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Management of Testicular Cancer at Milton Keynes University Hospital NHS Foundation Trust: A Five-Year Retrospective Analysis

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Abstract

Introduction: According to the European Association of Urology (EAU) guidelines, testicular cancer accounts for 1% of adult malignancies and 5% of urological tumours, with an incidence of 3 - 10 per 100,000 males annually in Western countries. Germ cell tumours (GCTs) represent 90% - 95% of cases, with non-seminomatous and mixed GCTs typically presenting in the third decade of life, and seminomas in the fourth. Early diagnosis through physical examination, scrotal ultrasound, tumour markers, and staging imaging is essential. **Methods:** A retrospective audit was conducted at Milton Keynes University Hospital, reviewing cases of testicular cancer from September 2018 to May 2024. Patients were identified through electronic medical records and data were extracted on demographics, tumour markers, imaging, histopathology, and management. **Results:** Forty patients were included, aged 18 to 89 years. Pre-operative ultrasound identified features of testicular tumour in 90% (36/40), though 10% (4/40) had benign histology. Conversely, 5% (2/40) had normal ultrasound findings but malignant histology. Elevated AFP, β-HCG, and LDH were observed in 10% (4/40), 25% (10/40), and 47.5% (19/40) respectively. Histopathology confirmed seminoma in 45% (18/40), mixed GCT in 32.5% (13/40), and other rare tumours in the remaining cases. Staging CT scans were performed in 82.5% (33/40), and post-operative tumour markers were monitored. Sperm banking was offered to 60% (24/40) and prosthesis placement to 27.5% (11/40). **Conclusion:** The management of testicular can-

cer at our centre aligns with EAU guidelines, demonstrating adherence to recommended diagnostic pathways, surgical management, and supportive care.

Keywords

Testicular Cancer, Cancer Screening, EAU Guidelines, Quality Improvement, Audit

1. Introduction

Testicular cancer can affect one or both testes and most commonly presents as a painless or painful testicular nodule, mass, enlargement, or induration [1]. It accounts for less than 1% of new cancer cases, with the majority of patients being diagnosed between the ages of 20 and 34 years [1]. Symptoms can vary from lump or swelling, pain, heaviness, abdominal discomfort, and breast pain [2]. Over 95% of testicular cancers are germ cell tumours (GCTs), which are broadly categorized into seminomas and nonseminomas; nonseminomas tend to be more aggressive and may contain multiple cell types [1]. Risk factors include undescended testicles, a family history of testicular cancer, low testicular volume, viral infections (such as HPV, EBV, CMV, Parvovirus B19, and HIV), genetic conditions like Klinefelter syndrome, a previous history of testicular cancer, white race, radiation exposure, high maternal estrogen levels, carcinoma *in-situ*, and testicular trauma [3] [4]. The global incidence of testicular cancer has been steadily rising, with an estimated 9720 new cases expected in the United States in 2025, and approximately 600 deaths—reflecting its excellent 5-year relative survival rate of around 94% [1].

Early detection significantly improves prognosis. Investigating testicular cancer involves a focused urology history and examination of the testes, neurological system, abdomen, chest, supraclavicular region, and lower limbs. Tumor markers assessment including Alpha-Fetoprotein (AFP), Beta-HCG, and Lactate Dehydrogenase (LDH) [5]. Transscrotal ultrasound with Doppler is the initial imaging modality for evaluating suspected testicular masses. If findings indicate a suspicious mass, a radical inguinal orchiectomy is performed to establish a diagnosis. In some cases of advanced disease, systemic therapy may be initiated based on elevated tumor markers or biopsy of metastases [1]. Imaging modalities also include staging CT scans and brain MRI as indicated [5] [6].

2. Epidemiology

Testicular cancer accounts for approximately 1% of all adult malignancies and 5% of urological tumors, with an annual incidence ranging from 3 to 10 cases per 100,000 males in Western countries [7]. According to the European Association of Urology guidelines, the vast majority (90% - 95%) of testicular cancer cases are germ cell tumors (GCTs), which are further classified into seminomas and non-

seminomas [7]. Non-seminomatous and mixed germ cell tumors most commonly present in the third decade of life, whereas pure seminomas peak in incidence during the fourth decade [7]. At diagnosis, bilateral involvement is observed in 1% - 2% of cases [7]. Most post-pubertal malignant GCTs arise from a precursor lesion known as germ cell neoplasia *in situ* (GCNIS) [7]. Non-GCNIS derived tumors, such as prepubertal-type teratomas and yolk sac tumors, typically occur in young children, while spermatocytic tumors tend to appear in older adults.

