Case Report - Developmental Disorder

Congenital diffuse infiltrating facial lipomatosis

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ABSTRACT

Congenital diffuse infiltrating lipomatosis of the face (CDIL-F) is a rare pathological entity belonging to the subgroup of lipomatous tumors. Till date only a handful of cases has been documented and known to occur exclusively in infancy. On microscopical examination, it is characterized by diffuse infiltration of mature adipose tissue over normal muscle fibers, rapid growth, associated osseous hyperplasia, and a high recurrence rate after surgical intervention. An attempt has been made to identify and characterize all the 49 documented cases of CDIL-F in literature along with describing a report of a male child with CDIL-F. Follow-up of 8 years has been documented. The pathogenesis and spectrum of treatment modality are discussed with identified clinical features.

Keywords: Facial tumor, infiltrating lipomatosis, lipomatosis, osseous hypoplasia

INTRODUCTION

Infiltrating or diffuse non-neoplastic proliferations of mature adipose tissue may cause compression of vital structures and pose severe esthetic concern. In congenital cases they impede and alter growth, cause severe psychological trauma and socialization problems. Although these lesions usually behave benign, they may be confused with well-differentiated liposarcoma on clinical examination.[1,2]

This type of pathological presentation encompasses six entities: diffuse lipomatosis, pelvic lipomatosis, symmetric lipomatosis (Madelung's disease), adiposis dolorosa (Dercum's disease), steroid lipomatosis, and nevus lipomatosus. The term lipomatosis is used to describe an extensive abnormal aggregate of fatty tissue that infiltrates soft tissue and not limited by tissue planes. Diffuse lipomatosis has been often defined as a rare, diffuse, infiltrating overgrowth of mature adipose tissue that usually affects large portions of an extremity or the trunk.[3] This lesion in head and neck is very rare and only a handful of cases have been reported in English literature.[2]

Congenital diffuse infiltrating lipomatosis of the face (CDIL-F) was described by Slavin *et al*. in 1983. It is named after a lesion that consists of infiltrative nonencapsulated tumor composed of benign mature adult fat predominantly involving the cheek and face. Lesion growth may lead to facial asymmetry, parotid involvement, osseous hypertrophy, and macroglossia. Neural involvement is often noted in the form of mucosal neuromas.

Owing to low frequency of occurrence, there is a paucity of the details of orofacial phenotypic features. This paper intends to report a case of CDIL-F and to provide a review of the literature for orofacial phenotypic features with emphasis on the etiopathogenesis.

CASE REPORT

A 3-year-old boy presented with a left side facial deformity at the outpatient department. Parents reported that the swelling started as an insidious and was slowly enlarging, remarkably noticeable since birth. [Figure 1] On examination a soft mass infiltrating the left cheek skin from the inferior mandibular border to the orbital rim and left labial commissure. The boundaries of the lesion were ill defined and it was non-pulsatile. The underlying facial skeleton was not involved. Clinically, the patient had a prominent, large nevus on the left cheek. The oral mucosa appeared normal. A working diagnosis of lymphangioma was made, and it was decided to observe the lesion annually.

