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Diagnosing the Uncommon: Liposarcoma of the Head and Neck

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Abstract

Liposarcomas are rare malignant tumors that primarily affect soft tissues, with a limited occurrence in the head and neck region. This article presents three cases of liposarcomas in young male patients within the head and neck region, highlighting the diagnostic challenges and differential diagnostic considerations. Case 1 involved a maxillary liposarcoma, initially considered as a schwannoma or lipoma. Case 2 presented as a thyroid adenocarcinoma but was later diagnosed as a para-tracheal myxoid liposarcoma. Case 3 describes a scalp liposarcoma displaying pleomorphic characteristics.

Head and neck liposarcomas are relatively uncommon, accounting for a small percentage of all sarcomas in this region. Liposarcomas in young adults are rare, and their occurrence in deep head and neck tissues is even rarer. Histologically, liposarcomas can be categorized into five distinct subtypes. Among these, the most common subtypes are well-differentiated liposarcoma and myxoid liposarcoma, while pleomorphic liposarcoma represents the subtype with the highest grade. The prognosis of head and neck liposarcomas is generally more favorable than non-head and neck liposarcomas, often presenting at an early stage. Treatment primarily involves surgical resection, with or without adjuvant radiotherapy.

In conclusion, head and neck liposarcomas are rare entities that necessitate a high level of suspicion for accurate diagnosis. Understanding the histological characteristics is crucial, particularly when dealing with fine needle aspiration cytology and squash preparations. These cases underscore the importance of considering liposarcomas in the differential diagnosis of head and neck tumors, despite their infrequent occurrence in this region.

Keywords: Liposarcoma, Head and neck, Myxoid, Pleomorphic, Well-differentiated

Introduction

Liposarcoma are considered the most common soft tissue mesenchymal sarcomas in adults and accounts for approximately 17-30% of all soft tissue sarcomas [1-5]. They exhibit a predilection for the extremities and the retroperitoneum. Of all the sarcomas occurring in the head and neck, liposarcoma comprise only 2-9% of sarcomas found in that region [5,6]. Due to the paucity of occurrence of this entity in the head and neck region, our knowledge of this sarcoma is limited and makes the clinical identification and treatment decisions very challenging. Herewith we report three cases of head and neck liposarcomas, presenting in young males, and we emphasize the diagnostic difficulties and the differential diagnostic issues.

Case Summary:

Case 1:

A twenty eight year old, young male, presented with a painless swelling in the right cheek for 15 days. CT scan showed a large hypodense lesion, in the infratemporal region, without any significant enhancement, extending into the right pterygopalatine fossa, masticator and buccal spaces, without bone erosion (Figure 1). Bilateral sub centimeter neck nodes were also seen. Differential diagnoses considered on CT scan were schwannoma versus a lipoma, emphasizing that it was mesenchymal in nature. The patient subsequently underwent a surgical removal of the mass, followed by an uneventful postoperative recovery.

Gross: The freshly excised specimen measured 5.5x3x2 cm and was a fleshy, yellowish mass with a glistening moist shiny appearance (Figure 2). Cut section revealed a firm, solid, grayish white jelly-like mass, showing myxoid and hemorrhagic areas. One solid bright yellow area was noted at one pole. No cystic or necrotic areas were identified.

Microscopy: Adipocytic elements were seen lying in a loose myxoid and hemorrhagic matrix (Figure 3). The tumor was composed of numerous large cells with vacuolated cytoplasm, resembling lipoblasts. Also seen were many stellate cells and bizarre multinucleated cells, lying within a loose myxoid matrix (Figure 4). There was no necrosis.

Based on gross and microscopic examination a diagnosis of "Pleomorphic Liposarcoma of the Maxilla" was offered.

Case 2:

Another twenty eight year old, young male patient presented with a painless swelling in the right neck region for 2 months. FNAC of the lesion done in an outside institute was reported as a mucinous adenocarcinoma of the thyroid gland. CT scan showed a non enhancing lesion in the superior mediastinum extending up into the posterior triangle of the neck and displacing the thyroid and the trachea (Figure 5).

An intraoperative frozen section (FS) was requested. Grossly, the specimen sent for FS consisted of multiple, whitish, sticky tissue fragments, covered with gleet like material. However, the tissue did not freeze or cut well, so squash cytology smears of the tissue were performed which on microscopy showed signet ring like cells in a vascular & mucoid background (Figure 6). A mistaken diagnosis of Adenocarcinoma was offered. The surgeon went ahead and carried out a complete excision of the mass.

Gross: An irregular shaped huge mass measuring 12x7x4 cm was received. External surface was slimy with areas of nodularity (Figure 7). Cut surface showed areas of calcification. The tumor as a whole showed a gelatinous appearance with abundant mucinous material. Necrotic and hemorrhagic areas were not identified.

Microscopy: Paraffin sections showed a variegated tumor with myxoid and round cell areas (Figure 8,9). This tumor revealed signet-ring cell like lipoblasts (resembling adenocarcinoma cells) which proved to be a diagnostic challenge on the squash cytology. The stroma consisted of abundant mucin with low cellularity at places. A typical chicken wire pattern of vasculature was noted.

Based on the overall microscopic findings a final diagnosis of "Myxoid Liposarcoma of the Para Tracheal Region"

Case 3:

A thirty six year old, male patient presented with a rapidly growing painless mass in the scalp. The mass was excised with adequate surgical resection margins and sent for routine histopathological examination.

Gross: An irregular vaguely lobulated mass measuring 3.7x3x2.5 cm was received in fresh state. External surface was yellowish and slimy to touch. Cut surface was yellowish to greyish white with few areas of necrosis and hemorrhage.

Microscopy: Paraffin sections revealed the presence of high-grade cells exhibiting pleomorphic tumor cells with prominent cytoplasmic vacuolization, with certain forms resembling characteristic lipoblasts displaying scalloped nuclei (Figure 10)

Based on the gross and microscopic findings a final diagnosis of "Pleomorphic Liposarcoma of the scalp" was rendered.

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Discussion:

Head and neck liposarcomas account for a very small proportion (2-9%) of all sarcomas of this region [5,6]. Most liposarcomas occur in the subcutaneous connective tissues of the face, neck and scalp [7]. Liposarcomas as a whole tends to affect adults in later life, with the peak incidence in the seventh decade and has a slight male preponderance. Liposarcoma in the young age group is rare and occurs mainly in the second decade of life [8]. It has a different spectrum of presentation compared to adult cases. Patients presenting in the younger age group have a better overall prognosis as compared to older individuals [7].

Liposarcomas have been classified by the World Health Organization (WHO) based on their histopathological appearance into five subtypes: pleomorphic, myxoid, well-differentiated, dedifferentiated and myxoid pleomorphic liposarcoma [9].