3. Aim

This study aims to describe the clinical characteristics and management pathways of patients undergoing radical orchidectomy for suspected testicular cancer at Milton Keynes University Hospital NHS Foundation Trust, and to evaluate the extent to which current practices align with the European Association of Urology guidelines.

4. Methods

This retrospective study was conducted at Milton Keynes University Hospital NHS Foundation Trust, a district general hospital in the United Kingdom. The study included all patients who underwent radical inguinal orchidectomy for suspected or confirmed testicular cancer between September 2018 and May 2024. Eligible patients were identified through the hospital's electronic medical records. Patients were excluded if they had incomplete documentation or if their care was delivered outside the Trust.

Data collected included patients' socio-demographic characteristics, tumor markers, histopathological diagnoses, staging investigations, waiting times from referral to surgery, involvement of the multidisciplinary team, and information on patient support measures such as sperm banking and prosthesis options.

Descriptive statistical analysis was conducted to summarize the characteristics and management pathways of the cohort. Although the data were initially collected as part of a local audit project, this manuscript presents a descriptive analysis of the patient population and management trends rather than a direct audit of compliance against predefined standards.

Formal ethical approval was not required, as the study used anonymized data from a previously registered local clinical audit. All data were handled in accordance with institutional data governance policies to ensure patient confidentiality.

5. Results

A total of 40 patients were reviewed, with ages ranging from 18 to 89 years (**Figure 1**). Most patients were through the two-week wait pathway by general practitioners. Pre-operative ultrasound findings were indicative of testicular tumors in 90% (36 of 40) patients, with 10% (4 of 40) having benign histology post-surgery. 5% (2 of 40) of patients with non-suggestive ultrasounds were diagnosed with malignant histology.

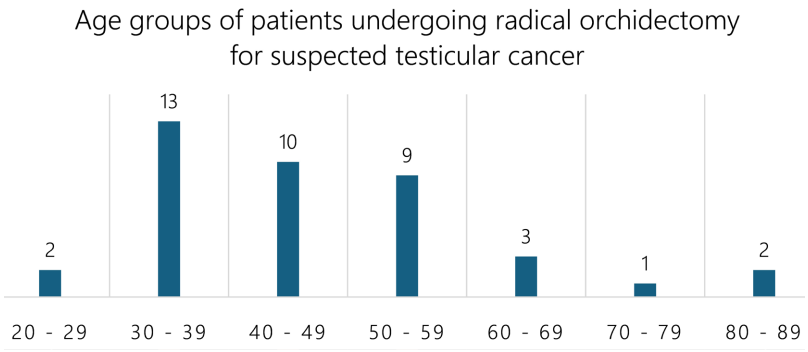

Figure 1. Age groups of patients undergoing radical orchidectomy for suspected testicular cancer (n=40).

In terms of histopathology (Table 1), 32.5% (13 of 40) of patients were diagnosed with mixed germ cell tumors, and 45% (18 of 40) had seminomas. A 5% (2 of 40) family history of testicular cancer was reported (Table 2).

Table 1. Types of histopathology of patients.

Histopathology	Number of patients	Staging	Positive cases
Seminoma	18	PT1	15
		PT2	3
Mixed Germ Cell	13	PT1	8
		PT2	5
Lymphoma (Large B cell)	1	-	-
Leydig cell tumor	1	-	-

Table 2. Family history of testicular diseases (n = 40).

No family Hx	**38**
Positive family Hx	1
Dad undescended testes	1

Table 3. Pre-operative tumor markers.

