Urinary bladder lipoma: an illustrative case

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ABSTRACT

Urinary bladder lipomas are rare neoplasms. Therefore, very few of them have been reported in the literature. We present a case that illustrates the typical features that allow radiologists to diagnose this entity: a solid lesion that arises from the urinary bladder wall, showing an endophytic growth and homogeneous hypoattenuation. After its surgical resection, the diagnosis was confirmed by anatomo-pathological analysis. In the discussion we describe other neoplasms that should also be considered when a submucosal bladder neoplasm is detected on computed tomography or other imaging techniques.

CASE REPORT

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The patient was a 63-year-old male, former smoker, who had been referred to the urology service with post-micturition dripping.

Urine analytic was perfectly normal, without microscopic haematuria or any signs of infection. Prostate-specific antigen was 1.31 (normal level).

The first diagnostic approach was an urinary ultrasonography. During the exploration, a solid nodule (approximately 1.3 cm long) was found adjacent to the right bladder wall. It seemed to be an intravesical lesion, which did not change its position after the patient was asked to mobilize (Figure 1).

Even though a lesion like this one could correspond to almost any entity arising from the urinary bladder wall -urothelial carcinoma among them-, it showed an echogenicity higher than expected, similar to the fat around the bladder. In fact, the radiologist who managed the exploration proposed that it could even be an extravesical lesion pushing the wall towards inner bladder.

This finding led the urologists to carry out a cystoscopy in order to directly excise the lesion or at least biopsy it. Nevertheless, during the exploration the bladder mucosa seemed to be absolutely intact, covering the lesion without any suspicion of malignancy (a sign that typically occurs when an extravesical mass deforms the bladder wall without infiltrating or penetrating it).

Therefore, an abdominal CT was performed, including non-enhanced phase, venous phase and excretory phase, following the usual diagnostic protocol for the urinary tract lesions. The study revealed the presence of a purely intravesical nodule arising from the right-upper wall of the urinary bladder, perfectly demonstrated at the multiplanar reconstructions. The lesion was homogeneous, with smooth margins, showing attenuation values similar to the peritoneal fat or the subcutaneous cellular tissue (around -101 Hounsfield Units). It did not enhance after the administration of iodinated contrast previous to the venous phase (Figures 2-3-4).

Assuming the lesion probably corresponded to a lipomatous neoplasm, a surgical resection of the tumour was needed, especially considering that the CT also revealed the presence of some hairline-thin septa inside the lesion (a feature that may be seen in many benign lipomas, but also in some well-differentiated malignant liposarcomas) (Figure 5).

Thus, it was indispensable to carry out an anatomo-pathological analysis of the tumour, not only to confirm the imaging diagnostic presumption, but also to make sure that the lesion did not show any features of malignancy (in which case it would be necessary a different managing and further follow-up).

A new cystoscopy was performed, in order to excise the full tumour. The surgical bed was locally treated with homeostasis. The procedure was performed successfully without any complication.

The histological examination described the following findings: Macroscopically, the specimen looked as an adipose brown-coloured fragment. Microscopically, the lesion looked as a well-defined submucosal nodule mostly composed of mature adipocytes without atypia or mitosis (Figure 6). These features were compatible with a submucosal bladder lipoma, with no malignant behaviour.

Three months after the resection, another urinary ultrasound was performed, revealing no findings inside the bladder.

DISCUSSION

Etiology & Demographics:

Primary urinary bladder tumours represent approximately 2%-6% of all neoplasms. They are subdivided in epithelial tumours (95%) and submucous/mesenchymal-originated tumours (5%). Among epithelial neoplasms, the most frequent is the urothelial carcinoma (reaching 90% of the cases), followed by squamous cell carcinoma (2-8%) and adenocarcinoma (<2%). Bladder lipoma is one of the mesenchymal tumours [1]. Its accurate prevalence is not really known, although it may be very low, since very few cases (13 to 16) have been reported in the literature so far; the age predilection is about 56.2 years [2,3].

The etiology -or risk factors- that may contribute to the development of this neoplasm is also unknown. Most of the cases are detected in the imaging techniques as incidental findings.

Clinical & Imaging findings:

Bladder lipomas are usually asymptomatic. There are few cases reported in the literature describing bladder lipomas associated to some symptomatology (such as dysuria, macroscopic or microscopic haematuria, repetitive urinary tract infections or urinary incontinence). However, it was not completely demonstrated whether those signs and symptoms had been specifically caused by the lipoma itself [2,3,4].

