

Analysis of Extrauterine Leiomyoma and Leiomyosarcoma; A Retrospective 5 Years Study

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Abstract

Objectives: The aim of the study was to investigate the non-uterine Leiomyoma and Leiomyosarcoma among cases undergoing histopathological assessment due to vague nature at Duhok Province.

Methods: A retrospective, cross-sectional study on patients who were diagnosed with leiomyoma/leiomyosarcoma in a single histopathological center in collaboration with several general surgery, outpatient clinics. All patients with resident at Duhok governorate, Kurdistan Region, Iraq. The duration of the collected sample was of 5 years and the study took 3 months for data collection and entry; between October 2024 and March 2025.

Results: Upon histopathological assessment, 95.91% were Leiomyoma while Leiomyosarcoma represented only 4.09%. The commonest location was the ovaries 89.9% for the general sample and 26.67% among Leiomyosarcoma. The prevalence one third in male 33.33% and 3.85% in females with a $P = 0.0102$ and a relative risk of males with leiomyosarcoma is 8.67 times of females with an OR of 12.5. younger age groups were more likely to suffer from leiomyosarcoma $P < 0.001$.

Conclusion: Leiomyoma and Leiomyosarcoma can be found outside the uterine cavity and the diagnosis requires histopathological assessment. Further studies on the disease are required to highlight the importance of the extra-uterine form of the disease in the human body.

Keywords: Leiomyoma, Leiomyosarcoma, extrauterine diseases, ovarian neoplasms, soft tissue neoplasms

Introduction

Leiomyoma is a common malignancy encountered in the female reproductive system, affecting 50–70% of females by the age of menopause, arising from smooth muscle cells and typically in the uterus. It is commonly known as uterine Fibroids.¹ This tumor can arise from deep soft tissues of the body, such as retroperitoneal abdominal organs, extremities, skin, gastrointestinal tract, and genitourinary tract.^{2,3} These tumors are commonly known as Non-uterine leiomyomas, which are classified based on site and their histological features; cutaneous from the arrector pili muscles, and vascular from the blood vessel wall.³ Non-uterine leiomyomas, like uterine leiomyoma, are benign tumors;³ nevertheless, they are less commonly seen than uterine leiomyomas and are more difficult to diagnose as the available imaging modalities cannot always differentiate them from other soft tissue tumors.^{2,3} These tumors microscopically show bundles of uniform, spindle-shaped smooth muscle cells with eosinophilic cytoplasm and elongated, blunt-ended nuclei,⁴ which is therefore differentiated from the malignant form, Leiomyosarcomas, as it lacks significant nuclear atypia, mitotic activity, or necrosis that are seen in Leiomyosarcomas.⁴ These tumors sometimes mimic ovarian tumors and other soft tissue neoplasms,⁴ increasing the demand for better physician awareness and a more invasive diagnostic approach with histopathology.^{2,4}

Presence of these tumors outside the uterine cavity is a rare incident, such as in the head and neck and oral cavity,⁵ or with cases believed to metastasize.⁶ The more aggressive form is Leiomyosarcoma, which is more significant among those with radiation exposure or can be a part of a genetic syndrome such as retinoblastoma and Li-Fraumeni syndrome.^{7,8} Hence,

the aim of this study is to investigate the non-uterine Leiomyoma and Leiomyosarcoma among cases undergoing histopathological assessment due to their vague nature in Duhok Province.

