Section: Oncology

Case Report

CHONDROSARCOMA OF THE HYOID BONE INVOLVING PARAPHARYNGEAL SPACE: A RARE HEAD AND NECK MALIGNANCY

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ABSTRACT

Background: Chondrosarcoma is a rare malignant cartilaginous tumor of the head and neck, and primary involvement of the hyoid bone is exceedingly uncommon. Tumors arising in this location may extend into the parapharyngeal space, posing diagnostic and surgical challenges due to deep anatomical location and nonspecific clinical presentation.

Case Presentation: A 48-year-old male presented with a slowly enlarging, painless left-sided neck swelling of 10 months' duration. Imaging demonstrated a well-defined heterogeneous mass in the left parapharyngeal space with internal septations, punctate calcifications, and partial encasement of the hyoid bone. Fine needle aspiration cytology suggested a chondroid lesion but could not exclude malignancy. The patient underwent wide local excision with left hyoidectomy and left selective neck dissection (Levels I–IV). Histopathological examination confirmed a well-differentiated (Grade I) chondrosarcoma with soft tissue extension (pT3N0). Surgical margins were negative, and lymph nodes showed no metastasis.

Management and Outcome: Complete surgical resection was achieved with tumor-free margins. No adjuvant therapy was administered. The patient was advised long-term radiological surveillance due to the potential risk of local recurrence.

Conclusion: Hyoid bone chondrosarcoma with parapharyngeal extension is an exceptionally rare entity that may mimic benign lesions on imaging and cytology. Histopathological evaluation remains essential for definitive diagnosis. Complete surgical excision with negative margins offers favorable outcomes in low-grade tumors, with long-term follow-up necessary to detect recurrence.

Keywords: Chondrosarcoma; Hyoid bone; Parapharyngeal space; Head and neck tumor; Low-grade sarcoma.

INTRODUCTION

Chondrosarcoma is a malignant mesenchymal tumor characterized by the production of cartilaginous matrix by neoplastic cells. It represents the second most common primary malignant tumor of bone after osteosarcoma.[1] Although it predominantly affects the pelvis, femur, and shoulder girdle, involvement of the head and neck region is relatively uncommon, accounting for approximately 1–12% of all chondrosarcomas.[1–3]

Within the head and neck, chondrosarcomas most frequently arise from the maxilla, mandible, nasal septum, skull base, and laryngeal cartilages—sites associated with residual embryonic cartilage or endochondral ossification centers.[2,3] Primary chondrosarcoma of the hyoid bone is exceedingly rare, with only a limited number of cases reported in the literature.[6-7]

The hyoid bone is a unique U-shaped structure located in the anterior neck at the level of the third cervical vertebra. Unlike other bones, it does not articulate directly with adjacent osseous structures

and serves as an anchoring point for suprahyoid and infrahyoid muscles involved in swallowing and phonation. Embryologically, the hyoid develops from the second and third branchial arches and contains cartilaginous components that may theoretically undergo neoplastic transformation. However, malignant tumors arising from this site remain exceptionally uncommon.[6,11]

Chondrosarcomas of the head and neck typically present as slow-growing, painless masses, and symptoms usually result from mass effect rather than early aggressive behavior.[1,2] When arising in deep neck spaces such as the parapharyngeal space, patients may present with medial displacement of the oropharyngeal wall, dysphagia, voice alteration, or airway compromise depending on tumor size and extent.[4,5] The parapharyngeal space is anatomically complex and contains critical neurovascular structures, making both diagnosis and surgical management challenging.

Radiologically, chondrosarcoma often appears as a lobulated mass with characteristic chondroid matrix mineralization, described as punctate or "ring-and-arc" calcifications on computed tomography.[8,9] Magnetic resonance imaging is particularly useful in assessing soft tissue extension and relationship to adjacent neurovascular structures. However, imaging and cytology frequently fail to reliably distinguish between benign chondroma and low-grade chondrosarcoma.[12,13]Histopathological examination therefore remains the gold standard for definitive diagnosis and grading.

