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Case Report

Radiotherapy in the Treatment of Lip localized Lymphangioma. Case Report and Literature Review

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Abstract

Lymphangiomas are developmental malformations that occur as benign tumors of the lymphatic channels. They occur very early in life and mostly prefer the head and neck region. In this case, we present a 21-year-old male patient with predominantly lower lip hemangioma from birth. Despite repeated surgical procedures and cryotherapy, growth continued and could only be controlled with external radiotherapy.

However, the doses of radiotherapy described so far for the treatment of these lesions seem inadequate for the control large lesions. We had to beam 3 times to check this case. We found that an average doses of 54-56 Gy (50-60 Gy) recommended for the control of some benign vascular diseases can be used in these cases.

Key Words: Lip Localized Lymphangioma, Radiotherapy, Higher Dose Radiotherapy, Good Cosmetic Result

Introduction

Lip localized lymphangioma is a rare condition characterized by the abnormal growth of lymphatic vessels in the lip tissue. It is caused by a congenital malformation of the lymphatic system, which results in the formation of cystic structures filled with lymphatic fluid[1]. The exact cause of this condition is not fully understood, but it is believed to be related to genetic factors[2]. There are currently no medical treatments that have been proven effective for lymphangiomas, and they are not responsive to radiation therapy or steroids[3]. However, there are various management strategies proposed for lymphangiomas, including surgical excision, electrocautery, cryotherapy, radiotherapy, and intralesional therapy[4].

Symptoms of lip-localized lymphangioma can include swelling, pain, and discomfort in the affected area. Diagnosis of this condition is typically made through physical examination, imaging studies such as magnetic resonance imaging (MRI) or computed tomography (CT) scans, and biopsy. It is important to diagnose and treat lip localized lymphangioma as early as

possible to prevent complications such as infection, bleeding, and obstruction of nearby structures[5].

The treatment of lip-localized lymphangiomas depends on the size, location, and severity of the lesion. Surgery is often the preferred treatment option, as it allows for complete removal of the affected tissue[6]. Chemotherapy may be used in combination with radiotherapy for more advanced cases[7]. It is important to note that the effectiveness of these treatments varies depending on the individual case, and a multidisciplinary approach involving a team of specialists may be necessary for optimal management of lip localized lymphangioma[8]. Radiotherapy may also be used in some cases, particularly for early stage tumors or for palliative reasons[7]. However, the option of external radiotherapy should not be forgotten in cases with long-term follow-up that are resistant to treatments.

In this study, a comprehensive literature search was conducted in Google Scholar and PubMed search engines using the keywords lower lip lymphangioma. Lower lip lymphangioma cases published in English until December 2021 by Hasan et al.[7] presented in the study. The current issue was developed by adding 2 cases published in the years 2022 and 2023. When this review, consisting of a total of 19 cases, is examined, our case is the only one with the largest diameter and receiving radiotherapy. Even though it is resistant to all treatments, it can be controlled, with a good cosmetic result thanks to external radiotherapy.

Case Report

A 21-year-old male patient presented with complaints of swelling in the lower lip and cosmetic condition. He stated that this swelling has been present since birth, and that it was getting bigger despite repeated surgeries and cryotherapy. He reported that surgery was performed 3-4 times, cryotherapy and intralesional treatments were performed 10 times, with his first operation at the age of 6 years. This information in the patient's anamnesis was verified by checking the hospital records. The swelling was smaller at first and then gradually increased to its present size. In the intraoral examination, there was swelling in the mucosal part of the lower and upper lips. The swelling was approximately 6x3 cm in size. Due to its location and clinical features, it was suggestive of lymphangioma. The diagnosis was confirmed by biopsy.

The pathology report showed dilated lymph vessels and a flattened layer of squamous cells and epithelial cells suggestive of lymphangioma.

Radiotherapy Delivery

Radiotherapy planning was done with MRI fusion. The visible lesion on the left half (upper and lower) of the patient's lips was defined as the gross tumor volume (GTV). A planned targert volume margin (PTV) of 0.5 cm in all directions has been added to surround target volume.

The patient first received 22 Gy RT with 12 MeV energy in 2014. Due to the progression of the lesion, second series of re-irradiation was delivery in 2016 with 12 MeV electron energy (180cGy/frx/12=21.6). In 2019, re-irradiation was performed from a limited area of the lower lip because only a small portion of the lesion had progression. Photon 6MV energy was applied from the daily 180cGy fraction with a total of 21.6 Gy with volumetric modulated arc therapy (VMAT) half arc (180cGy/frx/12=21.6). A 1 cm bolus was added to ensure that the GTV, which reached the skin level, received the desired dose. Figure 1 summarizes the information about the dose and dose of radiotherapy.