Patients and Methodology

Study Design, Sampling Technique, Data Collection

This study was conducted as a retrospective, cross-sectional study on patients who were diagnosed with leiomyoma/leiomyosarcoma. The study was focused in a single histopathological center in Duhok City which had retrieved data from several other smaller centers in the city. Cases were sent to that center for analysis from different Privet Hospitals, and several out patient clinic. All patients were resident at Duhok governorate, Kurdistan Region, Iraq. Date were retrieved from the data base which was dated of up to past 5 years. The process of data sorting and analysis took 3 months, from October 2024 until March 2025. A total of 367 cases were found to have the desired criteria and were added as samples to the study. All the data available of the patients were inserted into an excel sheet and was later analyzed. Inclusion criteria: all cases with suspected mass who were sent to histopathological report and turned positive for leiomyoma/leiomyosarcoma were included. All age group were included. Exclusion criteria: any case diagnosed with other than leiomyoma/leiomyosarcoma were excluded. Leiomyoma was identified if the cell showed a smooth muscle cell as Monotonous spindle cells with indistinct borders arranged in intersecting fascicles, while a case was diagnosed as Leiomyosarcoma in the presence of the

diagnostic triad of marked cytologic atypia, tumor cell necrosis and increased mitoses. Both conditions were documented in Pathology outline 25.

The final data of the patients were retrieved from the histopathological private hospital and were reassessed by a board certified Histopathologist. The socio-demographic characteristics which included age and gender as well as the indication for histopathology were retrieved from patients file. Any case who were suspicious of the tumor were sent to histopathological assessment regardless of the location of the biopsy.

Statistical Analysis

All data were initially input into an excel sheet and was later transformed into SPSS version 25 for assessment. The frequency of the sample was obtained numerically and by percentage. Person Chi-square test was used to assess the impact of age and gender on the form of the tumor, a *P* value of < 0.05 was regarded as statistically significant. No AI language tools were used for the drafting and refinement of this manuscript.

Ethical Approval

The ethical approval of the study protocol was received from the Duhok General Directorate of Health's Local Health Ethics Committee (Reference No., dated). In compliance with ethical guidelines, patient confidentiality was safeguarded by anonymizing personal data. All required permissions were obtained from relevant institutional authorities before data collection.

Results

Histopathologically, the lesions are either benign or malignant. The biopsies taken from the total 367 cases and sent to histopathology for assessment. Leiomyoma was seen in 357 cases accounting for 95.91% of the total sample while the malignant form Leiomyosarcoma was seen in only 15 cases with a rough estimation of 4.09% of the total sample as see in Figure 1.

The Specimens were collected from different parts of the body, ovarian was the commonest accounting for 89.9% of the total sample with 330 cases followed by Broad Ligament and Limbs each with 6 cases and 1.6%. Other rarer forms of

the disease were seen in the Bladder, Breast, Gluteal muscle, and Retroperitoneal wall each in 0.5%. Omentum was seen in 0.8%, and 0.8% in popliteal fossa. While each of the Abdominal wall, Appendix, Fallopian tube, Neck and Peritoneum has reported only one case Table 1.

The commonest location of Leiomyosarcoma was the ovaries accounting for 26.67% of all soft tissue's sarcoma, followed by the gluteal muscles 13.33%. other locations included; Abdomen, Breast, Inferior Vena Cava, Limb, Neck, Pelvic cavity, Peritoneum, popliteal fossa and retroperitoneum, each accounted for 6.67% as seen in Table 2.

Majority of the males and females had benign tumors, yet it is more likely the tumor to be malignant if found in a male than a female. The prevalence one third in male 33.33% and 3.85% in females with a statistically significant *P* value of

Table 1. Frequency of the specimen of different regions sent to histopathology

		Frequency	Percent
Location	Abdominal wall	1	0.3
	Appendix	1	0.3
	Bladder	2	0.5
	Breast	2	0.5
	Broad Ligament	6	1.6
	Fallopian tube	1	0.3
	Gluteal muscle	2	0.5
	Inferior vena cava	2	0.5
	Limb	6	1.6
	Neck	1	0.3
	Omentum	3	0.8
	Ovarian	330	89.9
	Pelvis	4	1.0
	Peritoneum	1	0.3
	Popliteal Fossa	3	0.8
	Retroperitoneum	2	0.5
	Total	367	100.0

