

## Comprehensive exploration unveiling the sonography and histopathology of uterine leiomyoma in a cow

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Article Info	Abstract
<b>Article history:</b> Received: 27 December 2023 Accepted: 05 February 2024 Available online: 15 April 2024	<p>Genital tumours are rare among cattle, largely due to their relatively short lifespans. Leiomyoma, a smooth muscle tumour being more prevalent in dogs, appears only at a rate of 1.00 - 2.00% in cattle, affecting reproductive efficiency in cases of complete uterine obstruction. This case report involves an 8-year-old cow with repeated insemination attempts unveiled 5.00 cm intra-luminal uterine mass, obstructing the right uterine horn. Transrectal sonography (TRUS) revealed a highly vascularized mass with normal ovarian function. Confirmation of clinical condition, <i>i.e.</i>, uterine leiomyoma, <i>via</i> uterine biopsy concluded the presence of neoplastic smooth muscle cells arranged in interlacing bundles showing mild pleomorphism, and special staining using Masson's trichrome revealed an unappreciable amount of connective tissue; subsequently right flank celiotomy was performed to remove the benign tumour. Forty-five days after celiotomy, TRUS examination confirmed an unobstructed uterine horn, and bilateral oviduct patency was adjudged with 2.50% methylene blue. Following treatment for chronic endometritis, artificial insemination led to conception nearly 90 days post-procedure. The TRUS aids preliminary diagnosis, while definitive identification demands necropsy and surgical methods. This case underscores the diagnostic significance of TRUS, histopathology and celiotomy for identifying and managing uterine leiomyoma in cattle.</p>
<b>Keywords:</b> Celiotomy Histopathology Transrectal ultrasonography Tubal patency Uterine tumour	

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### Introduction

In cattle, infrequent occurrence of genital tumours is reported compared to the other domesticated animals, possibly attributed to the fact that most cattle do not reach an age of predisposition for tumour development.<sup>1</sup> With carcinomas being the most prevalent type, followed by smooth muscle tumours such as leiomyomas and leiomyosarcomas,<sup>2</sup> the annual occurrence of bovine genital tract tumours seems to exhibit considerable variation, *i.e.*, 0.003 - 0.25%.<sup>3</sup> Leiomyomas represent smooth muscle neoplasms, being classified as mesenchymal tumour histopathologically,<sup>4</sup> are among the most frequently encountered benign tumours found in middle-aged to older dogs,<sup>5,6</sup> in contrast to 1.00 - 2.00% incidence in cattle.<sup>5,7</sup> Uterine tumours reduce reproductive efficiency due to pervasive nature and obstruction in the genital tract.<sup>8</sup> It has been reported that sonography in conjunction with tissue biopsy and histopathology plays a pivotal role

in diagnosis and further surgical management of uterine tumour.<sup>9</sup> Remarkably, only a solitary case report exists in cattle, delineating the diagnosis of uterine leiomyoma through trans-abdominal sonography up to this point.<sup>5</sup>

### Case Description

An 8-year-old Jersey Crossbred cow, last calved 2 years ago in its 3<sup>rd</sup> parity was referred to Department of Veterinary Gynaecology and Obstetrics, Dr. GC Negi College of Veterinary and Animal Sciences, Chaudhary Sarwan Kumar Himachal Pradesh Agricultural University, India, with a history of repeat breeding attempts, having been inseminated eight times for about 6 months without successful conception. The local para-veterinarian harboured suspicions regarding the existence of an intra-luminal growth within the uterus, yet no endeavours were made towards addressing the infertility issue through treatment measures. With inter-estrus interval of 18 days

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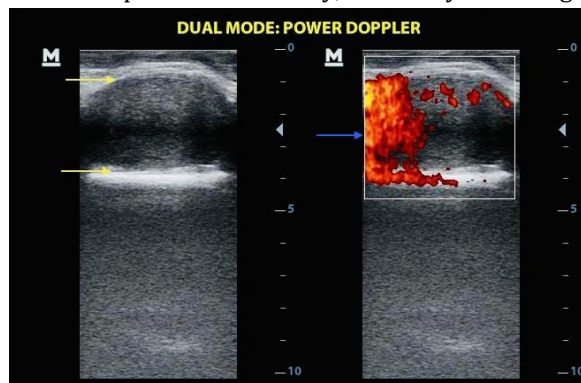


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and estrus duration of 36 hr, the cow was brought in on the first day of estrus for insemination, seeking the optimization of the successful conception chances.