Pleomorphic liposarcoma is the highest grade subtype, and carries the worst prognosis. Fortunately, this subtype is rare, accounting for less than 5% of all liposarcomas [10,11]. It develops during late adult life with peak incidence in the seventh decade. Two-thirds of the cases occur in the extremities and about one quarter develop in subcutaneous fat [12,13]. Our cases are extremely rare since it occurred in young adults and the deep tissues of the maxilla and subcutis of the scalp. These liposarcomas display two clearly distinguishable histologic patterns. The more common pattern resembles an undifferentiated pleomorphic sarcoma which contains, in addition, giant lipoblasts with bizarre hyperchromatic and scalloped nuclei. The second less frequent pattern consists of sheets of large pleomorphic giant cells with smaller mononuclear forms. Both cell types are highly vacuolated and lipid-rich, and lipoblasts are easy to identify. These two cell populations are present in varying proportions in this tumor subtype. These tumors are aggressive sarcomas with local recurrence and metastatic rates of 30- 50% and an overall 5-year survival of about 60% [12,13].

Myxoid liposarcoma is the second most common subtype forming 20-30% of cases with a peak incidence during the fourth and fifth decade of life [14]. Although it is the most prevailing liposarcoma subtype among children and adolescents [15,16]. They are typically found in deep soft tissues of the extremities. These tumors embrace a continuum of lesions which includes, at one extreme, highly differentiated myxoid tumors with distinguishable lipoblastic differentiation to poorly differentiated round cell tumors. The highly differentiated pure myxoid liposarcomas are multinodular masses of low cellularity with discrete lipoblasts. The cells are characteristically small without any discernible nuclear pattern, and without much mitotic activity. Rarely, the nuclei are enlarged and hyperchromatic. They can be distinguished from myxomas due to the presence of a delicate plexiform capillary vascular network throughout these tumors. Myxoid liposarcomas lose their differentiation in a gradual fashion and assume an increasingly round cell appearance. The cellularity becomes greater, the cells become larger with a more rounded shape, are arranged back to back with overlapping nuclei and obscure the vasculature. The recognition of the amount of round cell differentiation is important since it directly correlates to the clinical outcome. Kilpatrick et al. has used a three tiered system (0-5%, 5-25% and greater than 25% round cell component) in which the percentage of round cell component is directly proportional to chances of metastasis and the clinical outcome [17]. Overall, these tumors are considered to be of low to intermediate grade and have an excellent prognosis. Our case was unique in involving the paratracheal soft tissue in a young adult. Histologically it showed a gradual transition of myxoid areas with characteristic lipoblasts to more rounded and cellular tumor cells in sheets. The round cell component comprised less than 5% of the tumor. Myxoid liposarcomas are characterized by a reciprocal translocation between chromosomes 12 and 16: t(12;16)(q13;p11) which results in a fusion protein of DDIT3 (previously CHOP) gene on chromosome 12 and FUS (TLS) gene on chromosome 16. Targeted therapy with Trabectedin, a DNA minor groove binding drug has shown promise which is directed at nullifying the effect of the fusion protein of FUS-DDIT3 gene [18].

The other two subtypes of liposarcomas are Well-differentiated liposarcoma (WDLPS) and Dedifferentiated Liposarcoma (DDLPS). WDLPS is the most common subtype and represents 40-45% of cases with a peak incidence in the fourth and fifth decades of life [19]. They are most commonly seen in

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the deep soft tissues of proximal extremities and trunk [19-21]. WDLPSs are traditionally divided into three subtypes: lipoma-like, sclerosing and inflammatory types. The typical lipoma-like WDLPS shows predominantly mature fat cells with a variable number of spindled cells with hyperchromatic nuclei and multivacuolated lipoblasts. The sclerosing form has dense fibrotic zones alternating with mature adipocytes. Lipoblasts are usually rare to be found. The inflammatory type shows dense lymphoplasmacytic infiltrate superimposed on a lipoma-like or sclerosing form of WDLPS. It is the lowest grade of all subtypes, and as such, tends to carry a better prognosis [18]. In the majority of cases, there is amplification of MDM2 and/or CDK4 [22-24].

Dedifferentiated liposarcoma (DDLPS) is believed to arise from long standing or recurrent well-differentiated tumors and sometimes considered as a subtype of WDLPS. Depending on the amount of dedifferentiation, these can be intermediate or high grade. DDLPS peaks in the early seventh decade and accounts for 18% of liposarcomas [25]. These occur more commonly in the retroperitoneum than the deep soft tissues of the extremities. DDLPSs display areas of WDLPS with an abrupt transition into the dedifferentiated component. The dedifferentiated zones have the appearance of a high grade fibrosarcoma or undifferentiated pleomorphic sarcoma in 90% of cases. It has been proposed that dedifferentiated areas should have a mitotic count of at least 5 mitotic figures per 10 high power fields [26]. Though this criterion has not been used as many high grade non-lipomatous sarcomas do not meet this standard. The behavior of DDLPS is similar to, but slightly better than, that of other pleomorphic high grade sarcomas in adults. In the experience of Henricks et al, 41% of patients experience local recurrences, 17% metastasis and 28% death from their tumors [27]. DDLPS shares genetic commonalities with WDLPS, as both entities exhibit a consistent amplification of MDM2 and CDK4 (located at 12q14-q15) [23,28].

Head and neck liposarcomas usually have a more favorable tumor grade and histology when compared to liposarcomas of the non-head and neck sites. Well differentiated and myxoid types are more commonly encountered whereas pleomorphic and dedifferentiated liposarcomas are less common [7].

Liposarcomas of the head and neck were more frequently diagnosed early at the T1 stage when compared to the non-head and neck liposarcomas which were typically more advanced at presentation. Nodal metastasis was also found to be more common in the non-head and neck liposarcomas. Distant metastasis was equally seen at presentation in both the groups [7].

Overall, patients with head and neck liposarcomas presented with an early stage of the disease when compared to the non-head and neck liposarcoma patients. This could be explained due to the increased visibility and accessibility of these sites.

Head and neck liposarcomas are either treated with surgery alone or with a combination of surgery and radiotherapy or with radiation therapy alone. The prognosis is dependent on the treatment modality with patients receiving only radiation therapy having significantly worse outcomes than patients receiving either surgical resection alone or surgery plus adjuvant radiotherapy. All three of our patients were treated with surgery alone and are disease free for 2 years after the surgery.

Conclusion:

Head and neck liposarcomas display a lower grade and stage at the time of diagnosis as well as a significantly improved overall prognosis as compared to non-head and neck liposarcomas. A high degree of suspicion is often required to diagnose these cases owing to its rarity and its varied presentation. Knowledge of histology is also very important in these cases to overcome the misinterpretation that can occur in fine needle aspiration cytology and squash preparations, wherein the mature lipoblasts can be mistaken for signet ring cells.