Just like all the lipomatous neoplasms that can develop in other locations, the bladder lipoma presents as a homogeneous lesion composed of macroscopic fat (thus showing density values between -50 HU and -150 HU on CT, hyperintense on T1-weighted images on MRI and signal annulation on fat-suppressed sequences); other typical features may be its fusiform or oval shape and smooth margins [2,3,4].

Regarding the ultrasonography, it is possible to suggest that it is a fat-constituted lesion, as it may show a hyperechogenicity much higher than the adjacent bladder wall [2,4]. However, this technique is not accurate enough to perform a proper diagnosis, as there is a considerable overlap between this entity and other benign and malign bladder neoplasms.

Treatment & Prognosis:

At any rate, the presence -or absence- of symptomatology accompanying the tumour is not so relevant, because, once detected, a transurethral resection is indicated (since they are usually easily-accessible lesions at the cystoscopy), as wells as an anatomo-pathological examination, to clarify whether it is a benign lipoma or a well-differentiated liposarcoma.

After the resection, neither surgical-bed recurrences nor any other urinary tract locations have been reported in the literature.

Differential Diagnosis:

Other mesenchymal rare benign tumours that can arise from the submucosal layer of the urinary bladder include leiomyoma (the most frequent of them, 0.4%), fibroma, plasmacytoma, hemangioma, neurofibroma and solitary fibrous tumour. Most of these neoplasms are almost indistinguishable between them, since they are usually asymptomatic incidental findings and they present as endophytic bladder nodules with smooth margins and homogeneous soft-tissue attenuation values.

Furthermore, these features may also be seen in small-sized or low-grade malignant neoplasms. Therefore, given the significantly high prevalence of the urothelial carcinoma, when a small intravesical lesion is detected on the ultrasound, the radiologist cannot be certain that it does not correspond to a malignant entity. A cystoscopy may be recommended, especially considering that the urothelial carcinoma can present as a multifocal disease.

When they grow, some of these entities are more distinguishable thanks to some specific features, such as hemangioma (presenting as a hypervascular mass), neurofibroma (diffuse, nodular bladder wall thickening with target sign on T2-weighted images, corresponding to low-signal-intensity fibrosis surrounded by high-signal-intensity myxoid stroma), paraganglioma (ring calcification) or urachal

adenocarcinoma (midline, infraumbilical, soft-tissue mass with calcification, near the bladder dome).

Large malignant tumours may also show an aggressive behaviour, with heterogeneous enhancement (secondary to the presence of necrotic or cystic areas) and irregular-shaped margins that infiltrate the bladder wall. Although they can be asymptomatic, it is more likely that, in these cases, the patients suffer different symptoms, such as haematuria / microhaematuria, dysuria or urinary incontinence [5].

Paraganglioma is typically related to a clinical syndrome called micturition attack (catecholamine release during micturition, including hypertension, sweating, anxiety…).

Nevertheless, the bladder lipoma constitutes an important exception among the rest of entities arising from the bladder wall, as its fatty composition allows the radiologist to recognize it, as previously described. Only the liposarcoma could also show this feature, since they are also constituted by fat (especially well-differentiated liposarcomas, which usually show smooth margins). The less differentiated liposarcomas are, the easier is to recognize them as malignant neoplasms, since they tend to present more heterogeneous enhancement, irregular-shaped margins and infiltrative behaviour.

Finally, it is important to not confuse bladder lipomas with pelvic lipomatosis, an entity consisting in a non-malignant overgrowth of homogeneous adipose tissue rounding the pelvic viscera. Sometimes, this tissue compresses the bladder, leading to images that can simulate fatty-lesions dependent of the bladder wall [6]. It can also compress the rest of the pelvic viscera, causing some symptoms such as dysuria, urinary incontinence or constipation. Nevertheless, a careful analysis of the CT or MRI images and appropriate multiplanar reconstructions may allow the radiologist to determine it is not a truly bladder lesion, but an extravesical disease.

TEACHING POINT

Bladder lipoma is a rare neoplasm that can be recognized as an endophytic fatty lesion arising from the bladder wall. The resection and anatomo-pathological examination is required in order to demonstrate it shows none histological signs of malignancy.