During these treatments, a protective apparatus was placed to protect the mouth and teeth in order to minimize the side effects on normal tissues. This silicone-containing apparat was made specifically for the patient in the faculty of dentistry. The space of this apparatus is visible in the planning tomography and RT plan (Figure 2).

The patient has been in our follow-up for 9 years since 2014. Final check done with best cosmetic result. Photographs and MRI images of the patient before and after radiotherapy are shown in figures 3 and 4.

Discussion

Lip localized lymphangioma is a type of benign tumor that affects lymphatic vessels in the lip. Surgical treatment is one of the primary options for treating lip localized lymphangioma[5].

The primary goal of surgery is to achieve complete resection of the tumor[9]. However, the type of surgery performed depends on the size and location of the tumor. Some of the surgical options for treating lip localized lymphangioma include excision, laser ablation, and electrocautery[10]. In some cases, surgery may be followed by radiation therapy, additional surgeries, and/or chemotherapy with radiation, depending on the outcome of the primary surgery.

Like any surgical procedure, there are risks and benefits associated with surgical treatment for lip-localized lymphangioma. The benefits of surgery include the removal of the tumor, which can alleviate symptoms and improve the patient's quality of life. However, surgery can also result in local nerve damage and a high incidence of recurrence.

After surgery, it is essential to follow appropriate post-operative care to ensure a successful recovery. Patients may experience some swelling, bruising, and discomfort following surgery[11]. It is important to keep the surgical area clean and dry and to avoid strenuous physical activity until cleared by the healthcare provider. Additionally, patients should follow any medication regimens and attend follow-up appointments to monitor their progress and address any potential complications.

Radiotherapy is a non-surgical treatment option for lip localized lymphangioma that has shown effectiveness in treating unresectable lesions or for patients who are unwilling to consider surgery[12]. Radiotherapy works by destroying cancer cells in a precise treatment area, but it also affects normal healthy cells within the treatment area, which can cause side effects[13]. A study by Luzzatto et al. in 2000 found that radiotherapy was a viable option for treating lymphangioma with few complications[6].

While radiotherapy has been found to be effective in treating lip-localized lymphangioma, it is important to consider the potential benefits and risks of this treatment option. One of the benefits of radiotherapy is that it can be used as a non-invasive treatment option for unresectable lesions[12]. However, radiotherapy can also cause side effects such as hair loss, mucositis, infections, and dental caries[14-16]. Additionally, radiotherapy may not be appropriate for all patients, and other treatment options such as chemotherapy or surgery may be more suitable[7, 9, 17,18]. Radiotherapy may be an effective treatment option for lip-localized lymphangioma, especially in patients with large lesions who are not candidates for surgery.

When considering radiotherapy as a treatment option for lip localized lymphangioma, it is important to take precautions to minimize the risk of side effects. Patients may need to undergo imaging tests to determine the precise location of the lesion and to ensure that the radiation is delivered to the correct area[19]. It is also important to closely monitor patients for any potential side effects during and after treatment[13]. These precautions can maximize the potential benefits of radiotherapy while minimizing the risk of side effects.

The characteristics of lymphangioma cases located in the lip are summarized in table 1. The year of occurrence, age and gender, age at the time of the first complaint, size, main complaint and treatment information are included. Twelve of the 19 reported cases were male, aged between 14 months and 69 years, varying between 3mm and 50mm, and mostly manifested as swelling/growth. Most cases were treated with surgical excision, with a few cases of recurrence. Only our case received radiotherapy.

Chemotherapy is a potential treatment option for lip-localized lymphangioma, a type of lymphatic malformation. Chemotherapy works by using drugs to kill rapidly dividing cells, which includes cancer cells. For lymphangioma, chemotherapy may be used as a follow-up treatment in the case of lymphangiosarcomas[10]. However, it is important to note that chemotherapy is not always the first-line treatment for lymphangioma, and other options such as surgical excision, electrocautery, cryotherapy, and radiotherapy may be considered[35].

When deciding on the best treatment option for lip-localized lymphangioma, several factors must be considered. The type and size of the tumor, the patient's overall health, and potential side effects of treatment are all important factors to consider[36]. In some cases, these treatments may not be effective, and other options such as cyst enucleation or manual lymph drainage may be considered[2].

Patients should be informed of all available treatment options and their potential risks and benefits. Healthcare providers should take into account the patient's preferences and values when making treatment recommendations[5]. Clinical trials may also be an option for some patients, as they offer the opportunity to compare potentially better therapy with current standard treatments[5]. Ultimately, the decision should be made collaboratively between the patient and healthcare provider to ensure the best possible outcome.

