ISSN 2692-5877
DOI: 10.46998/IJCMCR.2024.46.001129

International Journal of
Clinical Studies & Medical Case Reports

Case Report

Utilization of J-Plasma for Cavernous Tongue Hemangioma Dissection

Spyridon Laskaris[1,*], Marina Karaiskou[1], Konstantinos Alevizopoulos[2] and Vasileios Chalkiadakis[3]

[1]*Department of Otolaryngology and Head and Neck Surgery, Metaxa Anticancer Hospital of Piraeus, Greece*

[2]*Ventac Partners, Athens, Greece*

[3]*Department of Otolaryngology and Head and Neck Surgery, 417 Army Equity Fund Hospital, Athens, Greece*

***Corresponding author:** Spyridon Laskaris MD, MSc, PhD Otolaryngologist – Head and Neck Surgeon, Metaxa Anticancer Hospital of Piraeus, Greece

Received: October 11, 2024 **Published:** November 06, 2024

Abstract

Hemangiomas are non-cancerous (benign) tumors caused by abnormal growth of blood vessels (developmental vascular abnormalities). Treatment approaches range from simple observation to conservative treatment and surgical excision. The following technique describes dissection using a cold atmospheric helium plasma device (J-Plasma; Apyx Medical Corporation, Clearwater, Fla). Although limited data are available, the above energy modality could be utilized for coagulation and precise dissection of hemorrhagic lesions such as cavernous tongue hemangiomas without collateral injury to adjacent healthy tissues and any tongue reconstruction ensuring a decreased hospital length of stay.

Keywords: Tongue; Hemangioma dissection; J-Plasma; Helium Plasma

Introduction

Hemangiomas are benign tumors caused by developmental vascular abnormalities. Clinically, hemangiomas can be classified as congenital, or infantile (formerly called juvenile or strawberry). Infantile hemangiomas develop in the initial two months of life, characterized by a notable proliferation from six to twelve months, leading to a gradual regression phase. Most infantile hemangiomas (His) typically undergo spontaneous regression by the age of six to nine years. In contrast, congenital hemangiomas (CHs) are present from birth, without exhibiting a proliferative phase, and either rapidly involute or not at all. Depending on the size of the vascular channels they are classified as capillary (small-diameter vascular channels) and cavernous (large-diameter vascular channels) [1]. More than 60-70% of them occur in the head and neck region and most frequently could involve buccal mucosa, lips, and tongue [2].

Usually, tongue hemangiomas require only medical observation since most will decrease and disappear over time. However, in case of persistent dimension hemangiomas that may cause speech and swallowing difficulties or airway compromise, treatment should be considered that includes conservative (usually Beta-blockers and oral steroids) or surgical resection [2].

Surgical resection of large lingual hemangiomas demands precision and surgical skills due to the perioperative risk of hemorrhage. Additionally, avoidance of unnecessary thermal damage to surrounding tissues using traditional electrocautery is important to decrease the loss of lingual tissue which could lead to severe consequences on tongue mobility and tongue deformation capabilities.

Cold atmospheric helium plasma is a new technology that combines properties of cold helium plasma which focuses Radio Frequency (RF) energy achieving greater control of tissue effect and precise surgical resection of the lesion. This technique decreases unintended tissue trauma by minimizing lateral and depth of thermal spread offering at the same time hemostasis which is highly important in surgical procedures of lingual hemangiomas due to high vascularization. J-Plasma (Apyx Medical Corporation, Clearwater, Fla) is a device using the technology above [3].

Case Report

A 37-year-old female presented with a cavernous hemangioma of the lateral part of the tongue with dimensions 25mm x 18mm and a depth of 22mm **(Figure 1)**. According to the patient, this tumor was presented several years before and has gradually increased to its present size and is associated with difficulty in speech and swallowing without pain or airway compromise. The patient had previously been treated conservatively with propranolol for 6 months without any decrease in the lesion. Surgical resection has been decided as treatment using cold atmospheric helium plasma technology, particularly J-Plasma.

