Clinical Oncology: Case Reports

REVIEW

A SCITECHNOL JOURNAL

Primary Undifferentiated Pleomorphic Sarcoma (UPS) of the Lung: Review

Carlos A. Cardenas*

Abstract

Primary Undifferentiated Pleomorphic Sarcoma (UPS) of the lung is an exceptionally rare malignancy, accounting for less than 0.2% of all lung tumors. This disease has posed considerable diagnostic and therapeutic challenges. This review delves into the complexity of primary lung UPS, encompassing diagnostic intricacies, therapeutic modalities, and prognosis.

Formerly known as Malignant Fibrous Histiocytoma (MFH) until its reclassification in 2012, UPS's diagnostic journey often relies on the exclusion of other well-characterized soft-tissue sarcomas. Our exploration underscores the significance of early disease recognition, emphasizing factors that influence recurrence and metastasis risk, such as surgical margin adequacy and tumor size.

Treatment strategies encompass a multidisciplinary approach, involving aggressive en bloc surgical excision with microscopically negative margins, complemented by adjuvant therapies like radiotherapy or chemotherapy. Recent studies offer valuable insights into refining these strategies, striving to enhance the overall prognosis for UPS patients. Survival rates for primary lung UPS remain modest, prompting ongoing investigations into novel frontiers, notably immunotherapy, in the quest for improved therapeutic outcomes.

This review not only sheds light on the rare and intricate nature of primary lung UPS but also amalgamates data, clinical experiences, and emerging research, this review contributes to a deeper understanding of UPS in the lung, and further advancements in diagnosis and treatment.

Keywords: Undifferentiated pleomorphic sarcoma; Chemotherapy; Lung tumor

Introduction

Primary Undifferentiated Pleomorphic Sarcoma (UPS) of the lung represents an exceptionally rare and complex malignancy, characterized by its distinct diagnostic and therapeutic intricacies. As researchers, our focus in this review centers on the pulmonary manifestation of UPS, shedding light on this disease [1].

UPS of the lung defies conventional classification and compels us to refine our understanding. It is now believed to originate from mesenchymal stem cells, a paradigm shift that has deepened our insights into its pathogenesis [2]. This malignancy possesses an exceptional propensity to infiltrate not only lung tissue but also neighboring structures, confounding the diagnostic process.

Historical accounts once positioned UPS as the predominant Soft-Tissue Sarcoma (STS) among adults. However, with advancements in diagnostic methodologies, including the utilization of immunohisto immunohisto chemistry markers and sophisticated cytogenetics, the landscape has grown more intricate. Many tumors that were once categorized as UPS have undergone reclassification into distinct sarcoma types [3].

The historical subtypes of Malignant Fibrous Histiocytoma (MFH), such as storiform, pleomorphic, myxoid, giant cell, and angiomatoid variants, have become obsolete. Instead, modern diagnostic approaches hinge on the meticulous exclusion of other well-characterized STSs to discern UPS with precision [1].

In this review, we navigate the multifaceted terrain of primary lung UPS, exploring the complex diagnostic nuances and the therapeutic challenges it presents. Our exploration extends to considerations of prognosis, acknowledging the distinctive hurdles that this rare malignancy imposes on both healthcare professionals and the research community. We underscore the imperative need for ongoing investigations to unravel the mysteries surrounding UPS, with the ultimate goal of enhancing its clinical management and improving outcomes for individuals facing this disease.

Literature

Primary Undifferentiated Pleomorphic Sarcoma (UPS) of the lung is an exceedingly rare malignancy, constituting less than 0.2% of all lung tumors. Its classification was notably redefined by the World Health Organization in 2012, previously having been referred to as Malignant Fibrous Histiocytoma (MFH). UPS presents a distinct rarity within the broader spectrum of soft-tissue sarcomas [4].

Within the realm of soft-tissue sarcomas, the predominant sites of affliction are typically the extremities or the abdomen. However, primary pulmonary sarcomas stand as an exceptional rarity, with UPS of the lung representing a particularly scarce entity.

Epidemiological insights gleaned from sources such as the Surveillance, Epidemiology, and End Results (SEER) program further elucidate the unique prevalence and demographic patterns associated with UPS [5]. Among reported STS cases, UPS assumes a significant role, comprising 17.1% of the total cases. This positioning renders UPS the second most prevalent STS, trailing only behind leiomyosarcoma, regardless of the primary tumor site.

