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Table of Contents

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VOLMUE:3 ISSUE:1 June: 2026 BUMJ

Welcome from the Editor-in-Chief

The Benghazi University Medical Journal (BUMJ) is a semi-annual, open-access publication that follows a rigorous double-blind, peer-review process. We publish original research, insightful reviews, intriguing case reports, and brief communications that highlight the latest advancements in diagnosis, treatment, and other health-related fields. BUMJ also welcomes correspondence about its published articles to encourage academic dialogue and the exchange of ideas.

Our mission is to be a platform for sharing innovative research, thought-provoking reviews, and impactful case studies. We strive to bridge the gap between research and clinical practice by promoting evidence-based approaches and covering a wide range of topics—such as basic medical sciences, cutting-edge diagnostics, therapeutic innovations, healthcare technologies, and interdisciplinary patient care.

At BUMJ, we are passionate about advancing healthcare and improving outcomes. We invite contributions from diverse voices in the medical community and look forward to fostering meaningful collaborations that make a difference.

Prof. Amina A. Alshekteria

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Academic Achievement in Children and Adolescents with Type 1 Diabetes: Tripoli University Hospital Experience, Libya.

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Original Research Article

ABSTRACT

Background: Type 1 diabetes (T1D) is a chronic disease affecting children and adolescents, which may impact their academic achievement.

Objective: To evaluate the clinical impact of T1D on academic achievement in children and adolescents and compare scholastic achievement with their non-diabetic peers.

Method and Materials: A prospective case-control study was conducted in the Pediatric Endocrinology Department at Tripoli University Hospital between February and May 2025, after obtaining ethical approval and parental consent. The study included 120 Libyan children and adolescents with T1D, aged 6–18 years, who were enrolled in formal schooling. Data on demographics, disease characteristics, glycemic control, and academic achievement were collected. Statistical analyses assessed associations between variables.

Results: Good glycemic control (HbA1c 6–8%) was observed in 55% of patients and was strongly associated with better academic achievement (P = 0.001). Children with well-controlled diabetes demonstrated academic achievement similar to that of their non-diabetic peers. Conversely, non-diabetic children achieved significantly higher mean grades than diabetic children with poor glycemic control. No significant associations were found between academic achievement and age, gender, or age at disease onset, including onset before school entry (P > 0.05). Parental education was significantly associated with academic achievement (father: P = 0.008; mother: p = 0.001). Factors significantly associated with glycemic control included hypoglycemia frequency (p = 0.030), hospital admissions (p = 0.046), ICU admissions (P = 0.02), and treatment modality (p = 0.001). Chronic complications and associated diseases had no significant impact on academic achievement.

Conclusion: Good glycemic control and effective diabetes management were associated with a better academic achievement. Parental education and treatment modality significantly influence glycemic control. T1D, in the absence of poor glycemic control, does not significantly impair academic achievement.

KEYWORDS: Type 1 diabetes; school achievement; glycemic control.

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INTRODUCTION

Diabetes mellitus (DM) is among the most prevalent chronic diseases affecting children and adolescents [1] and is widely recognized as one of the most significant health challenges of the 21st century. Its incidence continues to rise across all age groups and both sexes, impacting populations in both developing and developed countries. Globally, an estimated 2.58 million individuals aged ≤19 years are living with type 1 diabetes (T1D) [2], with approximately 132,000 new cases diagnosed annually [3].

Although type 2 diabetes is increasingly recognized in pediatric populations, T1D remains the most common form of diabetes in children and adolescents and is the focus of the present study.

T1D exerts substantial effects on multiple domains of a child's life, including social interactions, family dynamics, school attendance, and academic achievement [10].

The management of T1D in young children remains particularly complex, as maintaining optimal glycemic control is essential for preventing acute complications such as hypoglycemia and diabetic ketoacidosis (DKA) [1], as well as long-term complications including retinopathy, neuropathy, and nephropathy [1]. Emerging evidence further suggests that children and adolescents with T1D may experience impairments in cognitive and motor functioning [11]. Suboptimal glycemic control—particularly when associated with recurrent hypoglycemia or episodes of DKA—has been linked to adverse neurodevelopmental outcomes, including deficits in memory, attention, and executive functioning [12,13].

The interplay between health and education has traditionally been examined from the perspective of how educational attainment influences health outcomes. However, increasing attention is being directed toward the reverse relationship—namely, how early-life health conditions shape educational trajectories [14]. T1D represents a salient example of a chronic pediatric condition that may adversely affect academic achievement. Evidence indicates that children with T1D tend to exhibit poorer educational outcomes compared with their peers, particularly in the context of suboptimal glycemic control or elevated HbA1c levels [15]. Nevertheless, this relationship is multifactorial and may be influenced by several mediating variables. Advances in diabetes management technologies, alongside improved patient education, have the potential to enhance glycemic control and overall health outcomes [14]. More profound understanding of these dynamics is essential for informing strategies aimed at mitigating the educational impact of chronic diseases.

The extent to which T1D impacts cognitive functioning and academic achievement remains inconclusive. While numerous studies report that children with T1D generally demonstrate intelligence levels within the normative range, findings across the literature exhibit considerable variability. Several investigations have documented neuropsychological deficits within this population, including impairments in verbal intelligence [17], memory [18,19], processing speed [17], attention [20], visuospatial abilities [20], visual reasoning [21], and achievement on timed motor tasks.

Studies conducted in Sweden and Arizona demonstrate that children with diabetes exhibit poorer academic achievement compared with their siblings and non-diabetic peers [15,16]. Conversely, studies from Australia, Scotland, and Washington report no significant differences in academic outcomes between children with T1D and healthy controls [22,16]. A number of researchers propose that academic achievement in children with T1D is closely associated with glycemic regulation. Specifically, children who achieve and maintain optimal metabolic control tend to demonstrate superior academic outcomes compared with those exhibiting poor control [11, 24, 22]. These findings emphasize the importance of glycemic stability not only for physical health but also for cognitive development and educational attainment. However, some longitudinal studies have failed to establish a definitive causal relationship between glycemic variability and academic achievement, suggesting that psychosocial and environmental factors may play a critical mediating role.

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The present study seeks to evaluate academic achievement among children and adolescents with T1D in Libya, thereby addressing the relative scarcity of regional data on this topic.

METHODS AND MATERIALS

The study was a retrospective case-control study conducted on 120 Libyan children aged 6–18 years diagnosed with T1D and currently enrolled in school attending the pediatric endocrinology department, Tripoli University Hospital, during the period from February to May 2025. T1D group: 120 children and adolescents. Control group: 100 children (matched by age and selected from cousins or classmates).

Inclusion Criteria:

- Age 6–18 years, diagnosed with T1D.
- Currently enrolled in formal schooling.

Exclusion Criteria:

- Chronic illnesses affecting academic achievement, except autoimmune conditions associated with T1D (e.g., celiac disease, and hypothyroidism).

Data Collection: A pre-tested structured questionnaire was used to collect the following data:

- Demographics: age, gender, age at diagnosis.
- Parental education.
- School enrollment and attendance.
- Academic achievement was assessed using the official school average grades obtained from school records for the previous academic year. Grades were categorized into Excellent, Very Good, Good, and Fail according to the Libyan educational grading system. The same grading criteria were applied to both study groups.
-Glycemic control (average HbA1c over one year).
-Diabetes-related complications: hypoglycemia, DKA, ICU and hospital admissions.
-Treatment modality (MDI or insulin pump).

Statistical Analysis: Data were analyzed using SPSS version 20. Descriptive statistics were presented as means ± standard deviations and frequencies. Associations between categorical variables were assessed using the Chi-square test. Independent predictors of excellent academic achievement were evaluated using multivariate logistic regression analysis. Variables entered into the model included age, sex, glycemic control, treatment modality, father's education, and mother's education. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were calculated. Statistical significance was set at $P < 0.05$.

Ethical Considerations: Approval was obtained from Tripoli University Hospital. Study objectives and procedures were explained to participants and parents. Parental consent was obtained. Data confidentiality and anonymity were maintained.

RESULTS

A total of 120 children and adolescents with T1D included in this study. All participants were under regular follow-up at the endocrine outpatient department of Tripoli University Hospital, Tripoli, Libya. A control group of 100 non-diabetic children was included for comparison. Good glycemic control (HbA1c 6–8%) was achieved in 55% of patients, while 45% had poor control (HbA1c ≥ 9%).

Demographic characteristics and baseline data

The mean age of children with T1D was 12.88 ± 3.24 years, compared to 11.74 ± 2.72 years in the control group. Females were more predominant in the diabetic group (60%) compared to males (40%). Approximately 47.5% of patients developed diabetes before school entry, while 52.5% developed it after school entry. (Table 1)

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BUMJ

Table (1): Demographic characteristics and baseline data

Variable	(T1D (n=120	(Control (n=100
(Age (mean ± SD	3.24 ± 12.88	2.72 ± 11.74
Age range	18–7	17–7
Male	(40%) 48	(51%) 51
Female	(60%) 72	(49%) 49
Onset before school	(47.5%) 57	—
Onset after school	(52.5%) 63	—

Glycemic control and associated factors

There was no statistically significant association between glycemic control and age group (P = 0.416) or gender (P = 0.133).

However, a statistically significant association was observed between glycemic control and hypoglycemia frequency (P = 0.030), hospital admissions (P = 0.046), ICU admissions (P = 0.020), and treatment modality (P = 0.001). In contrast, no significant association was found between glycemic control and DKA episodes (P = 0.887). (Table 2)

Table (2): Glycemic control and associated factors

Variable	Category	Good	Poor	Total	P-value
Age group	6–10 yrs	13	14	27	0.416
	>10 yrs	53	40	93	
Gender	Male	31	18	49	0.133
	Female	35	36	71	
Hypoglycemia	Daily	2	10	12	0.030
	Weekly	23	17	40	
	Monthly	6	4	10	
	Every few months	4	0	4	
	None	31	23	54	
DKA	None	45	36	81	0.887
	1	18	14	32	
	≥2	3	4	7	
Hospital admission	None	48	36	84	0.046
	1	16	10	26	
	≥2	2	8	10	
ICU admission	None	64	46	110	0.020
	≥1	2	8	10	
Treatment	MDI	44	50	94	0.001
	Insulin pump	22	4	26	

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Glycemic control and academic achievement

A highly statistically significant association was observed (P = 0.001), with children who had good glycemic control more likely to achieve excellent and very good grades, while those with poor control had a higher proportion of failure. Logistic regression analysis showed that children with good glycemic control were nearly twice as likely to achieve excellent academic achievement compared to those with poor control (OR = 1.99; 95% CI: 0.95–4.19; P = 0.07), although this did not reach statistical significance. (Table 3)

Table (3): Glycemic control and academic achievement

Glycemic Control	Excellent	Very Good	Good	Fail	Total	P-value
Good	45	18	3	0	66	0.001
Poor	28	15	0	11	54	
Total	73	33	3	11	120	

Chi-square test: P = 0.001.

There was a statistically significant difference in mean academic grades between groups. Non-diabetic children had significantly higher mean grades compared to diabetic children (12.4 ± 2.6 vs. 9.3 ± 1.8, p < 0.001). (Table 4)

Table(4): Comparison between academic grades among diabetic and control groups

Group	Mean ± SD	P-value
Non-diabetic children	12.4 ± 2.6	<0.001
Diabetic children	9.3 ± 1.8	

Multivariate Logistic Regression Analysis

To adjust for potential confounding variables, a multivariate logistic regression analysis was performed. The model included age, sex, glycemic control, treatment modality, father's education, and mother's education. After adjustment, glycemic control was not independently associated with excellent academic achievement (AOR = 1.07, 95% CI: 0.41–2.80, P = 0.887). Age remained a significant predictor of academic achievement (AOR = 0.76, 95% CI: 0.65–0.89, P = 0.001). Treatment modality was also independently associated with better academic outcomes (AOR = 8.78, 95% CI: 2.28–33.81, P = 0.002). No significant independent associations were observed for sex, father's education, or mother's education. (Table 5)

Table (5): Multivariate Logistic Regression Analysis for Predictors of Excellent Academic Achievement

Variable	Adjusted OR	95% CI	P-Value
Glycemic control	1.07	0.41–2.80	0.887
Age	0.76	0.65–0.89	0.001
Gender	0.86	0.34–2.13	0.738
Father's education	0.90	0.66–1.23	0.523
Mother's education	1.27	0.95–1.69	0.112
Treatment modality	8.78	2.28–33.81	0.002

There was no statistically significant association between academic achievement and age at onset of diabetes (P = 0.59), chronic diabetic complications (P = 0.559), or associated diseases such as celiac disease and hypothyroidism (P = 0.214). (Table 6)

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BUMJ

Table (6): Academic Achievement and Clinical Factors

Variable	Category	Excellent	Very Good	Good	Fail	P-value
Onset	Before school	37	12	0	8	0.59
	After school	36	21	3	3	
Complications	Ophthalmopathy	6	6	0	0	0.559
	None	66	27	3	11	
Associated diseases	Celiac disease	6	7	1	0	0.214
	Hypothyroidism	3	0	0	0	
	None	64	26	2	11	

There was a statistically significant association between parental education and glycemic control. Father's education level was significantly associated with glycemic control (P = 0.008), and an even stronger association was observed with mother's education level (P = 0.001), indicating better glycemic outcomes with higher parental education. (Table 7)

Table (7): Parental education and glycemic control

Variable	Category	Good	Poor	P-value
Father	Preparatory	9	11	0.008
	Intermediate	19	13	
	Higher Institute	9	20	
	Bachelor/Master	29	10	
Mother	Primary	6	4	0.001
	Preparatory	2	10	
	Secondary	11	8	
	Intermediate	7	16	
	Higher/Bachelor	40	16	

DISCUSSION

The present study highlighted an important aspect of pediatric diabetes by contributing to the understanding of how T1D affected academic achievement among school-aged children and adolescents in Libya. The findings demonstrated that glycemic control was a key determinant of academic achievement, with poorer control significantly associated with lower achievement.

In contrast to the present study, data by other researchers found that older children tend to have better glycemic control [25]. While gender distribution showed a slight predominance of females, which was consistent with findings of other studies conducted in Iraq [27] as well as Australia and Japan [28, 29].Gender was not significantly associated with glycemic control, although some studies have reported poorer control among females [20].

The difference in the academic achievement between children diagnosed before versus after school entry was consistent with a Scottish study [15], which reported no association between age of diabetes onset and school achievement. In contrast, a study from Sudan suggested that longer disease duration may negatively affect academic outcomes [30].

In the present study, good glycemic control (HbA1c 6–8%) was better than findings reported in Sudan [32] and comparable to results from Saudi Arabia and Egypt [33, 34]. Importantly, hypoglycemia frequency, hospital admissions, ICU admissions, and treatment modality were significantly associated with glycemic control. These findings highlighted the clinical burden of poor metabolic control and its

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impact on disease stability.

Most participants maintained regular follow-up, and neither chronic diabetic complications nor associated conditions such as celiac disease and hypothyroidism had a significant impact on academic achievement. School attendance was generally regular, with absenteeism mainly related to clinic visits. These findings were consistent with previous studies [12,27], although some reports linked poor glycemic control with increased absenteeism [35]. Using the Libyan grading system, children with well-controlled diabetes had an academic achievement comparable to their non-diabetic peers, whereas those with poor glycemic control demonstrated significantly lower mean grades. This supports previous evidence indicating that T1D did not inherently impair academic achievement when adequately controlled [13], although some studies have reported slightly lower achievement among diabetic children [8].

The multivariate logistic regression model, suggested that the relationship between glycemic control and academic achievement might be partly influenced by other factors such as age, treatment modality, and family characteristics. Nevertheless, the strong unadjusted association observed in the study remains clinically relevant and warrants further investigation in larger multicenter studies.

Regarding treatment, the majority of participants managed with multiple daily injections (MDI), while a smaller proportion used insulin pumps. Treatment modality was significantly associated with glycemic control, with better outcomes observed among insulin pump users.