Table 2. The location of Leiomyosarcoma

Leiomyosarcoma	No.	%
Abdomen	1	6.67
Breast	1	6.67
Gluteal muscle	2	13.33
Inferior vena cava	1	6.67
Limb	1	6.67
Neck	1	6.67
Pelvis	1	6.67
Peritoneum	1	6.67
Popliteal Fossa	1	6.67
Retroperitoneum	1	6.67
Ovarian	4	26.67
Total	15	100.0

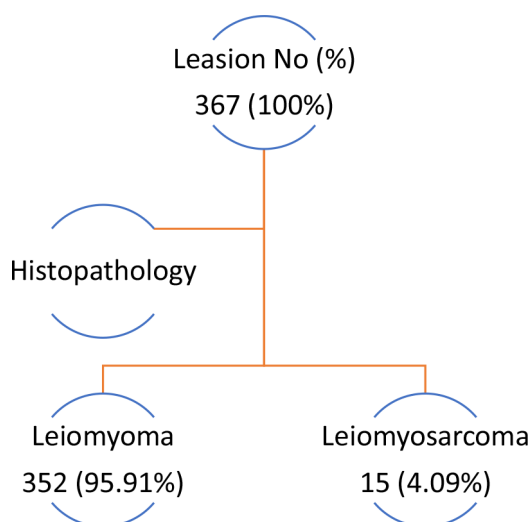


Fig. 1 Histopathological assessment of the lesions.

0.0102. additionally, the relative risk of males with leiomyosarcoma is 8.67 times of females with an OR of 12.5 in Table 3.

The highest prevalence of malignant tumor was seen among those < 18 years of age (50.0%), while patients aging 18–45 years of age accounted for 40.0% of all malignancies. Age had a statically significant impact on the form of tumor whether benign or malignant, $P < 0.001$. the prevalence of malignant form of tumor was higher among younger age group and was relatively declining with aging as seen in Table 4.

Discussion

This article highlights the importance of histopathological assessment of the specimen following the operation of any mass lesion suspected to be a tumor. Leiomyomas are typically seen in the uterus.^{2,3,9} Nevertheless, this article focuses on the tumors, benign or malignant, which were encountered by the surgeons in areas other than the uterine cavity. It is expected to encounter these tumors at extrauterine locations; commonly in the retroperitoneum, broad ligament, esophagus, skin, and vascular system.² From the 367 cases, 95.91% were Leiomyoma of extrauterine structures, and 4.09% represented leiomyosarcoma. Leiomyosarcoma itself is a common subtype of soft tissue sarcoma, yet it's a rare tumor in adults, with a prevalence of < 1% of all adult malignancies.⁸ These sarcomas are less encountered than uterine sarcoma.^{10,11} The commonest location of the leiomyosarcoma was the ovaries in this article.

The diagnosis of these tumors represents a challenge due to the degenerated forms, unusual sites, and size.² Additionally, they can mimic an ovarian tumor or can overlap with GIST.² Thus, histopathological assessment of these tumors represents a gold standard step in the diagnosis and management of these tumors.^{12,13} Leiomyosarcoma represents an important diagnosis of the disease, which is made through histopathological assessment since the clinical and imaging details could

not give a definitive diagnosis, and information could overlap between benign and malignant forms.^{12,14,15} From the malignant cases, the commonest location was the ovaries, representing 26.67% of the sample, followed by the gluteal muscle, 13.33%. Several articles reported retroperitoneal origin of the disease as the commonest location, followed by the inferior vena cava,^{16–18} yet in our study, ovaries were the commonest, followed by the gluteal muscles, and the retroperitoneal leiomyosarcoma and inferior vena cava had a prevalence of 6.67% each of the malignant forms.