Given the rarity of chondrosarcoma arising from the hyoid bone particularly with extension into the parapharyngeal space each reported case adds valuable insight into clinical presentation, radiologic features, pathological characteristics, and management outcomes.[6,15] We present a rare case of well-differentiated chondrosarcoma of the hyoid bone involving the parapharyngeal space and discuss its diagnostic and therapeutic considerations.

CASE PRESENTATION

A 48-year-old man presented with a progressively enlarging, painless swelling in the left upper neck for 10 months. He denied dysphagia, odynophagia, dyspnea, voice change, fever, weight loss, or other constitutional symptoms. There was no history of trauma, prior neck surgery, radiation exposure, or significant comorbidity.

Examination: A firm, well-defined, non-tender mass (~4–5 cm) was palpable in the left submandibular region extending toward the upper anterior neck. The swelling was mobile horizontally with restricted vertical mobility. Overlying skin was normal. Intraoral examination showed medial bulging of the left lateral oropharyngeal wall, suggestive of parapharyngeal space involvement. Cranial nerve examination was normal. No clinically significant cervical lymphadenopathy was detected.

Imaging: Contrast-enhanced MDCT demonstrated a well-defined heterogeneous lesion (4.2 × 4.3 × 4.1 cm) in the left parapharyngeal space with internal septations and punctate calcifications. The lesion displaced the oropharyngeal wall medially and demonstrated partial encasement with cortical irregularity of the left half of the hyoid bone. MRI showed a lobulated heterogeneous mass with septations, close relation to the left hyoid, and medial airway displacement [Figure 1–4].

Cytology: Ultrasound-guided FNAC revealed lobules of hyaline cartilage with mild pleomorphism and occasional binucleated cells; malignancy could not be excluded.

Surgery: The patient underwent wide local excision of the mass with left hyoidectomy and left selective neck dissection (Levels I–IV). Intraoperatively, a well-circumscribed chondroid tumor (~5 cm) was identified in the left parapharyngeal space, closely related to the hyoid. Frozen section suggested an atypical chondroid neoplasm suspicious for chondrosarcoma.

Histopathology: The tumor consisted of lobules of hyaline cartilage showing mild nuclear atypia, occasional binucleation, and low mitotic activity (1–2/10 HPF), consistent with well-differentiated (Grade I) chondrosarcoma. Soft tissue extension was present (pT3). Surgical margins were negative.

Management and Outcome: The patient subsequently underwent wide local excision of the mass with left selective neck dissection (Levels I–IV) and left-sided hyoidectomy on January 19, 2024. Reconstruction was performed using a rotational sternocleidomastoid muscle flap during the same operative session. Intraoperatively, a well-circumscribed chondroid tumor measuring approximately 5 cm was identified in the left parapharyngeal space in close relation to the hyoid bone. Frozen section examination suggested an atypical chondroid neoplasm, and the possibility of chondrosarcoma was raised.

Complete surgical excision with negative margins was achieved. Final histopathological analysis confirmed a well-differentiated (Grade I) chondrosarcoma with soft tissue extension (pT3N0). All lymph nodes retrieved from the left selective neck dissection (Levels I–IV) were reactive and negative for metastasis. Given the low-grade nature of the tumor and clear surgical margins, no adjuvant radiotherapy was administered. The postoperative course was uneventful, and the patient was advised regular long-term radiological surveillance to monitor for potential local recurrence.

[Figure 1] Notes: Coronal contrast-enhanced magnetic resonance image of the neck demonstrating a well-defined heterogeneous mass in the left parapharyngeal space. The lesion measures approximately 44.66 mm × 40.33 mm in maximal dimensions, with an additional smaller component measuring 12.59 mm. Internal septations are evident within the mass. The tumor produces medial displacement of the oropharyngeal airway and is seen

in close relation to the left half of the hyoid bone, features suggestive of a cartilaginous neoplasm.