Moreover, gender disparities emerge, with males exhibiting notably higher incidence rates than females. Additionally, within the male population, white individuals are more frequently affected than their black counterparts. Furthermore, the incidence of UPS escalates linearly with advancing age, particularly beyond the sixth decade of life [5].

These epidemiological facets highlight the distinctive position of UPS within the landscape of soft-tissue sarcomas [3]. Understanding the rarity, prevalence, and demographic variations associated with UPS is pivotal for healthcare practitioners, researchers, and policymakers as they address the challenges posed by this uncommon yet clinically significant malignancy. Such insights contribute to the ongoing efforts aimed at enhancing the clinical management and outcomes for individuals grappling with UPS [5].

***Corresponding author:** A. Cardenas. FORESC Research Foundation. E-mail: Karmed@live.com

Received: September 05, 2023; Manuscript No: COCR-23-116036
Editor Assigned: September 09, 2023; PreQC Id: COCR-23-116036 (PQ)
Reviewed: September 15, 2023; QC No: COCR-23-116036 (Q)
Revised: September 19, 2023; Manuscript No: COCR-23-116036 (R)
Published: September 26, 2023; DOI: 10.4172/cocr.6(9).310

Diagnostic challenges

Diagnosing primary lung UPS demands a multifaceted approach, encompassing clinical, radiological, and histopathological evaluations. Immunohistochemistry plays a pivotal role in confirming the diagnosis, with UPS typically being a diagnosis of exclusion. The rarity of UPS necessitates a comprehensive differential diagnosis to ensure accurate identification.

Primary Undifferentiated Pleomorphic Sarcoma (UPS) of the lung presents unique challenges in terms of diagnosis and treatment. The standard of care for this rare malignancy involves surgical intervention, primarily en bloc surgical excision with microscopically negative margins, especially for stage I tumors. Achieving this often necessitates wide local excision with sufficient margins of uninvolved lung tissue. However, cases involving critical structures like major blood vessels or airways may pose greater surgical challenges [6].

In situations where surgical margins are close to the tumor (<1 cm), microscopically positive, or involve vital structures, postoperative Radio Therapy (RT) becomes a vital component of treatment. Effective RT should encompass a 5 cm margin and can be administered through various modalities, such as external beam RT (EBRT), Intra Operative RT (IORT), Low-Dose Brachytherapy (LDR), or its High-Dose Equivalent (HDR) [6,7].

Chemotherapy with various antineoplastic agents is typically reserved for advanced, widespread, or unresectable stages of Soft-Tissue Sarcomas (STSs) in the lung. For stages II and III, multidisciplinary collaboration is essential to evaluate the appropriateness of pre- or postoperative chemoradiation [8]. Unresectable cases may require a combination of chemotherapy, chemoradiation, or regional therapy [8].

In the context of stage IV disease, no specific treatment plan has garnered sufficient data support. Thus, consultation with expert oncologists specializing in STSs is crucial to tailor interventions to individual patient needs. It's important to note that extremity amputation is considered a last resort, especially since overall survival rates are not significantly superior to limb-sparing surgery in the context of primary lung UPS [8].

Beyond traditional chemotherapy, ongoing investigations explore the potential of immune checkpoint inhibition with agents like pembrolizumab, nivolumab, and ipilimumab, although their application to primary lung UPS warrants further research [9].

The principles guiding the management of primary lung UPS mirror those applied to other anatomical locations. Resectable lung tumors call for excision with negative margins, often combined with IORT, while unresectable cases may be approached with chemotherapy, chemoradiation, or HDR therapy, tailored to the unique challenges posed by this rare lung malignancy.

Leukotrienes in UPS of the lung

The usage of leukotrienes, not only in the context of asthma management but also within the domain of Undifferentiated Pleomorphic Sarcoma (UPS) of the lung, remains a subject of ongoing exploration. While leukotrienes primarily feature in asthma treatment due to their role in airway inflammation, their potential relevance to sarcoma development, including UPS, is an intriguing avenue of investigation. These lipid mediators, known for their pro-inflammatory and pro-migratory properties, could potentially exert influence in both disease contexts [10].