Long-term follow-up and management are important for patients who have undergone treatment for lip-localized lymphangioma. Patients should be monitored for potential recurrence or side effects of treatment. Survivors of childhood and adolescent cancer, in particular, require close monitoring as side effects of cancer therapy may persist or develop months or years later[7]. Regular check-ups and imaging tests may be necessary to ensure proper management and to catch any potential issues early on.

Early diagnosis and treatment of lip-localized lymphangioma is crucial for successful management of the condition. Most cases of lymphangioma are treated by surgical excision, which is considered the gold standard[2,7]. However, surgery may not always be feasible, particularly in cases where the lesion is extensive or located in a difficult-to-access area. In such cases, alternative treatment modalities, such as sclerotherapy, cryotherapy, electrocautery, and laser therapy, may be employed[2]. It is important to note that the treatment plan should be personalized and multidisciplinary, involving collaboration between physicians, dentists, and other healthcare professionals to ensure optimal outcomes[5].

Advances in treatment options and research have led to improved management of lip-localized lymphangioma. In addition to traditional treatment modalities, such as surgery and

radiotherapy, new approaches, such as intralesional injections of steroids and bevacizumab, are being explored[2]. Furthermore, research is ongoing to identify novel therapeutic targets and develop more effective treatment strategies[7]. Nevertheless, with the consensus on the use of radiotherapy in benign diseases, lymphangiomas can be safely treated with appropriate radiotherapy technique with apparatus that can protect normal tissues in difficult areas such as the head and neck, including the lip[37-39].

Conclusion

Early diagnosis and personalized, multidisciplinary treatment plans are essential for successful management of lip-localized lymphangioma. The case we presented was larger in size compared to the lesions in the literature, so the dose administered to control the tumor was insufficient. In such cases, higher radiotherapy dose is required for better local and cosmetic results according to the lesion size. However, more research is needed to identify novel therapeutic targets and develop more effective treatment strategies for this condition.

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Table 1. The characteristics of lymphangioma cases located in the lip

Case No	Ref/ year	Age / gender	Symptom onset age	Size	Complaint	Treatment	Rec
1	(20) 1984	27/M	5 year	—	Mass lesion	Excision	Yes
2	(21) 1989	14 months/ M	1 month	Thumb-sized tumor	Swelling	Excised, cryosurgery, laser irradiation	Yes
3	(22) 1991	4/M	1 week	—	Swelling-difficulty with breathing	Laser therapy	Yes
4	(23) 2002	69/F	39 year		Irritation-discoloration	—	—
5	(24) 2008	23/M	22.5 months		Cosmetic concern	Excisional biopsy	No
6	(25) 2008	9/F	2 year		Swelling	Excision	—
7	(26) 2012	13/M	5 year	—	Enlargement	Excision	—
8	(27) 2013	13/M	13 year		Enlargement	Excision	—
9	(28) 2015	6/M	—	3mm	Mass	Excision	—
10	(28) 2015	4/F	—	10mm	Mass-difficulty in eating and speaking	Excision	—
11	(29) 2018	68/F	62 year	—	Mass	Follow-up	No
12	(30) 2019	4/F	Birth		Mass	Cryotherapy	No
13	(31) 2020	6/F	6 year		Asymptomatic nodules	Excision	No
14	(32) 2020	56/F	48 year	—	White painless vesiculobullous lesion	Excision	—
15	(33) 2020	10/M	9 year	2–3mm papules	Asymptomatic lesions on the buccal mucosa with swelling of the cheek and lips.	Sclerotherapy	—
16	(7) 2021	55/M	54 year	—	Painless growth	Excision	—
17	(7) 2022	45/M	42 year	20x15mm	Mass	Surgical excision	—
18	(34) 2023	19/M	1 month	10x5mm	Painless swelling	Surgical excision	No
19	Present case (2023)	21/M	Birth	55x25mm	Mass, Cosmetic concern	Surgical Excision, Cryotherapy, Radiotherapy*	—