During transrectal palpation of the genitalia, observations indicated a favourable uterine tone, displaying highly contractile characteristics. The consistency, size and texture of the cervix, uterine body and the point of bifurcation of the uterine horns appeared normal. However, within confines of right uterine horn, approximately 2.00 - 3.00 cm cranial to the uterine bifurcation, palpation of the small intra-luminal, non-painful mass measuring ~ 5.00 cm with firm consistency was appreciated. To rule out the occlusion of the lumen of right uterine horn and infertility due to the infectious cause, the genital discharge was aspirated with sterile artificial insemination barrel and sheath attached to 50.00 mL plastic syringe. Inability of barrel to pass beyond the point of intra-luminal growth confirmed the occlusion of the right uterine horn. Physical characteristics of genital discharge aspirated were evaluated, showing mucopurulent (approximately 50.00% pus, and 50.00% mucus) discharge of copious nature.

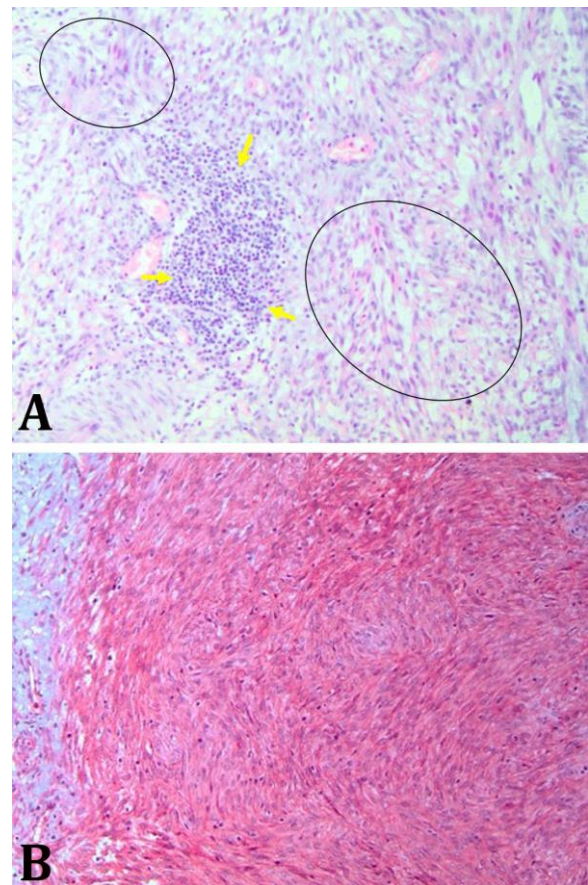
Transrectal sonography (TRUS), employing the Z5 VET (Mindray, Shenzhen, China) portable ultrasound system equipped with a 7.50 MHz linear rectal transducer, was conducted as a multi-faceted examination. This included Brightness Dual Power Mode to assess both the vascular perfusion of an intra-luminal mass and ovarian status for cyclicity. The TRUS unveiled an intriguing landscape within the intra-luminal mass, a spherical structure measuring precisely 3.17 cm in diameter, meticulously gauged *via* Mindray Z5's integrated caliper. This enigmatic mass exhibited a mosaic of irregular hypoechogenic/echogenic foci, being ensconced intricately within a delicate, thin echogenic capsule (Fig. 1). However, the most captivating revelation surfaced through Doppler and Power Mode methods, where the once-muted mass burst forth in vibrant hues, indicative of heightened vascularity and robust perfusion. Notably, these dynamic signals



**Fig. 1.** Sonographic depiction of uterine lumen growth in a Dual Power Doppler mode. Irregular hypoechogenic/echogenic foci within thin echogenic capsule (yellow arrows) along with highly vascularized blood perfusion (blue arrow).

showcased complete occlusion within the right uterine horn, underlining the significance of this vigorous vascular activity. The ipsilateral ovary adjacent to the mass appeared to be normal with dominant follicle and corpora lutea and albicantia, indicative of normal estrous cycles.