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Figure 1: CT Scan (Coronal View) shows a large hypodense non-enhancing lesion in the infratemporal region.

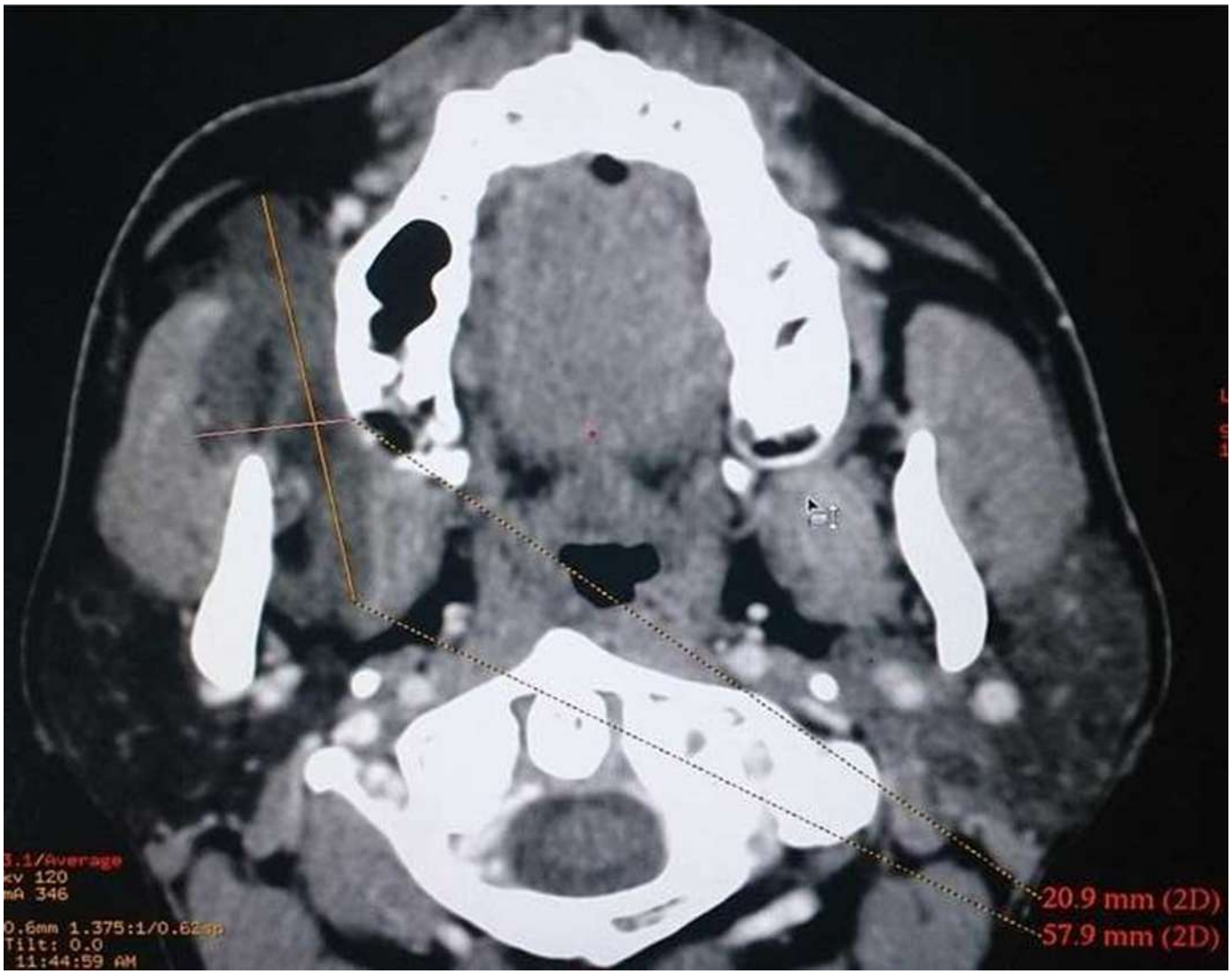

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Figure 2: Gross photograph of Liposarcoma of Maxilla showing soft fleshy greyish white mass with a glistening shiny appearance.