*Rec: Recurrent, Ref: reference, *: the only case that received radiotherapy*

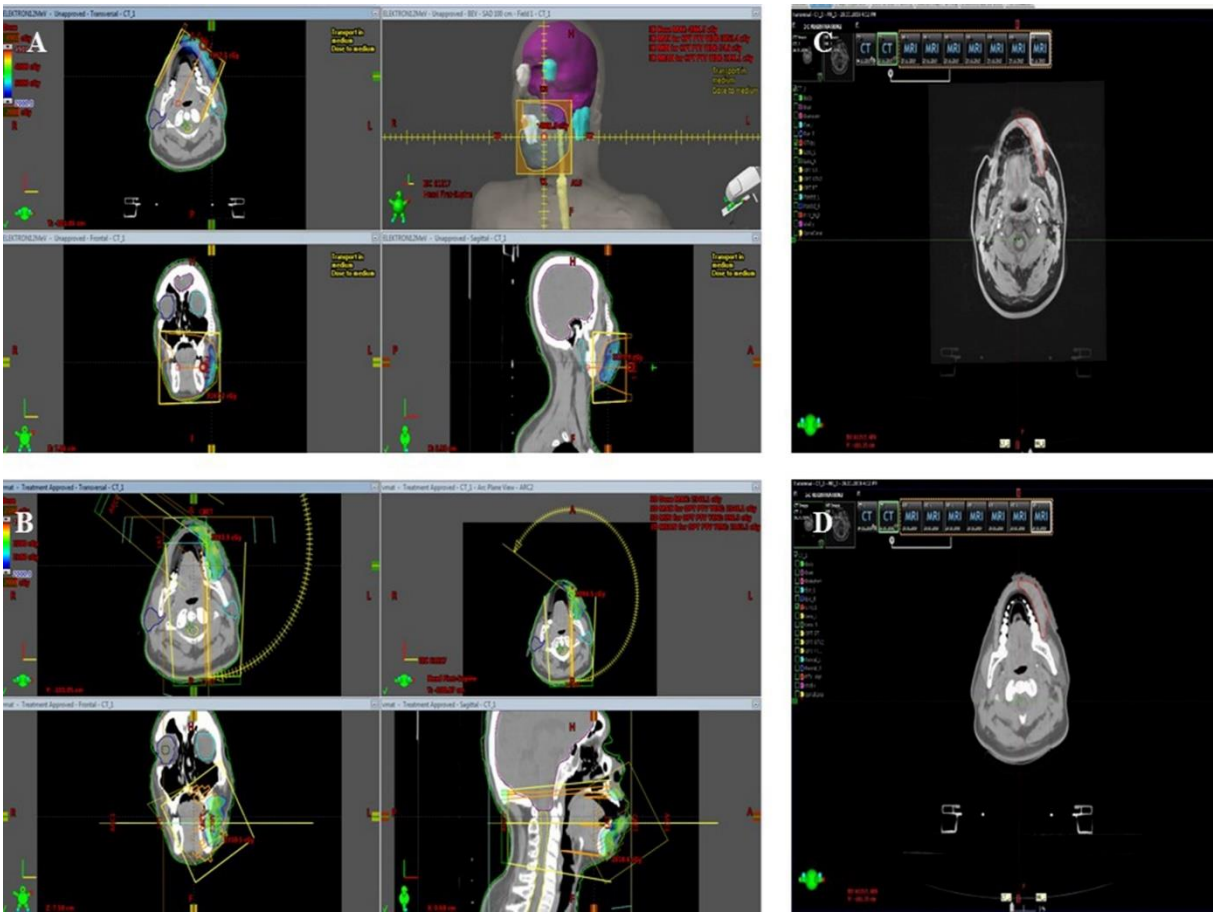

Figure 1. Radiotherapy dose and volume images of the patient. Planned radiotherapy with 12 MeV energy of 2016 (A). VMAT with 6 MV energy of 2019 (B). MRI-radiotherapy planning tomography fusion images used in treatment plans (C-D)

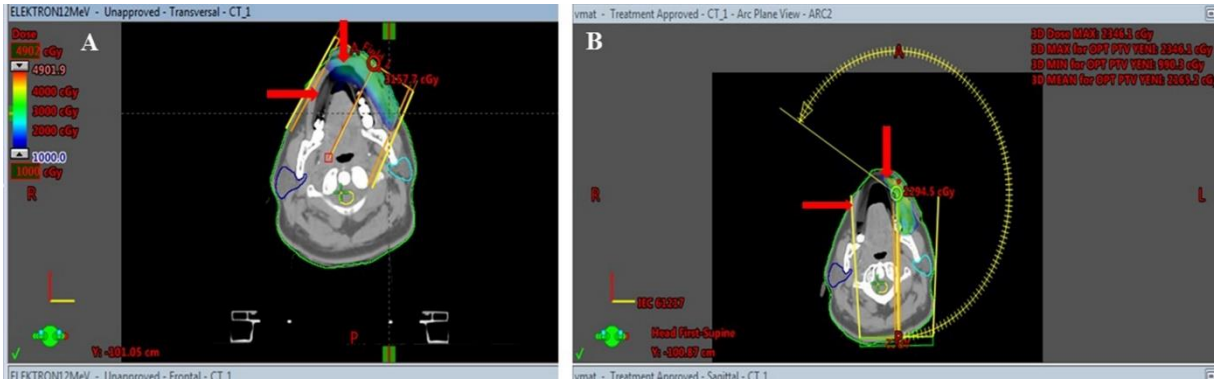

Figure 2. Intraoral apparatus used during electron (A) and photon (B) radiotherapy of the patient

