The Gulf Journal of Oncology

Indexed By PubMed and Medline Database

Issue 48, May 2025
ISSN No. 2078-2101







10th Gulf Week for Cancer Awareness Launches in Kuwait - February 2025 Focuses on 'Your Health is in Your Awareness'

The Official Journal of the Gulf Federation For Cancer Control

Table of Contents

Original Articles

Survival outcomes and prognostic factors of extragonadal germ cell tumors: An institutional experience over a decade. 07

S. Bindhu, Meher Lakshmi Konatam, Rachana Chennamaneni, Sadashivudu Gundeti

Baroreflex Sensitivity, Vascular Status, and Cardiorespiratory Fitness

In Breast Cancer Survivors – A Cross–sectional Analytical Study 15

Aashish S Raman, Rajalakshmi Rajasegaran, Govindarajan Vishnukanth, Rajeswari Aghoram, Biswajit Dubashi, Usha Dhanaradja, Allen Timothy

Patterns and Trends of Colorectal Cancer in the United Arab Emirates: A Retrospective Cohort Study, 2012–2021 23

Ahmad Amrou, Ali Al–Najjar, Rachid Kaddoura, Masa Alashkar, Zainab Al–Abdullah, Samuel B. Ho,

Neshteman Oghanna, Faisel Ikram, Shroque Zaher

Cytotoxic Effect of Chemotherapy in Women with Breast Cancer in the Wilaya of Oran 31

Fatima Zohra Tahari, Asmahane Medjdoub, Zineb Tahari, Fatima Zohraa Boussouf, Saddek Yahia, Houria Ouldcadi, Tewfik Sahraoui.

Outcomes of Radiotherapy for Early–Stage Laryngeal Cancer: A 12–Year Retrospective Review 37

Shehzad K, Alrajhi N, Alwhaid M, Alnagmy A, Shehadeh M, Alsemali, Gamal M, Aldehaim M

Utility of specific human papilloma virus DNA PCR to detect HPV in oral squamous cell carcinoma 48

Doshi Preeti, Lakhe Rachana, Christopher Annu, Jain Avantika, Bharadwaj Reena P

Clinical Spectrum of Sarcoma in the Sultanate of Oman 53

Dr. Maitha Al Sibani, Dr. Ajit Venniyoor, Dr. Kawther Al Lawati, Dr. Ahmed Al Lawati, Maryam Al Nabhani

Comparative Efficacy and Toxicity of Gemcitabine–Cisplatin vs. Gemcitabine–Carboplatin

in Metastatic Carcinoma of the Urinary Bladder: A Retrospective Review.....60

Varun Goel, Arpit Jain, Dharmistha Basu, Nivedita Patnaik, Vineet Talwar, Siddhant Swamy, Dr Sudhir Rawal

Case Report

FH–Deficient Uterine Leiomyomas: Pathological Insights into a Rare Tumor 67

Fatima Shamsuddin, Meera Balakrishnan, Smiley Annie George

Primary Squamous Cell Carcinoma of the Thyroid: A Rare Subtype of Anaplastic Carcinoma 72

Fatima. Safini, Achraf. Miry, Zainab. Oumouloud, Ghizlane. Ennibi, Sanae. Abbaoui, Bouchra. Amaoui.

Conference Highlights/Scientific Contributions

- **News Notes.....76**
- **Advertisements 80**
- **Scientific Activities 81**

Original Article

Clinical Spectrum of Sarcoma in the Sultanate of Oman

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Abstract

Introduction: Sarcomas are a group of malignant tumors arising from mesenchymal tissue, with variable presentations and outcomes. Multiple factors contribute to the prognosis of the disease. As they are relatively infrequent, data on their clinical spectra and treatment outcomes are limited. The aim of this study is to identify the clinical spectrum of sarcomas in the Sultanate of Oman.

Methods: This is a single–center, retrospective study, conducted in The Royal Hospital, Muscat. The target population was sarcoma patients aged 18 years and above, who were diagnosed and treated over 5 years between 2016 to 2020 in this hospital.

Results: A total of 234 patients with histologically proven soft tissue and bone sarcomas were included in the study. The median age of the patients was 43 years. Soft tissue sarcomas (STS) constituted the most common type (72.2%). The most common histopathologic subtype of STS was uterine sarcoma at 25.8%, followed by gastrointestinal stromal tumors (GIST) (12.4%).