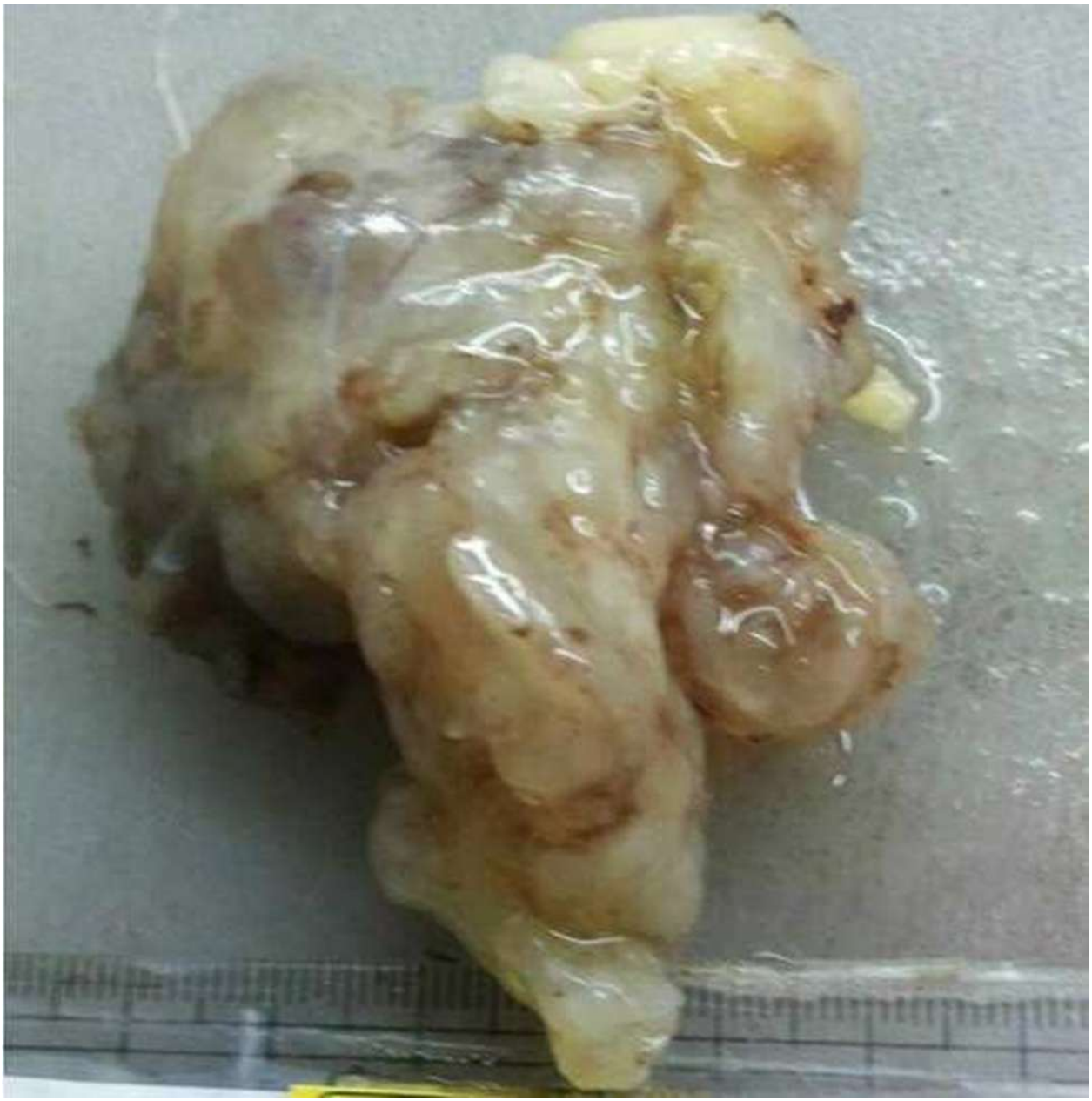

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Figure 3: Histology of Liposarcoma of Maxilla showing numerous lipoblasts in a loose myxoid and hemorrhagic background [H&E, X100]

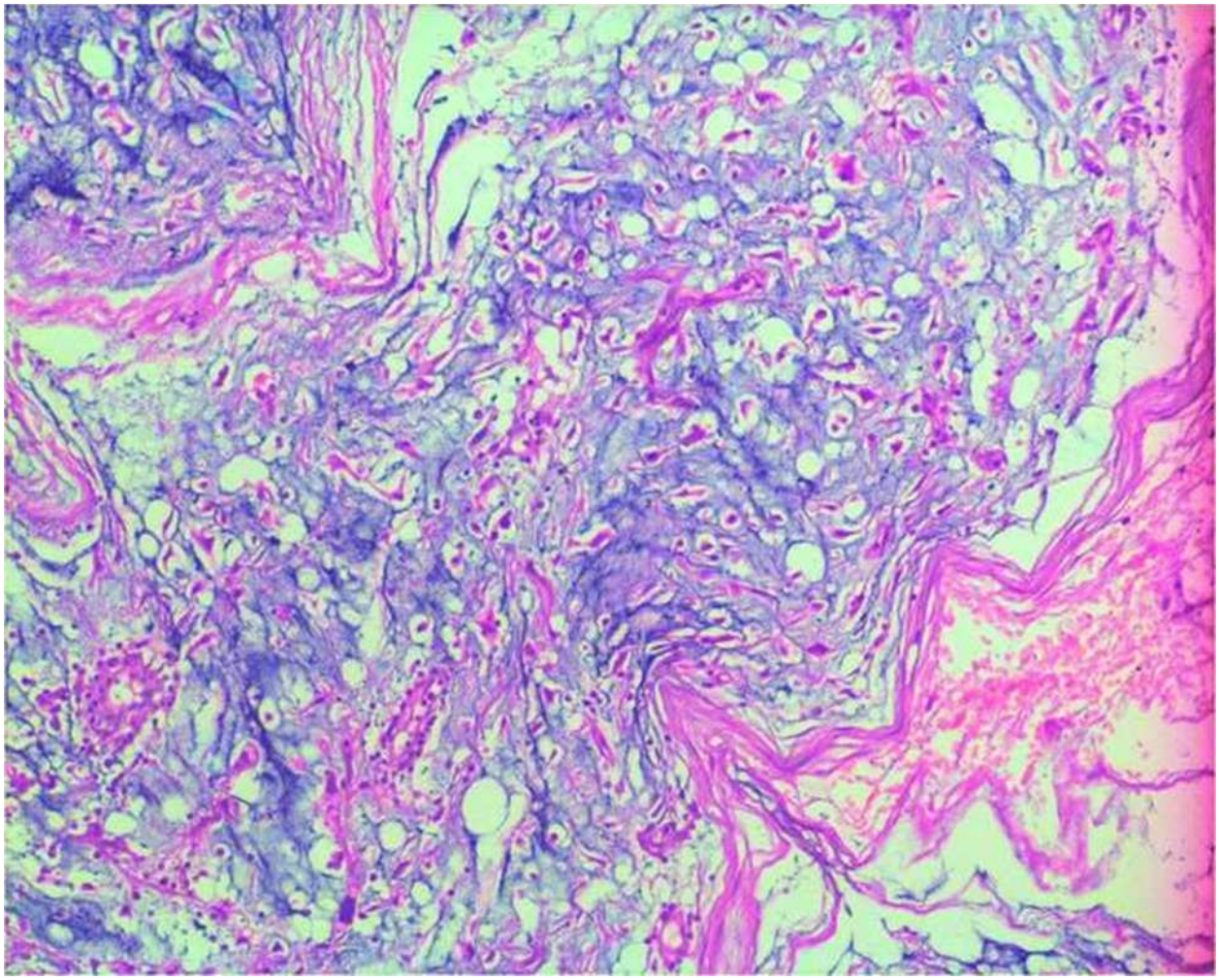

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Figure 4: Histology of Liposarcoma of Maxilla showing large vacuolated lipoblasts with bizarre cells (Inset) [H&E X400, Inset, X1000]