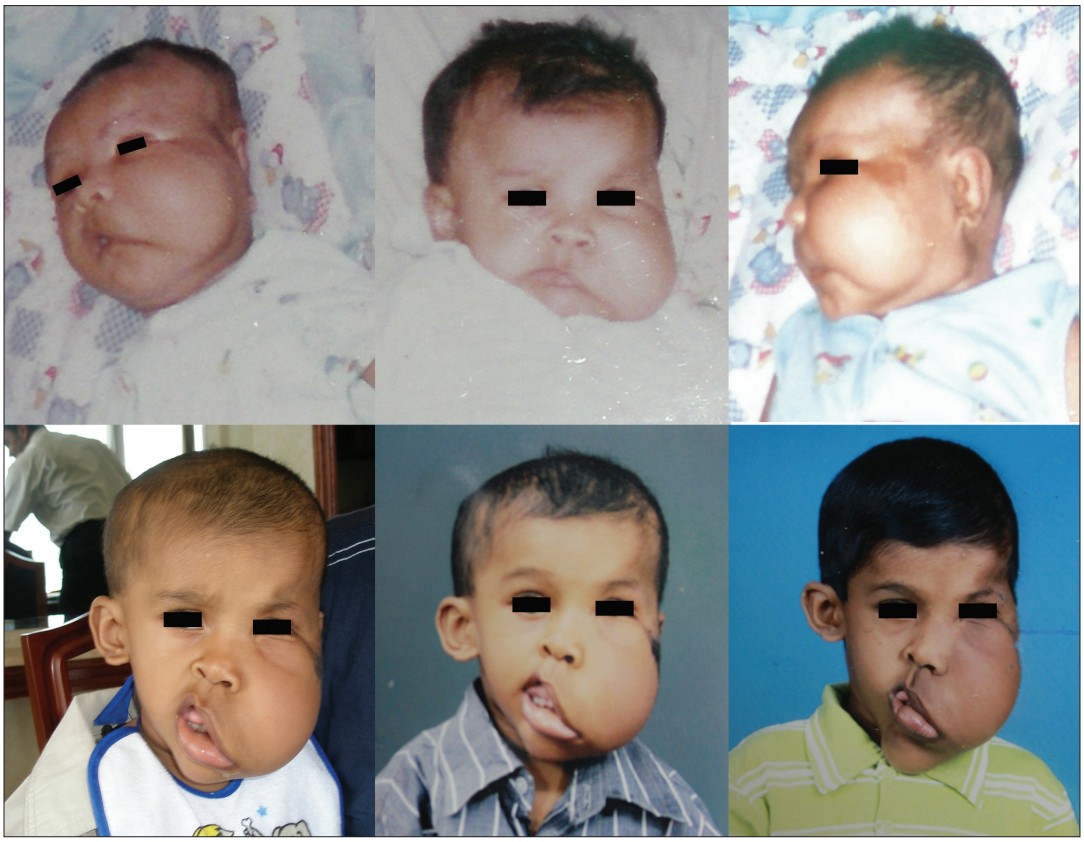

Figure 1: Course of the disease from birth until 4 years of age (before surgery)

As the child continued to grow, a progressive accelerated growth in the size of the left cheek was observed. Radiologically there was hypertrophy of all facial bones in the region, including zygoma, maxilla and mandible. When he was 4 years, a biopsy of the upper lip was made for a diagnosis, revealing a diffuse, poorly circumscribed, unencapsulated, lobulated, fatty infiltration consisting of mature fat cells without any cytological abnormalities. Nerve and muscular fibers and thin-walled blood vessels were observed throughout the adipose tissue. Neither lipoblasts nor signs of malignancy were found. A diagnosis of CDIL- F was made based on the clinical, radiological and histopathological features. Surgical reduction of the lipomatosis area was planned and executed. In the process most of the nevus was also removed. Only a minor portion of the nevus remained along the surgical margin [Figure 2].

Two more surgical debulking of the lipomatosis was carried out at age of 5 years and 7 years of age [Figure 3]. Currently the boy is 8.5 years old [Figure 4] and presented with clinical evidence of hypertrophy of the left masseter, the left medial pterygoid muscle, the left hemi-tongue, and the soft tissues of the left cheek. The left zygoma and inferior orbital rim was also hypertrophied [Figures 5-7]. The findings were confirmed by computed tomography. No ophthalmological, neurological (left cranial nerves V and VII were intact), vascular or respiratory problems were present. Psychomotor development till date was completely normal, and no other fatty infiltration was discovered on examination of the rest of the body. The patient is being followed up.

MATERIALS AND METHODS

Published literature search for CDIL-F from various online sources till March 2012 including Google and PubMed was done. The search term employed was "Lipomatosis" "face" and "Congenital". All scholarly manuscripts were reviewed. The collected articles were analyzed for clinical features, tabulated and descriptive statistics presented.

RESULT

Forty-nine cases of CDIL-F were identified from literature and one case is reported in this manuscript. The largest single case series was published by Padwa BL and Mulliken *et al.*, who had studied 13 cases from United Kingdom. The male to female ratio was 1:1.17 in favor of females. Thirty-seven cases had age of initial presentation [Table 1]. The age ranged from 0.25 to 53 years, with a mean age of 11.53 $\pm$ 14.46 years. The recurrence rate, after attempted surgery was 58.62%. The number of surgeries undertaken to provide this result considerably varied. Only a very few cases had good cosmetic result in a single surgery, whereas others required multiple surgeries. On an average, minimum of 3.4 surgeries has been performed for each recurrent case. Jaw bone was involved in 26 (52%) of cases exhibiting hypertrophy of bones. Zygoma appeared to less commonly affected with 15 (30%) of cases showing involvement. All cases had cheek involvement. In 13 cases out of 41 cases (31.7%) tooth involvement was evident exhibiting macrodontism and 15 cases (30%) exhibited early eruption. Clinically, neuromas (including

