


CASE REPORT

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# Unveiling spindle cell lipoma: a radiological case report

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## Abstract

**Background** Spindle cell lipoma is a benign adipocytic tumour, commonly occurring in the subcutis of posterior neck, upper back and shoulder, particularly in middle aged males. It is often composed of relatively equal ratio of fat and spindle cells, yet either component may predominate. Because of its variable ratio, a spindle cell lipoma may mimic liposarcoma radiologically. This article aimed to describe the MRI characteristics that assist in diagnosing spindle cell lipoma.

Case presentation:

A 45-year-old female presented with a gradually progressive neck swelling along the posterior aspect over a period of 2 years. Physical examination revealed a firm, mobile, non-tender mass in the left suboccipital region. Radiographic imaging showed a well-defined heterogeneous, minimally enhancing soft tissue swelling with areas of macroscopic fat and multiple macrocalcifications in the left suboccipital region extending to the left parapharyngeal space, showing loss of fat plane with adjacent muscles. Differential diagnoses of soft tissue neoplasms such as atypical lipoma and low-grade liposarcoma were considered. Surgical excision confirmed a myxoid variant of spindle cell lipoma upon histopathological examination.

**Conclusion** Spindle cell lipomas, commonly found in the posterior neck, have varied imaging features that are not distinctive. Despite their non-specific nature, radiologists should recognize these features, as the tumor can be treated effectively with simple excision. When encountering a well-defined, complex fatty mass in the subcutaneous tissue of the posterior neck, consider a diagnostic possibility of spindle cell lipoma.

**Keywords** Spindle cell lipoma, Posterior neck mass, Soft tissue neoplasm, Lipoma variants, Atypical lipoma, Lipomatous tumour

## Background

Spindle cell lipoma (SCL) is a rare and benign adipocytic tumor made up of a mixture of mature fat cells, spindle cells, and collagen fibers [1]. Spindle cell lipomas are most commonly found in middle-aged men, with

around 80% occurring in the subcutaneous tissue of the neck, upper back, and shoulders [1, 2], while occurrences within muscles are uncommon. It accounts for a small percentage of all lipomatous tumors and shares similar features with other fatty or spindle cell lesions, both benign and malignant [3, 4]. Despite incomplete removal, recurrence is unusual. Identifying spindle cell lipomas can be challenging for radiologists, pathologists, and surgeons, as they may lack visible fat, making them resemble other soft tissue tumors such as liposarcoma or schwannoma. In such cases, wide tumor excision is often the preferred treatment [5]. This article mainly aimed

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to outline the MRI characteristics helpful in diagnosing spindle cell lipoma.

### Case presentation

A 45 year old female presented with a neck swelling along the posterior aspect over a period of 2 years, which was gradually progressive in nature. The patient denies pain or recent injuries. She also denies fever or constitutional symptoms and reports no neurological deficits.

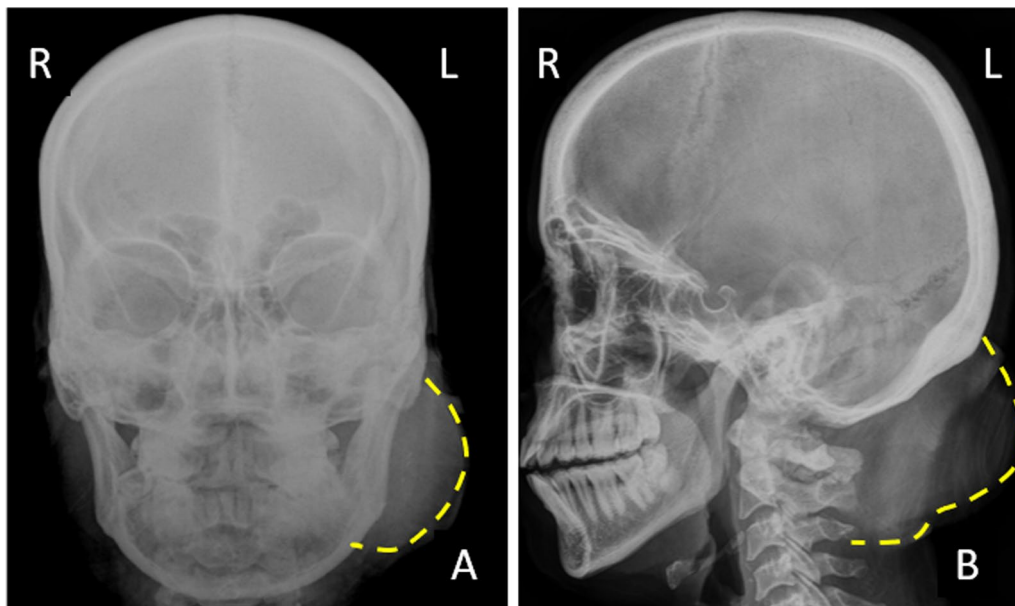
General physical examination was within normal limits. Examination of head and neck revealed no lymphadenopathy, clear oropharynx and no cranial nerve deficits. A large mass of approximate size  $9 \times 7 \times 5$  cm (CC  $\times$  TR  $\times$  AP) noted involving the left suboccipital region (Fig. 1).