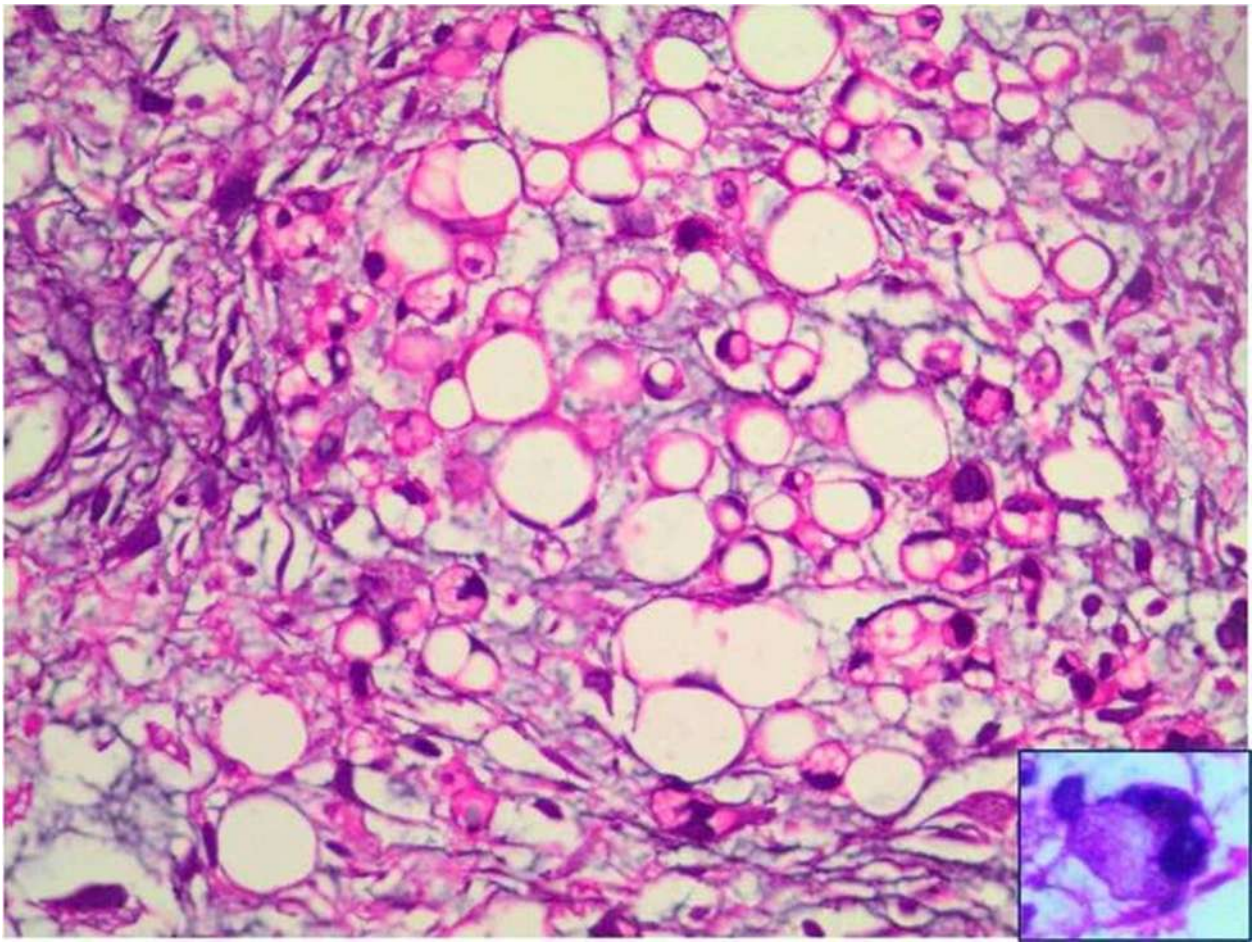

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Figure 5: CT Scan (Coronal View) shows a large hypodense non-enhancing mass in the paratracheal region displacing the thyroid and trachea.

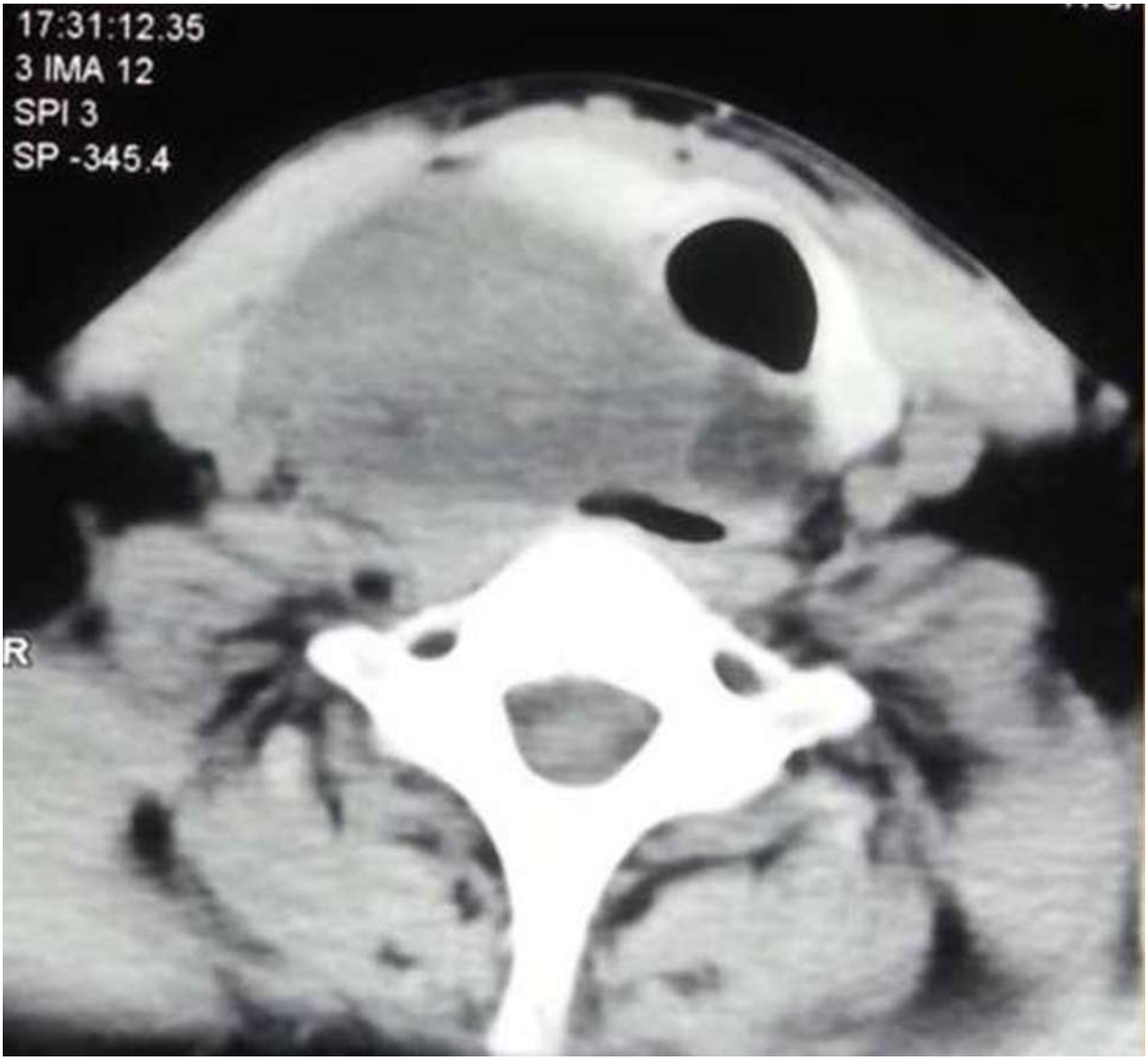

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Figure 6: Squash Cytology of Paratracheal Liposarcoma. A) & B) Signet ring-like cells [H&E, X200] along with C) Long endothelial channels [H&E, X400] and D) Mucoid background [H&E, X100]