AFP (3 - 8)	**Yes**	37	**High**	4
			Normal	33
	No	3		
B-HCG (0 - 4)	**Yes**	37	**High**	10
			Normal	27
	No	3		
LDH (208 - 378)	**Yes**	35	**High**	19
			Normal	16
	No	5		

Regarding tumor markers (Table 3), 10% (4 of 40) had elevated alpha-fetoprotein (AFP), 25% (10 of 40) had elevated beta-human chorionic gonadotropin (β-HCG), and 47.5% (19 of 40) had elevated lactate dehydrogenase (LDH). 82.5% (33 of 40) of patients underwent staging CT scans, either before or after multidisciplinary team discussions (Figure 2).

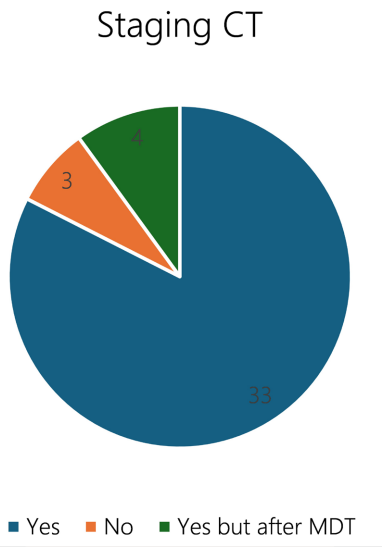

Figure 2. Number of staging CT performed and not performed (n = 40).

The waiting time for surgery ranged from 2 to 4 weeks in 42.5% (17 of 40) patients (Figure 3), while 72.5% (29 of 40) were seen within 2 weeks of referral (Figure 4).

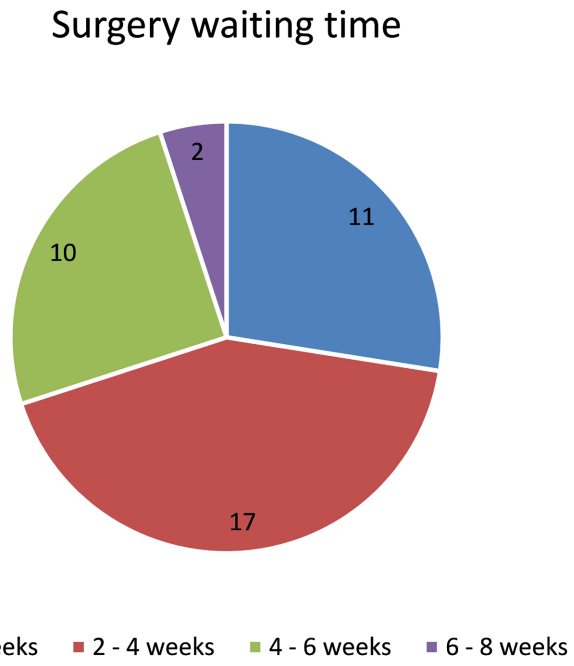

Figure 3. Surgery waiting time (n = 40).

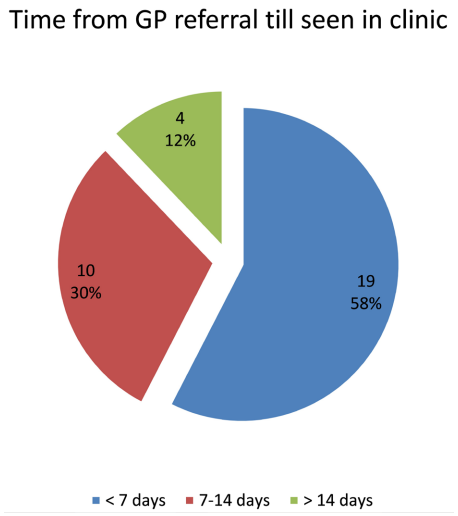

Figure 4. Time from GP referral till seen in clinic.