Parental education, particularly maternal education, was also significantly associated with glycemic control. This finding was consistent with previous studies demonstrating that higher parental education levels contributed to improved disease management and better glycemic outcomes in children [36, 39]. In addition to glycemic control, academic achievement may be influenced by several socioeconomic and psychosocial factors. Parental support, family socioeconomic status, access to healthcare services, school support systems, and psychological well-being might all contribute to educational outcomes. Children with T1D might also experience diabetes-related stress, anxiety, or difficulties in self-management, which could affect school achievement regardless of metabolic control. These factors should be considered when interpreting the relationship between diabetes and academic achievement. Overall, the findings suggested that T1D itself did not necessarily impair academic achievement when appropriately managed. Rather, suboptimal glycemic control appeared to be associated with poorer educational outcomes, highlighting the importance of effective diabetes management in school-aged children.

Study Limitations: This study had several limitations that should be considered when interpreting the findings. First, it was conducted at a single tertiary care center, which might limit the generalizability of the results to other populations. Second, the sample size was relatively small, which might reduce the statistical power to detect certain associations. Third, the study period was relatively short. In addition, academic achievement was assessed using school grades, which might not fully capture all aspects of cognitive and educational achievement. Finally, important socioeconomic and psychosocial variables, including family income, parental support, psychological well-being, school support, healthcare accessibility, and diabetes-related stress, were not comprehensively assessed.

CONCLUSION

Children with well-managed diabetes generally demonstrated academic achievement comparable to non-diabetic peers. Effective glucose management and awareness of strategies for managing T1D were associated with better academic outcomes, while inadequate monitoring correlated with poorer achievement. Parental education and treatment modality significantly influence glycemic control.

Recommendation

The association of poorer glycemic control with poorer school achievement serves as further evidence for clinicians to focus on improving glycemic control, which would help those children to achieve

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their life goals.

The new technology used, like the use of continuous glucose monitoring and insulin pumps were methods to monitor the glucose level effectively, which could give a clue to the decision makers to assess the need for additional support for children with T1D.

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Clinicopathological Profile and Treatment Stratification in Urinary Bladder Cancer: A Retrospective Study.

Hanan M. Garalla [1*], Khaled M. Darraz [2], Amal Elarebe [3], Ahmed Khaled Darz [4].

Original Research Article

ABSTRACT

Background: Urinary bladder cancer (UBC) exhibits marked heterogeneity in its clinicopathological characteristics, which directly influence treatment strategies and disease behavior. Understanding the correlation between pathological features and therapeutic approaches is crucial for optimizing patient management.

Aim: To evaluate the interplay between clinicopathological characteristics and treatment modalities in urinary bladder cancer and their implications for tumor behavior and clinical decision-making.

Method and Materials: This retrospective cohort study was conducted at the Department of Urology, Faculty of Medicine, Benghazi, in collaboration with the National Cancer Center, from January 2022 to December 2025. A total of 100 cases diagnosed via transurethral resection of bladder tumor (TURBT) and radical cystectomy were included. Non-neoplastic lesions were excluded. Data on demographics, clinical presentation, histopathology, tumor stage, grade, invasion status, and treatment were analyzed. Chi-square tests were used for associations, with $p < 0.05$ considered significant, with the calculation of odds ratios (OR) and 95% confidence intervals (CI).

Results: The data showed marked male predominance (91%; ratio 10.1:1) with a mean age of 60.2 ± 4.4 years. Most patients (90%) were aged 40–80 years. Painless hematuria (58%) and smoking (87%) were predominant. Urothelial carcinoma accounted for 92% of cases. Muscle-invasive disease was present in 62%, and 66% had high-grade tumors. A significant association was observed between tumor grade and muscle invasion ($\chi^2 = 15.60$, $p < 0.001$), with high-grade tumors being significantly more likely to present with invasive disease (OR = 5.73; 95% CI: 2.33–14.10).Treatment showed a significant association with disease category ($\chi^2 = 95.05$, $p < 0.001$).

Conclusion: UBC in this region is characterized by advanced presentation and aggressive biological behavior. The strong correlation between high grade and invasion emphasizes the urgent need for earlier detection strategies and tobacco cessation programs.

KEYWORDS: Urinary bladder cancer (UBC), clinicopathological characteristics, tumor staging, treatment strategies, clinical decision-making.

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INTRODUCTION

Urinary bladder cancer (UBC) remains a significant global health challenge due to its high incidence, recurrence rates, and variable prognosis depending on tumor stage and grade[1] . UBC is among the most common malignancies worldwide, characterized by diverse clinical behavior ranging from indolent non–muscle–invasive tumors to highly aggressive invasive disease[2] . This heterogeneity is largely attributable to underlying clinicopathological parameters, particularly tumor stage, histological grade, and invasion depth[3].

Accurate clinicopathological assessment is pivotal in shaping treatment choices, ranging from conservative management of non-muscle-invasive disease to radical interventions in muscle-invasive cases[4] . Emerging insights have revealed molecular signatures and immune microenvironment features that govern treatment efficacy and long-term outcomes [5]

Notwithstanding these advances, integrating comprehensive pathological features with real-world treatment approaches remains fundamental for disease stratification and selection of therapeutic strategies[6] . Nevertheless, increasing evidence demonstrates that staging alone may not fully capture tumor biology. Histopathological parameters, including tumor grade and invasion status, provide additional insights into tumor aggressiveness and potential progression[7] .

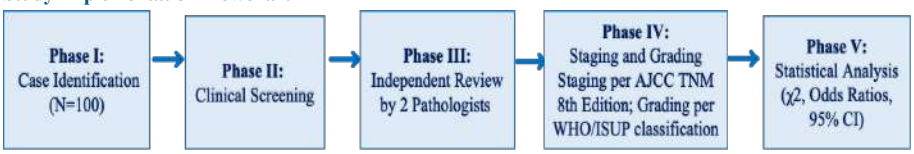
The management of UBC is guided chiefly by disease stage, with therapeutic options ranging from transurethral resection to radical cystectomy and systemic therapies[8] . However, variations in treatment patterns are regularly noted, reflecting disparities in histopathological findings and clinical practice[9] . Although the recognized importance of clinicopathological factors and their integrated role in shaping treatment strategies remain insufficiently explored, particularly in practical clinical settings[10] . Therefore, this study aims to determine how clinicopathological features of urinary bladder cancer influence tumor behavior and guide pathology-driven treatment decisions.

Material Methods

Study Design and Population

This retrospective cohort study was conducted at the Department of Urology, Faculty of Medicine, Benghazi, in collaboration with the National Cancer Center, from January 2022 to December 2025. The study included 100 consecutive cases of primary urinary bladder cancer diagnosed via transurethral resection of bladder tumor (TURBT) and radical cystectomy. Patients with non-neoplastic lesions, such as acute or chronic cystitis, were excluded.

Study Implementation Flowchart



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Pathological Assessment

Histopathological slides were independently reviewed by two experienced pathologistsDiscrepancies regarding tumor grade or staging were resolved through consensus review to ensure diagnostic reliability .Tumor staging was performed according to the AJCC TNM Classification8 ,th Edition .Grading followed the WHO/ISUP classification system, categorizing tumors into low-grade (LG)and high-grade (HG).

Statistical Analysis

Data were analyzed using descriptive statistics for demographics and clinical featuresBivariate associations between categorical variables) e.g ,.grade vs. Invasion status (were assessed using the chi-square (X^2) test ,with a significance threshold :a value of P 0.05>was taken as significant and P 0.01> as highly significant ,whereas P 0.05< was taken as non-significant.

To quantify the strength of the association between tumor grade and invasion, odds ratios (ORs) were calculated using standard formulae, with 95% confidence intervals (CIs) reported. A univariate chi-square test was employed rather than multivariate logistic regression due to the sample size (N = 100). Logistic regression models generally require a sufficient number of events per variable (EPV), typically at least 10:1, to ensure model stability and avoid overfitting. Given the cohort size and the distribution of variables, the use of a multivariate model would have risked generating unstable coefficients and potentially inflated effect estimates.

3. Result

A total of 100 cases diagnosed with urinary bladder cancer were included in this study. There was a marked male predominance (91% males vs 9% females), yielding a male-to-female ratio of 10.1:1 (Table 1).

Table (1): Clinicodemographic Characteristics and Risk Factors in UBC Patients (N=100)

Variable	Frequency (%)
Age group	
≤20 Y	1(1%)
20–40 Y	6 (6%)
40–60 Y	52 (52%)
60–80 Y	38 (38%)
≥80 Y	3 (3%)
Sex	91(91%)
Male	9 (9%)
Female	M: F = 10.1:1
Clinical presentation	
Painless hematuria	58 (58%)
Hematuria with burning micturition	9 (9%)
Hematuria with urinary retention	22 (22%)
Urinary retention	4 (4%)
Burning micturition	6 (6%)
Loin pain	1 (1%)
Associated risk factor	
Smoking history	
Yes	87%
No	13%
Total	**100 (100%)**

The age range of the patients was 18-80 years. The mean age at diagnosis was 60.2 ± 4.4 years, with most patients (90%) falling within the 40–80 years age group. Only 6% (6 of 100) of the patients presented with bladder cancer at a younger age than 40 years, while only 1 patient presented at less than 20 years of age. Painless hematuria alone was the most common clinical presentation in (58%) of cases, followed by hematuria associated with urinary retention (22%) and burning micturition (9%). Smoking was identified as the predominant risk factor, present in 87% of the cohort.

In Table 2, histopathological analysis demonstrated that urothelial carcinoma (transitional cell carcinoma) (TCC) was the dominant histopathological subtype (92%), whereas squamous cell carcinoma (SCC) constituted only 8%. Regarding tumor staging, (22%) cases were urothelial confined carcinoma (PTa), (16%) lamina propria invasive carcinoma (PT1), and (62%) muscle-invasive carcinoma (PT2). Among the studied cases, high-grade urinary bladder carcinoma was found to be the most common, with (66%), and low-grade carcinoma com-

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prised (34%).

This highlights the aggressive biological behavior of bladder tumors in this cohort. Consistently, muscle-invasive bladder cancer (MIBC) was observed in 62% of patients, compared to 38% with non-muscle-invasive bladder cancer (NMIBC).

Table (2): Clinicopathological Characteristics of UBC Patients in Our Study.

Variable	N (%)
Tumor histology	
TCC	92 (92%)
SCC	8 (8%)
Pathologic Stage	
(PTa) non-invasive	22 (22%)
(PT1)Lamina propria invasion	16 (16%)
(PT2) Muscle invasive	62 (62%)
Grade	
Low (LG)	34 (%)
High (HG)	66 (66%)
Muscle invasion	
Non-Muscle invasion (NMIBC) =PTa,PT1	38 (38%)
Muscle invasion (MIBC)=PT2-PT4	62 (62%)
Total	**100%**

Regarding the association between Grade and Muscle Invasion ;A highly significant association was found between histological grade and the presence of muscle invasion (χ^2=15.60, df=1, p<0.001). High-grade tumors were significantly more likely to present with muscle-invasive disease (OR=5.73;95% CI: 2.33−14.1 as shown in Table.(3).

Table (3): Association of Tumor Grade and Muscle Invasion Status in Bladder Cancer

Grade	MIBC	NMIBC	Total
High grade	50	16	66
Low grade	12	22	34
Total	**62**	**38**	**100**

Chi-square test showed a highly significant association between tumor grade and muscle invasion status ($\chi^2 = 15.60$, df = 1, $p < 0.001$).

Risk-adapted therapeutic strategies in patients with urothelial bladder cancer (UBC) demonstrated clear stratification based on histopathological classification and disease severity level. Patients with low-risk NMIBC (PTa, low grade) were predominantly managed with TURBT followed by intravesical chemotherapy (18/22, 81.8%), reflecting standard conservative management for low-risk disease, with minimal use of BCG (18.2%) and no use of trimodal therapy. In contrast, high-risk NMIBC (PT1, high grade) required more intensive management, including TURBT combined with Bacillus Calmette–Guérin (BCG) therapy (12/16, 75%), with consideration of early radical cystectomy for BCG-unresponsive disease. A small proportion received chemotherapy (18.8%) or trimodal therapy (6.2%), likely reflecting individualized clinical decisions or disease progression risk .Therapeutic approaches were appropriately escalated according to disease category ($\chi^2 = 15.60$, df = 1, $p < 0.001$). For patients with MIBC (PT2–PT4), the majority were treated with trimodal therapy (50/62, 80.6%), incorporating radical cystectomy, neoadjuvant chemotherapy, and radiotherapy. Notably, none of the MIBC patients received TURBT with chemotherapy alone, highlighting the appropriate escalation of treatment intensity. A minority received BCG (19.4%), which may reflect selected cases with mixed features or transitional management, as shown in Tables (4).

Table (4): Risk-Adapted Treatment Stratification and Clinicopathological Correlation

Grade / Invasion group	Risk Stratification	TURBT + chemotherapy	TURBT + BCG	Trimodal therapy	Total
NMIBC	Low-risk (PTa, LG)	18	4	0	22
NMIBC	High-risk (PT1, HG)	3	12	1	16
MIBC	(PT2–PT4)	0	12	50	62
Total		**21**	**28**	**51**	**100**

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TURBT: Transurethral Resection of Bladder Tumor .BCG :Bacillus Calmette-Guérin) Intravesical Immunotherapy .(Trimodal therapy = (radical cystectomy with neoadjuvant chemotherapy + radiotherapy).

Chi-square test showed A significant relationship was observed between disease category and treatment approach.

($\chi^2 = 95.05$, df = 4, $p < 0.001$).

DISCUSSION

The clinicopathological profile observed in this Benghazi cohort reveals an aggressive disease behavior characterized by advanced presentation at diagnosis. The male-to-female ratio of approximately 10:1 demonstrates a profound male predominance. This disparity markedly exceeds the global average, where bladder cancer prevalence is typically three to four times higher in males than in females [11,12] It also surpasses the 7:1 ratio reported in recent epidemiological data from Tripoli, indicating regional variations within Libya itself [11,13]. This stark gender imbalance is heavily influenced by local sociocultural habits, specifically the 87% smoking rate recorded among males in this cohort compared with the near-zero tobacco use reported among local females [14].

Age remains a critical demographic determinant; 87% of all bladder cancer cases in this study occurred between the ages of 40 and 80. This concentrated age distribution mirrors established global patterns demonstrating a rising incidence of urothelial malignancies with advancing age, a phenomenon driven by decades of cumulative exposure to environmental carcinogens and tobacco smoke [11,12]. This distinct age clustering underscores the clinical necessity of establishing targeted secondary screening and diagnostic pathways for individuals presenting with lower urinary tract symptoms aged 40 and older [6,12].

Painless gross hematuria emerged as the primary clinical presentation within this cohort. This clinical pattern is highly consistent with international literature confirming that patients presenting with gross hematuria have a significantly higher risk of advanced stage disease at initial resection than those presenting with microscopic hematuria or storage symptoms [13]. While painless hematuria represents the classic diagnostic hallmark of urothelial malignancy, its absence cannot definitively rule out underlying disease [1,13] Prompt diagnostic evaluation of any presentation of hematuria remains the single most critical factor in mitigating diagnostic delay and improving long-term oncological outcomes [6,10].

Tobacco use represents the primary preventable risk factor driving both the incidence and mortality of bladder carcinoma in this population. Large-scale pooled analyses indicate that current smokers experience a 3-fold higher risk of developing bladder cancer than never-smokers, with a clear dose-dependent relationship between smoking intensity and poor long-term prognosis [14] The heavy tobacco burden identified in this cohort directly correlates with the aggressive disease characteristics observed at the time of surgical resection.

