intervention, three patients showed an excellent response; all of them required a single injection. Reduction in size started within the first week and complete disappearance occurred by the first month. Another patient showed a good response. In one patient, injection was followed by swelling and inflammation of the lesion, followed by cellulitis. Immediate antibiotic therapy was initiated, but the case was lost to follow-up.

In five recurrent patients who were injected, a good response was achieved in two patients, whereas the other three patients were re-operated for complete excision.

The injected patients developed some minor side effects including local swelling, redness, pain, and low-grade fever during the first 24, which required only symptomatic treatment. No patient developed pulmonary interstitial fibrosis.

Sixteen patients developed recurrences (Fig. 11), including seven patients who previously had cervical CL, four patients who previously had axillary CL, three patients who previously had parotid CL, one patient who previously had abdominal CL, and one patient who previously had thigh CL (Table 3).

Complications included recurrence in 16 patients, a disfiguring scar in nine patients, seroma in seven patients, skin disruption, hematoma, and hypoglossal nerve palsy in two patients, facial nerve palsy in one patient, and cellulitis following a sclerosant injection in one patient.

Discussion

The development of the lymphatic system can be explained by two theories: the centripetal and centrifugal theories. Lewis [36] supported the centrifugal theory, and, according to this hypothesis, the lymphatic system develops as mesenchymal spaces that later coalesce into a system of vessels that eventually join the venous system. Huntington and McClure supported the centripetal theory, which proposes that the jugular and posterior lymphatics form as outgrowths of endothelium from veins into the surrounding mesenchyme [36].

This study showed that CL occurs more commonly in the cervicoaxillary region compared with other regions of the body. This distribution pattern is similar to that reported by other studies [8,15,20].

Most patients (92.5%) presented before the age 1 year. Late presentation (after the neonatal period) in this study was because of reluctancy to medical consultation by some parents living in rural areas who have low socioeconomic status. The seven patients who presented after 1 year had abdominal CLs with late presentation. All reviews have reported that presentation of CL in adulthood is rare [11,13].

An antenatal diagnosis was made in seven (7.5%) patients. This low rate of diagnosis is because of in the lack of antenatal care in remote, rural areas.

The primary indications for a surgical intervention in the patients of the series were esthetic reasons, and compression on airway and digestive systems. We did not encounter other indications for an urgent intervention such as sudden enlargement with respiratory compromise [37].

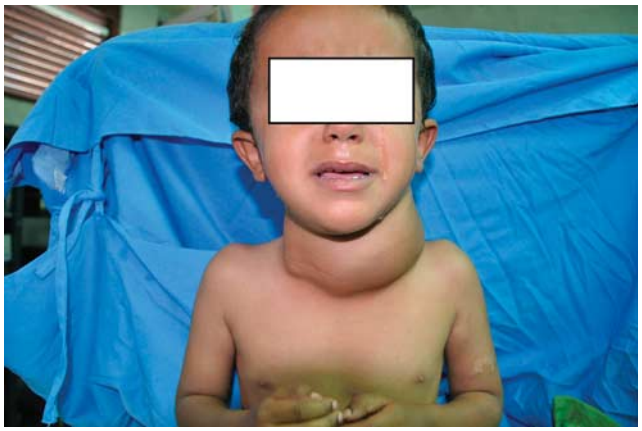
A surgical approach was favored in this series over injection sclerotherapy; although it is gaining popularity in the west [32], surgery is still the first line of management in the developing countries [20].

Surgery for CLs is difficult and may have to be multistage to remove the lesion. We decided on a multistage operative approach for 37 cases (all of them were in the cervical and axillary regions). This is in agreement with other authors [2] who have used this approach to avoid injury to vital structures in the neck and axilla.

Although spontaneous regression has been observed by some authors and thus required conservative management, particularly for macrocytic lymphangiomas located in the posterior triangle of the neck [3,38], we operated on all patients without awaiting spontaneous regression.

We used the sclerotherapy approach as the primary line for treatment in four patients and as management for recurrence in five patients. Evacuation of most of the fluid out of the lesion is a crucial step for success, as it facilitates more contact between the sclerosant and the endothelial lining of the lymphangioma. The amount injected must not distend the lesion markedly as this may precipitate inflammation. The total dose of injection must not exceed 10 mg per injection setting; otherwise, there may be a risk of development of pulmonary interstitial fibrosis, a well-documented complication for this sclerosant [32]. To report the results of sclerotherapy, we used the criteria for response on the basis of previous reports to classify results into excellent, good, and poor responses [39,40].

Fig. 11



Recurrent cervical cystic lymphangioma.

Table 3 Sites of recurrence

Sites	*N* (% of recurrent cases)
Cervical	7 (43.75)
Axillary	4 (25)
Parotid	3 (18.75)
Abdominal wall	1 (6.25)
Thigh	1 (6.25)

Recurrence was the most common complication (17.2%) in our study. Recurrence after CL excision is high because of the infiltrative nature of the lesion and the involvement of vital structures, making its complete elimination very difficult in ~60% of cases [41]. The remaining small lymphatics expand and form the lesion again. In this respect, our results are in agreement with those of other reports in the literature [39].

Although we used a nerve stimulator to identify the related nerves during dissection of the anomaly, we had two cases of a hypoglossal nerve and one facial nerve palsy, which indicates that nerve injury may occur despite efforts to prevent this.

The rate of development of other complications (seroma, hematoma, unsightly scar, wound disruption) was similar to that of other reports in the literature [28].

Conclusion

CL has a variable presentation in children. A staged operative procedure may be necessary in order to reduce mortality and morbidity including the risk of injury to the neighboring structures. Sclerotherapy has almost the same efficacy as the first line of management as surgery, although it is not widely practiced in developing countries.

There is a high postoperative complication associated with surgical excision, especially with head and neck CLs. Anesthesia in these patients requires careful monitoring. Long-term follow-up is desirable after excision because of the possibility of recurrence.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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