In this study, males represented only 1.79% of the total sample, yet 33.3% had Leiomyosarcoma vs 66.6% Leiomyoma, a percentage much higher than found in females with a very high relative risk and Odd Ratio, 8.67 and 12.5, respectively; indicating that the probability of the tumor to be malignant is 8.67 times more likely in males than females, leiomyosarcoma in males compared to females and cases of Leiomyosarcoma are 12.5 times more likely to be in males than females. Gender is found as an independent risk factor of Leiomyosarcoma, particularly female gender.¹⁹ Additionally, the incidence rises with aging,^{20,21} several studies found the incidence to be neglectable for females under the age of 40 and substantially increases after the age 49,^{11,20,21} in this study, the percentage was higher, taking into account both age groups under 18 and 18–45 years of age, the prevalence of leiomyosarcoma was 4.5% followed by a decrease and a significant increase after the age 60. Additionally, we found that tumors that appear in patients under the age of 18 years have a 50% chance of being Leiomyosarcoma.

Strengths and Limitations

This study represents the first of its kind to describe extrauterine Leiomyoma and Leiomyosarcoma over 5 years in Duhok Region, which expands the knowledge about the disease. Additionally, it represents a large and dependable sample of data analysis of the disease. Finally, fundamental

Table 3. The correlation of the gender to the tumor form

		Tumor		Relative risk	OR
		Benign	Malignant		
Gender	Male no. (%)	2 (66.67)	1 (33.33)	3 (100.0)	0.33
	Female no. (%)	350 (96.15)	14 (3.85)	364 (100.0)	0.04
Total		352 (95.91)	15 (4.09)	367 (100.0)	

$P = 0.0102$, OR = 12.5, RR = 8.67.

Table 4. The correlation of the age to the tumor form

		Tumor		Total
		Benign	Malignant	
Age group	< 18 No. (%)	1 (50.0)	1 (50.0)	2 (100.0)
	18 – 45 No. (%)	147 (96.1)	6 (3.9)	153 (100.0)
	46 – 60 No. (%)	176 (97.8)	4 (2.2)	180 (100.0)
	> 60 No. (%)	28 (87.5)	4 (12.5)	32 (100.0)
Total		352	15	367

$P < 0.001$.

information with a good number of cases on Leiomyosarcoma is presented in the manuscript. The limitation of this study is the limited data (information) available for the cases to pursue an extensive analysis of the disease due to the underdeveloped system of data recording as well as the sample representing a single center study. Furthermore, the retrospective nature of the study could have added another limitation to the study since for each case there were not enough information in the data base, including the absence of molecular data and survival data.

Conclusion

Extrauterine Leiomyoma and Leiomyosarcoma represent a group of soft tissue muscle tumors of significant value that can be easily misdiagnosed without histopathology. The majority of these tumors were found to be benign, and a small number were found to be malignant. The extra-uterine Leiomyomas

and Leiomyosarcomas were primarily found in the ovaries, with a significant impact of age and gender on the malignant form; males and Pediatrics (i.e., age < 18 years) were more likely to have malignant forms than other groups.

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Conflict of Interest

The authors have no conflict of Interest.

Participation and Responsibility

All authors participated equally in the data collection, research conduction and writing of the manuscript. ■