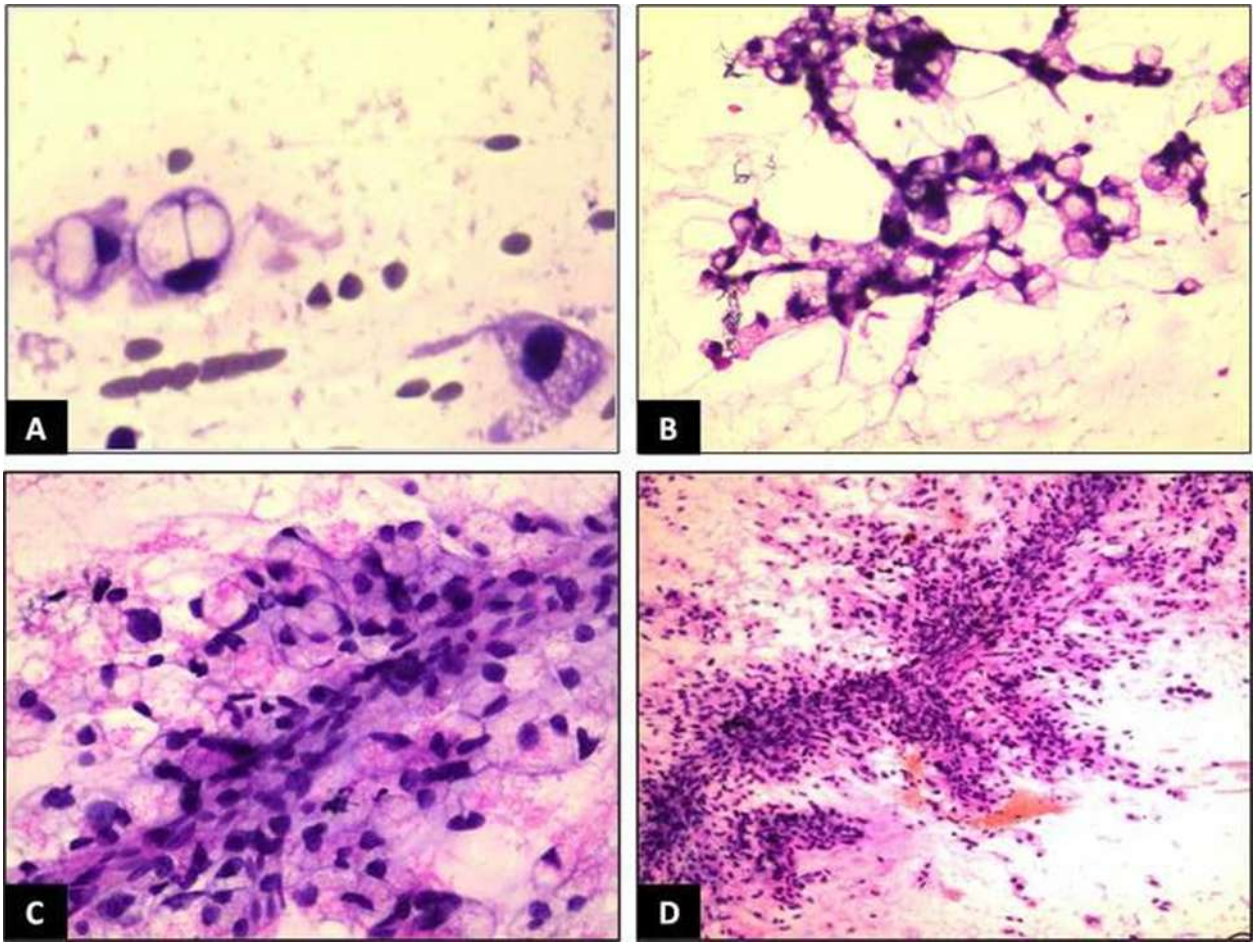

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Figure 7: Gross photograph of Paratracheal Liposarcoma showing a large irregular nodular mass along with a part of normal thyroid tissue