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FIGURES

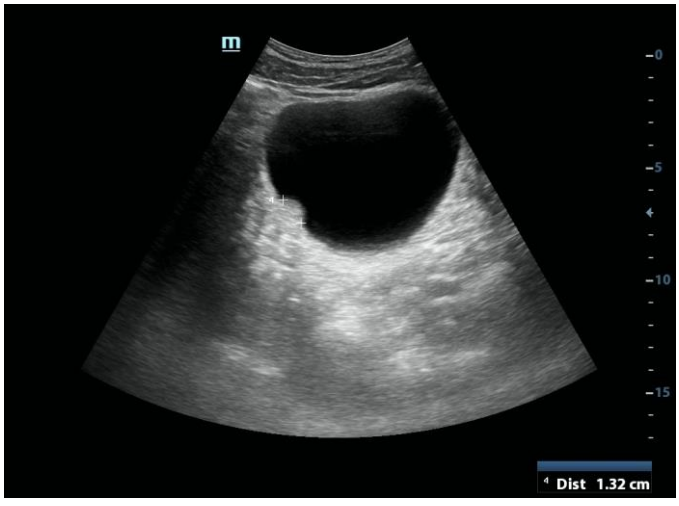

Figure 1: 63 year-old male with bladder lipoma.

FINDINGS: Incidental finding of a homogeneous hyperechoic lesion arising from the right bladder wall, with an endophytic growth. Notice that the echogenicity of the lesion is very similar to the fat around the bladder.

TECHNIQUE: Bladder ultrasound in axial-oblique plane, using C5-2 MHz convex probe.

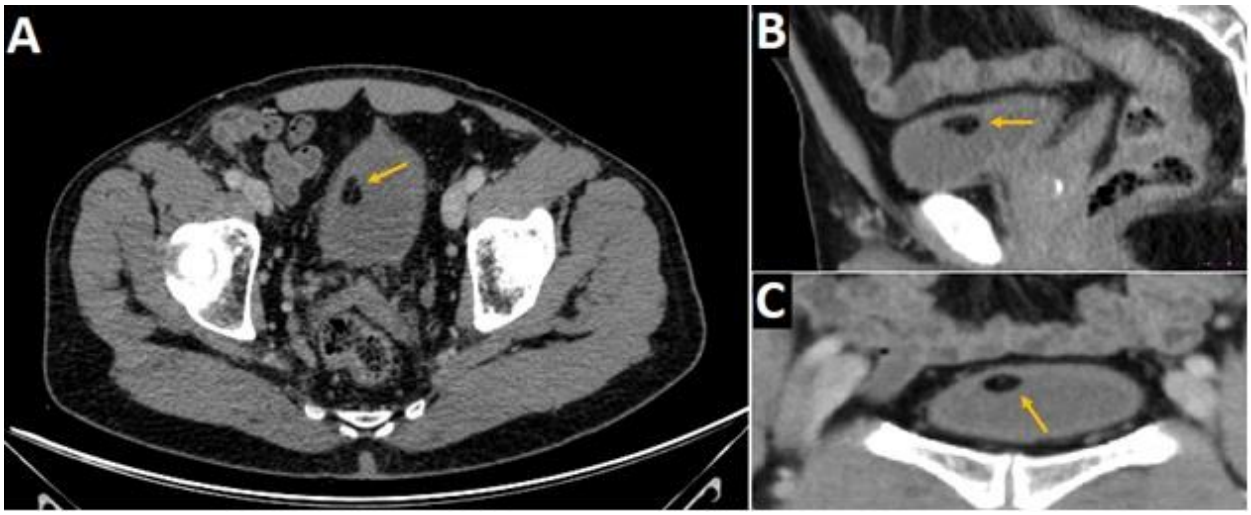

Figure 2: 63 year-old male with bladder lipoma.

FINDINGS: Contrast enhanced CT demonstrating the presence of a completely intravesical nodule (yellow arrows), dependent of the right-upper bladder wall. It looks like a homogeneously hypodense lesion, showing well-defined margins. It measured 1.8 x 1.3 x 0.9 cm (antero-posterior, transverse and cranio-caudal diameters, respectively).

TECHNIQUE: Contrast enhanced CT of the pelvis in the venous phase. Axial (A), sagittal (B) and coronal (C) planes (310 mAs; 120 Kv; 2 mm slice thickness; 1 mm slice space; 110 ml iopamidol [300 mg/ml]).