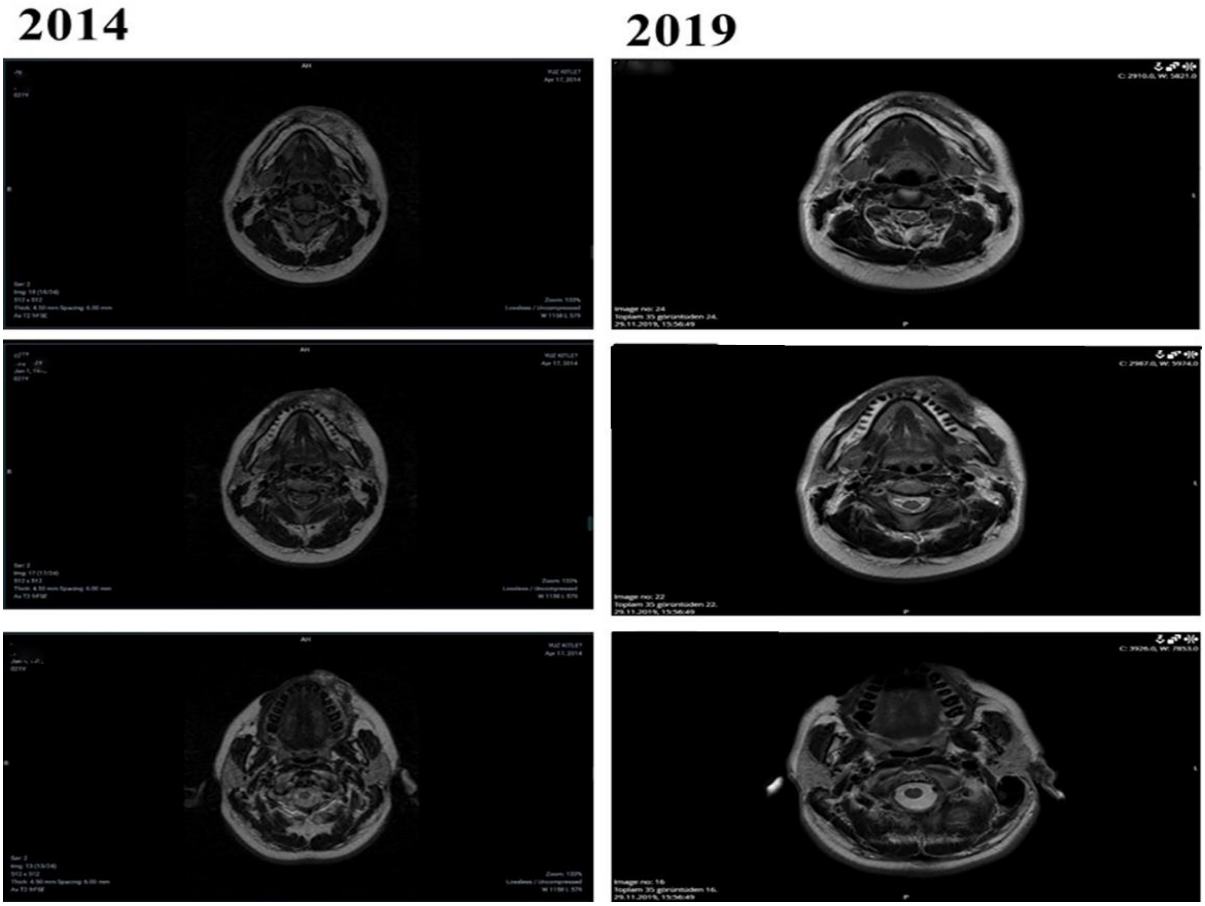

Figure 3. MRI of the patient. MRI before receiving RT in column dated 2014: 5.5x2.5cm heterogeneous lymphangioma in subcutaneous T1W and T2Asers in the left lower lip. In the column dated 2019, MRI after receiving the second series of RT: the lesion diameter was measured as 28x18mm.

Figure 4. Photographs of the patient's current lesion taken at various times. Photograph of the lesion before radiotherapy in 2010, during non-radiotherapy treatments (A). Photograph of 2019 after radiotherapy (B and C). Late photograph of 2023, 9 years after radiotherapy (D, E, and F).