Figure 2: Stage I surgery – (a-d) Preoperative view showing the gross facial defect, (e, f) Intraoperative view of debulking via (g) Postoperative view

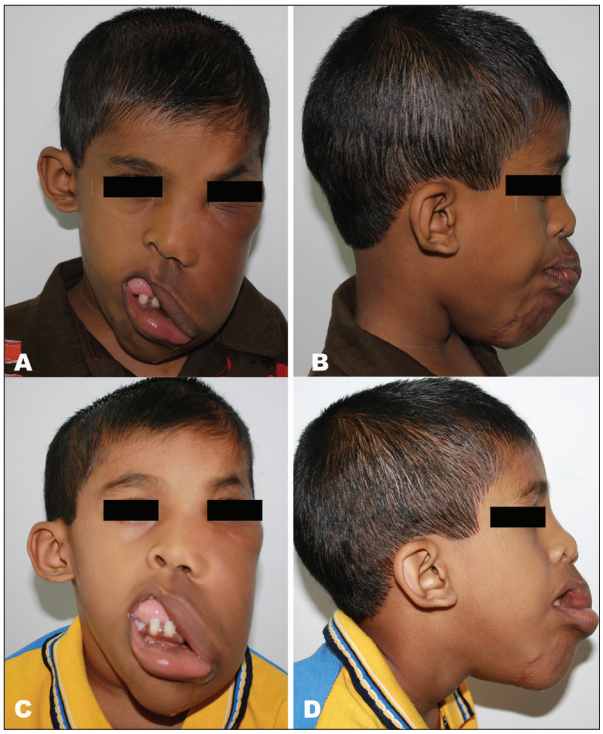

Figure 3a: Stage II surgery - (a,b) Preoperative view, (c,d) Postoperative view following reduction

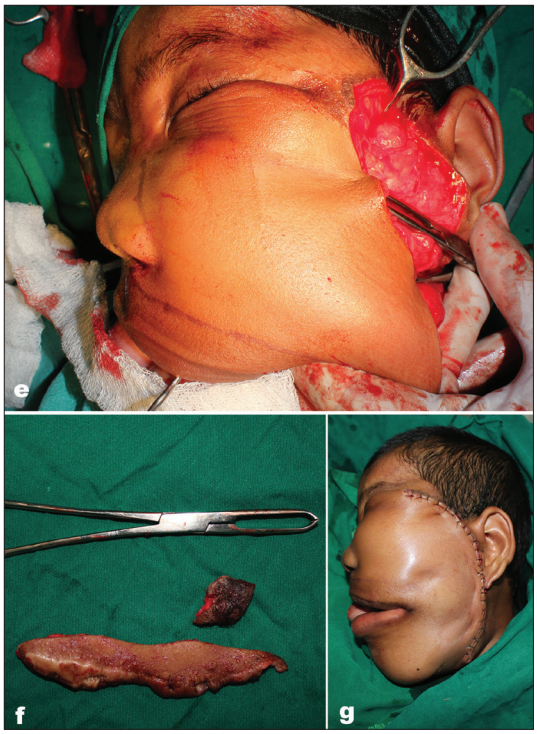

Figure 3b: (e,f) Intraoperative showing (g) immediate postoperative view

mucosal neuromas) was seen in 9 (18%) cases. Macroglossia was a finding in 12 (24%) of cases. In cases that had adequate details, involvement of neck tissues was observed in a single case (2.7%). Parotid gland involvement was observed in 6 cases (16.22%). Nevus was observed in 3 cases (8.11%) and intracranial abnormalities were observed in one case.