A critical, defining feature of this Benghazi cohort is that 62% of patients presented with muscle-invasive bladder cancer (MIBC; stages ≥pT2) at initial diagnosis. This distribution represents a striking reversal of the epidemiological patterns typically documented in Western populations, where non-muscle-invasive bladder cancer (NMIBC) accounts for approximately 75% of new cases [15]. This profound discrepancy points to a significant diagnostic gap within the local healthcare infrastructure. Patients frequently overlook or misinterpret intermittent, painless hematuria, delaying clinical consultation until the tumor has breached the muscularis propria [1,7,13]. Furthermore, our findings show a powerful statistical association between high tumor grade and muscle invasion (OR=5.73, p<0.001), demonstrating that high-grade tumors in this region are nearly six times more likely to be deeply invasive at presentation than low-grade lesions. Compared to historical data from Benghazi collected between 1983 and 2009, which reported a poorly differentiated/high-grade rate of only 16.6%, the 66% high-grade rate identified in the current cohort indicates

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either an alarming evolutionary shift toward more aggressive biology or a substantial improvement in modern histopathological diagnostic precision [1,3,7]. Because traditional tumor staging and grading systems can sometimes exhibit limited prognostic sensitivity—particularly in predicting individual progression rates for high-risk pT1 disease or muscle-invasive tumors there is an increasing clinical reliance on advanced risk-stratification models [2,16,17]. Modern frameworks incorporate detailed morphological and microenvironmental criteria, including tumor budding, specific growth patterns, and tumor-infiltrating immune cells, to better capture aggressive tumor biology [2,5,17]. For NMIBC, standard risk models integrate tumor stage, grade, size, multiplicity, and the concurrent presence of carcinoma in situ (CIS) to tailor therapeutic intensity appropriately [15].

The therapeutic choices documented in this study demonstrate close adherence to a risk-adapted strategy, in which treatment intensity scales directly with the biological aggressiveness of the tumor. A highly significant association was observed between tumor stage, grade, and the selected treatment modality (χ 295.05= , P0.001>). Patients presenting with low-risk NMIBC (pTa, low-grade) were managed primarily via transurethral resection of bladder tumor (TURBT) combined with immediate intravesical chemotherapy; an approach robustly supported by evidence demonstrating a substantial reduction in short-term recurrence rates [18,19].

For patients diagnosed with high-risk NMIBC (pT1, high-grade), treatment was appropriately escalated to TURBT followed by induction and maintenance intravesical Bacillus Calmette-Guérin (BCG) immunotherapy [15,20,21]. Radical cystectomy was selectively reserved as an upfront strategy for very high-risk disease or as a salvage intervention for BCG-unresponsive cases, balancing long-term oncological control with patient quality of life [22,23]. Furthermore, emerging data indicate that alternative intravesical combinations, such as sequential gemcitabine and docetaxel, offer an effective secondary therapeutic avenue for patients facing BCG shortages or treatment failure [24]. For the majority of patients presenting with MIBC (pT2–pT4), treatment shifted toward a multimodal approach. This strategy centered on radical cystectomy, neoadjuvant platinum-based combination chemotherapy, and targeted radiotherapy, aligning with modern global standards designed to optimize overall survival while attempting bladder preservation where clinically feasible [4,8,25].

LIMITATIONS

This study has several limitations that must be considered when interpreting the data. First, its retrospective nature introduces potential documentation bias, particularly regarding the quantification of secondary risk factors, occupational exposures, and precise smoking histories (such as pack-years). Second, as a single-center study conducted within a major tertiary hospital in Benghazi, the findings may not fully capture the complete epidemiological, socioeconomic, or geographic diversity of the broader Libyan population. Third, the sample size (N=100) restricted our ability to execute stable multivariate logistic regression analyses to simultaneously control for age, gender, and smoking intensity as independent predictors of stage progression. Finally, the absence of advanced molecular subtyping and long-term survival data limits our capacity to evaluate the ultimate, multi-year survival efficacy of the risk-adapted treatment strategies deployed in this cohort.

CONCLUSION AND RECOMMENDATIONS

Urinary bladder cancer in eastern Libya presents predominantly as an aggressive, high-grade, and muscle-invasive malignancy at the time of initial diagnosis. It primarily affects middle-aged and older males with a heavy history of tobacco use. The strong statistical correlation between high tumor grade and deep muscle invasion demands a shift from reactive management to proactive, early diagnostic interventions.

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RECOMMENDATIONS

Public Health Initiatives: Establish and fund aggressive, targeted tobacco cessation programs as a form of primary oncological prevention, focusing heavily on high-risk male demographics.

Early Detection & Education: Launch widespread public health campaigns and primary care educational seminars focusing on the critical clinical significance of painless gross hematuria. This is essential to encourage early presentation, reduce diagnostic delays, and capture urothelial tumors at the highly treatable, non-muscle-invasive stage.

Pathological Standardization: Implement standardized synoptic pathology reporting protocols across all regional diagnostic centers in eastern Libya, strictly adhering to the updated AJCC Cancer Staging manual and WHO grading criteria to optimize risk stratification.

Expanded Research: Fund prospective, multi-center registry studies across Libya that incorporate survival tracking and molecular biomarker analysis to address the diagnostic gaps identified in this cohort.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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A histopathological Study of the Oral White Lesion Cases in Benghazi.

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Original Research Article

ABSTRACT

Background: The white lesions of the oral cavity are clinically common. They represent a large number of cases diagnosed as diseases with different severity, such as dysplasia and traumatic keratosis, and may lead to squamous cell carcinoma (SCC).

Aim: The study was to determine the types of oral white lesions in all patients who presented to the Oral Pathology Department at the Faculty of Dentistry in Benghazi in the period from 1999 to 2019.

Method and Materials: This study was a retrospective and descriptive type. The data were taken from the records of 149 cases with white lesions in the oral cavity and squamous cell carcinoma derived from white lesions. Statistical analysis and SPSS program were used.

Results: showed that most of the cases were more than forty years old. In general, more women than men were affected. The site of lesion was unilateral buccal mucosa in most cases. More than 56% were diagnosed as lichen planus, followed by leukoplakia (10.7%), simple keratosis (10.7%), frictional hyperkeratosis (6.7%), lichenoid reactions (3.4%), lupus erythematosus (3.4%), and white sponge nevus (2.0%). This study showed that the most common oral lesions, most commonly involved sites, age range and gender predilection were consistent with most published research in the literature, with the possibility of transformation of these lesions into dysplasia and SCC.

Conclusion: These lesions were associated with many systemic diseases. Awareness, early diagnosis and treatment will minimize disease further development.

KEYWORDS: oral white lesion, lichen planus, leukoplakia.

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INTRODUCTION

The oral cavity is exposed to external environmental insults in addition to systemic diseases that initially appear in the mucosa of the oral cavity, leading to oral lesions. The oral white lesions (OWL), which are commonly found on the oral mucosa, might be benign (may not require treatment), pre-malignant or malignant conditions.

Leukoplakia was mostly demonstrated as precancerous cases of the oral cavity, and the OWL is a medical manifestation of oral cancers; so a distinctive diagnosis of these lesions is essential. Also, the appearance of dysplasia in the pathology of OWL is clinically important (1) & (2). In a study of oral white lesion in Iran, the cases of white lesions were about 20.9% of the study population. The idiopathic lichen planus (ILP) was the most common lesion (3).

Lichen planus is commonly found in the mucosa of the oral cavity. OLP is an inflammatory immune-mediated disorder. This was followed by leukoplakia in which speckled leukoplakia and verrucous type were more common (4).

In Hungary, about 27% of the study sample had dysplasia showing characteristic changes in the epithelial thickness due to the increased cell proliferation (hyperplastic epithelial dysplasia). It is also associated with parakeratosis. These findings may be understood as a probable cause to the changes of epithelial and connective tissue layers in leukoplakia (5).

So far, no work has been done to evaluate all the types of oral white lesions among the Libyan population. This study aimed to shed light on the incidence of white lesions of the oral cavity over the past twenty years in Benghazi. All the information available in the files of oral white lesion patients was collected and evaluated. The results and possible risk factors were discussed in relation to previous results in the literature.

AIMS OF STUDY

This research was conducted to:

1.Study the types of oral white lesions in all patients who presented to the oral pathology department in the Faculty of Dentistry in Benghazi, and their residences.

2.Identify the number of cases with special concern to the age, sex, site of lesion, grade of dysplasia and diagnosis.

3.Evaluate the cases of squamous cell carcinoma derived from these white lesions.

MATERIAL AND METHODS

The study was a cross-sectional, retrospective type. About 149 cases, included in this study, were diagnosed with oral lesions in the department of oral pathology, Faculty of Dentistry in the period from 1st January 1999 to 31st December 2019.

All the patients' information, including: sex, age at diagnosis, site of lesion, histopathological type, and grade of dysplasia, was extracted from medical file records.

Inclusion criteria:

All the white lesions in the oral cavity, including lingual, buccal, labial mucosae, palate, and floor of mouth, with special concern to dysplasia and OSCC caused by OWL.

Exclusion criteria:

Nicotine stomatitis, neoplastic lesions, actinic cheilitis, and actinic keratosis were excluded from the study.

H&E stained tissue sections of lesions were collected and examined under a light microscope. Different histopathological changes and dysplasia grades were established.

Statistical analysis:

The data were analyzed using IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, N.Y., USA). Descriptive statistics, including frequency, percentage, and mean ± standard deviation, were obtained for all variables as appropriate. A P value of less than 0.05 was considered statistically significant. Microsoft Word, SPSS, and Excel were used to create tables and graphs.

RESULTS

During the period of twenty years, there were 149 patients with OWL. About 84 cases (56.4%) were diagnosed as lichen planus, then leukoplakia 16

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Benghazi University Medical journal
Faculty of Medicine, University of Benghazi
BUMJ VOLMUE:3 ISSUE:1 June: 2026

cases (10.7%), simple keratosis 16 cases (10.7%), frictional hyperkeratosis 10 cases (6.7%), lichenoid reaction 5 cases (3.4%), lupus erythematosus 5 cases (3.4%), white sponge nevus 3 cases (2.0%) & Squamous cell carcinoma developed from white lesions were 10 cases (6.7%).

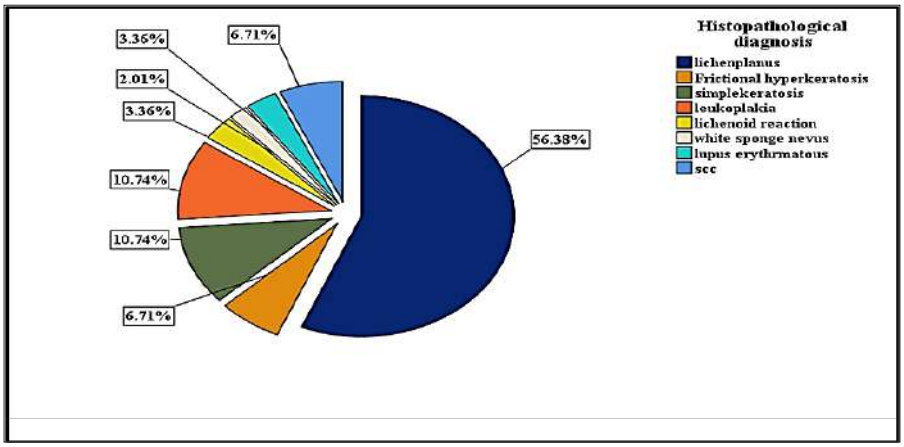

Figure (1): Histopathological diagnosis

Histopathological diagnosis according to age:

The majority of the OWL cases were above 40 years = 109 (73.2%). The cases under 40 years old were 40 (26.8%).

Most of the cases of the lichen planus, leukoplakia, simple keratosis, squamous cell carcinoma and lichenoid reaction were over forty years old, while more cases of frictional hyperkeratosis, white sponge nevus and lupus erythematosus were under forty years old.

Table (1): Age groups according to histopathological diagnosis, p value= 0.001 highly significant

	age groups	
	< 40 yrs. No. (%)	≥ 40yrs No. (%)
Lichen planus	21 (52.5%)	63 (57.8%)
Frictional hyperkeratosis	6 (15.0%)	4 (3.7%)
Simple keratosis	5 (12.5%)	11 (10.1%)
Leukoplakia	1 (2,5%)	15 (13.8%)
lichenoid reaction	0 (0.00%)	5 (4.6%)
white sponge nevus	3 (7.5%)	0(0.00%)
lupus erythematous	3 (7.5%)	2 (1.8%)
Squamous cell carcinoma	1 (2.5%)	9 (8.3%)
Total	40 (100%)	109 (100%)

Histopathological diagnosis according to gender:

The number of female cases in general was higher, 78 (52.3%), than male cases, 71 (47.7%). The lichen planus cases were higher in females, in addition to lichenoid reaction. In the male category, simple keratosis, leukoplakia, lupus erythematosus, and white sponge nevus were higher.

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Benghazi University Medical journal
Faculty of Medicine, University of Benghazi
VOLMUE:3 ISSUE:1 June: 2026
BUMJ

P value = 0.318 (not significant)

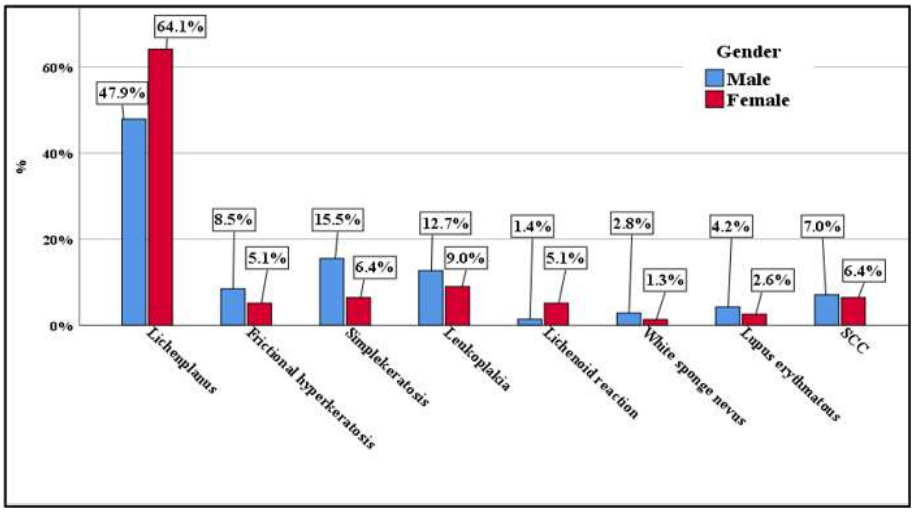

Figure (2): Histopathological diagnosis according to gender

The site of lesion distribution:

In oral white lesion cases, the buccal mucosa showed the highest number of cases, 81 (54.4%) patients, followed by multiple sites 20 (13.4%), labial 18 (12.1%), tongue 16 (10.7%), palate 12 (8.1%), and the least was the floor of the mouth in 2 (1.3%) cases.

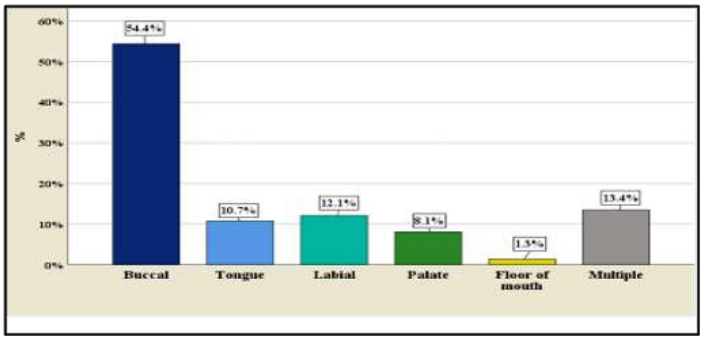

Figure (3): Site of lesion.

The number of patients according to grades of dysplasia:

Concerning the dysplasia of oral white lesions, about 24.2% of the oral white lesion cases developed dysplasia with different grades. Out of 36 dysplasia cases, 26 (72.2%) were mild, 8 (22.2%) were moderate, & 2 (5.6%) were severe.