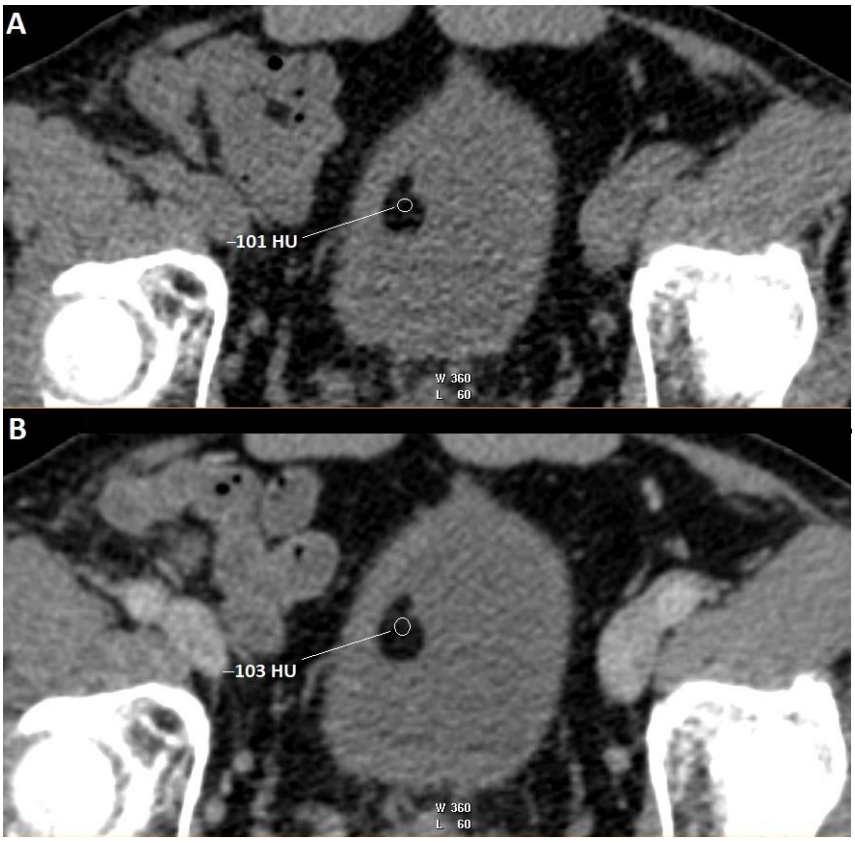

Figure 3: 63 year-old male with bladder lipoma.

FINDINGS: Non-enhanced CT (A) and contrast enhanced CT (B), where attenuation measurements indicate it is a fatty-composed lesion, without significant enhancement after iodine contrast administration.

TECHNIQUE: Axial non-enhanced CT of the pelvis (220 mAs; 120 Kv; 2 mm slice thickness; 1 mm slice space). (A) and axial contrast enhanced CT of the pelvis in the venous phase (310 mAs; 120 Kv; 2 mm slice thickness; 1 mm slice space; 110 ml iopamidol [300 mg/ml]). (B).

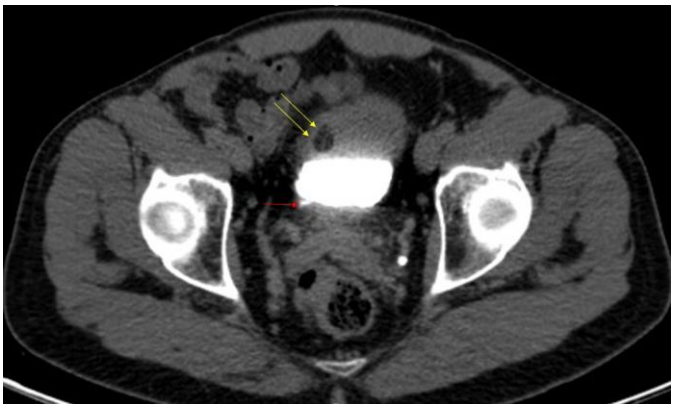

Figure 4: 63-year-old male with bladder lipoma.

FINDINGS: Excretory phase CT in axial plane, showing the distance between the neoplasm (yellow arrows) and the right ureterovesical junction (red arrow): 3 cm approximately.

TECHNIQUE: Axial contrast enhanced CT of the pelvis in the excretory phase (310 mAs; 120 Kv; 2 mm slice thickness; 1 mm slice space; 110 ml iopamidol [300 mg/ml]).