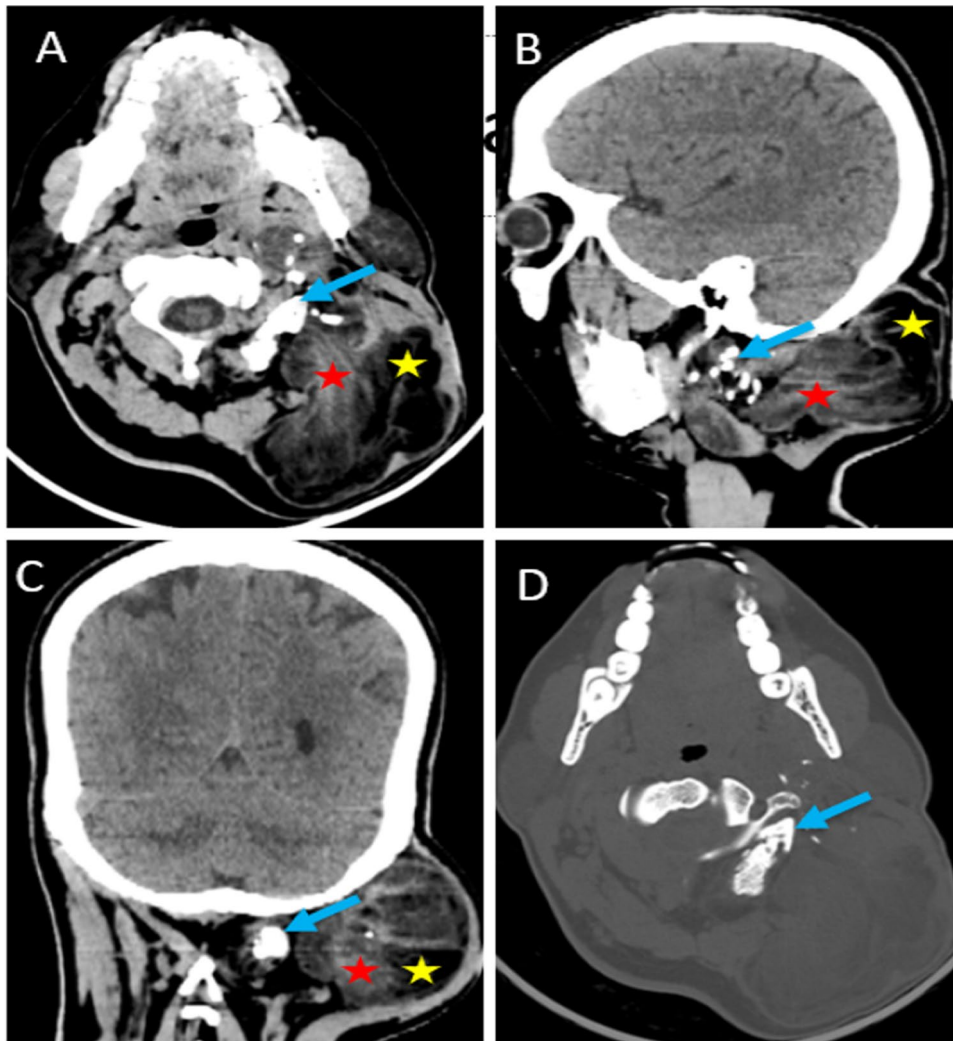
**Fig. 1** 45 year old female presented with a large mass in the left suboccipital region

The mass was soft, mobile, non tender and compressible. Overlying skin appeared normal. No redness, induration or fluctuance. Patient also had decreased range of neck movement, especially extension. Remainder of the physical examination was normal. Laboratory evaluation of the patient was unremarkable.