Under general anesthesia, intraorally, using the above tech-

nology, surgical dissection was performed **(Figure 2,3)**. Traditional electrocautery had not been used. Hemangioma was completely resected with well-defined borders without perioperative hemorrhage and with highly precise surgical resection eliminating tongue deficit at a minimum. Sutures were unnecessary, and no complications were associated with the surgical site **(Figure 4)**. The postoperative period was uneventful, and the patient was discharged from the hospital the same day. Wound healing was rapid without deficit and completed within 4 weeks **(Figure 5, 6)**. No recurrence was observed in the three years of follow-up. The histopathological report confirmed the diagnosis of cavernous hemangioma.

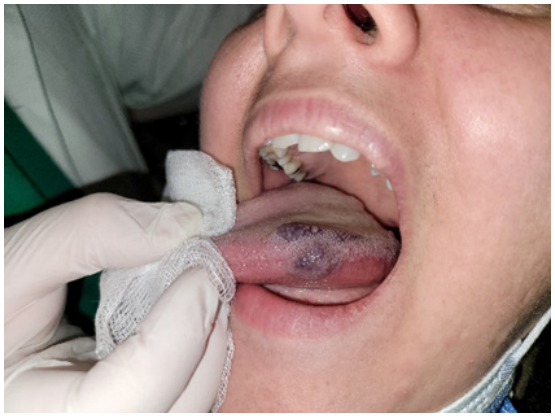
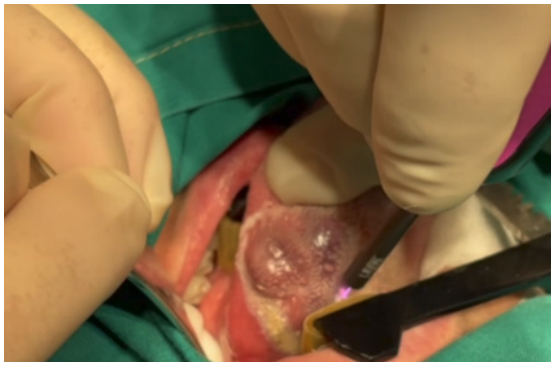


Figure 1: Cavernous Hemangioma of the lateral part of the tongue.



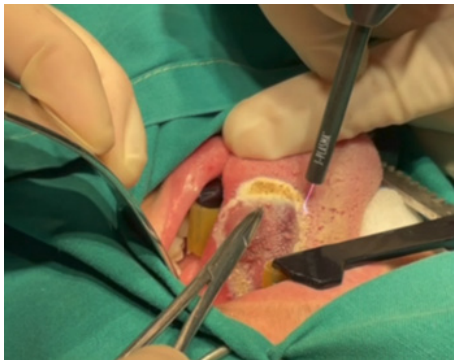


Figure 2, 3: Process of dissection of cavernous lingual hemangioma using cold atmospheric helium plasma device (J-Plasma; Apyx Medical Corporation, Clearwater, Fla).

Discussion

Lingual hemangiomas are benign tumors that can cause recurrent hemorrhage, cosmetic deformity, speech, and swallowing difficulties, or in some cases airway compromise [2]. Treatment depends on size and localization, as well as on the evolution stage of the lesion. Surgical intervention is typically recommended when systemic treatments fail to yield results or for cosmetic purposes. This procedure may involve a straightforward excision, which can be performed alone or in combination with plastic surgery [4].

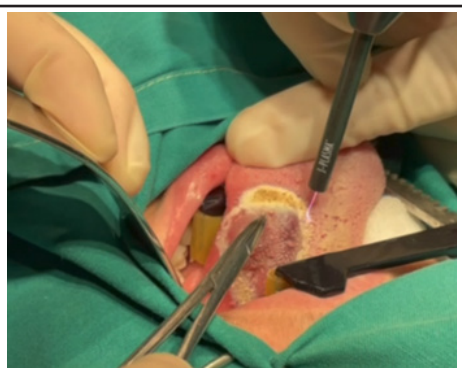


Figure 4: Hemangioma resected with well-defined borders.