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BUMJ VOLMUE:3 ISSUE:1 June: 2026

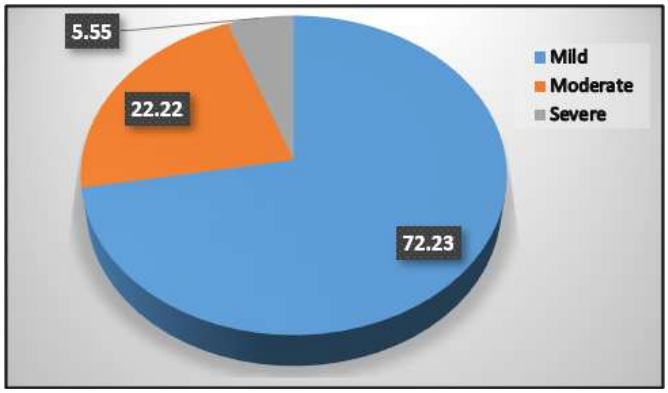

Figure (4): Distribution of dysplasia and grades.

Distribution of lichen planus cases according to clinical subtypes:

OLP subtypes; most of the cases were diagnosed as erosive 36 (42.9%), bullous cases were 5 (6.0%), reticular were 4 (4.7%), & the least was atrophic 2 (2.4%) cases. About 37 (44%) of patients were recorded without a subtype in the files.

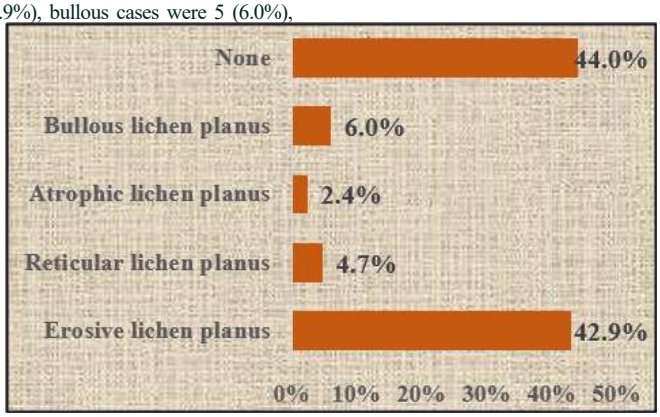

Figure (5): OLP cases distribution according to clinical subtypes

The numbers of oral leukoplakia cases according to clinical subtypes

There were 16 patients with leukoplakia. Verrucous leukoplakia accounted for 13 (81.3%) cases, and candida leukoplakia accounted for 3 (18.7%) cases. There were no recorded cases of homogenous or hairy leukoplakia.

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Benghazi University Medical journal
Faculty of Medicine, University of Benghazi
VOLMUE:3 ISSUE:1 June: 2026
BUMJ

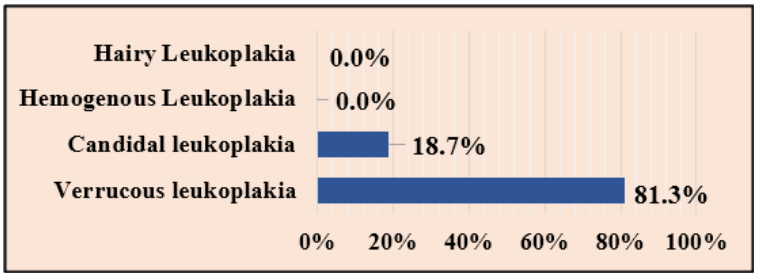

Figure (6): leukoplakia cases and clinical subtypes

Distribution of oral SCC according to clinical presentation (N=10)

The number of OSCC cases that progressed from OWL was 10 patients, with more patients having white than white & red lesions. The predominant grade of OSCC was well to moderate with 6 (60%) patients and 4(40 %) cases were of well grade. The grades were well in which white and red & white were equal at 2 cases each (50%), and well to moderate where white was higher with 4 cases (66.6%) than white & red with 2 cases (33.3%).

p value = 0.691 not significant

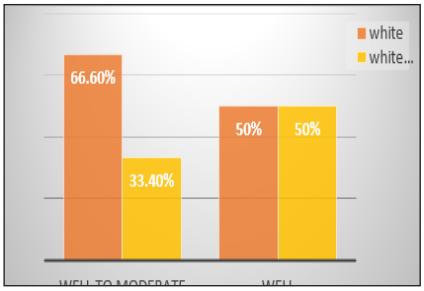

Figure (7): Distribution of clinical feature of oral SCC according to Grade

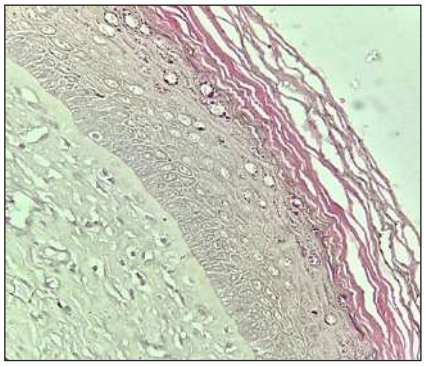

Figure (8): (frictional hyperkeratosis) The section showed hyperkeratosis (black arrow) with thick squamous epithelial layer and mildly inflamed stroma (blue arrow) H&E (10X)

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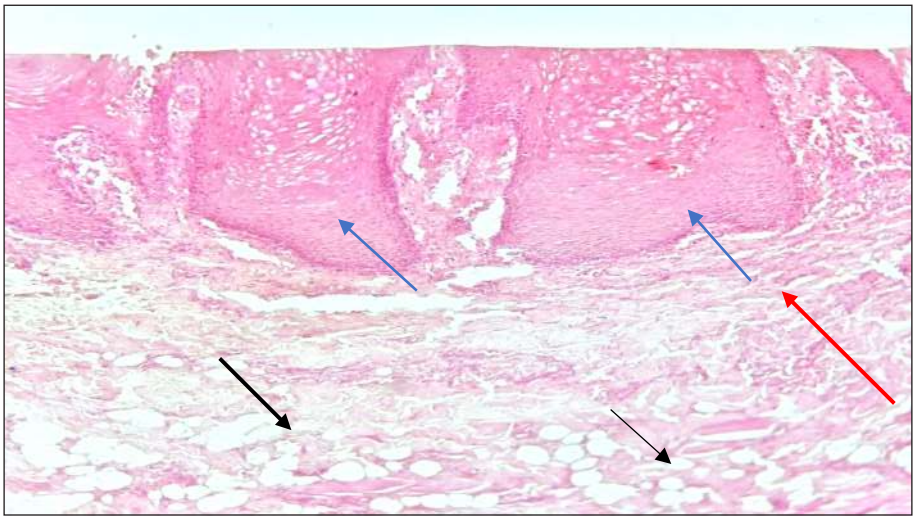

Figure (9): (white sponge nevus) The section showed severe acanthosis with formation of large blunt rete ridges (red arrow) and spongiosis. Extensive vacuolation of squamous epithelium (blue arrows); the underlying tissue showed loose congested fibrous tissue (black arrows), H&E (X10)

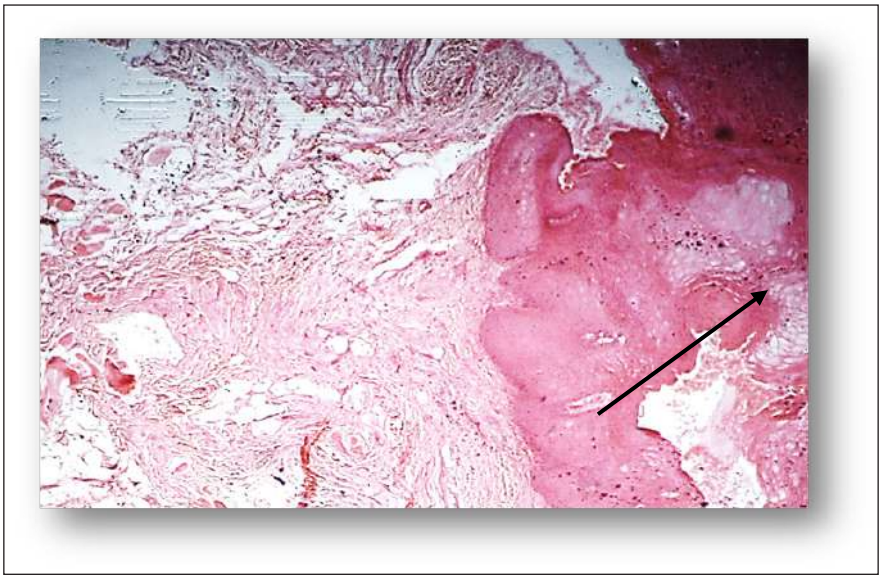

Figure (10) (hyperplasia lichen planus) There is irregular epidermal hyperplasia with balloon degeneration of squamous epithelium also there in a few inflammatory cells in the lower stroma (black arrow) H & E (X10).

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Benghazi University Medical journal
Faculty of Medicine, University of Benghazi
VOLMUE:3 ISSUE:1 June: 2026 BUMJ

DISCUSSION

The oral cavity lesions represent a large number of different clinical features. Most of these lesions are benign, some are premalignant and/or malignant at the time of clinical presentation.

The results of this study showed that most of the cases were more than forty years old. In general, more females were affected than males (Figure.1 & 2), (Table 1). The site of infection in most cases was unilateral buccal mucosa (Figure. 3). Most cases were lichen planus, followed by leukoplakia, simple keratosis, frictional hyperkeratosis, lichenoid reactions, lupus erythematosus, white sponge nevus, and SCC. The grades of SCC ranged between well to moderate (60%) and well (40%). The dysplasia of OWL was found in 24.2% of our patients, with a mild grade in the majority of the cases, some moderate, and a few severe cases (Figure. 4).

The age range of our patients was in agreement with previous results in different countries (6, 7, 8, 9, 10). In general, more females were affected, probably related to hormonal changes and autoimmune diseases. Others found that OWL was higher among males due to khat/tobacco chewing habits ($P < .001$). The number of oral keratotic white lesions was more prominent in males.

It was noticed that the OLP patients were middle-aged (57.8%), with females (64.1%) (Figure.5), whereas males were 47.9%, which agrees with previous studies on the incidence of lichen planus and its age and gender distribution in Tripoli (6) and in Iran (7). Others reported that Idiopathic LP cases were more common, with 63.5% female and 36.5% male, but OLP was higher among females in Serbia ($P < 0.001$) (8).

The OLP affected 0.5–2.0% of the general population (11, 12, 13). Other workers believed that the pathogenesis of OLP was due to immune-modulated events (14). The pathogenesis of OLP includes psychological factors and the genetic background of the patient (15, 16). Systemic conditions such as thyroid dysfunction, hypertension, hepatitis, and diabetes (17, 18) are also associated.

Among the various comorbidities observed in another study, 10.5% of the cases had diabetes mellitus, 8.9% had hypertension, 5.0% had thyroid dysfunction, 2.8% were in an immunocompromised state, 0.8% were anemic, and 25.7% were due to oral abusive habits (18, 19).

The OLP and Hashimoto's thyroiditis (HT) are both autoimmune diseases mediated by T cells. OLP is due to apoptosis in the basal cells of the oral epithelium triggered by cytotoxic CD8 + T cells. Hashimoto's thyroiditis (HT) is due to perforin release by the same lymphocytes, damaging the thyroid cells. A meta-analysis concluded that among OLP patients, the thyroid disease was high. In addition, the risk for women is about 10 times higher than for men because it is triggered by autoimmunity, which is more commonly found in women than men (20, 21).

In Libyan patients, 25% of the diabetic cases had hypothyroidism. In another study, similar results were found. Thyroid problems and female gender were risk factors. These cases were more prominent in females (22.5%) than males (2.5%) (22).

In Alwahat Libya, similar conclusion was reached concerning the gender distribution in thyroid diseases (23).

In OLP subtypes, erosive LP was the most prevalent (42.9%). Most ELP patients were between 50-80 years old, with a higher number of females than males (24).

Other subtypes included bullous lichen planus (BLP) (6.0%), reticular lichen planus (RLP) (4.7%), and atrophic lichen planus (2.4%). Notably, no subtype information was available in the medical records for about 44% of the OLP patients. OBLP rarely affects the oral mucosa. OBLP was usually present with blisters occurring over typical lesions of lichen planus. The blisters are more generalized and extensive.

EOLP is symptomatic, causing painful ulcerations. Although it is less common, it is more clinically significant (24, 25).

Unlike ELP, reticular OLP is incidentally found on the oral mucosa, characterized by white lace-like lesions known as Wickham striae. Infiltration of lym-

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phocytes in the lamina propria and hyperkeratosis were important histological findings.

Direct immunofluorescence (DIF) can localize fibrinogen deposits and IgM-positive bodies may also be seen, as well as deposits of complement C3, IgG and IgA (26).

The atrophic LP is not common. It forms plaques with an atrophic center. The oral mucosa is frequently affected and these eruptions are much more chronic, and can lead to an OSCC if not followed carefully (26).

The Oral lichenoid lesion (OLL) was diagnosed in only 3 of our patients, most of whom were females over forty years old. Allergic responses to drugs and dental material may cause inflammatory lesions, such as graft-vs-host disease (GVHD); in addition, those suffering from systemic conditions, e.g., chronic hepatitis C (27, 28) and hepatitis B vaccinated (30). The inflammatory mediators may stimulate epithelial cell proliferation, increasing the epithelial thickness. However, the connective tissue cell number was higher in OLP than in OLL, and the presence of a band of basal lamina with strands into the connective tissue provides the basis for the differentiation between OLP and OLL (29, 30, 31). Earlier, some cases were reported as a drug-induced lesion due to the exposure to medications and drugs. The implicated agents are angiotensin-converting enzyme inhibitors and nonsteroidal anti-inflammatory drugs (32, 33, 34, 35).

Since LP is multifocal in more than 60% of females and more than 70% of males, it was concluded that LP with mucosal involvement should be considered and managed as a systemic disease, insisting on the need for a multidisciplinary clinic to ensure optimal care and treatment.

Leukoplakia cases were 10.7% in our patients (Figure. 6). They showed older age but different gender distribution than LP cases with 12.7% males and 9% females. But the age distribution confirmed that the majority of cases occur in individuals over 40 years old. It is defined as a white patch or plaque that cannot be characterized clinically or pathologically as any other disease (35). The Idiopathic leukoplakia is recognized as a rare, potentially malignant lesion, primarily located on the tongue, with a greater risk of malignancy than the tobacco-associated variety (36, 37). This risk escalates with age. Clinically, diagnosis can be quite challenging, as it involves excluding other conditions that could cause hyperkeratosis.

Our results were in accordance with research reporting an annual frequency of 6.6% for oral leukoplakia. The gender ratio was male predominant at 7.5:1, with most reported cases occurring in individuals from the 1st to the 8th decade of life, peaking in the 4th to 6th decades (38).

Robert A et al reached different results concerning the gender distribution with predominant female cases (39). This might be due to the predominance of homogenous leukoplakia over smoking-related leukoplakia, as most patients were non-smokers, and smoking is more strongly associated with males. They also found that non-homogeneous leukoplakia was associated with non-smoker status. This supports our findings, where non-homogeneous was higher among our patients.

Leukoplakia can be subtyped, with Proliferative Verrucous Leukoplakia (PVL) (40) accounting for 81.3% of Leukoplakia patients, while candidal leukoplakia comprises about 18.7%. Further studies have shown that PVL with a high recurrence rate along with a significant rate of malignancy occurring in about 74% of cases, often with multi-centric foci (40) which aligns with our findings.

Leukoplakia may be caused by smoking, some components of toothpaste, mouthwash, ultraviolet radiation, microorganisms, and viruses.

Tobacco use was considered an important risk factor related to the triggering of OL and OSCC. Tobacco carcinogens are responsible for chromosomal aberrations affecting the normal process of DNA repair and the cell cycle, leading to aneuploidy (41).

The genetic disorder is the mutation of the tumor suppressor gene p53. These genes regulate the normal processes of apoptosis and cell turnover. Patients with smoking history constitute about 80% of leukoplakia cases (42).

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In Libya, smoking is a common habit among male SCC patients (43) and diabetic patients (44). Other studies concluded that smoking, age, and gender were widely related to OWL. These findings were in agreement with others published in Iran (9), and also supported by a Saudi study that 88.8% of the tobacco users had oral lesions (45).