DISCUSSION

The etiology of CDIL-F is still unclear. Infective etiology of the condition has not been ruled out. Association with congenital Cytomegalovirus infection has been reported in literature. Sporadical, spontaneous somatic mutation at a mosaic state could

Figure 4: Stage III – (a-f) Preoperative view showing the facial defects with bite hypertrophic scar previous surgery

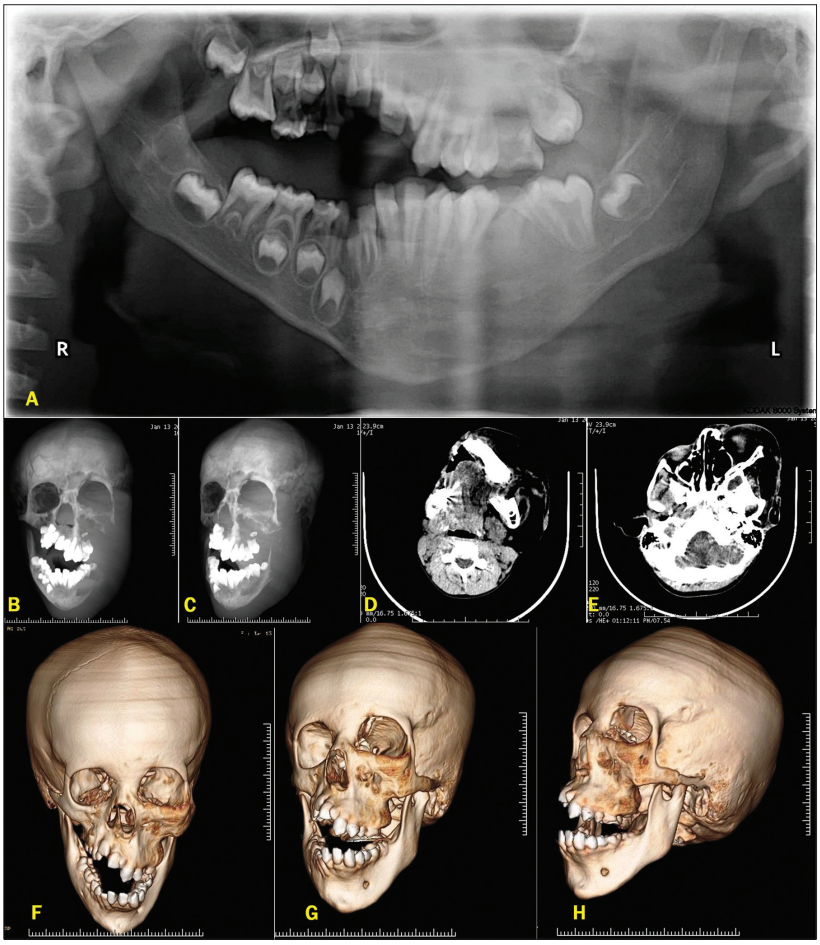

Figure 5: Stage III – Preoperative OPG and CT premature eruption of all tooth in left maxillary quadrant

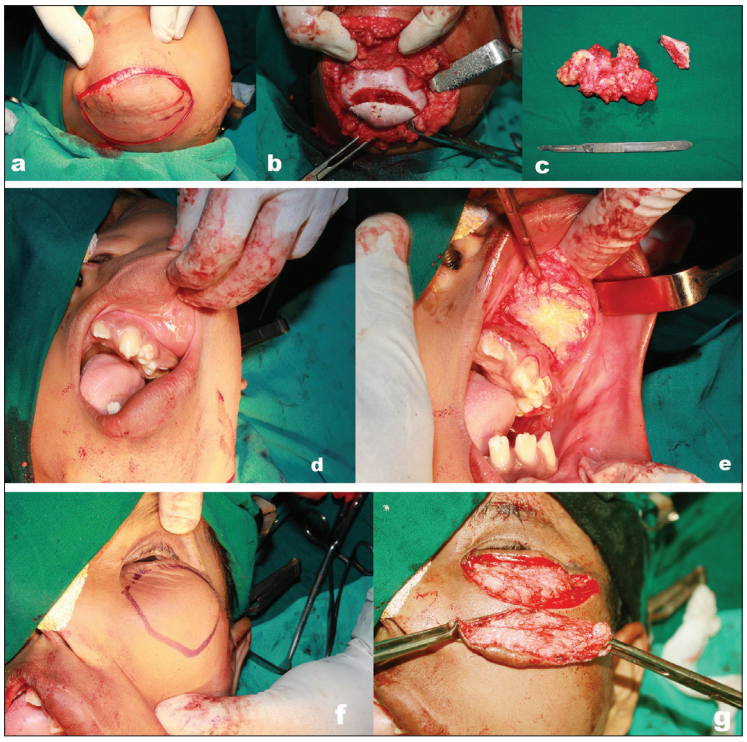

Figure 6: Stage III (a-c) Resection of submental soft tissue, (d, e) Intraoral debulking of left cheek, (f, g) – debulking of left infraorbital mass that cause visual obstruction