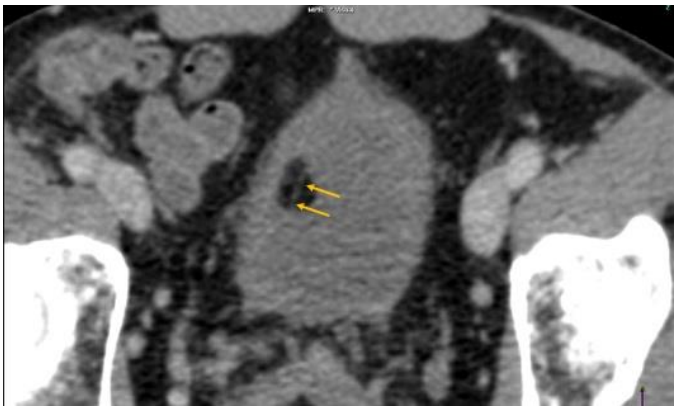

Figure 5: 63 year-old male with bladder lipoma.

FINDINGS: Axial contrast enhanced CT showing some hairline-thin septa inside the lesion (yellow arrows).

TECHNIQUE: Axial contrast enhanced CT of the pelvis in the venous phase (310 mAs; 120 Kv; 2 mm slice thickness; 1 mm slice space; 110 ml iopamidol [300 mg/ml]).

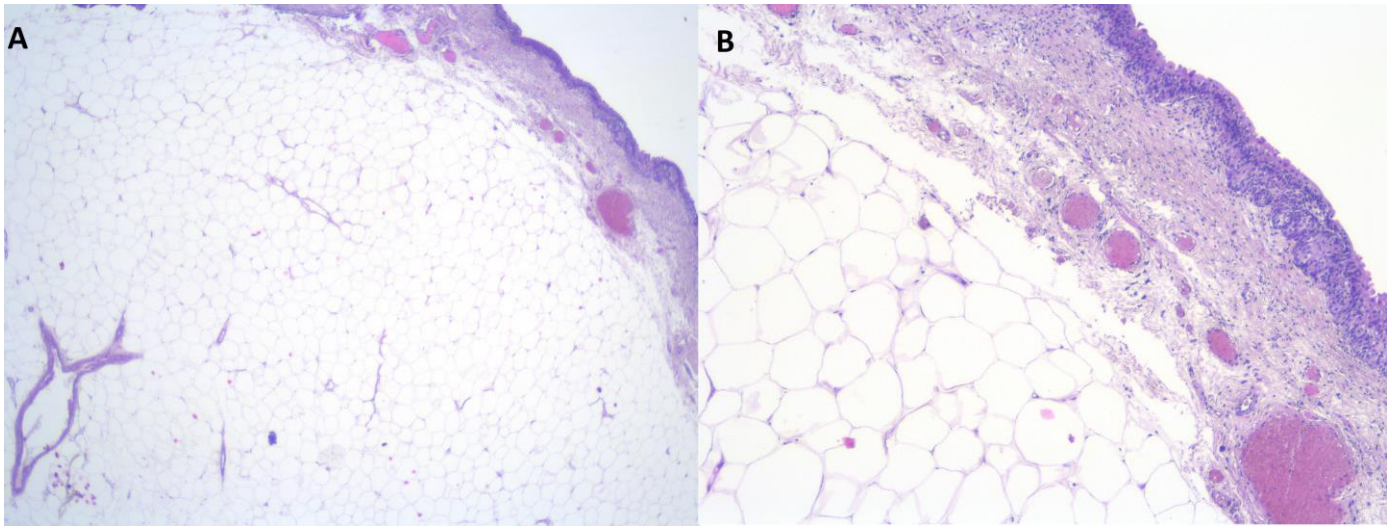

Figure 6: 63 year-old male with bladder lipoma.

Histopathology of the resected specimen (H&E)(A), and magnified (B), demonstrating that the lesion is mostly composed of mature adipocytes.

Etiology	Unknown. Incidental finding.
Incidence	Very low. Only 13-16 cases reported in the literature
Gender Ratio	No gender predilection
Age Predilection	56.2 years (SD: 12.4; range: 32-75 years)
Risk factors	N / A
Treatment	Transurethral resection
Prognosis	Benign tumour. No recurrence described
Findings on imaging	• US: Well-defined hyperechoic endophytic bladder nodule • CT: Homogenous endophytic bladder nodule with fat density (between -50 HU and -150 HU) • MRI: Homogenous endophytic bladder nodule that shows hyperintense on T1-weighted images and becomes hypointense on fat-suppressed sequences

Table 1: Summary table for bladder lipoma.