Among 234 patients, 60 patients had metastatic disease and received palliative chemotherapy, and 174 patients were treated with curative intent.

The mean progression free survival (PFS) in localized and metastatic bone sarcomas was 52.0 months and 10 months respectively. In STS cohort, the mean PFS in localized and metastatic was 33.0 months and 23.0 respectively.

The mean of overall survival (OS) was 58.8 months and 11.8 months in localized and metastatic bone sarcomas while in STS, the mean of OS was 91.0 months and 26.0 months respectively.

There was a statistically significant association between age and survival in STS, while the same was not seen in bone sarcomas.

Conclusion: Sarcomas are infrequent tumors with variety of histological subtypes and prognosis. We observed a gradual decline in survival with advancing age in the STS group.

Keywords: Sarcoma, soft tissue, Bone, Prognosis

Introduction

Sarcomas are a group of malignant tumors arising from connective tissues and are divided into bone and soft tissue sarcomas (STS). STS are rare tumors that constitute around 1% of all cancer types [1,2]. The most recent World Health Organisation (2020) classification of soft tissue tumours divides them into 11 categories depending on tissue of origin; more than 70 types of STS entities are listed [3]. Risk factors can be due to environmental exposures (radiation and chemicals) or genetic causes. HIV–positive patients have high risk for Kaposi sarcoma [4] multicellular growth, the pathogenesis of which remains unclear. Endemic African Kaposi's Sarcoma (KS. The presentation varies between adult and children [1,5]. The varied presentations

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of STS poses a challenge in identifying the risk factors and prognostic outcome [6]. Prognosis depend on age of presentation, presence of metastasis at diagnosis and tumor size [7,8], though increasingly, the molecular subtype and presence of druggable mutations are poised to change the natural history of some subtypes. Prognosis is poor if the patients present with metastatic disease; however, age is a significant factor affecting outcomes, with adults doing less well [7,9].

Published literature shows that STS make up the majority of sarcoma patients while bone sarcoma account for 10% [9]. The data from Oman is limited as the sarcoma histology is not reported as a single disease but distributed amongst the primary sites. As per Ministry of Health data from 2019, there were 13 bone tumors reported; among the STS, there were 8 uterine sarcomas, 3 gastric GISTs, 3 phyllodes sarcoma of breast, with a few rarer subtypes[10]. The present study is retrospective with the purpose of gaining insight into the disease pattern and outcomes of bone and soft tissue sarcomas. Understanding the pattern of sarcomas is essential in improving care, and for further research.

Methods

This is a retrospective study carried out on sarcoma patients aged 18 years and more, diagnosed in The Royal Hospital, National Oncology Center between 2016 to 2020. The data was retrieved from electronic medical records (Al Shifa) using a standardized data collection form. The following data were collected: Age, sex, site, histological type, grade, stage, treatment modality and survival outcomes.

The data were analyzed to correlate disease outcomes with age of presentation and other parameters such as histological subtypes, method of treatment, etc.

Statistical analysis

Data were analyzed with SPSS software. Descriptive statistics were used to summarize demographic and clinical characteristics. Kaplan–Meier estimates were utilized for survival analysis across different treatment lines to provide survival time estimates. Additionally, the Chi–Square test was applied to examine the association between age categories and disease outcomes. The statistical significance threshold was set at a p–value of 0.05.

Results

A total of 234 patients of histologically proven sarcomas were included in the study. The median age of the patients was 43 years (range: 18–87 years). Male patients constituted 42.3% (n = 99) and 57.6% (n=135) were female. STS constituted the most common type at 72.2%, followed by bone sarcomas at 27.7% (Osteosarcoma accounted for 46% of the latter, followed by Ewing sarcoma 43% and chondrosarcoma 10.7%). The most common type of STS in our study was uterine sarcoma 25.8% (of which the most common subtype was leiomyosarcoma) followed by gastrointestinal stromal tumor (GIST) 12.4% and pleomorphic sarcomas, as shown in ►Table 1.