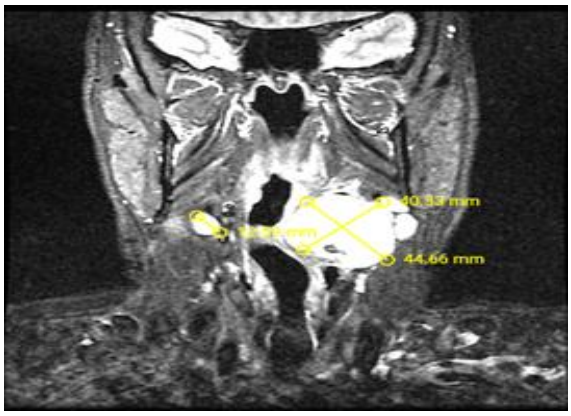

Figure 1: Coronal Contrast-Enhanced MRI Showing Left Parapharyngeal Chondrosarcoma

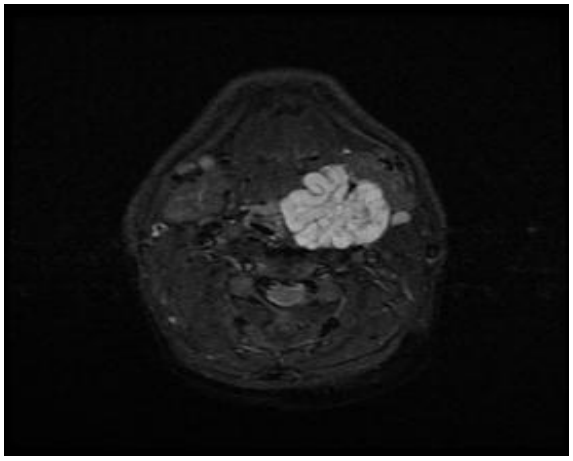

Figure 2: Axial Contrast-Enhanced MRI Demonstrating Left Parapharyngeal Space Mass

Figure Notes: Axial contrast-enhanced magnetic resonance image of the neck revealing a lobulated, hyperintense mass in the left parapharyngeal space. The lesion demonstrates heterogeneous enhancement with well-defined margins and internal septations. Medial displacement of the oropharyngeal airway is noted. The mass is seen in close relation to the hyoid region, consistent with a cartilaginous neoplasm involving the deep neck space.

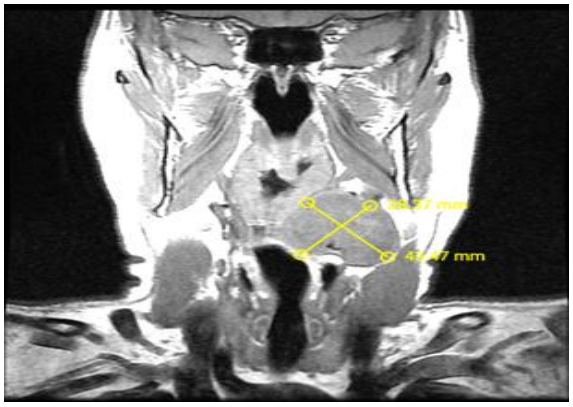

Figure 3: Coronal Contrast-Enhanced MRI Showing Parapharyngeal Space Involvement.

Figure Notes: Coronal contrast-enhanced magnetic resonance image of the neck demonstrating a well-circumscribed heterogeneous mass in the left parapharyngeal space measuring approximately 43.47 mm × 38.37 mm in maximal dimensions. The lesion exhibits internal septations and produces medial displacement of the oropharyngeal airway. The mass is closely related to the left hyoid bone, suggestive of a cartilaginous neoplasm with deep neck space extension.

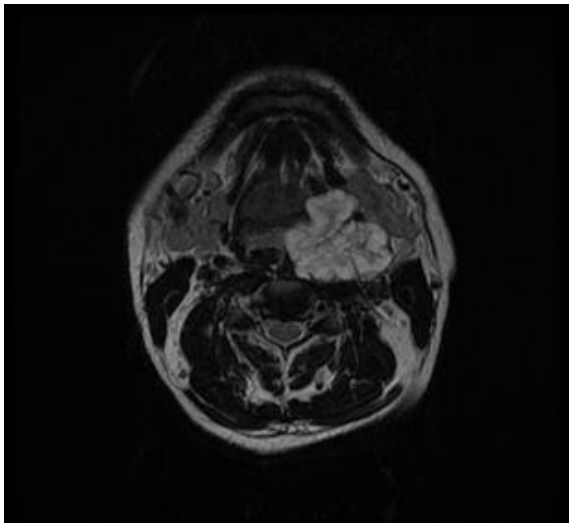

Figure 4: Axial MRI Demonstrating Lobulated Parapharyngeal Mass

Figure Notes: Axial magnetic resonance image of the neck showing a lobulated, well-defined hyperintense mass in the left parapharyngeal space. The lesion demonstrates internal septations and heterogeneous signal intensity, resulting in medial displacement of the oropharyngeal airway. The tumor is seen in close proximity to the hyoid region, consistent with a cartilaginous neoplasm involving the deep neck space.