	Incidence	**Clinical presentation**	**Imaging features (US)**	**Imaging features (CT)**	**Imaging features (MRI)**
Bladder lipoma	Unknown. Very few cases reported.	Usually asymptomatic. Incidental finding.	Fatty composition (hyperechogenic).	Fatty composition (thus showing density values between -50 HU and -150 HU on CT).	Fatty composition (hyperintense on T1-weighted images on MRI and signal annulation on fat-suppressed sequences).
			Homogeneous. Endophytic bladder nodule. Smooth margins.		
Other benign mesenchymal bladder neoplasms	Mesenchymal bladder neoplasms: 5% Leiomyoma (most common)	Usually asymptomatic. Incidental finding.	Endophytic bladder nodule. Smooth margins.		
			Hemangioma: hypervascular mass (detectable intralesional flow on color-Doppler images).	Hemangioma: hypervascular mass (significant enhancement after iodinated contrast administration).	Hemangioma: hypervascular mass (significant enhancement after gadolinium contrast administration).
					Neurofibroma: Diffuse, nodular bladder wall thickening with *target sign* on T2-weighted images (low-signal-intensity fibrosis surrounded by high-signal-intensity myxoid stroma)
Malignant mesenchymal bladder neoplasms	Mesenchymal bladder neoplasms: 5% Rhabdomyosarcoma (most common in children) Leiomyosarcoma (most common in adults)	Haematuria / microhaematuria. Dysuria. Urinary incontinence. Paraganglioma: *micturition attack* (a characteristic clinical syndrome of catecholamine release during micturition, including hypertension, sweating, anxiety…)	Irregular-shaped / smooth margins.		
			Small / Low-grade tumours: endophytic bladder nodule.		
			Large / Aggressive tumours: solid mass that infiltrates the walls of the bladder +/- necrotic/cystic areas (anechoic).	Large / Aggressive tumours: solid mass that infiltrates the walls of the bladder +/- necrotic/cystic areas (hypodense).	Large / Aggressive tumours: solid mass that infiltrates the walls of the bladder +/- necrotic/cystic areas (hyperintense on T2-weighted sequences).
			Liposarcoma: heterogeneous, partial fatty composition (hyperechogenic), infiltrative behaviour.	Liposarcoma: heterogeneous, partial fatty composition (thus showing density values between -50 HU and -150 HU on CT), infiltrative behaviour.	Liposarcoma: heterogeneous, partial fatty composition (hyperintense on T1-weighted images on MRI and signal annulation on fat-suppressed sequences), infiltrative behaviour.
Malignant epithelial bladder neoplasms	Urothelial carcinoma: 90% Squamous cell carcinoma: 2%-8% Adenocarcinoma: <2%	Haematuria / microhaematuria. Dysuria. Urinary incontinence.	Irregular-shaped / smooth margins. Uni / Multifocal.		
			Small / Low-grade tumours: endophytic bladder nodule.		
			Large / Aggressive tumours: solid mass that infiltrates the walls of the bladder +/- necrotic/cystic areas (anechoic).	Large / Aggressive tumours: solid mass that infiltrates the walls of the bladder +/- necrotic/cystic areas (hypodense).	Large / Aggressive tumours: solid mass that infiltrates the walls of the bladder +/- necrotic/cystic areas (hyperintense on T2-weighted sequences).
			Urachal adenocarcinoma: midline, infraumbilical, soft-tissue mass near the bladder dome.		
Pelvic lipomatosis	Unknown	Secondary to compression of the pelvic viscera: dysuria, urinary incontinence, constipation…	Overgrowth of homogeneous adipose tissue rounding the pelvic viscera		
			Fatty composition (hyperechogenic).	Fatty composition (thus showing density values between -50 HU and -150 HU on CT).	Fatty composition (hyperintense on T1-weighted images on MRI and signal annulation on fat-suppressed sequences).

Table 2: Differential diagnosis table for bladder lipoma.

ABBREVIATIONS

CT = Computed Tomography
HU = Hounsfield Units
MRI = Magnetic Resonance Imaging
US = Ultrasonography

KEYWORDS

Lipoma; bladder; mesenchymal bladder tumours; computed tomography; ultrasound