A plain skull radiograph, anteroposterior and lateral view, was obtained, which showed a soft tissue swelling in the left suboccipital region (Fig. 2). On CT imaging, a well-defined heterogeneously hypodense lesion containing macroscopic fat and soft tissue areas in the left suboccipital region was noted, which seemed to extend to the left parapharyngeal space. This lesion showed few specks of macrocalcification within, without bony erosion (Fig. 3). The patient also underwent contrast enhanced MRI, which revealed a well defined lobulated lesion in the left suboccipital region which was predominantly T1 hypointense and T2 hyperintense (Fig. 4) extending to the left para-pharyngeal space (Fig. 4 A and C). The lesion showed areas of suppression on the T2 fat suppressed sequence (Fig. 5 A and B) and focal areas of blooming (Fig. 5C). Post contrast, this lesion showed minimal heterogeneous enhancement (Fig. 5D). There was no restricted diffusion. This lesion also showed loss of fat plane with the left lateral pterygoid muscle and left sub-occipital and paraspinal muscles. A mass effect was noted over IJV with collapsed lumen at the level of the mass and proximal loss of signal void secondary to slow flow. There were no signs of invasion. A differential diagnosis of soft tissue



**Fig. 2** 45 year old female presented with posterior neck swelling. Skull radiograph Anteroposterior **A** and lateral view **B** showing soft tissue swelling in left suboccipital region



**Fig. 3** 45 year old female presented with posterior neck swelling. NCCT in axial **A**, sagittal **B** and coronal **C** sections showing macroscopic fat (yellow star) and soft tissue areas (red star) in the left suboccipital region with macrocalcification (blue arrow). **D** NCCT in axial bone window showing macrocalcification (blue arrow) with no bony erosion

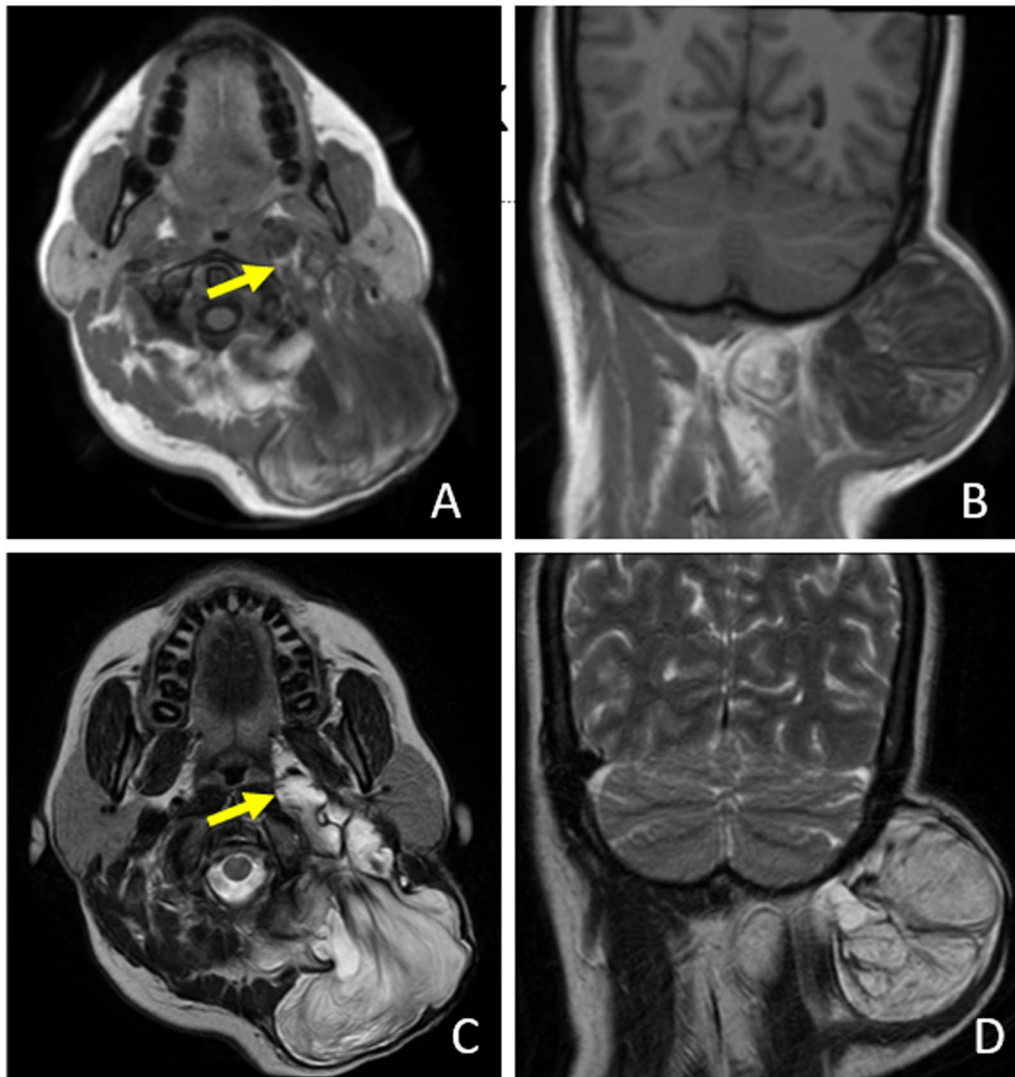
neoplasm, such as atypical lipoma and low grade liposarcoma, was considered. In view of the loss of fat plane with adjacent muscles and calcification, malignancy could not be ruled out.