DISCUSSION

Chondrosarcoma of the hyoid bone is an exceptionally rare entity, accounting for a minute proportion of head and neck sarcomas. While chondrosarcomas constitute the second most common primary malignant bone tumor overall,[1,2] their occurrence in the head and neck region remains uncommon,[1–3,9] and primary involvement of the hyoid bone is particularly rare.[6,7,12] The scarcity of reported cases contributes to diagnostic uncertainty and the absence of standardized management guidelines.

Clinically, low-grade chondrosarcomas typically present as slow-growing, painless masses, often with an indolent course.[1,2] In the present case, the patient exhibited a gradually enlarging neck swelling over 10 months without compressive or constitutional symptoms. Such presentations may mimic benign cartilaginous tumors or other mesenchymal lesions, leading to delayed diagnosis.[7,12] When tumors

extend into the parapharyngeal space, symptoms may arise from mass effect on adjacent structures, including medial displacement of the oropharyngeal wall, dysphagia, or airway compromise.[4,5,10] In our case, medial bulging of the oropharyngeal wall was evident on examination, correlating with radiological findings.

Radiologically, chondrosarcomas characteristically demonstrate lobulated masses with chondroid matrix mineralization.[8,9] Punctate or "ring-and-arc" calcifications on computed tomography are highly suggestive of a cartilaginous neoplasm. Magnetic resonance imaging is particularly valuable in assessing tumor extent, soft tissue invasion, and relationship to neurovascular structures in the parapharyngeal space.[4,16] However, imaging findings may overlap with benign chondroma, particularly in low-grade lesions, making definitive preoperative diagnosis challenging.

Fine needle aspiration cytology has limited utility in distinguishing chondroma from low-grade chondrosarcoma, as both may demonstrate lobules of hyaline cartilage with mild cellular atypia and occasional binucleation.[12,13] In the present case, cytology suggested a chondroid lesion but could not exclude malignancy. Histopathological evaluation of the excised specimen remains the gold standard for diagnosis.[1,2] The tumor in this case demonstrated features consistent with Grade I chondrosarcoma, including mild nuclear enlargement, minimal atypia, low mitotic activity, and infiltrative growth with soft tissue extension, similar to previously reported cases.[6,12,15]

Complete surgical excision with negative margins is widely accepted as the primary treatment modality for low-grade chondrosarcoma of the head and neck.[1,3,6] Achieving tumor-free margins is critical, as inadequate resection has been associated with higher rates of local recurrence.[2,3] Regional lymph node metastasis is rare in Grade I tumors,[1,9] consistent with the absence of nodal involvement (pN0) in this patient. However, isolated cases of nodal metastasis have been reported.[17] The role of adjuvant radiotherapy remains limited and is generally reserved for unresectable tumors, positive margins, recurrent disease, or higher-grade variants.[3,6]

Prognosis in low-grade hyoid chondrosarcoma is generally favorable when complete resection is achieved.[6,8] Nevertheless, long-term follow-up is essential, as local recurrence may occur several years after initial treatment.[2,12] Given the rarity of this tumor, each reported case contributes valuable information regarding clinical behavior, optimal management strategies, and outcomes.

CONCLUSION

Chondrosarcoma of the hyoid bone with extension into the parapharyngeal space is an exceptionally rare head and neck malignancy that presents significant diagnostic challenges due to its deep anatomical location and indolent clinical course. Imaging and cytology may suggest a benign chondroid lesion, making histopathological examination essential for definitive diagnosis and grading. Complete surgical excision with negative margins remains the cornerstone of management and is associated with favorable outcomes in low-grade tumors. Long-term radiological surveillance is crucial, as local recurrence may occur despite low histological grade. Early recognition of this rare entity facilitates appropriate surgical planning and improves patient prognosis.

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