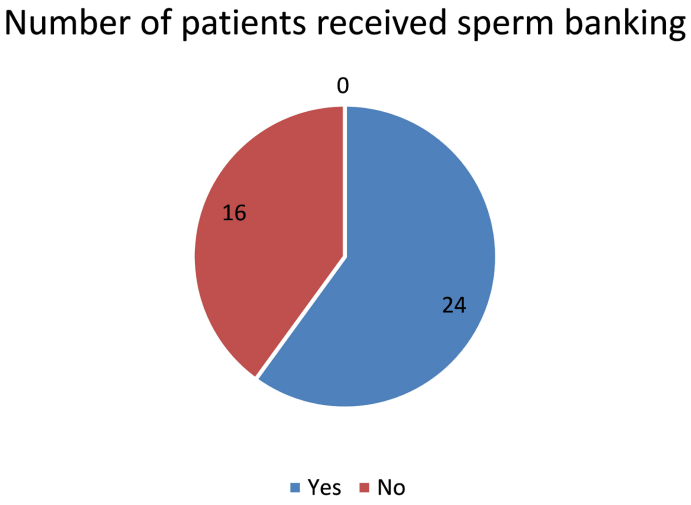

Figure 5. Number of patients received sperm banking (n = 40).

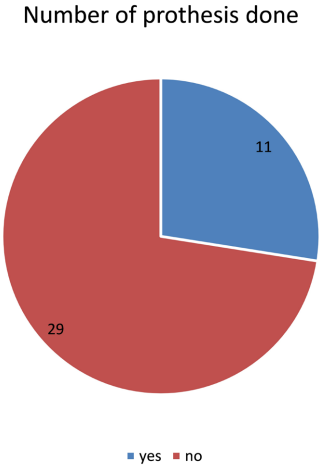

Figure 6. Number of prothesis done (n = 40).

For patient support, 60% (24 of 40) were offered sperm banking (**Figure 5**), and 27.5% (11 of 40) underwent prosthesis placement (**Figure 6**).

6. Discussion

This retrospective study evaluated the management of patients undergoing radical orchidectomy for suspected testicular cancer at Milton Keynes University Hospital and assessed the degree of adherence to the European Association of Urology guidelines. The findings indicate that while several aspects of the diagnostic and treatment pathway align with recommended standards, there remain areas where clinical practice could be optimized.

In our cohort of 40 patients, the age distribution was consistent with European Association of Urology-reported epidemiology, with non-seminomatous and mixed germ cell tumors predominantly affecting men in the third decade, and seminomas appearing more frequently in the fourth decade [7]. The detection of testicular malignancy in patients up to 69 years underscores the need for clinical vigilance across a broader age range. Only 5% (2 of 40) of patients reported a family history of testicular cancer, reflecting the known low familial prevalence, though this remains an important risk factor.

Regarding diagnosis, 90% (36 of 40) had ultrasound findings suggestive of a testicular tumor. However, 10% (4 of 40) of these turned out to have benign histology, and conversely, malignancy was identified in 5% (2 of 40) whose ultrasounds were non-suggestive. These figures highlight both the high sensitivity and limitations of ultrasonography, reinforcing the European Association of Urology recommendation for bilateral testicular ultrasound in all patients with suspected testicular cancer [7].

Tumor markers were measured pre-operatively in all patients, aligning with the guideline emphasis on baseline serum levels of AFP, β-HCG, and LDH. Notably, 10% (4 of 40) had elevated AFP, 12.5% (5 of 40) had elevated β-HCG, and 50% (20 of 40) had elevated LDH, illustrating the importance of these markers in diagnosis and monitoring. Post-operative tumor markers were also checked, demonstrating compliance with the guideline recommendation to assess marker half-life kinetics post-orchidectomy [7].

Staging was appropriately conducted with contrast-enhanced CT scans in nearly all cases, reflecting good adherence to European Association of Urology guidance for radiological evaluation [7]. Additionally, the majority of patients were referred under the two-week wait (2WW) pathway, with 73% (29 of 40) seen within the target time frame. Although this meets national expectations, it is consistent with findings from a systematic review by the Centre for Reviews and Dissemination, which reported variable cancer detection rates under the 2WW system (13% to 40%) [8]. Our malignancy detection rate of 80% (32 of 40) is notably higher than average, supporting the effectiveness of referral and diagnostic processes at MKUH.

Fertility preservation is a key quality metric in testicular cancer care. Consistent with European Association of Urology recommendations, sperm banking was of-

fered to 60% (24 of 40), and testicular prostheses were discussed or provided in 28% (11 of 40). However, the lower-than-expected offering of these supportive interventions may reflect under-documentation or logistical barriers, underscoring a need to improve patient counseling and access to supportive services [9].