The patient underwent a wide excision of the tumour in the left parapharyngeal space with frozen section evaluation for adequate marginal resection. Intraoperatively, an 8 × 7 cm lipomatous growth extending from the left posterior auricular region into the left parapharyngeal space, splaying the pharyngeal muscles and originating from the infratemporal muscles, likely lateral pterygoid muscle, was seen (Fig. 6). Histopathological examination revealed a spindle cell lipoma, myxoid variant.

### Discussion

Spindle cell lipomas (SCL) were first documented by Enzinger and Harvey in 1975 [6]. They are non-cancerous growths that can be effectively treated with local excision and have never been known to spread to other parts of the body. These slow-developing, typically solitary lumps are usually painless and commonly occur in men aged 45 to 65. The higher incidence in men has been attributed to the presence of androgen receptors in SCLs [7]. However, in our particular case, the patient is a 45-year-old female, which is relatively rare.

Typically, they manifest as clearly defined tumors beneath the skin in the back of the neck, shoulders, or upper torso of middle-aged men [8]. As many as 60% of spindle cell lipomas are located in these areas [9]. In



**Fig. 4** 45 year old female presented with posterior neck swelling. In T1 weighted in axial **A** and coronal **B** sections, the lesion appears predominantly hypointense. In T2 weighted in axial **C** and coronal **D** sections, the lesion appears predominantly hyperintense. Axial T1 weighted **A** and T2 weighted **C** sections showing extension of the lesion to left parapharyngeal space (yellow arrow)