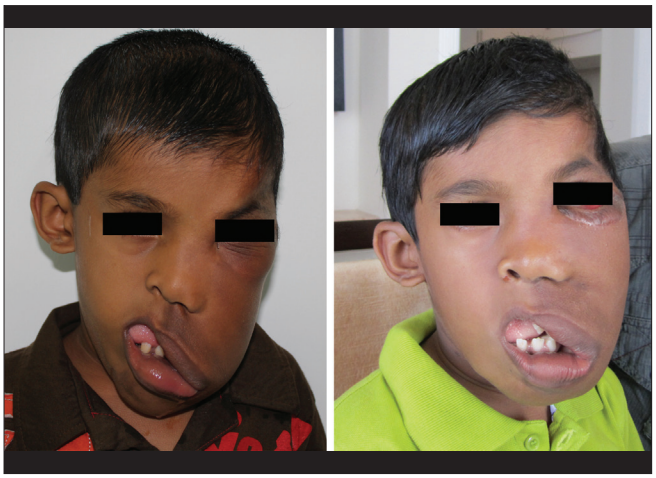

Figure 7: Pre and Postoperative view of stage III surgery

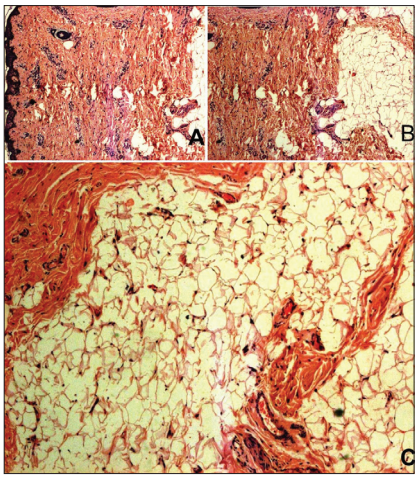

Figure 8: Histopathology photographs (H and E section) A, B: 10x, Infiltrating adipocytes and superficial presence of fat cells. Note the nerve bundles C: 20x, Clear adipocytes, normally appearing and penetrating between muscles

possibly give rise to adipocytic stem cell producing infiltrated lipomatosis. Hormones, trauma, chronic irradiation and muscle metaplasia have suggested as the cause of the mutation. These mutated cells probably alter the production of tissue growth factor or modify the response to the receptor response leading to aberrant formation of mucosal neuroma, bony growth and tooth development. The spectral model lends support to the concept of somatic mosaicism. It could be used to explain the sporadic occurrence of equal gender distribution, spotty distribution of lesions, and variable severity but never the diffuse involvement throughout the whole body or an entire organ system. Abnormalities in chromosome 12 also has been proposed as possible mechanisms for the lipomatous change in CDIL-F.[4]

By studying embryology of fetal fat tissue, it has been reported that facial fat develops at a relatively later stage of development by about the third and fourth months of intrauterine life. Initially, small lobules formed by aggregated adipocytes appear in areas of the subcutaneous region and buccal fat pad. This accounts for the fact that cheek being involved in all cases as indicated by our review.[3,5]

Table 1: Features of Congenital Diffuse Infiltrating Facial Lipomatosis of face from literature

		Other Reports (n = 37)	Padwa BL and Mulliken (n = 13)	Total (n = 50)	Percentage
Gender	Male	15	8	23	46
	Female	22	5	27	54
Gender ratio	Male: Female	1: 1.47	1.6: 1	1:1.17	
Recurrence[#]	Surgery not attempted	2	7	9	18
	Yes[$]	11	6	17	34
	No recurrence	12	0	12	24
	Recurrence rate	47.8%	100%	58.62%	
	Not known	12	0	12	24
Jaw Bone	Not involved	20	4	24	48
	Either Jaws	17	9	26	52
Zygoma involvement	Not Involved	27	7	35	70
	Hypertrophy	9	6	15	30
Tooth involvement	Not Detailed	9	0	9	18
	Macrodont	10	3	13	26
	Not Involved	18	10	28	56
Neuromas	Absent	35	6	41	82
	Present	2	7	9	18
Early eruption	Absent	34	1	35	70
	Present	3	12	15	30
Macroglossia	Absent	33	5	38	76
	Present	4	8	12	24