Among 234 patients, 60 patients had metastatic disease and received palliative chemotherapy, and 174 patients were treated with curative intent (surgery, chemotherapy and radiation). After first line treatment, the mean of progression free survival (PFS) in localized bone sarcoma and soft tissue sarcoma is 52 months and 33.3

Characteristics (n:234)		
Histologic category		
Bone Sarcoma	65	27.7
– Osteosarcoma	30	46
– Ewing sarcoma	28	43
– Chondrosarcoma	7	10.7
Uterine Sarcoma	55	32.5
– Leiomyosarcoma	19	34.5
– Carcinosarcoma	21	38
– Stromal sarcoma	7	0.12
– Undifferentiated	5	0.09
– Adenosarcoma	3	0.05
Gastrointestinal stromal tumor	21	12.4
Rhabdomyosarcoma	11	0.06
Kaposi Sarcoma	10	0.05
Leiomyosarcoma	13	0.07
Miscellaneous	59	34.9
Pleomorphic Sarcoma	15	0.08
Liposarcoma	12	0.07
Fibrosarcoma	12	0.07
Synovial Sarcoma	10	0.05
Angiosarcoma	4	0.02
Epithelioid Sarcoma	3	0.017
Spindle cell sarcoma	3	0.017

Table 1: Patient characteristics with histological category of diagnosis

Age Groups * Soft Tissue Sarcoma Outcome Crosstabulation									
		Soft Tissue Sarcoma Outcome						Total	
		Alive		Dead		Lost Follow Up			
		N	%	N	%	N	%	N	%
Age Groups	**18–24**	3	8.1%	3	3.9%	2	3.6%	8	4.7%
	25–34	6	16.2%	16	21.1%	5	8.9%	27	16.0%
	35–44	2	5.4%	5	6.6%	15	26.8%	22	13.0%
	45–54	11	29.7%	12	15.8%	6	10.7%	29	17.2%
	55–64	7	18.9%	20	26.3%	11	19.6%	38	22.5%
	65–74	6	16.2%	10	13.2%	10	17.9%	26	15.4%
	75–88	2	5.4%	10	13.2%	7	12.5%	19	11.2%
Total		37	100.0%	76	100.0%	56	100.0%	169	100.0%

Chi–Square Tests			
	Value	**df**	**Asymptotic Significance (2–sided)**
Pearson Chi–Square	24.024[a]	12	.020
Likelihood Ratio	23.038	12	.027
N of Valid Cases	169		
a. 5 cells (23.8%) have expected count less than 5. The minimum expected count is 1.75.			

Table 2: Association between age and disease outcome in STS

months respectively. In metastatic group the mean of PFS was 10.0 months in bone sarcoma and 23 months in STS, as shown in ►Figs1&2.

The mean of overall survival (OS) was 58.8 months and 11.8 months in localized and metastatic bone sarcoma respectively. In STS the mean OS was 91.0 months and 26.0 months in localized and metastatic group respectively, as shown in ►Figs3&4.

The association between age group and disease outcome was studied and showed increased mortality with advancing age in STS with p–value is 0.020, which indicates that there is a statistically significant association between advancing age group and lower survival, as shown in ►Table 3.

Discussion

Bone and soft tissue sarcomas are a rare heterogeneous group of tumors[2,5,11,12]. They occur during adulthood and childhood with differing patterns of histiotypes and presentations [2,5,9,13]. The fifth edition of World Health Organization classification (2020) of soft tissue tumours (which include both benign and malignant tumours) classify these tumours under eleven categories, and list more than 60 malignant entities, pointing towards increasing complexity of diagnosis, especially as several of the less frequent sarcomas need molecular studies for confirmation[3,14].

The incidence of STS increases with age, with the reported median age in Western literature falling in the sixth decade[5,15,16]. In our study, the median age was 43 years, which was 20 years younger compared to other studies, with a slight female predominance. The age distribution of study population affects the incidence, histological subtypes and survival of the patients [5,12]. The peaks in incidence occurs at 30 years and at 70 years. This is attributed to increased numbers of Kaposi sarcoma cases in young adults [17,18] and by increased numbers of fibrohistiocytic tumors, liposarcoma, and leiomyosarcoma in the elderly.