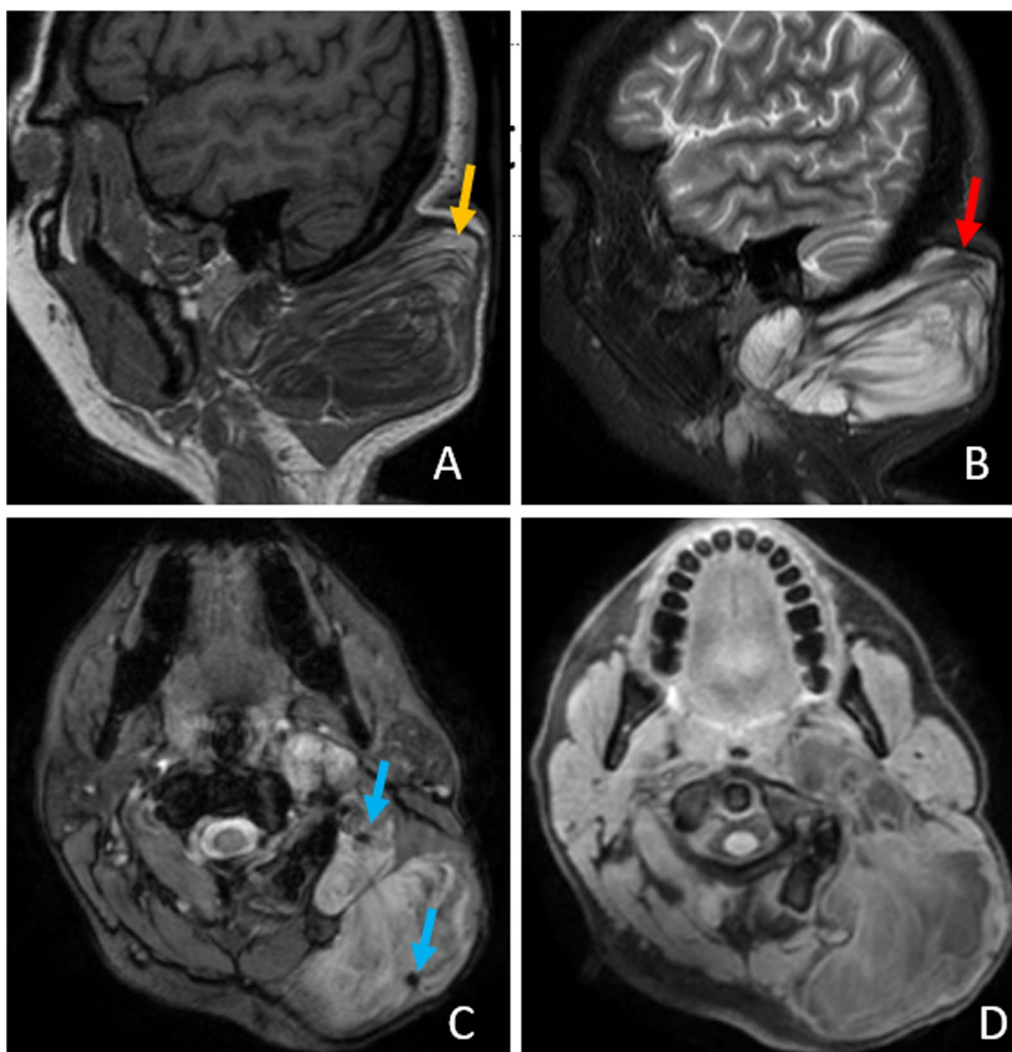
our case, the lesion was located in the posterior neck in the left suboccipital region. However, there have been documented instances of spindle cell lipomas appearing in various other parts of the body, including the extremities, oral cavity, larynx, bronchus, esophagus, orbit, scalp, breast and ischiorectal fossa [5]. Schwartz et al. [10] reported a rare case of a lipid-poor spindle cell lipoma in the lower extremity, where the initial clinical and radiological evaluations raised concerns about malignancy. However, the final histopathological examination (HPE) confirmed the diagnosis of spindle cell lipoma (SCL).

Identifying fat within a tumor is the key indicator for diagnosing adipocytic tumors through imaging. Bancroft et al. [5] detailed the CT and MR imaging characteristics

of nine cases of spindle cell lipoma (SCL) in different locations. In their series, all nine lesions were well-defined; eight (89%) contained varying amounts of fat, while one showed no radiological evidence of fat. Similarly, in our case, the lesion was well defined and macroscopic fat was appreciated in both CT and MRI.

Although spindle cell lipomas (SCL) are benign, there have been reports of SCL infiltrating adjacent structures, including bones [11]. Choi et al. [12] studied the CT and MR imaging features of seven cases of SCL. Six of the seven lesions were well-defined and located in the subcutaneous fat of the posterior neck, anterior neck, and buccal space. One lesion was ill-defined, situated deep in the supraclavicular fossa, and infiltrating





**Fig. 5** 45 year old female presented with posterior neck swelling. T1 weighted **A** and T2 fat suppressed sequence **B** sagittal sections displaying focal areas of hyperintensity in T1 (orange arrow) with corresponding signal drop in T2 fat sat (red arrow). **C** Gradient sequence in axial section showing few areas of blooming (blue arrow). **D** T1 post contrast in axial section showing heterogenous enhancement of the lesion

the adjacent shoulder muscles. In our case, the tumor showed a loss of fat plane with the left lateral pterygoid muscle, left sub-occipital, and para-spinal muscles, and during surgery, it was found to originate from the infratemporal muscles.

The World Health Organization (WHO) categorizes benign lipomatous growths into nine separate types: lipoma, lipomatosis, lipomatosis affecting nerves, lipoblastoma, angioliipoma, myoliipoma of soft tissue, chondroid lipoma, spindle cell/pleomorphic lipoma, and hibernoma [13, 14].