[$]if available, [#]when data available

Craniofacial membranous bones arise from ectomesanchymatous cells that had previously migrated from the neural crest. Facial musculatures are derived from mesoderm. Odontogenic apparatus originates from oral epithelium and ectomesenchymal cells of neural crest origin. The myobalsts of I – III branchial arches derive from the adjacent somitomeres and this differentiation appears to be controlled by the neural crest cells. The neural crest cells are designated to occupy certain position in branchial arch. In the event, the cells are transplanted elsewhere the somitomeres differentiate into ectopic structures of the designated arch. This observation in chicken strengthens the transmigrated neural crest cell theory for CDIL-F and hence this entity could be classified as a neural crest anomaly.[1] However, the role of angiogenesis in the progression of CDIL-F has been ruled out recently.[6]

CDIL-F has been diagnosed in a patient with clinical features of congenital hypertrophy exhibiting the following characteristic histomorphologic findings: (1) infiltration of adipocytes into adjacent soft tissue and hypertrophy of the underlying bony elements; [Figure 8] (2) absence of malignant histopathological characteristics; (3) conspicuous absence of lipoblasts; (4) presence of fibrous elements as stroma; (5) increased number of blood vessels with areas of unifocally thickened muscular walls and (6) increased number of nerve bundles of variable size with focal fibrosis.[1,2]

The phenotypic features of CDIL-F has been listed out by Padwa[1] and include increase in soft tissue mass, macrodontia, abnormal root formation, and early eruption of deciduous and permanent teeth on the affected side. Macroglossia, protuberances on the tongue and buccal mucosa diagnosed as mucosal neuromas are other common findings. Bone changes in CDIL-F include hyperplasia with or without sclerosis involving skull, cervical vertebrae, mandible (including ramus, condylar process) and zygoma. These changes could be arise due to increased vascularity, periosteal irritation from overlying soft mass, regional mesenchymal malformation or altered growth receptor signaling abnormalities. Our findings are in complete agreement with the findings in literature.

The differential diagnosis often included are the Proteus Syndrome, Encephalocraniocutaneous lipomatosis, hemihyperplasia–multiple lipomatosis syndrome and Bannayan-Riley-Rulvacava syndrome. The differential diagnosis has been done in detail by Padwa and Mulliken. Clinical differential diagnosis of CDIL-F includes lymphatic/vascular malformations, lipomas (intermuscular/intramuscular, angiolipomas/fibrolipomas, liposarcoma and lipoblastomatosis) and congenital overgrowth syndromes causing progressive hemifacial hyperplasia. Overgrowth of one or more mesodermal elements (vascular-Klippel-Trenaunay-Weber syndrome, neural-neurofibromatosis, osseous-fibrous dysplasia or varied tissues-Proteus syndrome) causes localized hyperplasia, similar to the fatty infiltration in CDIL-F. The differentiation of CDIL-F from lipoblastomatosis and liposarcoma may require histopathology and should be performed early so as to institute appropriate therapy.[1]

The role of imaging modalities including computed tomography (CT) and magnetic resonance imaging (MRI) in this lesion is interesting. A typical CT of CDIL-F will show a diffuse, non-uniform fatty infiltration with Hounsfield Unit being in the range of 260 – 2120 along with strong evidence of nonuniform, unilateral hyperplasia of craniofacial bones as seen in the present case. The nonhomogenous character of fatty infiltration observed probably arises from the intervening fibrous elements in the complex facial soft tissues. MRI may be useful to confirm the predominantly fatty nature of the condition as also to exclude any probable association of lymphatic/ vascular malformations. MRI are not recommended in CDIL-F unless neurological abnormalities are observed. In young patients, the findings of a high signal intensity (isointense to fat) of the lesion on T1 and T2-weighted images (hypointense on fat-suppressed images) along with strong clinical correlation

may eliminate the need for biopsy. In addition, MRI study may rule out other probable potential complications including facial nerve encasement and intracranial/cerebral abnormalities (ipsilateral hemimegalencephaly, asymmetric ventricular-sylvian fissure dilatation, arachnoid cyst, cerebellopontine angle lipoma). Considering the rare nature of the lesion and coupled with the fact that MRI are extremely unreliable to rule out CDIL-F from liposarcomas.[2] MRI studies was not performed in the present case as there was no other associated neurological symptoms.