Sarcomas account for less than 1% of all adult solid malignant cancers[1,15]. The vast majority of diagnosed sarcomas are STS, and the malignant bone tumors make up just 10% of sarcomas [3]. In our study, the percentage of bone sarcomas was higher and accounted for 27.7%. Osteosarcomas composed of 46% of these tumours, which is similar to other studies[19,20]. Histological subtyping of STS

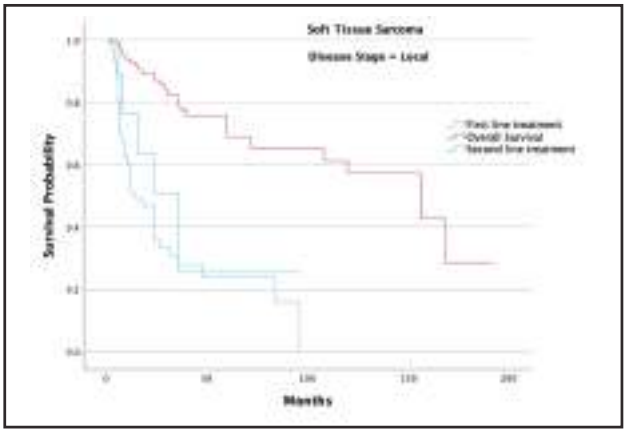


Figure 1A: Localized soft tissue sarcoma

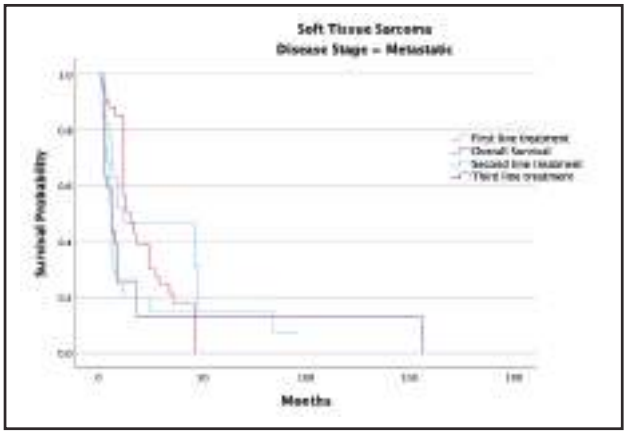


Figure 1B: Metastatic soft tissue sarcoma

Line of treatment	PFS (months)
First line (N=100)	33
Second line (N=39)	40

Line of treatment	PFS (months)
First line (N=69)	23
Second line (N=39)	18

Figure 1: Kaplan–Meier estimate of progression–free survival after first and second line treatment between localized and metastatic soft tissue sarcoma