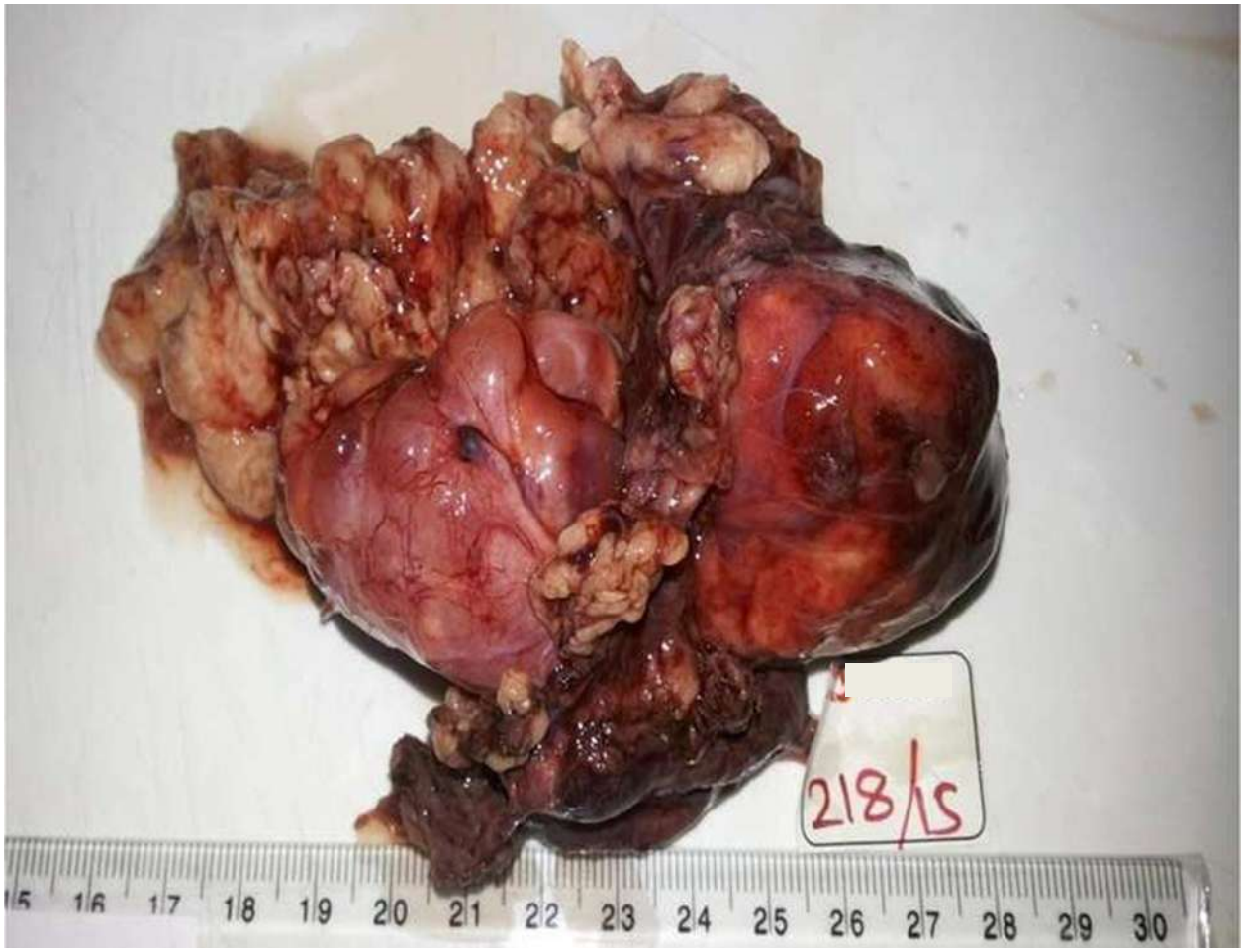

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Figure 8: Histology of Paratracheal Liposarcoma showing numerous lipoblasts lying in a loose myxoid background [H&E, X400]

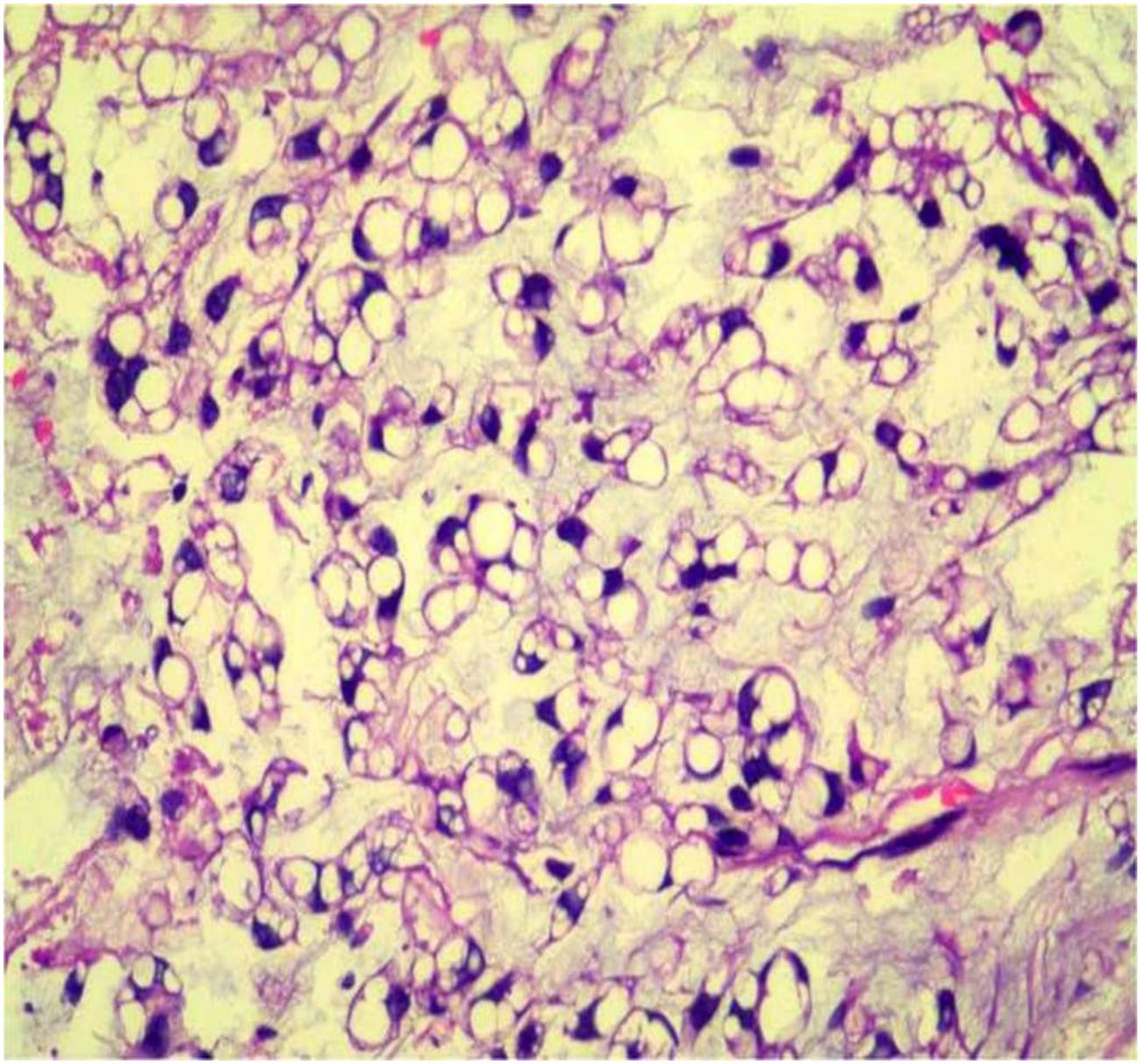

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Figure 9: Histology of Paratracheal Liposarcoma showing sheets of round hyperchromatic tumor cells devoid of a myxoid stroma [H&E, X400]