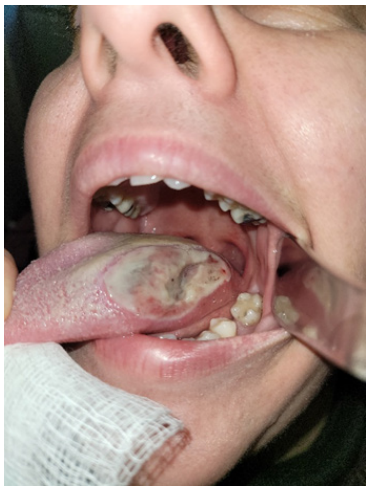


Figure 5: Follow up one week after surgery.

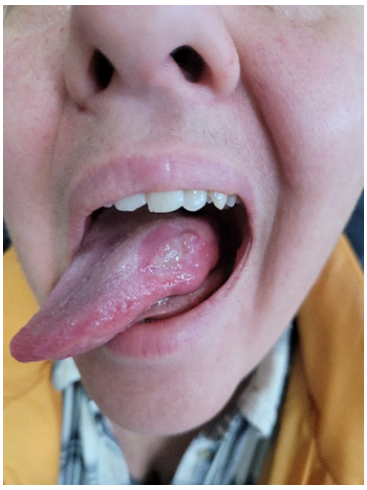


Figure 6: Follow up one month after surgery.

Electrosurgical devices of high frequency, that use electrical current for tissue cauterization, have been associated with the generation of high temperatures that extend to the adjacent tissues causing thermal damage and other postoperative complications. Monopolar diathermy represents the standard surgical approach in the treatment of lingual lesions. However Flexible fiber-based CO2 laser and monopolar cautery for resection of oral cavity lesions such as lingual lesions showed that there was a trend for patients treated with laser to have less pain, better quality of life scores, and faster return to normal diet and activity level in contrast to patients who underwent electrocautery technique. However, these differences did not reach statistical significance [5].

Cold atmospheric helium plasma is a new technology that combines properties of cold helium plasma which focuses radiofrequency (RF) energy.

The clinical application of J-Plasma in certain types of procedures, including oncologic and dermatologic surgeries, is documented in only a limited number of reports within the literature. [6,7]. Additionally, this device appears to minimize perioperative complications, such as hemorrhage while decreasing postoperative pain and overall procedural duration in patients undergoing otolaryngologic surgery [8,9]. J-Plasma facilitates safe and efficient tissue coagulation, ablation, and incision with controlled precision [3]. Moreover, its retractable blade offers enhanced versatility and energy management, along with improved visibility at the application site. Consequently, this device is highly attractive for procedures that require meticulous dissection and coagulation [10]. These data have motivated us to utilize this device for the resection of tongue cavernous hemangioma, as its potential risks appear to be comparable to those of conventional electrocautery devices offering potential benefits for the patient's recovery in addition to enhancing the surgical procedure. This technique appears to have no adverse impact on key outcomes when compared to our prior experience with standard surgical approaches. However, a greater patient sample is required to assess its effect on hemostasis, precise surgical dissection, and a decrease in hospitalization time.

Regarding cost, J-Plasma is priced higher than the typical electrocautery device with a cost for a J-Plasma probe of around 520 € (taxes included) for a single use. Comparative studies in the literature indicate that low-temperature plasma devices offer a considerably lower overall cost than traditional electrocautery; however, these studies do not address helium gas devices [11]. Taking into consideration that hospitalization time required for partial glossectomy of benign lingual tumors using conventional electrocautery devices varies from 2 to 3 days, the J-Plasma technique decreases significantly hospitalization costs since the patient is discharged the same day of the operation. This data indicates a level of cost-effectiveness; however, further comparative studies focused specifically on J-Plasma are necessary to validate this approach.