MRI is the preferred method for examining soft tissue masses in clinical settings. Typically, the main

indicators for identifying malignant soft tissue tumors involve their deep location, considerable size, and varied signal intensity, especially noticeable on T2-weighted MR images [15, 16]. However, additional factors are also taken into consideration. Suspicious characteristics that warrant concern for malignancy encompass [17–19]:

1. Size exceeding 5 cm
2. Heterogenous signal intensity on T2 images
3. Deep positioning in relation to the surrounding fascia
4. Abrupt onset and/or rapid expansion
5. Firmness compared to muscle tissue



**Fig. 6** 45 year old female presented with posterior neck swelling. Gross specimen showing lipomatous growth which seems to extend to the left parapharyngeal space

6. Involvement or invasion of adjacent structures

The posterior neck is devoid of major blood vessels, cranial nerves, or significant lymphatic structures and is mainly composed of subcutaneous fat and skeletal muscle. Consequently, patients with masses in this area can generally be assured of a low likelihood of malignancy [20]. The most prevalent condition is lipomas, while other types of masses in the posterior neck include liposarcoma, nuchal fibroma, schwannomas, epidermal

inclusion cysts, lipoblastoma, hemangioma, leiomyoma, and lymphangioma. Among these, liposarcoma, schwannoma, and nuchal fibroma are the most closely related differential diagnoses (Table 1).

Spindle cell lipomas may show significant amount of fat, minimal fat or no fat [2]. Ultrasound imaging depicts non-fat components with nonspecific soft tissue echogenicity and moderate internal blood flow on Doppler. These regions appear hyperdense compared to typical fat on CT scans and exhibit significant enhancement following contrast administration. MRI reveals the non-adipose-containing portions to be isointense with skeletal muscle on T1-weighted sequences, displaying variable intermediate signals on T2-weighted sequences, and demonstrating intense enhancement post-gadolinium injection [5].

Under microscopic examination, spindle cell lipomas typically display bland spindle-shaped cells resembling fibroblasts, arranged in distinctive parallel patterns often likened to a "school of fish". These cells are interspersed with varying quantities of mature fat cells set against a backdrop of "ropelike" collagen bundles, myxoid stroma, mast cells, and blood vessels [21]. Immunohistochemical analysis reveals that the spindle cells are positive for CD34 but negative for S-100 protein, aiding in the differentiation from nerve sheath tumors. Additionally, spindle cell lipomas may exhibit chromosomal deletions on the 13q and/or 16q regions, which are regarded as characteristic features of this type of lipoma [4].

**Table 1** Differential diagnosis for posterior neck mass

	Spindle cell lipoma [2, 5]	Liposarcoma [25]	Schwannoma [26, 27, 28]	Nuchal fibroma [29, 30]
Age predominance	Middle age, 45–65 years	50–70 years	50–60 years	Middle age, 30–40 years
Sex predominance	Male	No sex predilection	No sex predilection	Male
CT	Well defined heterogeneous lesion containing fat and soft tissue density areas with intense enhancement of soft tissue component	Three distinct patterns Solid: + 20 HU Mixed: Areas with < -20 HU and areas > + 20 HU Pseudocystic: homogenous density between -20 HU and +20 HU Calcification ± Thick or nodular enhancing septae	Well defined mass Can show cystic and fatty degeneration Causes mass effect with adjacent structures rather than invading them.	Poorly demarcated soft tissue density mass in the subcutaneous fat, radiating out into the surrounding fat
MRI	May contain significant fat, minimal or no fat Adipose containing area: T1 & T2: Hyperintense STIR: Suppressed Non-Adipose containing area: T1: Isointense T2: Variable intensity T1C+: Intense enhancement	T1: Hyperintense T2: Hyperintense possibly with prominent high signal foci Fat Sat: Hypointense T1C+: Moderate to marked enhancement of septa	T1: Hypointense to isointense to muscle T2: Heterogeneously hyperintense T1C+: Intense enhancement Characteristic Signs: Split fat sign Target sign Fasicular sign	T1 and STIR: Hypointense to muscle T2: Mixed signal intensity T1C+: Significant enhancement