About 18.8% of our leukoplakia patients were diagnosed with candida leukoplakia (CL). It is a candidiasis variant caused by a fungal pathogen. Clinically, the lesions can be treated with antifungals. But if not properly treated, it may transform into dysplasia and carcinoma.

In our study 6.7% of the cases had frictional hyperkeratosis in younger males (Figure. 8). The age of most of the cases occurred in the individuals below 40 years old with a notable gender distribution leaning towards males (8.5%), compared to females (5.1%).

Frictional keratosis (FK) is a repeated trauma, initiated by sharp dentures, oral habits (biting the cheek), chemical, heat or physical irritants leading to a reaction of the mucosa in the oral cavity. Over-keratinization of the non-keratinized areas (e.g. buccal mucosa) and in those keratinized (e.g. hard palate); in the latter the lesion is called frictional hyperkeratosis (Figure; 8).

The lesions more or less extended in proportion to the traumatized area, with a translucent, white appearance to which erythematous areas could also be associated. The lesions were smooth or wrinkled, totally asymptomatic, and surrounded by healthy, pink-colored mucosa. Frictional hyperkeratosis appears whiter in color, with a thicker stratum spongiosum (acanthosis) that absorbs fluid, forming a pseudo-membrane. White lesions are mostly benign, a few are considered malignant disorders (46). If the lesion does not disappear, a biopsy and histopathological examination is required.

The simple keratosis cases were approximately 10.7% of all cases. The majority of cases occur over 40 years, with a notable gender shift toward males (15.5%) compared to females (6.4%).

White sponge nevus (WSN) is a rare genetic disorder of the oral mucosa (Figure.9) that appears as whitish, spongy, thickened plaques (47, 48). The mutations occur in the genes for Keratin 4 or 13, which code for intermediate filaments (48).

Our results included 2.0% of total cases of OWSN. The age distribution shows the majority of cases occur under 40 years, with a notable gender distribution of more males (2.8%) than females (1.3%).

Lupus erythematosus (LE) is an autoimmune disorder. It upsets the oral mucosa with varied prevalence (49, 50). It is affecting 3.4% of our patients. It also showed more cases among younger male individuals. The gender distribution was different from the published reports, but in agreement concerning the site, where the unilateral buccal mucosa was the most common site (54).

Discoid lupus erythematosus refers to an oral discoid lesion with pathologically characteristic features that can be confused with lichen planus.

Concerning the site distribution of the oral white lesions (OWL), the buccal lining (54.4%) was identified as the most common site, with 59.7% unilateral, while the remaining 40.3% were bilateral buccal mucosae, compared to the rest of the oral mucosa. This was in accordance with previous studies (14), while the floor of the mouth had the least occurrences, with only 1.3% (Figure. 3). Similar results were found by other workers (40).

This study revealed that 24.2% of cases with OWL were diagnosed with dysplasia. These were categorized into different grades. Notably, 72.2% of these cases exhibited mild dysplasia, while 22.2% had moderate dysplasia and 5.6% were classified as severe dysplasia. These results were similar to those found by Gurung (4)

Moreover, within 54 cases of homogeneous leukoplakia, 40.7% were found to have mild dysplasia, and 3.7% showed moderate dysplasia. Speckled leukoplakia cases displayed varying grades of dysplasia—mild, moderate, and severe—while two cases of VL were diagnosed with dysplasia between moderate and severe, which corroborates our study findings (Figure. 4). The term “epithelial dysplasia”

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denotes significant histologic abnormalities, indicating a greater risk of malignancy that might develop from oral leukoplakia (51, 52, 53).

Approximately 10 OSCC cases arose from oral lesions. Among these, about 6 patients (7.5%) had white lesions, and 4 patients had both white and red lesions. The most common grade of OSCC observed was well to moderately differentiated, with 42.5% of patients falling into this category (Figure. 7). When considering the relationships between the types of lesions and their grades, well-differentiated SCC arose from white lesions in 2 cases and the same number from red and white lesions. Additionally, 4 cases of well to moderately differentiated SCC originated from white lesions, while 2 cases were associated with red and white lesions (Figure. 7). Concerning the age distribution, most of our OSCC patients were more than forty years old, with a ratio of male to female of 1.63:1. Similar results were found by Japer MA (42).

Tobacco, alcohol, and human papillomavirus (HPV) cause lesions and may lead to malignant disorders and consequently OSCC (55). Genetic mutations may inactivate oncogenic signaling and suppressor signaling, increasing uncontrolled proliferation of OSCC cells. About 80%-90% of head and neck SCC (HNSCC) cases were due to expression of epidermal growth factor receptors (EGFR). These receptors promote OSCC cell proliferation, metastasis, and apoptosis resistance.

Tobacco use is a major risk factor for OSCC (56, 57). Smoking was reported in 79% of patients. These habits affect the incidence of OSCC in many sub-sites of the oral cavity such as the palate, while in the other forms of tobacco use, OSCC often occurs in alveolar sulcus or gingiva (48).

In our results, the lining of the lateral sides of the oral cavity was mostly affected, with fewer cases involving multiple sites, the palate, and the floor of the mouth.

A multidisciplinary team of specialists in surgery, oncology and nutrition is required to deal with these cases (49, 51, 57, 58).

CONCLUSION

The oral cavity is exposed to external environmental insults in addition to systemic conditions that initially appear in the oral cavity, leading to oral lesions. White lesions are common findings in the oral cavity. These lesions might be benign (and may not require treatment), pre-malignant or malignant conditions.

RECOMMENDATION

-Improvement in public awareness, lifestyle and regular dental examination.

-Early detection and diagnosis can improve access to affordable treatment and palliative care.

-A complete medical history, including habits, drug history, and duration of disease, is required.

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Final Year Medical Students' Perception of Different Assessment Methods in the Internal Medicine Department, University of Benghazi .

Najat O. Buzaid [1 2*], Sami A. Lawgaly [1 2].

Original Research Article

ABSTRACT

Introduction: Assessment of medical students involves many challenges and processes to develop competent physicians; nonetheless, students' feelings and perceptions of assessment methods are usually neglected.

Aim: To evaluate the perception of final year medical students to different assessment methods in the final examination at the Department of Internal Medicine, Faculty of Medicine, University of Benghazi.

Method: A cross-sectional study. An electronic three-point Likert scale questionnaire was distributed to final year medical students electronically.

Results: A total number of 337 students were included in the study. The majority of the studied group were females and accounted for 255 (75.7%). The mean age was 27.7 years. Exam unfairness was reported by 85.8% of students while 81.9% reported that the exam was dreadful. Females significantly reported more perception of exam unfairness than males 90%vs 74% respectively (P=0.0013.

Conclusion: Students reported high anxiety, and females perceived unfairness more significantly than males.

KEYWORDS: Medical, Final, perception, Exam, Benghazi University, written, OSCE, Perception.

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INTRODUCTION

The 5th year final exam is an important turning point for medical students, where graduates become practitioners. Studying medicine includes different learning domains, which include knowledge and understanding of different diseases as well as clinical skills and different diagnostic procedures. During studying, they also learn communication skills and ethics. It is a great challenge for the University of Benghazi (the oldest University in Libya) to graduate a competent physician in order to continue its progress.

The exam is not just a certification requirement, but it is designed to evaluate and introduce competent future practitioners to the community with proper knowledge, skills, attitude, and ethics. [1]

Nonetheless, the medical assessment is mainly for students' competence but ignores a very important part, which is the feelings and perception of students towards these assessment methods. The perception by students may affect their performance as well as their future choices in practicing medicine.[2]

There are different assessment modalities that constitute the final exam in medicine. They include written exams and the Objective Structured Clinical Examination (OSCE). The written exam includes two papers: paper -1 in the form of case scenarios (which test knowledge, analysis, and critical thinking) and paper- 2 which tests the knowledge. The OSCE exam evaluates clinical skills, critical thinking and analysis. Each assessment tool has its important part for assessing competence, but on the other hand they have their potential burden and emotional and cognitive stress.[1]

Students' perceptions are powerful mediators of how assessment objectives translate into actual learning behaviors. A student who perceives the exam as a test of becoming a real physician will be different from the exam, which is perceived as only the gateway to success. [2]

Students' perceptions and feelings towards assessment methods influence study strategies and retention of knowledge. In the long run, they affect the development of clinical response and their resilience towards stress and anxiety associated with the future clinical training [3]. Exploring and understanding what students feel toward the exam is essential to reconstruct and re-frame evaluation methods to yield competent and reflective physicians.

The study aimed to determine the perception of final -year medical students of different assessment methods at the Department of Internal Medicine, Faculty of Medicine, University of Benghazi

METHODS

The study was a cross-sectional study. Data were collected using a three- point Likert scale questionnaire designed by researchers after reviewing the literature. A pilot test was conducted, and the questionnaire's Internal Consistency (Reliability) test yielded a Cronbach's Alpha of 0.74.

Electronic questionnaires were distributed to the final year medical students immediately after the final exam.

Statistics:

Frequencies and percentages were calculated. Mean and standard deviation were used to describe the age and different perception items. Data was entered and analyzed using SPSS version 18. The Mann-Whitney U test was used to compare the means of perceptions by males and females. A P value of < 0.05 was considered a cut-off of significance.

RESULTS

The total number of participants was 337 students. The majority of participants were females, 255 (75.7%). The mean age was 27.73 ± 1.16 years. Most students (85.8%) answered that the final exam was not fair.

General Perception of Exam Quality:

There was a high consensus on the psychological impact, with 90.2% reported the exam was exhausting, and 81.9% reported significant exam dread. (Table 1)

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Table (1): General Perception of Exam Quality

Question	Yes N (%)	Medium N (%)	No N (%)
Was the final exam fair?	12 (3.6)	36 (10.7)	289 (85.8)
Was the exam time sufficient?	134 (39.8)	97 (28.8)	106 (31.5)
Was the exam well-managed?	66 (19.6)	85 (25.2)	186 (55.2)
Was the exam well-prepared?	54 (16)	94 (27.9)	189 (56.1)
Was it an exhausting exam?	304 (90.2)	23 (6.8)	10 (3)
Are you aware of the required info?	37 (11)	66 (19.6)	234 (69.4)
Were you fully aware of the exam method?	136 (40.4)	86 (25.5)	115 (34.1)
Did you experience exam dread?	276 (81.9)	55 (16.3)	6 (1.8)

OSCE-Specific Feedback (Clinical Stations)

The clearest aspect of the exam was the station instructions (57% answered Yes). (Table 2)

Table (2): OSCE-Specific Feedback (Clinical Stations)

Question	Yes N (%)	Medium N (%)	No N (%)
The time in each station was enough	166 (49.3)	86 (25.5)	85 (25.2)
Instructions were clear	192 (57)	75 (22.3)	70 (20.8)
Tasks were fair	114 (33.8)	98 (29.1)	125 (37.1)
The station sequence was logical	151 (44.8)	89 (26.4)	97 (28.8)
It gave me a chance to learn	118 (35)	86 (25.5)	133 (39.5)
Correctly assesses skills	68 (20.2)	97 (28.8)	172 (51)

Learning Effectiveness by Assessment Type

The clinical exam is perceived as more educational than the written papers (37.1% vs ~7%). (Table 3)

Table (3): Learning Effectiveness by Assessment Type

Assessment Method	High N (%)	Low N (%)	No Comment N (%)
Paper 1	18 (5.3)	102 (30.3)	217 (64.4)
Paper 2	27 (8)	115 (34.1)	195 (57.9)
Clinical Exam	125 (37.1)	137 (40.7)	75 (22.3)

Gender Comparison of Exam Perceptions

Males perceived exam fairness more than females with mean scores of 1.34 vs 1.13 (P<0.001). A major disparity exists regarding time sufficiency, where males perceived that the time was enough more than females with mean scores of 2.4 vs 1.9 respectively (P<0.001). Male students were more likely than female students to feel that the exam provided a genuine opportunity to learn (P=0.004).

High emotional burden was found in both genders, where the mean score for exhaustion was higher in females (1.2) than males (1.1) and the difference was significant (P = 0.013).

Females generally reported more extreme negative perceptions compared to males. (Table 4)

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BUMJ

Table (4): Gender Comparison of Exam Perceptions.

Perception Item	Male Mean	Female Mean	p-value
The final exam was fair	1.34	1.13	< 0.001
Exam time was sufficient	2.44	1.97	< 0.001
Exam was well-managed	1.88	1.57	0.004
Chance to learn from exam	2.20	1.88	0.004
Logical station sequence	2.35	2.10	0.013
Clear station instructions	2.52	2.31	0.020
Exhausting nature (Reverse)	1.22	1.10	0.031
Wide range of skills covered	1.88	1.64	0.031
Accurate skill assessment	1.87	1.64	0.034
Fair tasks at each station	2.12	1.92	0.060
Exam was well-prepared	1.66	1.58	0.472
Awareness of exam method	2.02	2.07	0.685
Exam dread	1.23	1.19	0.952

DISCUSSION

Globally, more females were interested in medical education than males. The study showed similar results, also similar results were reported by a study at the University of Tripoli, where the majority of the students were females. [3] This was important, as the present study suggested that female students reported negative perception towards exam fairness significantly more than males. The exam was a structured measure of competence, but students might perceive it emotionally unfair because it might be tricky for them and tested knowledge in a way not familiar to them. Medical students at the University of Benghazi preferred clinical exams more than written ones. Internationally, there was a push toward "authentic assessment." A study in the United Kingdom found that students value clinical assessments more because they offer higher "face validity", meaning the students believed the test actually measured their ability to be doctors. [4]

A recent study on medical student performance at the University of Benghazi [5] confirmed that students actually perform significantly better in clinical examinations (73.9% pass rate) compared to written exams (43% pass rate). This high performance likely fueled the positive perception found in the present study, as students felt more competent and successful in these "hands-on" formats. Findings from the University of Tripoli found that students reported that clinical exposure and assessments were the most vital part of their education, despite high associated stress levels. [6]

Other studies showed a "love-hate" relationship with MCQs; they were preferred for their objectivity and lack of examiner bias, yet criticized for being "easy to fail" if the questions were poorly constructed. [7,8] While both genders experienced high stress, females felt the grading was less objective. Many studies in the western world found different results, where female students often reported higher satisfaction with clinical grades. [9] However, in the Middle East and North Africa region, studies suggested that female students might be more sensitive to the lack of structured feedback, which was often not found in traditional Libyan clinical exams. Interestingly, one study of the University of Benghazi found no significant difference in exam scores between male and female students at different exam types (written, clinical, or viva). It suggested that the perception of unfairness reported by female students was a psychological or environmental perception, as

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both genders achieved nearly similar results. [5]

A study at the University of Tripoli in 2025 found that female medical students reported significantly higher stress levels (94%) than males (80%). This heightened stress might exacerbate the unfairness perception of clinical exams, where emotional stress is high. [10] In one study in Saudi Arabia, female students often scored significantly better than males in clinical and subjective tests, but they reported higher levels of negative perception towards exam assessment methods. This suggested that this gap between exam perception and performance might be more related to the psychological burden and the lack of feedback that would otherwise reassure female candidates. [11] The clearest aspect of the exam was the station instructions, suggesting that the verbal/written communication at individual stations was relatively effective despite the overall negative perception of fairness.

CONCLUSION

Our study found that students reported high anxiety, and a low learning value for Paper 1. Additionally, there was a significantly higher perception of exam unfairness among females. We recommend that the university address this 'environmental stress' and gender-based perception gap to better align the technical quality of the exam with the student experience. Furthermore, we suggest conducting peer-OSCEs, during which students are provided with rubrics to grade each other during practice sessions.

LIMITATIONS

The study was a cross-sectional study results might be affected by recent exams.

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Undescended Testis in Benghazi Children Hospital: A Retrospective Study of Correlation Between Age at Presentation, Laterality, Presence of Hernial Sac, and Testicular Size from 2020 to 2024 .

Rabeeah Ahmed Abdulmawlay [1*], Saleh Algumati [2].