Conclusion

The outcomes of our study utilizing J-Plasma for the resection of tongue hemangiomas are encouraging. Nonetheless, further clinical research is required to evaluate the effectiveness, safety, and cost-effectiveness of this device in comparison to conventional methods. To facilitate this, it is essential to establish objective criteria for comparison to draw more reliable conclusions.

Consent: Patient written consent was obtained before submission.

Funding: No funding source or acknowledgments.

Disclosure of conflict of interest: No conflict of interest is to be disclosed.

References

1. George A, Mani V, Noufal A. Update on the classification of hemangioma. J Oral Maxillofac Pathol, 2014; 18(Suppl 1): S117-120. doi: 10.4103/0973-029X.141321.
2. Lyssy LA, Puckett Y. Oral Hemangiomas. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing, 2024.
3. Gentile RD. Cool Atmospheric Plasma (J-Plasma) and New Options for Facial Contouring and Skin Rejuvenation of the Heavy Face and Neck. Facial Plast Surg, 2018; 34(1): 66-74. doi: 10.1055/s-0037-1621713.
4. Kamala KA, Ashok L, Sujatha GP. Cavernous hemangioma of the tongue: A rare case report. Contemp Clin Dent, 2014; 5(1): 95-98. doi: 10.4103/0976-237X.128680.
5. Rosenthal M, Baser RE, Migliacci J, Boyle JO, Morris LGT, Cohen MA, et al. Flexible fiber-based CO2 laser vs monopolar cautery for resection of oral cavity lesions: A single center randomized controlled trial assessing pain and quality of life following surgery. Laryngoscope Investig Otolaryngol, 2021; 6(4): 690-698. doi: 10.1002/lio2.572.
6. Parsa M. Retroperitoneal Dissection of Ovarian Endometrioma Using J-Plasma Technology. J Minim Invasive Gynecol, 2015; 22(6S): S140. doi: 10.1016/j.jmig.2015.08.475.
7. Binenbaum Y, B en-David G, Gil Z, Slutsker YZ, Ryzhkov MA, Felsteiner J, et al. Cold Atmospheric Plasma, cre-ated at the Tip of an Elongated Flexible Capillary Using Low Electric Current, Can Slow the Progression of Mela-noma. PLoS One, 2017; 12(1): e0169457. doi: 10.1371/journal.pone.0169457.
8. Chan KH, Friedman NR, Allen GC, Yaremchuk K, Wirtschafter A, Bikhazi N, et al. Randomized, controlled, multi-site study of intracapsular tonsillectomy using low-temperature plasma excision. Arch Otolaryngol Head Neck Surg, 2004; 130(11): 1303-1307. doi: 10.1001/archotol.130.11.1303.
9. Zhang QF, She CP, Song W, Zhang X. [Endoscopic surgery using the low-temperature plasma radiofrequency for nasal inverted papilloma]. Zhonghua Er Bi Yan Hou Tou Jing Wai Ke Za Zhi, 2009; 44(7): 543-545.
10. Konstantinos Filis, George Galyfos, Fragiska Sigala, Georgios Zografos. Utilization of low-temperature helium plasma (J-Plasma) for dissection and hemostasis during carotid endarterectomy. Journal of Vascular Surgery Cas-es, Innovations and Techniques, 2020; 6(1): 152-155. https://doi.org/10.1016/j.jvscit.2020.01.008.
11. Kim Bomin, Kim Beom Jin, Seo Il-Kook, Kim Jae Gyu. Cost-effectiveness and short-term clinical outcomes of argon plasma coagulation compared with endoscopic submucosal dissection in the treatment of gastric low-grade dysplasia. Medicine, 2018; 97(15): p e0330. | DOI: 10.1097/MD.0000000000010330.