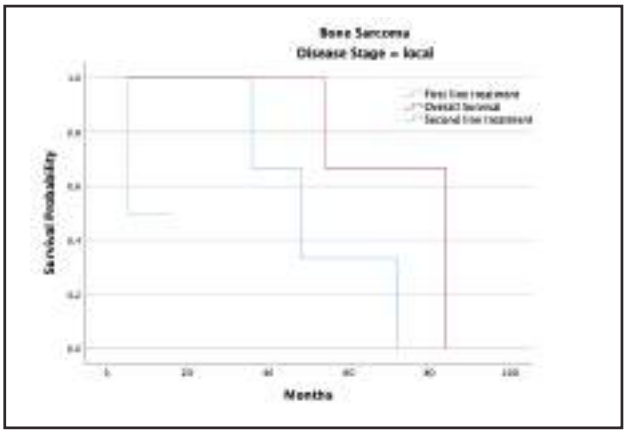


Figure 2A: Localized bone sarcoma

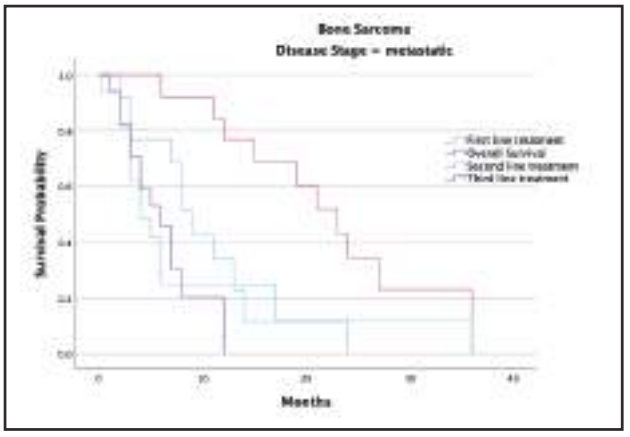


Figure 2B: Metastatic bone sarcoma

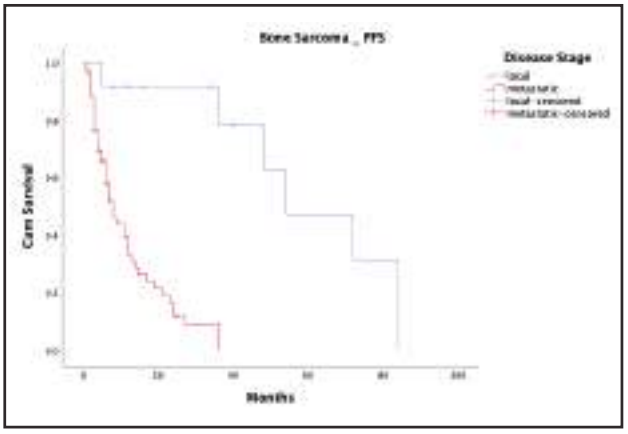
Line of treatment	PFS (months)
First line (N=34)	52
Second line (N=12)	10

Line of treatment	PFS (months)
First line (N=31)	10
Second line (N=22)	8

Figure 2: Kaplan–Meier estimate of progression–free survival after first and second line treatment between localized and metastatic Bone sarcoma

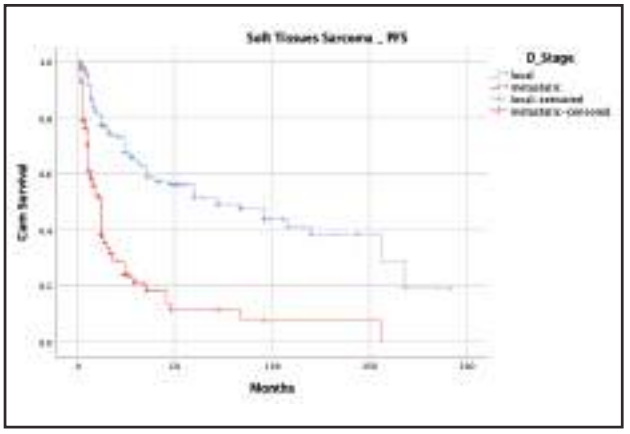
is difficult, needing specialized pathologists and molecular studies, which partly account for different patterns in various studies [21]. STSs are often labeled high–grade sarcomas or undifferentiated pleomorphic sarcomas when specific lines of differentiation are not identified[3]. In our study, uterine sarcomas were the commonest subtype of which leiomyosarcoma (34.5%) was the commonest, similar to that in other studies[21,22]. This was followed by GISTs and undifferentiated pleomorphic sarcomas.

A previous study conducted in Sultanate of Oman by another cancer center recorded 126 cases over a ten year period from 2013 to 2022, and the most histopathological subtypes were tumors of myo–fibroblastic origin[23]. A large study published in abstract form from another Gulf country (Saudi Arabia) reported 214 patients of STS over a 10–year period from a single center; the median age was similarly low (38 years) and the most common histology subtypes were synovial sarcoma (19.6%), liposarcoma



Overall survival	(months)
Localized	58.8
Metastatic	11.8

Figure 3: Kaplan–Meier estimate of overall survival between localized and metastatic bone sarcomas



Overall survival	(months)
Localized	91
Metastatic	26

Figure 4: Kaplan–Meier estimate of overall survival between localized and metastatic STS

Age Groups * Disease Outcome Crosstabulation

		Disease Outcome						Total	
		Alive		Dead		Lost Follow Up			
		N	%	N	%	N	%	N	%
Age Groups	**18–24**	10	50.0%	9	36.0%	5	25.0%	24	36.9%
	25–34	9	45.0%	7	28.0%	8	40.0%	24	36.9%
	35–44	1	5.0%	8	32.0%	5	25.0%	14	21.5%
	45–66	0	0.0%	1	4.0%	2	10.0%	3	4.6%
Total		20	100.0%	25	100.0%	20	100.0%	65	100.0%

Chi–Square Tests

	Value	df	Asymptotic Significance (2–sided)
Pearson Chi–Square	8.767[a]	6	.187
Likelihood Ratio	10.388	6	.109
N of Valid Cases	65		

a. 5 cells (41.7%) have expected count less than 5. The minimum expected count is .92.