The uterine biopsy began with meticulous cleansing of perineum, ensuring sterility. Guided manipulation positioned the instrument through the cervix, delicately entering the uterus. Attention to detail identified the biopsy instrument's precise location within the uterine horn. Careful positioning with hand *per* rectum allowed accurate tissue collection with finesse. Methodically, the targeted tissue was clipped, preserving its integrity. The instrument was gently withdrawn, securing the collected sample. The collected tissue was meticulously preserved in 10.00% formal saline to maintain its structural integrity and biological characteristics for further detailed examination through histopathology (Fig. 2).



**Fig. 2.** Photomicrographs of uterine biopsy. **A)** Presence of neoplastic smooth muscle cells arranged in interlacing bundles (black circled areas) showing mild pleomorphism. Increase in nucleus: cytoplasm ratio with prominent nuclei and 1-2 mitotic figures per 10 high power fields, along with chronic inflammatory cells infiltration (yellow arrows) around the vessels (Hematoxylin and Eosin staining, 20.00 $\times$ ); **B)** Inappreciable amount of connective tissue between neoplastic cells (Masson's trichrome staining, 10.00 $\times$ ).

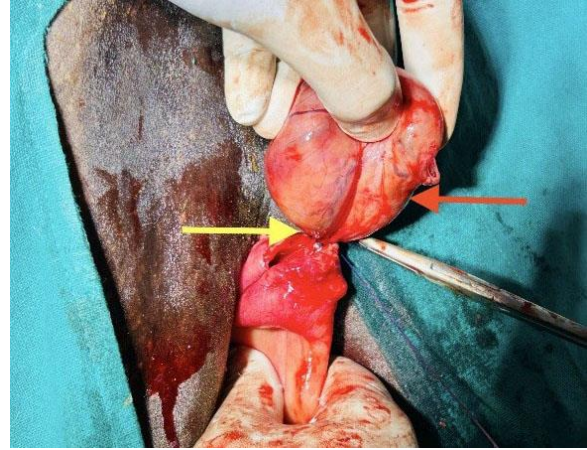


Upon the diagnosis through histology, standing right flank celiotomy was performed for removal of the intra-luminal growth. A surgical incision was made outside the abdominal cavity to perform a hysterotomy and prevent any potential contamination inside the abdomen. Upon incision of the right uterine horn, the round mass was found attached to the uterine wall (Fig. 3), the stalk was then excised and representative samples from the tumour mass (Fig. 4) were collected in 10.00% neutral buffered formalin for histopathological evaluation. The uterine serosa and muscular layers were re-apposed using a double inverting pattern with number 2 Polyglactin 910 (Lotus Surgical Private Ltd., Uttarakhand, India). Sutures were placed only partial-thickness incorporating the serosa and muscular layer of the uterus. The abdominal wound was lavaged and the incision closed routinely.

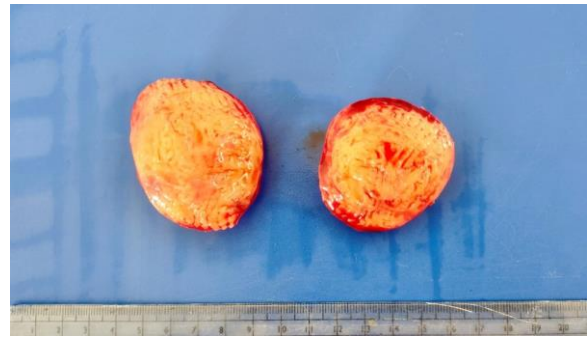
The cow received general medical support including analgesic meloxicam (Intas Pharmaceutical, Ahmedabad, India) being administered at a dose of 0.50 mg kg<sup>-1</sup>, intramuscularly (IM) for 3 days and streptomycin-penicillin (Zenex Animal Health India Private Ltd., Ahmedabad, India) being administered at a dose of 2.50 mg kg<sup>-1</sup> IM twice a day for 5 days. The cow recovered and discharged 5 days post-operatively, and reappraisal was advised for evaluation of tubal patency after 45 days.