6.1. Implications

This study demonstrates that MKUH largely adheres to EAU guidelines in the diagnostic and staging workup of testicular cancer, particularly in imaging, tumor marker evaluation, and the 2 WW referral process. However, variation in sperm banking rates and prosthesis offering, along with the detection of benign tumors post-operatively, highlight opportunities for improved documentation, patient education, and streamlined pre-operative counseling.

6.2. Limitations

This study has several limitations. First, it was conducted at a single center and included a relatively small sample size (n = 40), limiting the generalizability of the findings to broader populations. Second, no inferential statistical analysis was performed to explore associations between variables such as tumor marker levels and histological subtype or staging. The purely descriptive nature of the data limits the ability to draw stronger conclusions or assess the significance of observed patterns.

6.3. Future Research

Future research should consider a multicenter design with a larger cohort to better understand national patterns in testicular cancer diagnosis and care, and to validate institutional performance against broader benchmarks. In addition, integrating statistical analysis to explore potential predictors of malignancy and treatment outcomes could inform clinical decision-making and enhance pathway efficiency. The development of a regional testicular cancer registry may also facilitate ongoing audit, quality improvement, and research efforts across NHS trusts.

7. Conclusion

The management of testicular cancer at Milton Keynes University Hospital demonstrates general adherence to European Association of Urology guidelines, particularly in the areas of early diagnosis, timely surgical intervention, and use of imaging and tumor markers for staging. While diagnostic pathways and oncological management appear robust, areas such as fertility preservation counselling and documentation of supportive care require improvement. These findings highlight the importance of consistent, guideline-driven practice and suggest opportunities to optimize patient-centered care within existing clinical pathways.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Gilligan, T., Lin, D.W., Adra, N., Bagrodia, A., Feldman, D.R., Yamoah, K., *et al.* (2025) NCCN Guidelines Insights: Testicular Cancer, Version 2.2025. *Journal of the National Comprehensive Cancer Network*, **23**, 1-9. https://doi.org/10.6004/jnccn.2025.0018

[2] Oliver, R.T.D. (1997) Testis Cancer. *Current Opinion in Oncology*, **9**, 287-294. https://doi.org/10.1097/00001622-199709030-00012

[3] Garner, M.J., Turner, M.C., Ghadirian, P. and Krewski, D. (2005) Epidemiology of Testicular Cancer: An Overview. *International Journal of Cancer*, **116**, 331-339. https://doi.org/10.1002/ijc.21032

[4] Yazici, S., Del Biondo, D., Napodano, G., Grillo, M., Calace, F.P., Prezioso, D., *et al.* (2023) Risk Factors for Testicular Cancer: Environment, Genes and Infections—Is It All? *Medicina*, **59**, Article 724. https://doi.org/10.3390/medicina59040724

[5] Stephenson, A., Eggener, S.E., Bass, E.B., Chelnick, D.M., Daneshmand, S., Feldman, D., *et al.* (2019) Diagnosis and Treatment of Early-Stage Testicular Cancer: AUA Guideline. *Journal of Urology*, **202**, 272-281. https://doi.org/10.1097/ju.0000000000000318

[6] Baxter, M.A., MacDonald, G., Malik, J., Law, A., Dahle-Smith, Å., Mmeka, W., *et al.* (2020) Testicular Cancer: Improving Outcomes with National Quality Performance Indicators. *BMJ Open Quality*, **9**, e000726. https://doi.org/10.1136/bmjoq-2019-000726

[7] Nicol, D., Boormans, D., *et al.* (2025) EAU-Guidelines on Testicular-Cancer. European Association of Urology.

[8] Mathew, A. and Desai, K. (2009) An Audit of Urology Two-Week Wait Referrals in a Large Teaching Hospital in England. *The Annals of the Royal College of Surgeons of England*, **91**, 310-312. https://doi.org/10.1308/003588409x391767

[9] Scott, C., Omar, K., Alnajjar, H.M., Alifrangis, C., Ahmed, K. and Muneer, A. (2021) A Patient-Centric Pathway for Testicular Cancer—A Multi-Centre Study Investigating the Uptake of Semen Cryopreservation and Impact on Treatment. *Andrology*, **9**, 823-828. https://doi.org/10.1111/andr.12984