Table 3: Association between age and disease outcome in bone sarcomas

(13.5%), undifferentiated pleomorphic sarcoma (11.6%), and leiomyosarcoma (9.8%)[24]. Data from Saudi Cancer registry of STS of the extremities and pelvis seen between January 2006 and December 2015 noted 659 patients; they too reported a lower median age (22% of the cases occurring in the 19–30 years age group), with lower incidence when compared to Western countries (average, 2.4 cases per one million) but with similar histological presentation (liposarcoma was the most commonly diagnosed (n = 135; 20.5%), followed by undifferentiated pleomorphic sarcoma (n = 87; 13.2%)[25].

In our study, among 234 sarcoma patients, 60 patients had metastatic disease and 174 patients presented with localized disease. The management of localized STS is decided after a multidisciplinary approach between surgery, radiation oncology and medical

oncology. Surgery is the important modality of therapy, Radiotherapy or chemotherapy in a perioperative setting improves outcomes and it is associated with increased ease of resection and decreased local recurrence with improvement of survival outcomes [26–28]. Neo–adjuvant therapies (either radiation or chemotherapy) were considered on a case–to–case basis after tumor board discussions.

The prognosis of STS is determined by local recurrence and distant metastasis, with long term survival mainly depending on metastasis [12]. In our study, after first line treatment, the mean of progression free survival (PFS) in bone sarcomas was 10.0 months and STS was 23.0 months, and after second line treatment was 8.0 months in bone sarcoma and 18.0 months in STS. In addition, in our study the mean overall survival (OS) was 58.8 months and 11.8 months in localized and metastatic bone sarcomas respectively and in STS the mean OS was 91.0 months and 26.0 months in localized and metastatic group respectively. In a retrospective study from Germany that included 24,753 patients, the reported overall median survival was 5.83 years [29] For localized STS patients, the median PFS estimate was 20.93 months, with 1–year DFS and OS rates being 87.6 and 95.3%, respectively. The variation in survival outcomes can be explained on the basis of heterogeneity of the study population such as age profile, histological subtypes, grades, and use of different treatment options.

The de novo and relapsed metastatic STS patients received systemic chemotherapy therapy. The presence of metastases predicts a dismal outcome in STS, the mean PFS in metastasis after first– and second–line treatment were 23 months (95% CI: 15.9– 34.7) and 18.8 months (95% CI: 9.29– 23.37) respectively. The median PFS and OS of metastatic STS patients in an Indian study was 9.83 months (95% CI: 4.8– 14.85) and 23.90 months (95% CI: 7.43–40.36) (30). Another study from the United States of 363 metastatic STS patients reported a median OS of 22 months and 17 months among treated and untreated patients [15]. The PFS and OS in metastatic patients reflect a better probability of survival in those who received loco–regional therapy or definitive therapy.

In our study, there is a statistically significant association (p–value is 0.020) between age group and disease outcome in STS, with increased mortality in the advanced age group.

Strengths and Limitations:

Our study conducted in tertiary hospital is the largest study so far from Oman and helps to understand the spectrum of bone and STS in the country. It should act as a catalyst for further studies in this rare category of tumours. The limitations of this study include the retrospective design, single–center study, and relatively small sample size. Prospective data collection with molecular studies and long–term follow–up are planned to better understand these tumours and improve patient outcomes.

Conclusion

Sarcomas are rare tumors with a variety of histologic subtypes. Our study, the largest from the Oman so far, is indicative of the clinical spectrum and survival of sarcoma patients in the country. We observed a gradual decline in survival with advancing age in the STS cohort.

Acknowledgement

We would like to express our sincere gratitude to Dr. Ajit for his invaluable assistance in the preparation and writing of this manuscript. His expertise, guidance, and constructive feedback have greatly contributed to the quality and depth of this work. We deeply appreciate his support throughout the research and writing process.