Leukotrienes, like LTB4 and cysteinyl leukotrienes, are known for their pro-inflammatory and pro-migratory properties. UPS is characterized by aggressiveness and metastatic tendencies, involving complex interactions within the tumor microenvironment [10].Targeting the leukotriene pathway, either through receptor antagonists or biosynthesis inhibitors, could offer a potential therapeutic avenue for UPS. However, this area requires further research, including preclinical and clinical studies, to assess its feasibility and effectiveness in managing UPS in the lung [11]. While promising, the use of leukotrienes in UPS treatment should be approached cautiously and investigated within the framework of well-designed clinical trials and scientific research [11].

Differential diagnosis

In the diagnostic journey of Undifferentiated Pleomorphic Sarcoma (UPS), a critical aspect lies in distinguishing it from other types of Soft-Tissue Sarcomas (STSs). This differentiation is pivotal and necessitates a comprehensive approach involving clinical history, physical examination, and the judicious utilization of immunohistochemistry markers .

Several STSs share clinical and histopathological features with UPS, making it imperative to consider and rule out potential differentials. These include atypical fibroxanthoma, liposarcoma, leiomyosarcoma, rhabdomyosarcoma liposarcoma, angiosarcoma fibrosarcoma, myxofibrosarcoma, dermatofibrosarcoma protuberans, osteosarcoma, and malignant peripheral nerve sheath tumor [12-15].

Moreover, UPS may exhibit certain resemblances, both clinically and histopathologically, to conditions such as metastases, desmoplastic melanoma, and spindle-cell squamous cell carcinoma. These overlapping characteristics underscore the intricacy of diagnosing UPS and emphasize the need for a meticulous diagnostic process to ensure accurate identification [16].

The differential diagnosis is a critical juncture in the evaluation of suspected UPS cases. It underscores the importance of a comprehensive clinical assessment and the judicious application of immunohistochemistry markers to differentiate UPS from its mimicking counterparts. This aspect of diagnosis is essential for guiding appropriate management and therapeutic strategies tailored to the specific type of STS [16].

Prognosis

Primary lung UPS exhibits an aggressive clinical course with a high likelihood of recurrence and metastasis. Survival rates vary, but some long-term survival cases have been documented. Vigilant post-treatment follow-up is imperative due to the malignancy's aggressive nature [5].

Timely disease recognition and appropriate treatment strategies are pivotal for improving UPS prognosis. In retrospective analysis, recurrences were observed in a notable percentage of cases, with a higher risk associated with larger tumors and advanced staging. Metastasis risk was elevated in intermediate-sized tumors and those with vascular or lymphatic invasion [5].

Post-treatment, local recurrence was statistically associated with advanced age and inadequate surgical margins, while metastatic disease was more prevalent in larger tumors. Overall survival rates at 5 and 10 years stand at 60% and 48%, respectively [17].

Interestingly, radiation-associated UPS exhibited worse disease-specific survival and recurrence rates compared to sporadic UPS. Regular follow-up visits are essential for monitoring recurrence or metastasis [17].

Conclusion

Undifferentiated Pleomorphic Sarcoma (UPS) of the lung, constituting less than 0.2% of all lung tumors, presents a diagnostic and therapeutic enigma. Once categorized as Malignant Fibrous Histiocytoma (MFH) until its reclassification in 2012, UPS stands as a rare and challenging malignancy.

This review illuminates the intricate landscape of primary lung UPS, emphasizing diagnostic intricacies, therapeutic strategies, and prognosis. Diagnosis primarily hinges on excluding other well-classified soft-tissue sarcomas, making early recognition paramount.

Treatment revolves around aggressive measures, including en bloc surgical excision with microscopically negative margins, often supplemented by adjuvant therapies such as radiotherapy or chemotherapy. Recent studies underscore the pivotal role of surgical margin adequacy and tumor size in shaping the disease course, offering valuable insights into improving overall prognosis.

Survival rates for primary lung UPS remain modest, reflecting the urgency of further research and refined treatment paradigms. Ongoing investigations explore promising frontiers, including immunotherapy, aiming to enhance therapeutic outcomes.

Collaborative, multidisciplinary approaches, uniting oncologists, surgeons, and radiation therapists are instrumental in delivering optimal care to UPS patients. As our understanding of this rare malignancy evolves, it is incumbent upon the medical community to continue advancing research, conducting clinical studies, and refining treatment protocols.