**Table 2** Differentiating features between lipoma and liposarcoma [22–24]

Characteristics	Lipoma	Liposarcoma
Common location	Subcutaneous	Intramuscular
Size	< 10 cm	> 10 cm
Fat	> 75%	< 75%
Septation	No or few thin (< 2 mm) septa	Thick or nodular (> 2 mm) septa
T2 WI	No or minimal high T2 signal foci	Prominent high T2 signal foci
Post contrast	No or minimal enhancement	Prominent enhancement

Lipomas typically manifest as superficial, well-defined masses with low attenuation (usually around  $-65$  to  $-120$  HU) and minimal internal soft tissue components. Deeper or larger lipomas might exhibit scattered areas of internal soft tissue density due to factors such as fat necrosis, fibrous tissue, blood vessels, or muscle fibers. In cases of intramuscular lipomas, they may infiltrate and intertwine with adjacent skeletal muscle, resulting in a characteristic striated appearance [13]. On MRI, lipomas typically appear with high signal intensity on both T1 and T2 weighted sequences, saturate on fat-saturated sequences, and demonstrate little to no enhancement following contrast administration. There are number of features to differentiate whether the lesion is a lipoma or liposarcoma. (Table 2) [22–24].

Liposarcomas, common in adults between 50 and 70 years of age, can present in three distinct patterns depending on the quantity and distribution of fat within the tumor: solid, characterized by attenuation over  $+20$  HU; mixed, featuring areas with less than  $-20$  HU and areas exceeding  $+20$  HU; and pseudocystic, exhibiting homogeneous density between  $-20$  and  $+20$  HU. Indicators favouring a diagnosis of liposarcoma over lipoma include: uneven attenuation with notable soft tissue components within the fatty mass, unclear demarcation of neighbouring structures, signs of infiltration or encroachment upon surrounding structures, and the presence of calcifications [25].

Schwannomas is common in adults between 50 and 60 years of age. Schwannomas are typically sharply defined masses that push neighbouring structures aside rather than invading them directly. They commonly exhibit cystic and fatty degeneration [26]. On MRI, they appear hypointense or isointense on T1-weighted sequences, heterogeneously hyperintense on T2-weighted sequences, and demonstrate intense enhancement [27]. Certain characteristic signs aid in their identification, including the split fat sign, which manifests as a thin rim of peripheral fat on non-fat-suppressed sequences; the target sign, characterized by a peripheral T2 signal with central low signal; and the fascicular sign, displaying multiple small ring-like structures [28].

Nuchal fibromas, which is common in middle aged male is a benign fibrous tumor arising from the connective tissue of neck [29]. It can present as either well-defined or poorly outlined lesions primarily located in the superficial soft tissues. They typically appear hypoechoic on ultrasound imaging. On CT, poorly demarcated, soft tissue density mass in the subcutaneous plane, radiating out into the surrounding fat [29]. On MRI, they exhibit low signal intensity on T1-weighted and STIR sequences, while displaying mixed signal intensity on T2-weighted sequences. Post-contrast imaging reveals significant enhancement [30].

## Conclusions

Spindle cell lipomas, commonly found in the posterior neck, have varied imaging features that are not distinctive. Despite their non-specific nature, radiologists should recognize these features, as the tumor can be treated effectively with simple excision. When encountering a well-defined, complex fatty mass in the subcutaneous tissue of the posterior neck, consider a diagnostic possibility of spindle cell lipoma.

## Abbreviations

SCL	Spindle cell lipoma
CT	Computed tomography
MRI	Magnetic resonance imaging
CEMRI	Contrast enhanced magnetic resonance imaging
STIR	Short tau inversion recovery
IJV	Internal jugular vein
HU	Hounsfield unit

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## Author contributions

Dr JV Identification of the imaging findings in CT and diagnosed the condition followed by manuscript preparation. Dr VB Contributed in initial clinical assessment and surgical management. Dr YS Data collection including image retrieval and equally participated in manuscript preparation. Dr EP Gave expert opinion on the imaging features, discussed differentials and contributed in manuscript preparation. Dr UA Gave expert opinion on the imaging features, discussed differentials and contributed in manuscript preparation. Dr BR Helped in refining the manuscript and identified the findings in MRI. All the authors have participated sufficiently in contributing to the content of 'Unveiling spindle cell lipoma: a radiological case report' and have read & approved the manuscript.

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**Availability of data and materials**

Available.

**Declarations****Ethical approval and consent to participate**

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**Consent for publication**

Informed written consent had been obtained from the participant for publication of the same as a case report.

**Competing interests**

Not applicable.

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