Original Research Article

ABSTRACT

Background: The inability of the testis to descend into its typical scrotal position at birth is known as undescended testis (UDT) or cryptorchidism. It is estimated that one to four percent of full-term and up to forty-five percent of preterm newborn male neonates are affected by UDT.

Objective: To determine the mean age of patients at the time of presentation with palpable undescended testis, to analyze the distribution of cases by laterality (right, left, or bilateral), to assess the association between undescended testis and the presence of a hernial sac, to evaluate the size of the affected testis in comparison with the contralateral normal testis, and to examine the correlations among these variables in order to provide evidence-based clinical recommendations

Method: A hospital-based retrospective study was conducted in the Pediatric Surgery Department at Benghazi Children Hospital, encompassing all male patients who underwent surgery for a confirmed diagnosis of undescended testis, aged between five months and 12 years, from 2020 to 2024. All patient records were reviewed to extract the required data.

Results and Conclusion: A total Results and conclusion: This is a retrospective review of 140 children (UDT) presenting to Benghazi Children's Hospital to evaluate the age of presentation, laterality, size of the testis, the presence of hernial sac, and the associated surgical findings. The majority of the patients (67.9%) presented between 0 and 2 years, which is very much in accordance with international guidelines of early surgical intervention and presentation. However, a notable proportion (32.1%) presented after the age of 3, suggesting a delay in referral and time of operation. Increased risk of testicular atrophy with increasing age was noted, particularly in the 6–8year-old group. The presence of hernial sac was observed in 35.7% of the instances, more in the younger age group of children. Laterality was evenly split between the right and left sides, with bilateral cases constituting only 5%, Nearly every patient who had a history of empty scrotum was admitted for orchidopexy. Two patients who had previously undescended testes (UDT) and a history of recurrent irreducible hernias were admitted for herniotomy. Three cases of testicular torsion and one case of irreducible inguinal hernia were among the four patients who were brought as emergencies and had a history of inguinal swelling. No statistically significant correlations were noted between testicular size and age, laterality, or the presence of a hernia.

KEYWORDS: Undescended Testis, laterality, Hernial sac, and Testicular Size.

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INTRODUCTION

Cryptorchidism, commonly referred to as undescended testis (UDT), represents the most frequent congenital anomaly affecting the male genitalia. [1] It is characterized by the failure of one or both testes to descend into the scrotal sac along their normal path during fetal development. Normally, testicular descent is completed by the third trimester of gestation and, in most cases, any delay corrects spontaneously within the first few months of life. [2] However, if the testis fails to descend by the age of six months, the condition is unlikely to resolve on its own and is considered pathological. The prevalence of UDT ranges between 2– 4% in full-term neonates and up to 30% in preterm infants, reflecting the role of gestational maturity in testicular descent. By the age of one year, the prevalence drops to around 1%, due to spontaneous descent occurring during early infancy.[3]

Clinically, undescended testis is of paramount importance because of its potential short- and long-term consequences. These include infertility, impaired spermatogenesis, increased risk of testicular malignancy (particularly seminoma), susceptibility to trauma, risk of torsion, inguinal hernia association, and psychological effects related to genital appearance. Early diagnosis and timely management are therefore crucial to optimizing outcomes. [4] UDT can be classified as: Palpable testes – most commonly located in the inguinal canal. And non-palpable testes – either intra-abdominal, absent, or atrophic. [5]

Laterality is another important clinical parameter. Unilateral undescended testis is more common than bilateral involvement, with the right testis affected more frequently. However, bilateral cryptorchidism raises higher concerns about endocrine abnormalities and infertility potential. [5]

A significant proportion of children with UDT present with an associated patent processus vaginalis, which manifests as an inguinal hernia sac. This is explained by the embryological link between testicular descent and closure of the processus vaginalis. Thus, assessing the presence of a hernial sac at surgery provides important clinical information about the pathogenesis of the condition. [6]

The age of presentation remains one of the most clinically significant variables in the management of UDT. International guidelines, including those from the American Urological Association (AUA) and the European Association of Urology (EAU), recommend that orchiopexy should be performed ideally between 6–18 months of age. Surgery within this window offers the best chance to preserve fertility potential and reduce the risk of testicular malignancy. Delayed presentation, particularly beyond two years, is associated with progressive germ cell loss, impaired Sertoli cell function, and smaller testicular size, all of which compromise long-term reproductive capacity. [7]

In many developing countries, including Libya, delayed presentation is still common due to lack of awareness, limited access to specialized pediatric urology services, and sociocultural factors. Studying the age distribution of children presenting with UDT in Benghazi Children Hospital can highlight the current gaps in early detection and referral. [7]

It is essential to clarify that the scope of this study is focused on surgical interventions for UDT conducted at Benghazi Children Hospital, where management is primarily limited to open surgical procedures, as laparoscopic techniques are currently not performed at this facility.

Testicular size serves as an important clinical and surgical marker of gonadal function. A smaller testis suggests impaired development, reduced spermatogenic potential, or longstanding undescended status. Testicular growth is known to be adversely affected the longer the testis remains outside the scrotum, as the higher intra-abdominal or inguinal temperatures impair germ cell maturation. [8]

Several studies have demonstrated that early orchiopexy correlates with improved testicular volume and histological outcomes, while delayed surgery often leads to irreversible atrophy. Therefore, evaluating testicular size in relation to age at presentation provides insight into the functional prognosis of these patients. [8,9]

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Clinically, a significant proportion of boys presenting with inguinal hernia are also found to have undescended testes, and vice versa. Understanding the correlation between UDT and hernia sac in the Benghazi pediatric population will provide valuable epidemiological and surgical data for the region.

While undescended testis has been extensively studied worldwide, local data from North Africa, and particularly Libya, remain scarce. Benghazi Children Hospital serves as a referral center for a large pediatric population, making it an ideal setting to evaluate the clinical spectrum of UDT in the region. A retrospective analysis spanning 2020 to 2024 offers an opportunity to assess patterns of presentation, laterality, presence of hernia sac, and testicular size over a recent five-year period.

From a public health perspective, identifying trends in delayed presentation can inform awareness campaigns, improve referral systems, and promote adherence to international guidelines for early intervention.

Rationale of the Study:

Despite being a common pediatric condition, there is a lack of systematic data on UDT in Benghazi and across Libya. The absence of local research makes it difficult to evaluate whether current practices align with international recommendations, and whether regional factors influence presentation and outcomes. By conducting a retrospective study, this thesis aims to bridge that gap and provide evidence-based insights relevant to both clinicians and policymakers.

Statement of problem:

Undescended testis (UDT), or cryptorchidism, is among the most common congenital anomalies in male children. If left untreated, it carries significant long-term consequences, including impaired fertility, and increased risk of testicular malignancy.

Despite clear international guidelines recommending early detection and timely surgical correction, delayed presentation remains a persistent problem in many resource-limited healthcare settings, including Benghazi, Libya. The scarcity of local data on the clinical and demographic characteristics of UDT—particularly regarding the interplay between testicular size, presence of an associated hernial sac, laterality, and age at presentation—represents a major barrier to improving care. Bridging this gap is crucial not only for optimizing pediatric surgical outcomes but also for shaping future health policies and public health initiatives aimed at enhancing early recognition and intervention.

Significance of the study:

There are various reasons why this study is important.

1. Local Relevance: It is the first thorough retrospective investigation of Benghazi Children Hospital's UDT cases, providing insightful information about regional trends and clinical practice difficulties.
2. Clinical Implications: The study may assist in identifying trends indicative of delayed intervention or associated complications by examining the relationship between age at presentation and key variables, including laterality, presence of a hernial sac, and testicular size.
3. Public Health Insight: To promote early detection and referral, the results can guide focused awareness campaigns for parents and primary healthcare providers.
4. Policy Development: In accordance with international recommendations, the findings of this study may inform national pediatric surgical guidelines and institutional protocols, directing practice toward earlier surgical intervention, preferably before the age of 18 months.

Furthermore, this study establishes a foundational framework for future prospective research and contributes to the development of a database for pediatric urological anomalies in Libya.

Objectives:

The present study aimed:

1. To determine the average age of patients at the time of presentation of undescended testis.
2. To analyze the distribution of cases based on the side (right, left, or bilateral).
3. To assess the association between undescended testis and the presence of hernial sac.
4. To evaluate the size of the affected testis and com-

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pare it with the contralateral normal testis.

5. To examine the correlations among these factors in order to provide evidence-based clinical recommendation

METHODS AND MATERIALS

Research Setting and Period:

This study was conducted between January 2020 and August 2024 at the Pediatric Surgery Department, Benghazi Children Hospital, Benghazi, Libya.

Study Design:

A hospital-based retrospective study was conducted in the Pediatric Surgery Department at Benghazi Children Hospital.

Study Population and Data Collection:

The study included all male patients who underwent open surgical intervention for a confirmed diagnosis of palpable undescended testis at the Pediatric Surgery Clinic of Benghazi Children Hospital, with ages ranging from 41 days to 12 years. The inclusion criteria were, all the patients who have files and regularly follow up the surgery clinic were available in hospital archives at the time of data collection between the 1st of January 2020 to the end of August 2024. A convenient sample (n=140) was obtained from the total number of admissions to the surgical department during the study period 7111 patients. All patients' files were revised to the following: Demographic characteristics, age at presentation. Full history, clinical general examination (side of the undescended testis (right, left, or bilateral), the presence of an associated hernial sac, and the size of the testis measured during surgery).

Procedures:

Data were collected using a pre-designed structured data collection form encompassing sociodemographic characteristics, clinical history, and examination findings.

The data collection form was completed by the principal researcher to extract the required information from patient records.

Data Analysis:

Data were analyzed using statistical package for social science SPSS program, version 23. A range of statistical methods was employed to analyze the study data. Descriptive statistics, including frequencies and percentages, were used to summarize the characteristics of the sample and the distribution of key variables. In addition, appropriate inferential statistical tests were applied to examine relationships between variables and assess their statistical significance, in order to draw meaningful conclusions that support the objectives of the study and enhance the reliability of the findings. Data were presented in form of tables and figures, where the figures done by Microsoft Excel 2010.

Ethical Considerations and Approvals:

This research was conducted in accordance with the highest ethical standards and adhered to all relevant guidelines and regulations governing medical research involving human subjects. The study was submitted for review and approval by the Institutional Review Board (IRB) or equivalent ethics committee at the institution, as well as other relevant regulatory authorities. Patient privacy and confidentiality were protected through the de-identification of all collected data. The study was conducted in a manner designed to minimize any potential risks or discomfort to the study population. All necessary permissions and approvals were obtained from the hospital administration and relevant governmental agencies prior to accessing and utilizing the medical records required for this study.

RESULTS

The majority of patients (67.9%) presented between 0 and 2 years of age, which reflects improved awareness compared to historic norms. The majority of patients (96.4%) had a hospital stay of three days, while only a small proportion (3.6%) stayed for 2 days. The uniformity suggests that the average length of hospitalization in this cohort is standardized to 3 days, likely reflecting a consistent post-operative or clinical care protocol. The low variation may also indicate effective management with minimal complications requiring extended stays. However, nearly one-third of cases (32.1%) presented beyond the age of 3 Years, which is considered delayed according to pediatric urological guidelines

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Benghazi University Medical journal
Faculty of Medicine, University of Benghazi
BUMJ VOLMUE:3 ISSUE:1 June: 2026

recommending orchidopexy before 12 months of age. Delayed intervention may contribute to long-term risks such as infertility, malignancy, and susceptibility to trauma. (Table.1) (Figure.1)

Table (1): Distribution of age group at presentation among patients with undescended testis (N=140)

Age Group	Frequency	Percent
0 - 2	47	33.6
3 – 5	48	34.3
6 – 8	26	18.6
9 - 12	19	13.6
Total	140	100.0

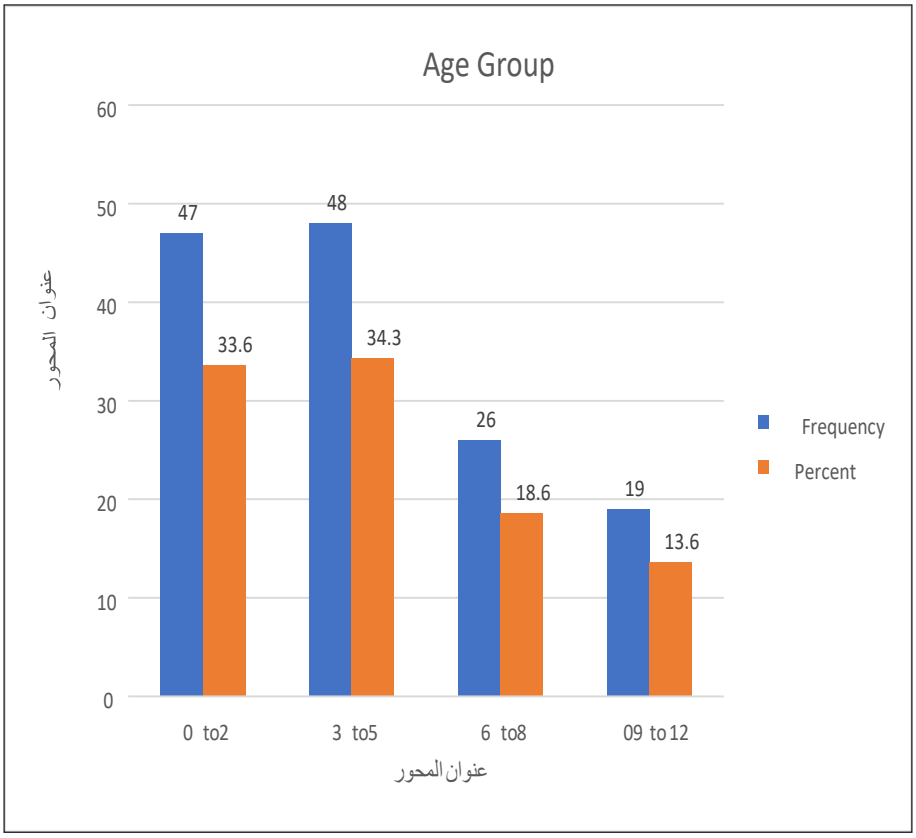

Figure (1): Age Distribution of Study Participants

Benghazi University Medical journal
Faculty of Medicine, University of Benghazi
VOLMUE:3 ISSUE:1 June: 2026
BUMJ

The condition affected the left and right sides almost equally, with a slight predominance on the left. Bilateral undescended testis was relatively uncommon (5.0%), consistent with literature that unilateral cases are more frequent than bilateral ones. (Table.2)

Table (2): Distribution of Laterality of Undescended Testis (N=140)

	Frequency	Percent
Right	66	47.1
Left	67	47.9
Bilateral	7	5.0
Total	140	100.0

A hernial sac was observed in 35.7% of the patients. This suggests a significant association between undescended testis and patent processus vaginalis, which can lead to an indirect inguinal hernia. The data emphasizes the importance of examining for hernias in patients with UDT, especially during surgical exploration. (Figure.2)