Follow up treatment commenced 45 days post-celiotomy, and a series of examinations was conducted to evaluate various aspects, including rectal, sonographic and analysis of tubal patency. Transrectal palpation and TRUS indicated normal findings within the genital tract, revealing no abnormalities or growths within the uterine horns. The B-mode ultrasound displayed the normal appearance of uterine horns. Assessment of the right-side oviduct patency involved using a sterile 2.50% methylene blue solution. This evaluation method utilized a Foley's catheter inserted through the uterus, inflating the balloon at the end of the right uterine horn before injecting the dye. Subsequently, the urinary bladder was catheterized, and after a 30-min post-infusion interval, the presence of blue coloration in the urine indicated the patency of the right uterine horn (Fig. 5). Similarly, the patency assessment of the other uterine horn occurred four hr after the initial infusion. The results confirmed the patency of both uterine horns, suggesting unobstructed oviducts on both sides. Following this confirmation, subsequent treatment for chronic endometritis was initiated based on these findings. In the subsequent estrus, the cow received intra-uterine infusion of cephalixin benzathine being administered at a dose of 500 mg (Metricef®; MSD Animal Health) once, along with enrofloxacin being administered IM at a dose of 5.00 mg kg<sup>-1</sup> (Zenex Animal Health India Private Ltd.) daily for 5 consecutive days. The owner was advised to allow sexual rest for the upcoming estrus cycle and plan artificial insemination in the subsequent one.

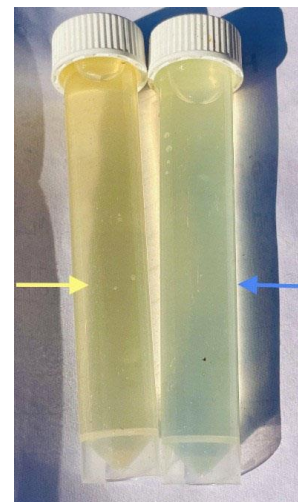
Ninety-five days after celiotomy, the cow underwent artificial insemination following the AM-PM rule, using superior quality French mini semen straw. Pregnancy was confirmed with transrectal palpation 90 days after artificial insemination.



**Fig. 3.** Exteriorisation of intra-luminal growth during right flank celiotomy (red arrow), and clear demarcation of the tumorous mass stalk (yellow arrow).



**Fig. 4.** Cross-sectional image of the tumorous mass exteriorized after celiotomy measuring 4.50 cm in diameter.



**Fig. 5.** Yellow colour of urine (control; yellow arrow), and blue discolouration of the urine (after evaluation of right side fallopian tube; blue arrow).

## Discussion

Leiomyomas, often called fibroids, tend to appear as solitary, solid and circular growths. Being firm to touch, they resemble abscesses in terms of appearance.<sup>10</sup> With smooth surface and well-defined appearance of distinct mass, leiomyomas are benign growths made up of smooth muscle fibres and collagen.<sup>11</sup> Initially, tumours are soft and fleshy, but become firm with time due to stromal connective tissue developing within the tumour.<sup>5,12</sup> It seems that steroid hormones, particularly estrogens, might have a role in their development; while, progesterogens could have an inhibitory effect.<sup>13</sup> To differentiate neoplastic conditions affecting the tubular reproductive tract, several factors such as pregnancy, abscesses, adhesions, mummified or macerated fetuses, and even tuberculosis should be considered.<sup>11</sup> With the advent of ultrasonography, a preliminary diagnosis can be made, although it does not provide an insight into the exact origin of the tumour. There is a notable scarcity regarding the diagnosis of uterine leiomyoma using TRUS, as only a solitary case report (trans-abdominal sonography) has been reported yet.<sup>5</sup> Thus, the scarcity of case documentation highlights a significant gap in understanding of the uterine leiomyoma sonographic features using TRUS.<sup>5,13</sup> However, for a more definitive diagnosis, additional steps such as exploratory surgery, necropsy, or post-celiotomy tissue examination would offer more conclusive insights into the nature and specific identity of the condition affecting the reproductive tract.

In conclusion, this case emphasizes the vital role of TRUS in providing initial insights, while it stresses the need for surgical exploration in relation to histopathology for conclusive diagnosis. Thus, a holistic diagnostic approach offers a cornerstone in ensuring precise identification and tailored treatment for pathological conditions in bovine.

## Acknowledgments

Declared none.

## Conflict of interest

No conflict of interest was reported by the authors.

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