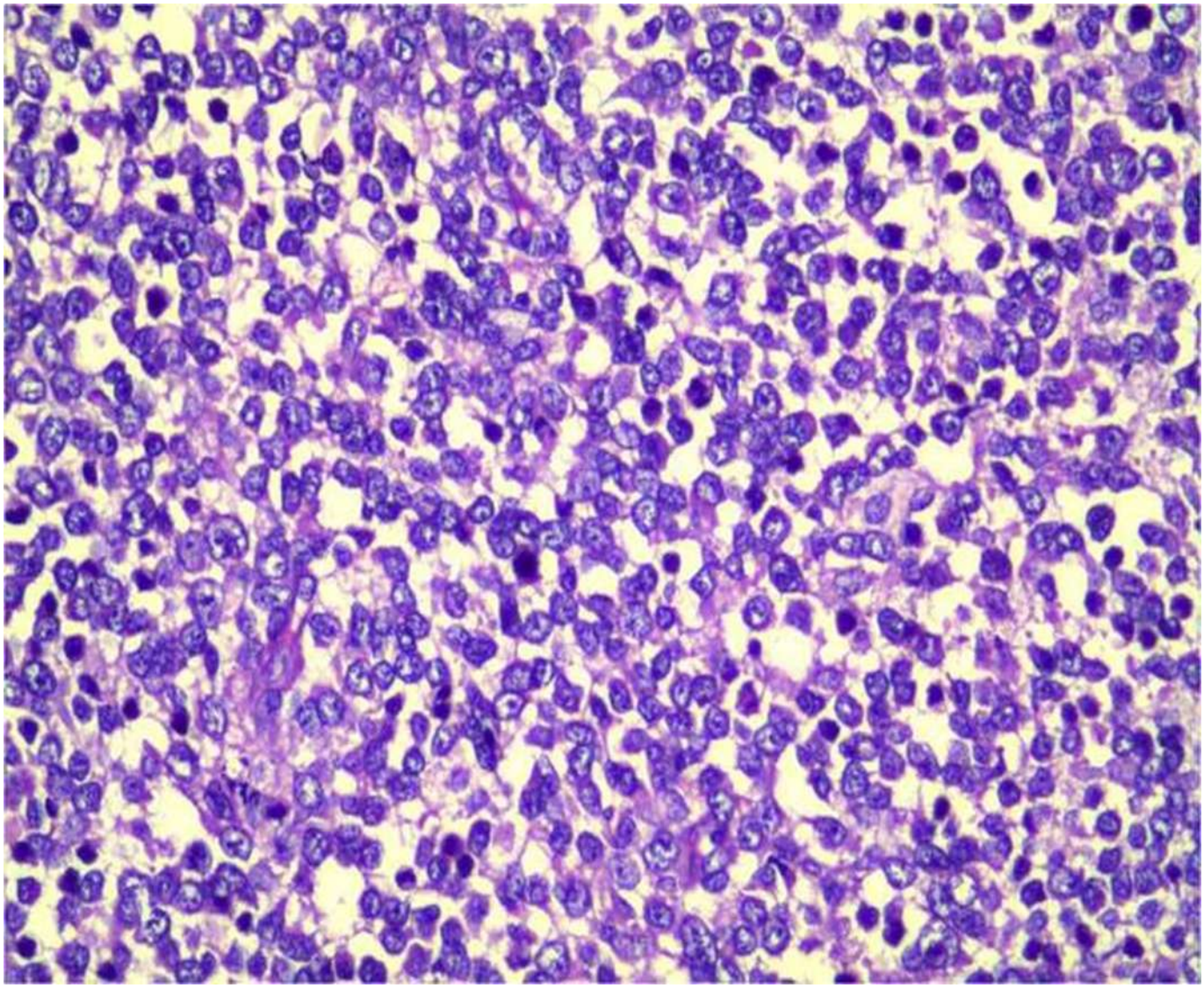

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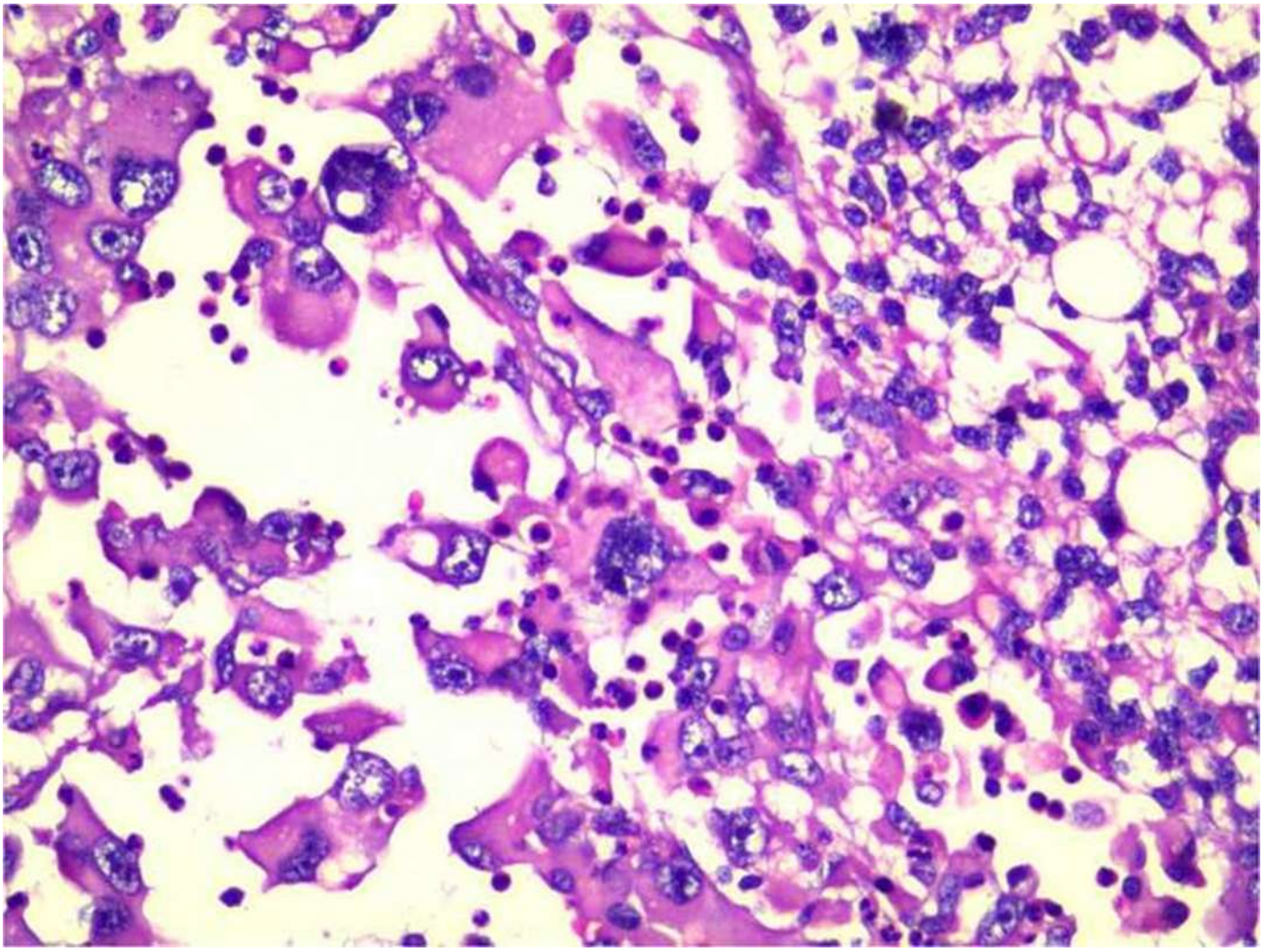
Figure 10: Histology of Pleomorphic Liposarcoma of Scalp showing large pleomorphic lipoblasts lying in a loose stroma [H&E, X400]



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