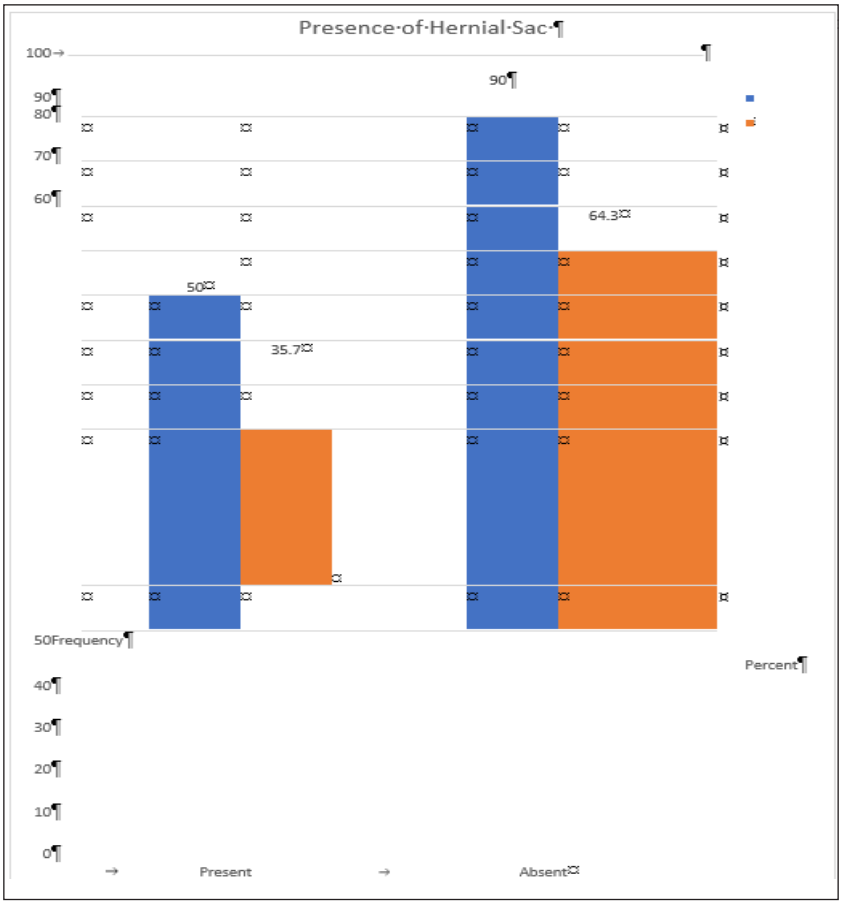

Figure (2): Presence of Hernial Sac Among Patients with Undescended Testis (N=140)

Benghazi University Medical journal
Faculty of Medicine, University of Benghazi
BUMJ VOLMUE:3 ISSUE:1 June: 2026

Most of the undescended testes were of small size (64.3%), suggesting potential testicular atrophy due to delayed descent. It is It should be noted that in this study, no standardized instrument was employed to measure testicular size; rather, the operating surgeon's intraoperative estimation was used. This highlights the importance of early diagnosis and intervention to prevent testicular damage. (Table.3)

Table (3): Distribution of Testicular Size in Patients with Undescended Testis (N=140)

	Frequency	Percent
Small size	90	64.3
Good size	50	35.7
Total	140	100.0

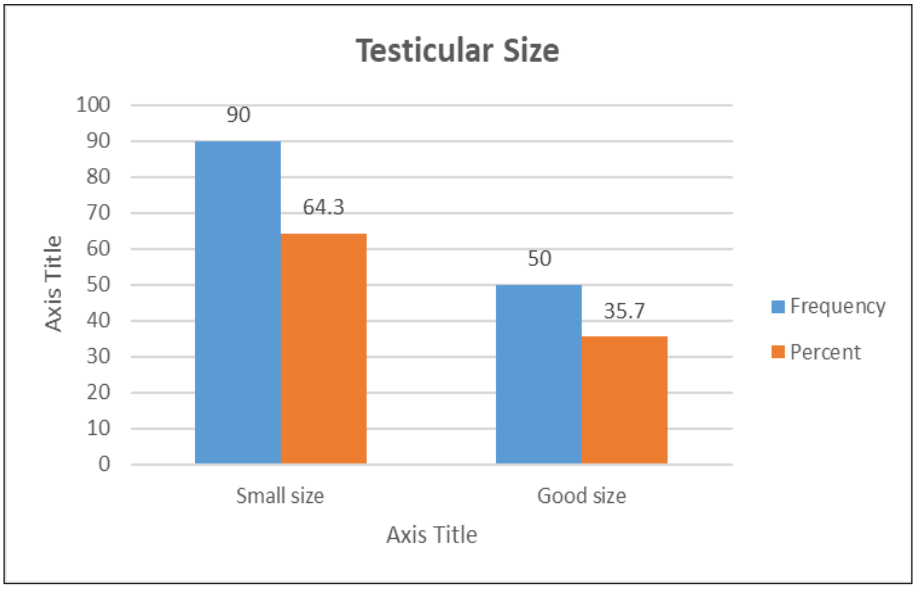

Figure (3): Distribution of Testicular Size in Patients with Undescended Testis (N=140)

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Benghazi University Medical journal
Faculty of Medicine, University of Benghazi
VOLMUE:3 ISSUE:1 June: 2026
BUMJ

There is a notable trend toward smaller testicular size in older age groups. Specifically, 84.2% of patients aged 6–8 years had small testes compared to 65.3% in the 0–2 year group. While the result did not reach statistical significance (p = 0.070), this suggests a potential age-dependent atrophic effect, likely due to prolonged maldescent. This reinforces the urgency of early intervention to preserve testicular function. (Table.4)

Table (4): Correlation between Age Group and Testicular Size

Age Group	Small size	Good size	Total
0 - 2	31 (22.1%)	16 (11.4%)	47
3 – 5	31 (22.1%)	17 (12.1%)	48
6 – 8	12 (8.6%)	14 (10.0%)	26
9 - 12	16 (11.4%)	3 (2.1%)	19
Total	90 (64.3%)	50 (35.7%)	140

P. Value 0.07

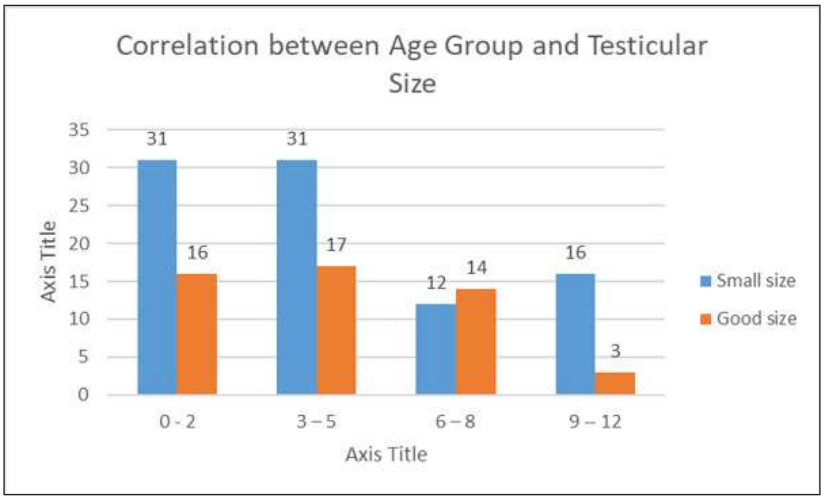

Figure (4): Correlation Between Age Group and Testicular Size

The presence of a hernial sac is most common in the youngest age group (0–2 years), which may reflect early anatomical defects such as a patent processus vaginalis. However, there is no statistically significant association between age and hernial sac presence (p = 0.598), suggesting that this feature may develop or persist independently of the timing of presentation. (Table.5)

Table (5): Correlation Between Age Group and Presence of Hernial Sac

Age Group	Present	Absent	Total
0 - 2	20 (14.3%)	27 (19.3%)	47
3 – 5	14 (10.0%)	34 (24.3%)	48
6 – 8	9 (6.4%)	17 (12.1%)	26
9 - 12	7 (5.0%)	12 (8.6%)	19
Total	50 (35.7%)	90 (64.3%)	140

P. Value 0.598

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VOLMUE:3 ISSUE:1 June: 2026

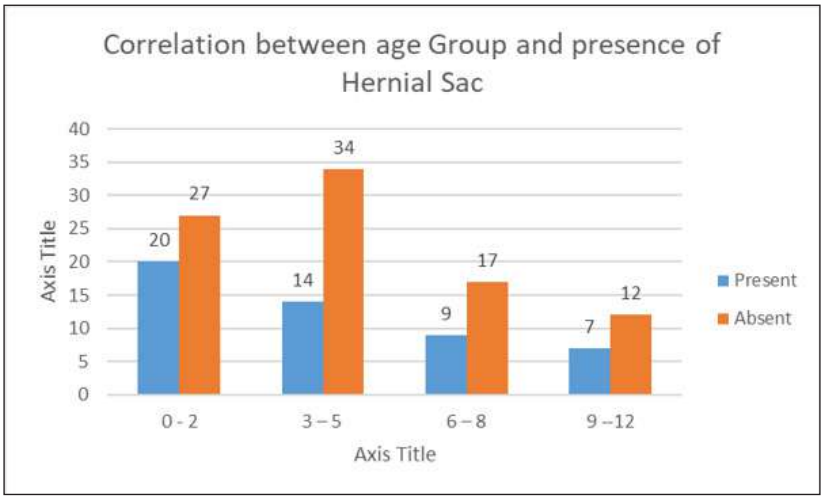

Figure (5): Correlation Between Age Group and Presence of Hernial Sac

No statistically significant association was identified between testicular size and clinical presentation. (Table.6)

Table (6): Association between clinical presentation and testicular size

Testicular Size	Right empty scrotum	Left empty scrotum	Left inguinal swelling	Bilateral empty scrotum	Total
Small	42 (30.0%)	42 (30.0%)	4 (2.9%)	2 (1.4%)	90 (64.3%)
Adequate	27 (19.3%)	21 (15.0%)	0 (0.0%)	2 (1.4%)	50 (35.7%)
Total	69 (49.3%)	63 (45.0%)	4 (2.9%)	4 (2.9%)	140 (100%)

p-value: 0.223 (not significant)

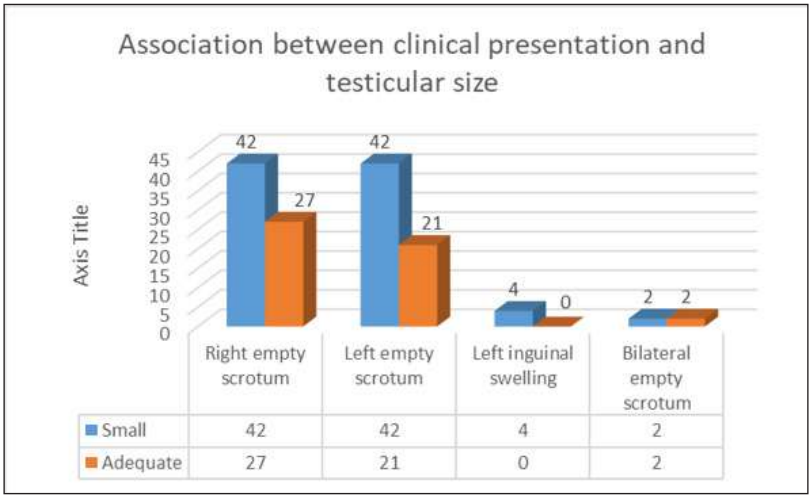

Figure (6): Association Between Clinical Presentation and Testicular Size

DISCUSSION

Undescended testis (UDT) is a prevalent condition among the male pediatric population worldwide. Nevertheless, published data on the prevalence and management of UDT within Libya remain scarce. For both clinicians and researchers, the timing of orchidopexy has remained a subject of ongoing discussion. Growing awareness of the progressive histological changes occurring in the cryptorchid testis during infancy—including a decline in Leydig cell number, reduced germ cell development, and an elevated risk of future malignant transformation—has led to increasing advocacy for early orchidopexy, with these changes becoming more pronounced in undescended testes beyond 12 months of age. [10] [11]

The literature has shown that testicular maldescent is linked to an increased risk of testicular germ cell cancers. Multiple studies have demonstrated that orchiopexy performed prior to puberty is protective against malignant transformation, with the lowest reported risk observed in children who underwent surgery between the ages of zero and six years. [12] [13]

Over the past few decades, the suggested time window for orchidopexy has undergone a significant change due to these and other reasons. In 1996, the American Academy of Pediatrics suggested that surgery be performed at 12 months of age, arguing that early intervention could increase future fertility and avoid testicular atrophy. [14] This recommendation was further supported by the EAU/ESPU, which states that surgery should be done before the age of 12 months, and no later than 18 months, if testicular descent has not been completed by the age of six months. Even with these and other international guidelines, orchidopexy is still not always carried out in the allotted amount of time. [13]

This retrospective analysis of 140 pediatric patients with undescended testis (UDT) at Benghazi Children Hospital provides valuable insights into the age of presentation, testicular size, laterality, and the presence of associated hernial sacs.

The majority of cases (67.9%) presented between 0 and 2 years of age, which aligns more closely with global recommendations for early detection. However, over one-third (32.1%) of patients presented after 3 years, suggesting a persistent delay in timely diagnosis and referral. This delay is concerning, given that international guidelines advocate for orchidopexy before 12 months of age to reduce the risks of infertility, testicular atrophy, and malignancy.

A strong trend toward testicular atrophy with increasing age was observed, particularly in the 6–8-year age group, where 84.2% of testes were classified as small. Although this trend did not reach statistical significance ($p = 0.070$), the clinical implication is clear: the longer a testis remains undescended, the greater the likelihood of irreversible damage due to thermal injury, impaired blood supply, and disrupted development. These findings reinforce the need for early intervention to preserve long-term testicular function.

K. F. Neel conducted a retrospective assessment of 345 boys who had been diagnosed with UDT in two centers in Riyadh, Saudi Arabia, in 2008. The average age of orchidopexy was 54.8 months. However, he did not address the cause of the management's delay. [10]

This pattern of delayed intervention has been noted in several settings. For instance, Barthold and Gonzalez (2003) have reported that only 25% of the patients in the U.S. had timely surgery before age one, even though guidelines were established. [15]

Correspondingly, a study conducted in India by Raghavendran et al. noted that over 60% of the boys had surgery after 2 years of age. On the other hand, a Swedish study by Thorup et al. revealed enhanced adherence to guidelines following national health policy reforms, with median age at orchidopexy being 13.7 months, demonstrating the effect of public health initiatives. [11]

Regarding laterality, the distribution was nearly equal between right (47.1%) and left (47.9%) sides, with bilateral involvement accounting for only 5%. This symmetry is consistent with global epidemiological data and indicates that anatomical side does not significantly influence testicular size or the timing of presentation.

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Hutson et al. reported no marked predilection for either side, although a mild right-sided predominance attributable to delayed right testicular descent has been noted in the literature. This is consistent with the global literature, which reports bilateral involvement in approximately 10% or fewer of UDT cases. [5]

For bilateral undescended testes orchidopexy is usually performed on both sides during the same surgery, a staged approach is indicated in the following cases:

Vascular risk.

Anesthetic limitations.

To confirm the viability and successful outcome of the first orchidopexy before proceeding with the contralateral side.

A hernial sac was present in 35.7% of patients, most commonly in the 0–2-year group. While this suggests a developmental association with a patent processus vaginalis, no significant relationship was found between the presence of a hernia and age, testicular size, or laterality.

This emphasizes the importance of always assessing for hernias intraoperatively, regardless of clinical presentation.

The identification of a hernial sac in 35.7% of patients—most commonly in the age group 0– 2 years—is consistent with literature showing a highly significant correlation between UDT and a patent processus vaginalis associated with it. Over 90% of patients with UDT possess an associated patent processus vaginalis. [1]

Almost all cases were admitted for orchidopexy with history of empty scrotum. Two cases were admitted for herniotomy with a history of recurrent irreducible hernia and already undescended testes (UDT). Four cases were admitted as emergencies with a history of inguinal swelling, including three cases of testicular torsion and one case of irreducible inguinal hernia.

In this study, cases of testicular torsion were managed solely as complications arising from failure to perform timely orchidopexy for UDT; consequently, the contralateral side was not evaluated.

Furthermore, a comprehensive assessment of torsion within this population was limited by the challenges of long-term follow-up inherent to retrospective case review.

Statistical testing revealed no significant correlations between age, laterality, hernial sac presence, and testicular size. However, the clinical trends observed are compelling and highlight the potential impact of delayed presentation on testicular health. The findings also underscore the importance of public health initiatives aimed at promoting early screening during infancy and timely surgical referral.

No statistically significant relationships were observed between testicular size and factors such as age, laterality, or the presence of a hernial sac. Nevertheless, clinical trends suggest a meaningful association between delayed presentation and poor testicular outcomes. These observations emphasize the need for enhanced neonatal and infant screening programs, parental education, and improved referral systems to ensure that affected children receive timely and effective management.