Funding and Conflict of Interest

This research did not receive any specific grant from funding agencies. We have no conflicts of interest to disclose

References

1. Siegel RL, Miller KD, Wagle NS, Jemal A. Cancer statistics, 2023. CA Cancer J Clin. 2023 Jan;73(1):17–48.
2. Sheoran A, Garg A, Yadav U, Kundu ZS, Sherawat R, Singla M, et al. Outcomes of Wide Resection of Soft–Tissue Sarcoma of the Extremity: A Retrospective Analysis. Cureus. 14(7):e27329.
3. Choi JH, Ro JY. The 2020 WHO Classification of Tumors of Soft Tissue: Selected Changes and New Entities. Adv Anat Pathol. 2021 Jan;28(1):44.
4. Matondo P, Zumla A. The spectrum of African Kaposi's sarcoma: is it consequential upon diverse immunological responses? Scand J Infect Dis. 1996;28(3):225–30.
5. Ferrari A, Sultan I, Huang TT, –Galindo CR, Shehadeh A, Meazza C, et al. Soft Tissue Sarcoma Across the Age Spectrum: A Population–Based Study from the Surveillance Epidemiology and End Results Database. Pediatr Blood Cancer. 2011 Dec 1;57(6):943–9.
6. Weskamp P, Ufton D, Drysch M, Wagner JM, Dadras M, Lehnhardt M, et al. Risk Factors for Occurrence and Relapse of Soft Tissue Sarcoma. Cancers. 2022 Mar 1;14(5):1273.
7. Han D, Li C, Li X, Huang Q, Xu F, Zheng S, et al. Prognostic Factors in Patients with Rhabdomyosarcoma Using Competing–Risks Analysis: A Study of Cases in the SEER Database. J Oncol. 2020 Sep 17;2020:2635486.