In conclusion, this review underscores the persistence necessary to confront the complexities presented by primary lung Undifferentiated Pleomorphic Sarcoma (UPS). Through the collaborative accumulation of knowledge and the cultivation of innovative approaches, there is potential to enhance the prognosis and quality of life for individuals affected with this uncommon and defiant disease.

References

1. Robles-Tenorio, A., & Solis-Ledesma, G. (2021). Undifferentiated pleomorphic sarcoma.
2. Travis WD, Brambilla E, Noguchi M, Nicholson AG, Geisinger KR, et al. (2011). International association for the study of lung cancer/american thoracic society/european respiratory society international multidisciplinary classification of lung adenocarcinoma. J thorac oncol 6(2), 244-285.
3. Cardenas, C. A. (2023). Sarcomas:"A Comprehensive Review of Classification, Diagnosis, Treatment, and Psychosocial Aspects. Clin Oncol Case Rep 6, 6, 2.
4. Mankin HJ, & Hornicek FJ. (2005). Diagnosis, classification, and management of soft tissue sarcomas. Cancer control 12(1), 5-21.
5. Gu H, Song R, Beeraka NM, Li T, Zhao D, et al. (2023). SEER-Based Survival Nomogram (1998-2015) Based on 'Stage, Lymph Node Dissection, Tumor Size and Degree of Differentiation, and Therapies' for Prognosis of Primary Pulmonary Sarcoma. Technol Cancer Res Treat 22, 15330338221150732.
6. Von MM, Kane JM, Bui MM, Choy E, Connelly M, et al. (2020). NCCN guidelines insights: soft tissue sarcoma, version 1.2021: featured updates to the NCCN guidelines. J Natl Compr Cancer Netw 18(12), 1604-1612.
7. Fleming C, Rimner A, Gil'ad NC, Woo KM, Zhang Z, et al. (2016). High- and low-dose-rate intraoperative radiotherapy for thoracic malignancies resected with close or positive margins. Brachytherapy, 15(2), 208-215.
8. Steen S, & Stephenson G. (2008, October). Current treatment of soft tissue sarcoma. In Bayl Univ Med Cent Proc (Vol. 21, No. 4, pp. 392-396). Taylor & Francis.
9. Shiravand Y, Khodadadi F, Kashani SMA, Hosseini-Fard SR, Hosseini S, et al. (2022). Immune checkpoint inhibitors in cancer therapy. Curr Oncol 29(5), 3044-3060.
10. Abrishami S, Acharya S, Cueva MC, Sundaram DM, Salian RB, et al. (2023). Role of Leukotriene Antagonists in the Treatment of Asthma Exacerbations. J Crit Care Emerg Med 2(2), 1-4.
11. Tian W, Jiang X, Kim D, Guan T, Nicolls MR, et al. (2020). Leukotrienes in tumor-associated inflammation. Front. Pharmacol., 11, 563120.
12. Nodar SR, Salazar S, Cárdenas C, Yllán VG. (2022). Testicular Tumor in Children: A Rare Case Report. Curr Pract Med Sci Vol. 9, 25-34.
13. Cardenas C. A, & Rosero D. (2023). Para-Testicular Mesenchymal Chondrosarcomas: an Updated Review of Clinical Insights and Therapeutic Considerations. J Clin Images Rep SRC/JCIR-118. DOI: doi. org/10.47363/JCIR/2023 (2), 116, 2-4.
14. Donoso PC, Pérez MPS, Aguirre CC, Barbosa, AO, Gómez CMG, et al. (2022). Angiosarcoma suprarrenal primario. Arch Patol 3(3), 96-103.
15. Nodar SR, Ortíz Barbosa AP, García BE, Aguirre CC, Cárdenas Gómez JT, et al. (2022). Primary Angiosarcoma of the Spleen with Spontaneous Rupture: A Case Report. Clin Oncol Case Rep 5, 9, 2.
16. Baldovini C, Rossi G, & Ciarrocchi A. (2019). Approaches to tumor classification in pulmonary sarcomatoid carcinoma. Lung Cancer: Targets Ther.131-149.
17. Vodanovich DA, Spelman T, May D, Slavin J, Choong PF, et al. (2019). Predicting the prognosis of undifferentiated pleomorphic soft tissue sarcoma: a 20-year experience of 266 cases. ANZ j surg 89(9), 1045-1050.

Author Affiliations Top

FORESC (Foundation For Research and Sciences), USA