Treatment is complicated by compromise between early resection that limits extensive infiltration and the number of surgical procedures needed versus the higher likelihood of facial nerve damage in younger patients. Liposuction is an additional method employed to achieve facial symmetry. The primary approach by many authors for management of this condition is wide local excision.[1] Several others including Slavin *et al*.,[5] MacMillan *et al*.,[7] De Rosa *et al*.,[8] have negated this approach as this wide excisions resulted in regrowth, requiring repeated excisions and resections. In the present literature review, it is observed that the post resection recurrence rate is 58.6% with a varying follow-up period ranging from 4 months to 20 years. It is identified that an approximate 3.4 surgical debulking procedures has been performed in this review and this is consistent with reports.[1] The recurrence rate in the reported literature agrees with the present systematic review too.

The interceptive surgeries or the debulking procedures are noted to have a high complication rate. This is attributed to the infiltrative nature of the lesion, complex anatomy of the facial region, differential growth in different regions of face at different ages. The regrowth is governed by these factors along with intrinsic nature of the lesion. These factors sums up as a need for multiple resections in CDIL-F. It has been reported that with increasing surgeries, an increase of the intensity of the capillary stain was observed that lead to postulation that angiogenesis may play a role in recurrence of CDIL-F.[1] However, a recent study of Couto *et al*. has disproved this postulation.[6] The recurrence or a regrowth has a possibility of being a result of incomplete resection. As these fatty aggregates are histologically benign, the value of aggressive extirpation and or exploration needs to be weighed against the possibility of the resultant deformity and or potential facial nerve damage.[1]

The timing of surgical intervention is also debated. Slavin *et al*. advocated early aggressive resection in an effort to control the overgrowth and to improve facial appearance.[5] However, these authors also warn that this procedure is unlikely to produce significant esthetic improvement owing to local tissue infiltration and recurrence. Several others are not in concurrence with early aggressive debulking citing likelihood of recurrence and potential risk to the facial nerve damage. However, they agreed that the postponement of intervention renders the procedure more extensive as well as has a negative effect on the psychological well being of the patient and family members. Owing to these contradictory views, most of them agree that delaying complete resection is a better modality as there is less chance of damaging the facial nerve, and there is a more mature contralateral cheek for comparison during late resection. For practical purposes, it is advised that extensive resection may be postponed as long as possible. Temporary measures such as liposuction to improve asymmetry, excision of mucosal neuromas and elevation of the ptotic upper lip may be performed to improve the psychological well being of the patient. More ever these procedures can be performed in with minimal risk and can be repeated if necessary. Following this protocol, periodical debulking has been done to improve the patient's esthetics and expectation.[1]

REFERENCES

1. Padwa BL, Mulliken JB. Facial infiltrating lipomatosis. Plast Reconstr Surg 2001;108:1544-54.
2. Sahai S, Rajan S, Singh N, Arora H. Congenital infiltrating lipomatosis of the face with exophytic temporomandibular joint ankylosis: Case report and review of the literature. Dentomaxillofac Radiol 2012;[Epub ahead of print].
3. Enzinger and Weiss's Soft Tissue Tumors. In: Weiss SW, Goldblum JR, editors. 4th ed. London: Publisher Mosby Elsevier; 2002. p. 574.
4. Chen CM, Lo LJ, Wong HF. Congenital infiltrating lipomatosis of the face: Case report and literature review. Chang Gung Med J 2002;25:194-200.
5. Slavin SA, Baker DC, McCarthy JG, Mufarrij A. Congenital infiltrating lipomatosis of the face: Clinicopathologic evaluation and treatment. Plast Reconstr Surg 1983;72:158-64.
6. Couto RA, Mulliken JB, Padwa BL, Hassanein AH, Rogers GF, Kulungowski AM, *et al*. Facial infiltrating lipomatosis: Expression of angiogenic and vasculogenic factors. J Craniofac Surg 2011;22:2405-8.
7. MacMillan AR, Oliver AJ, Reade PC, Marshall DR. Regional macrodontia and regional bony enlargement associated with congenital infiltrating lipomatosis of the face presenting as unilateral facial hyperplasia. Brief review and case report. Int J Oral Maxillofac Surg 1990;19:283-6.
8. De Rosa G, Cozzolino A, Guarino M, Giardino C. Congenital infiltrating lipomatosis of the face: Report of cases and review of the literature. J Oral Maxillofac Surg 1987;45:879-83.

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