8. Patel SJ, Pappoppula L, Guddati AK. Analysis of Trends in Race and Gender Disparities in Incidence–Based Mortality in Patients Diagnosed with Soft Tissue Sarcomas from 2000 to 2016. Int J Gen Med. 2021 Jul 24;14:3787–91.
9. Iwai T, Hoshi M, Takada J, Oebisu N, Aono M, Takami M, et al. Prognostic factors for elderly patients with primary malignant bone and soft tissue tumors. Oncol Lett. 2015 Jun 29;10.
10. Cancer third leading cause of death in Oman – Times of Oman [Internet]. [cited 2024 Jul 8]. Available from: https://timesofoman.com/article/120569–cancer–third–leading–cause–of–death–in–oman
11. Thway K. Well–differentiated liposarcoma and dedifferentiated liposarcoma: An updated review. Semin Diagn Pathol. 2019 Mar;36(2):112–21.
12. Coindre JM, Terrier P, Guillou L, Le Doussal V, Collin F, Ranchère D, et al. Predictive value of grade for metastasis development in the main histologic types of adult soft tissue sarcomas: a study of 1240 patients from the French Federation of Cancer Centers Sarcoma Group. Cancer. 2001 May 15;91(10):1914–26.
13. Noone AM, Cronin KA, Altekruse SF, Howlader N, Lewis DR, Petkov VI, et al. Cancer incidence and survival trends by subtype using data from the Surveillance Epidemiology and End Results Program, 1992–2013. Cancer Epidemiol Biomark Prev Publ Am Assoc Cancer Res Cosponsored Am Soc Prev Oncol. 2017 Apr;26(4):632–41.
14. Neuville A, Ranchère–Vince D, Dei Tos AP, Montesco MC, Hostein I, Toffolatti L, et al. Impact of molecular analysis on the final sarcoma diagnosis: a study on 763 cases collected during a European epidemiological study. Am J Surg Pathol. 2013 Aug;37(8):1259–68.
15. Chen C, Borker R, Ewing J, Tseng WY, Hackshaw MD, Saravanan S, et al. Epidemiology, Treatment Patterns, and Outcomes of Metastatic Soft Tissue Sarcoma in a Community–Based Oncology Network. Sarcoma. 2014;2014:145764.
16. Collignon C, Carton M, Brisse HJ, Pannier S, Gauthier A, Sarnacki S, et al. Soft tissue sarcoma in children, adolescents and young adults: Outcomes according to compliance with international initial care guidelines. Eur J Surg Oncol. 2020 Jul 1;46(7):1277–86.
17. Lebbe C, Garbe C, Stratigos AJ, Harwood C, Peris K, Marmol V del, et al. Diagnosis and treatment of Kaposi's sarcoma: European consensus–based interdisciplinary guideline (EDF/EADO/EORTC). Eur J Cancer. 2019 Jun 1;114:117–27.
18. Rouhani P, Fletcher CDM, Devesa SS, Toro JR. Cutaneous soft tissue sarcoma incidence patterns in the U.S. Cancer. 2008;113(3):616–27.
19. Holm CE, Grazal CF, Raedkjaer M, Baad–Hansen T, Nandra R, Grimer R, et al. Development and comparison of 1–year survival models in patients with primary bone sarcomas: External validation of a Bayesian belief network model and creation and external validation of a new gradient boosting machine model. SAGE Open Med. 2022 Feb 8;10:20503121221076387.
20. Survival Rates for Osteosarcoma [Internet]. [cited 2024 Jul 21]. Available from: https://www.cancer.org/cancer/types/osteosarcoma/detection–diagnosis–staging/survival–rates.html
21. Grimer R, Judson I, Peake D, Seddon B. Guidelines for the Management of Soft Tissue Sarcomas. Sarcoma. 2010;2010:506182.
22. Gronchi A, Miah AB, Tos APD, Abecassis N, Bajpai J, Bauer S, et al. Soft tissue and visceral sarcomas: ESMO–EURACAN–GENTURIS Clinical Practice Guidelines for diagnosis, treatment and follow–up☆. Ann Oncol. 2021 Nov 1;32(11):1348–65.
23. Shaibi MA, Hinai MA, Albaali D, Sharqi A al, Abri MA, Hosni M al, et al. Soft Tissue sarcoma in Arabs, 10–year retrospective experience of a tertiary center in Oman. Eur J Surg Oncol [Internet]. 2024 Feb 1 [cited 2024 Nov 17];50(2). Available from: https://www.ejso.com/article/S0748–7983(23)01446–4/abstract
24. Alshamsan B, Alrifai O, Atayeb M, AlAboud M, Alshomrani A, Alsadoun N, et al. Characteristics and outcomes of soft tissue sarcoma in Saudi Arabia. J Clin Oncol. 2022 Jun 1;40(16_suppl):e23544–e23544.
25. Aljuhani W, Alanazi A, Alshehri E, Alageel MK, Masuadi E, Zolaly M, et al. Descriptive analysis of incidence, demographic characteristics, and survival outcomes of soft–tissue sarcoma of the extremities in Saudi Arabia. Sci Rep. 2024 Nov 25;14(1):29123.
26. Pervaiz N, Colterjohn N, Farrokhyar F, Tozer R, Figueredo A, Ghert M. Pervaiz N, Colterjohn N, Farrokhyar F, Tozer R, Figueredo A, Ghert M.. A systematic meta–analysis of randomized controlled trials of adjuvant chemotherapy for localized resectable soft–tissue sarcoma. Cancer 113: 573–581. Cancer. 2008 Aug 1;113:573–81.
27. Kraybill WG, Harris J, Spiro IJ, Ettinger DS, DeLaney TF, Blum RH, et al. Phase II study of neoadjuvant chemotherapy and radiation therapy in the management of high–risk, high–grade, soft tissue sarcomas of the extremities and body wall: Radiation Therapy Oncology Group Trial 9514. J Clin Oncol Off J Am Soc Clin Oncol. 2006 Feb 1;24(4):619–25.
28. Yang X, Zhang L, Yang X, Yu W, Fu J. Oncologic outcomes of pre– versus post–operative radiation in Resectable soft tissue sarcoma: a systematic review and meta–analysis. Radiat Oncol Lond Engl. 2020 Jun 23;15:158.
29. Saltus CW, Calingaert B, Candrilli S, Lorenzo M, D'yachkova Y, Otto T, et al. Epidemiology of Adult Soft–Tissue Sarcomas in Germany. Sarcoma. 2018;2018(1):5671926.
30. Mathigatta Shivarudraiah S, Sundaram V, Pandalanghat S, Soneji D, Kumar M, Patel A, et al. Adult Soft Tissue Sarcoma: A Prospective Observational Real–World Data. Indian J Med Paediatr Oncol. 2021 Aug 1;42:339–45.