References

- Barjon K, Kahn J, Singh M. Uterine leiomyomata. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025.
- Mathew R, Francis S, Jayaram V, Anvarsadath S. Uterine leiomyomas revisited with review of literature. *Abdom Radiol (NY)*. 2021;46:4908–26. doi:10.1007/s00261-021-03126-4.
- Sandberg A. Updates on the cytogenetics and molecular genetics of bone and soft tissue tumors: leiomyoma. *Cancer Genet Cytogenet*. 2005;158(1):1–26. doi:10.1016/j.cancergencyto.2004.08.025.
- Saurabh S. A case report of uterine fibroid with broad ligament fibroid. *Int J Curr Res Rev*. 2023. doi:10.31782/ijcrr.2023.151602.
- Veeresh M, Sudhakara M, Girish G, Naik C. Leiomyoma: a rare tumor in the head and neck and oral cavity: report of 3 cases with review. *J Oral Maxillofac Pathol*. 2013;17(2):281–7. doi:10.4103/0973-029X.119770.
- Chouchane A, Boughizane S, Nouira M, et al. Benign metastasizing leiomyoma: new insights into a rare disease with an obscure etiopathogenesis. *Diagn Pathol*. 2024;19:2. doi:10.1186/s13000-023-01427-4.
- Robinson E, Neugut AI, Wylie P. Clinical aspects of postirradiation sarcomas. *J Natl Cancer Inst*. 1988;80(4):233–40. doi:10.1093/jnci/80.4.233.
- George S, Serrano C, Hensley ML, Ray-Coquard I. Soft tissue and uterine leiomyosarcoma. *J Clin Oncol*. 2018;36(2):144–50. doi:10.1200/JCO.2017.75.9845.
- Florence AM, Fatehi M. Leiomyoma. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK538273/>
- Ricci S, Stone R, Fader A. Uterine leiomyosarcoma: epidemiology, contemporary treatment strategies and the impact of uterine morcellation. *Gynecol Oncol*. 2017;145(1):208–16. doi:10.1016/j.ygyno.2017.02.019.
- Leibsohn S, D'Ablaing G, Mishell D, Schlaerth J. Leiomyosarcoma in a series of hysterectomies performed for presumed uterine leiomyomas. *Am J Obstet Gynecol*. 1990;162(4):968–74; discussion 974–6. doi:10.1016/0002-9378(90)91298-Q.
- Mikami Y. Histopathology of uterine leiomyoma. In: *Histopathology of Uterine Tumors*. 2018:1–21. doi:10.1007/978-981-10-7167-6_1.
- Lundeberg K, Vidis L, Martin J, Randolph-Habecker J. Invaluable role of histopathology in the diagnosis of cutaneous leiomyosarcoma in insulin injection site reaction. *BMJ Case Rep*. 2021;14:e241333. doi:10.1136/bcr-2020-241333.
- Mathew B, Gupta D, Gahlot G. Cutaneous leiomyosarcoma of penile prepuce: a rare case. *IP Arch Cytol Histopathol Res*. 2024. doi:10.18231/j.achr.2024.043.
- Kumari S, Yadav G, Kaushik B, Kumar A, Phulwara R, Singh A, et al. Histopathological spectrum of leiomyoma of the uterus with an emphasis on pathological technique to avoid the misdiagnosis: a single tertiary centre experience. *J Med Evid*. 2023;4:225–30. doi:10.4103/jme.jme_151_22.
- Hilliard N, Heslin M, Castro C. Leiomyosarcoma of the inferior vena cava: three case reports and review of the literature. *Ann Diagn Pathol*. 2005;9(5):259–66. doi:10.1016/j.anndiagpath.2005.05.001.
- Rao U, Finkelstein S, Jones M. Comparative immunohistochemical and molecular analysis of uterine and extrauterine leiomyosarcomas. *Mod Pathol*. 1999;12(11):1001–9.
- Kerrison W, Thway K, Jones R, Huang P. The biology and treatment of leiomyosarcomas. *Crit Rev Oncol Hematol*. 2023;103955. doi:10.1016/j.critrevonc.2023.103955.
- Bao Y, Yang X, Zhao Q, Li W. Analysis of demographics and treatment outcomes for gastrointestinal leiomyosarcoma based on the SEER database. *Sci Rep*. 2025;15. doi:10.1038/s41598-025-91758-7.
- Valzacchi G, Rosas P, Uzal M, Gil S, Viglierchio V. Incidence of leiomyosarcoma at surgery for presumed uterine fibroids in different age groups. *J Minim Invasive Gynecol*. 2020. doi:10.1016/j.jmig.2019.06.013.
- Rodriguez A, Zeybek B, Asoglu M, Sak M, Tan A, Borahay M, Kilic G. Incidence of occult leiomyosarcoma in presumed morcellation cases: a database study. *Eur J Obstet Gynecol Reprod Biol*. 2016;197:31–5. doi:10.1016/j.ejogrb.2015.11.009.

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