This study demonstrates that a substantial proportion of children with undescended testis in Benghazi present after the recommended age for corrective surgery, increasing the risk of long-term complications such as testicular atrophy. While the majority of patients were seen between 0 and 2 years, a significant number still presented beyond this window, with older children showing higher rates of testicular hypoplasia.

CONCLUSION

This is a retrospective review of 140 children with undescended testis (UDT) presenting to Benghazi Children's Hospital to evaluate the age of presentation, laterality, size of the testis, the presence of hernial sac, and the associated surgical findings. The majority of the patients presented between 0 and 2 years, which is very much in accordance with international guidelines of early surgical intervention and presentation. However, a notable proportion presented after the age of 3, suggesting persistent delays in referral and diagnosis.

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A clinical trend toward increased testicular atrophy with increasing age was noted, particularly in the 6–8-year-old group, where most of the testes were small, but not statistically significant. The presence of hernial sac was observed in 35.7% of the instances, more in the younger age group of children, but without any correlation with either age, laterality, or testicular size.

Laterality was evenly split between the right and left sides, with bilateral cases in line with international epidemiological data. No statistically significant correlations were noted between testicular size and age, laterality, or the presence of a hernia, but clinical significance demonstrates that late treatment can have a negative impact on testicular growth and subsequent function. Nearly every patient who had a history of empty scrotum was admitted for orchidopexy. Two patients who had previously UDT and a history of recurrent irreducible hernias were admitted for herniotomy. Among the four patients admitted as surgical emergencies with a history of inguinal swelling, three were diagnosed with testicular torsion and one with an irreducible inguinal hernia.

Overall, the findings emphasize ongoing challenges in adherence to global surgical timing guidelines for UDT. Delayed orchidopexy remains an issue and indicates a need for system wide improvement in screening and referral pathways within the Libyan healthcare system.

RECOMMENDATION

Based on the findings of this study, the following recommendations are proposed:

1. Public Education: Awareness campaigns should be directed toward parents and caregivers to promote early detection and timely surgical correction of UDT, thereby reducing the long-term risks of infertility and malignancy.

2. Enhancement of Referral Pathways: Effective and streamlined referral mechanisms from primary care physicians and pediatricians to pediatric surgeons should be established to minimize delays in surgical intervention.

3. Adherence to International Guidelines: All hospitals should enforce compliance with established international recommendations, which advocate for orchidopexy before 12 months of age and no later than 18 months.

4. Further Research: Larger, multi-center prospective studies with extended follow-up periods should be conducted to evaluate fertility outcomes, malignancy risk, and quality of life in UDT patients.

5. Health Policy and System Reforms: A nationwide health policy mandating systematic reporting and timely surgical intervention for UDT should be developed, drawing on successful models implemented in other countries.

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Small bowel obstruction due to splenosis few years after splenectomy : A Case Report .

Khaled Saad Alsherif *.

Case Report

ABSTRACT

Background: Small bowel obstruction secondary to abdominal splenosis is a rare clinical condition that may occur many years after splenectomy and often presents a diagnostic challenge. We report the case of a patient who presented with features of acute small bowel obstruction ten years following splenectomy. The patient had a history of prior splenic surgery and no other significant abdominal pathology. Contrast-enhanced computed tomography of the abdomen revealed multiple well-defined intra-abdominal nodules consistent with splenosis, associated with signs of mechanical small bowel obstruction.

Given the persistence of obstructive symptoms, the patient underwent exploratory laparotomy. Intraoperatively, multiple ectopic splenic implants were identified within the peritoneal cavity, with dense adhesions causing small bowel obstruction. Adhesiolysis and excision of the obstructing splenic tissue were performed. Postoperative recovery was uneventful, with complete resolution of symptoms.

Histopathological examination confirmed the presence of ectopic splenic tissue consistent with splenosis. The patient remained asymptomatic on follow-up.

This case highlights the importance of considering abdominal splenosis in the differential diagnosis of small bowel obstruction in patients with a history of splenic injury or splenectomy. Early recognition using appropriate imaging modalities may aid diagnosis, while surgical management remains the definitive treatment in symptomatic cases.

KEYWORDS: abdominal Splenosis, Small bowel obstruction, Splenectomy, Intestinal obstruction.

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INTRODUCTION

Intestinal obstruction is one of the most common surgical emergencies encountered in clinical practice and remains a significant cause of morbidity and hospital admission worldwide. It results from the partial or complete interruption of the normal passage of intestinal contents and may lead to serious complications, including bowel ischemia, necrosis, perforation, sepsis, and death if diagnosis or treatment is delayed. Although postoperative adhesions, incarcerated hernias, malignancies, and volvulus account for the majority of cases, uncommon aetiologies continue to pose diagnostic challenges because of their rarity and nonspecific clinical presentation [1,2].

Splenosis is a benign acquired condition characterised by heterotopic autotransplantation of viable splenic tissue following traumatic splenic rupture or splenectomy. After disruption of the splenic capsule, splenic fragments may disseminate throughout the peritoneal cavity and implant on vascularised surfaces, where they subsequently establish an independent blood supply and proliferate. Unlike accessory spleens, which arise from congenital embryological anomalies and possess a normal splenic architecture and vascular pedicle, splenetic implants derive their blood supply from surrounding tissues and demonstrate variable histological organisation [3,4].

The true incidence of splenosis remains uncertain and is likely underestimated, with studies suggesting that splenic autotransplantation may occur in up to 65–75% of patients following splenic trauma or splenectomy. The condition most commonly involves the peritoneal cavity, including the omentum, mesentery, bowel serosa, and pelvic structures, although ectopic splenic tissue has also been reported in the thorax, liver, pancreas, subcutaneous tissue, and other unusual locations. In most cases, splenosis remains asymptomatic and is discovered incidentally years or even decades after the initial splenic injury during imaging studies or surgical exploration performed for unrelated conditions [4–6].

Despite its generally benign nature, splenosis may occasionally result in clinically significant complications depending on the size, number, and location of the implants. Reported manifestations include chronic abdominal pain, gastrointestinal bleeding, hydronephrosis, ureteric obstruction, pelvic pain, and intestinal obstruction. Bowel obstruction secondary to splenosis is particularly rare and may occur through several mechanisms, including adhesive bands, external compression of bowel loops, mesenteric involvement, volvulus, or entrapment of intestinal segments between splenic nodules. Because symptoms may develop many years after the original splenic injury, the relationship between prior splenectomy and current presentation is often overlooked, contributing to delayed diagnosis and management [7–9].

The diagnosis of abdominal splenosis remains challenging because radiological findings frequently mimic both benign and malignant intra-abdominal pathologies, including peritoneal carcinomatosis, metastatic disease, lymphoma, gastrointestinal stromal tumors, and primary peritoneal neoplasms. Conventional imaging modalities such as ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI) can demonstrate multiple soft-tissue nodules but often lack sufficient specificity for definitive diagnosis. Nuclear scintigraphy using technetium-99m-labelled heat-damaged red blood cells remains the most sensitive and specific noninvasive diagnostic modality for identifying functional ectopic splenic tissue and differentiating splenosis from neoplastic disease, thereby preventing unnecessary invasive procedures [4,10,11].

Awareness of splenosis as a potential cause of intestinal obstruction is therefore of considerable clinical importance. In patients presenting with bowel obstruction and a remote history of splenic trauma or splenectomy, splenosis should be included in the differential diagnosis, particularly

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BUMJ

when multiple unexplained intra-abdominal nodules are identified on imaging. Early recognition may facilitate appropriate operative planning, avoid misdiagnosis, and prevent unnecessary extensive surgical resection. Given the rarity of this presentation, individual case reports continue to provide valuable insights into its pathophysiology, diagnostic challenges, and optimal management strategies.

We report a rare case of small bowel obstruction secondary to abdominal splenosis occurring ten years after splenectomy. This case highlights the diagnostic difficulties associated with this unusual entity and emphasizes the importance of considering splenosis in the differential diagnosis of intestinal obstruction in patients with a previous history of splenic trauma or splenectomy.

Case Presentation

A [33]-year-old male presented to the emergency department with a [3]-day history of abdominal pain, abdominal distention, obstipation and multiple episodes of profuse bilious vomiting Upon presentation,he was haemodynamially stable and afebrile On physical examination he had severe abdominal distension,high_pitched bowel sounds diffuse tenderness and no guarding .The patient laboratory studies showed leucocytosis with a left neutrophil shift:the remaining test results were all within the normal range An abdominal x_ray showed small bowel distention with multiple air _fluid levels (figure1).

Figure (1) abdominal x ray show multiple air fluids levels

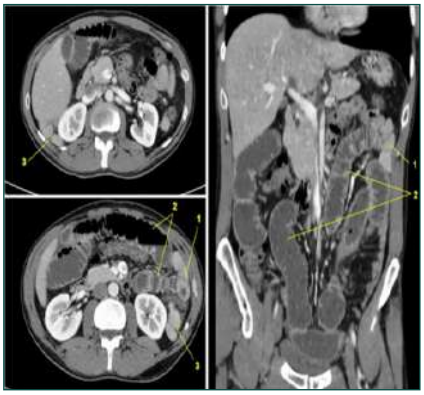

Figure (2) Abdominal computed tomography with intravenous contrast showing the mass causing small bowel obstruction (1), dilated proximal small bowel loops (2) and splenosis distributed in the abdomen (3)

Enhanced abdominal computed tomography was consistent with small bowel obstruction ,with transition zone at the level of the left lower abdominal quadrant suggesting an internal hernia or adhesions .Radiology also noted multiple disseminated nodules compatible with splenosis (figure 2)The patient had a significant past surgical history of splenectomy performed ten years earlier following abdominal trauma.

A diagnosis of small bowel obstruction was made ,A nasogastric tube was inserted and the patient was prepared for surgery .A midline Exploratory laparotomy over old wound scar was done , which revealed multiple dark _red nodules ranging from 1cm to 10 cm attached to the mesentery and jejunal loop (figure 3), causing extrinsic compression and adhesions leading to obstruction ,Adhesiolysis and excision of the obstructing nodules were performed. Histopathological examination confirmed splenic tissue formed by a white pulp and a red pulp, consistent with splenosis.

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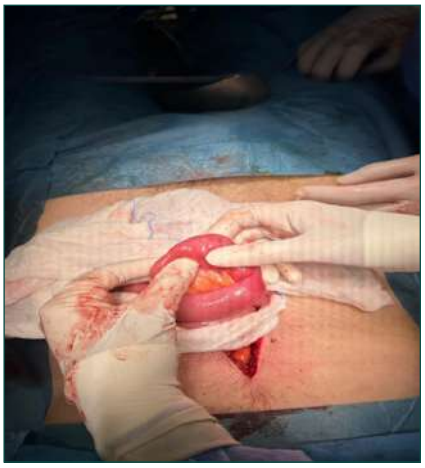

Figure (3) shows intraoperative picture for splenosis nodules at jejunal loop of bowel.

The postoperative course was uneventful, and the patient was discharged on postoperative day [5]. At follow-up, the patient remained asymptomatic.

METHODS

Study Design:

- A descriptive single-patient case report was conducted
- Detailed clinical history, including prior splenic trauma or splenectomy, was obtained
- Physical examination and routine laboratory investigations were performed
- Radiological evaluation with contrast-enhanced CT abdomen was used for assessment
- Surgical exploration was undertaken due to clinical indication
- Intraoperative findings were recorded, and excised tissue was sent for histopathological examination
- Postoperative follow-up was carried out to assess clinical outcome and recovery

Study Setting:

Takins General Hospital, Takins, Libya.

DISCUSSION

Abdominal splenosis is an uncommon acquired condition resulting from autotransplantation of splenic tissue following splenic trauma or splenectomy. Although its incidence after splenic injury may be relatively high, most cases remain asymptomatic and are discovered incidentally. Symptomatic splenosis is rare, and small bowel obstruction (SBO) secondary to splenosis remains an exceptionally uncommon complication, with only isolated case reports and small case series available in the literature. A recent systematic review by Peitsidis et al. highlighted the rarity and heterogeneous clinical presentation of splenosis, emphasising its potential to mimic a variety of intra-abdominal pathologies and contribute to diagnostic uncertainty (1). (La Clinica Terapeutica

The interval between splenic injury and the diagnosis of splenosis is highly variable, ranging from 1 to 57 years according to the systematic review by Peitsidis et al. (1). This prolonged latency period frequently obscures the association between previous splenic trauma and current clinical manifestations. In the present case, intestinal obstruction occurred ten years after splenectomy, which is consistent with previously reported cases of splenosis-related bowel obstruction. (La Clinica Terapeutica)

Radiological diagnosis remains challenging because splenosis may closely resemble peritoneal carcinomatosis, metastatic disease, lymphoma, or other intra-abdominal neoplasms. Contemporary radiological reviews have emphasized that CT and MRI findings are often non-specific, whereas technetium-99m-labelled heat-damaged red blood cell scintigraphy remains the most sensitive and specific non-invasive diagnostic modality for confirming ectopic splenic tissue (2,3). However, its utility may be limited in emergency settings where acute intestinal obstruction necessitates urgent surgical intervention. (NCBI)

From a surgical perspective, operative management is indicated in patients with persistent bowel obstruction or when the diagnosis remains uncertain. In our patient, multiple splenic implants and associated adhesions resulted in mechanical small bowel obstruction. Adhesiolysis

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and excision of the splenic nodules successfully relieved the obstruction without bowel resection. Awareness of this rare entity is essential because misdiagnosis may lead to unnecessary extensive surgical procedures. Therefore, splenosis should be considered in the differential diagnosis of intestinal obstruction in any patient with a remote history of splenic trauma or splenectomy.

CONCLUSION

splenosis should be considered in Pt presenting with IO & a prior H/O splenic trauma or splenectomy. Early recognition may prevent misdiagnosis &unnecessary extensive surgery.surgical excision of symptomatic implant provides definitive treatment with excellent outcomes

Ethical Statement

Administrative approval obtained from patient And from Takins general hospital

CONFLICT OF INTEREST

The author declare no conflict of interest.

AUTHORS' CONTRIBUTIONS

Khaled S. Alsherif: study design, data collection, analysis, manuscript drafting.

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We describe in Table 1 all the reported cases in the literature where a splenosis was the cause of bowel obstruction and whether or not exploration is warranted.

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A National Primary PCI Network in Libya: An Urgent Health Policy Imperative.

Ali M. Elneihoum * MD, PhD, FESC.

Letter to Editor

Dear Editor

Cardiovascular disease remains the leading cause of death in Libya, accounting for approximately 37% of total mortality, according to the World Health Organization 2023 country profile [1]. Among these, acute coronary syndromes (ACS)—particularly ST-elevation myocardial infarction (STEMI)—represent a time-critical condition where survival is directly dependent on rapid access to reperfusion therapy. Yet in Libya, access to primary percutaneous coronary intervention (PCI), the gold-standard treatment, remains inconsistent, fragmented, and largely confined to a few urban centers.

This gap is no longer simply a clinical issue—it is a national health system failure that demands urgent policy intervention.

Regional experience provides compelling evidence that improvement is both feasible and impactful. In Egypt, the implementation of coordinated STEMI networks significantly increased primary PCI utilization and reduced in-hospital mortality by more than 50% [2]. Similarly, in Morocco, national registry data have identified delayed reperfusion and limited PCI access as key drivers of mortality, prompting structured efforts to expand timely intervention [3]. In Saudi Arabia, nationwide registries have demonstrated that organized STEMI care systems can improve both access and outcomes across diverse geographic regions [4].

These regional experiences offer a clear message: the challenge is not the lack of capability, but the absence of organization. Libya already possesses the foundational elements—trained cardiologists, catheterization laboratories in major cities, and an evolving healthcare system. What is lacking is a coordinated national framework to ensure timely reperfusion.

We therefore call upon the Libyan Ministry of Health to adopt a clear, actionable national strategy for STEMI care centered on primary PCI. This strategy should include:

- Designation of regional PCI-capable centers operating 24/7 within a hub-and-spoke network
- Integration of emergency medical services (EMS) with pre-hospital ECG transmission and direct catheterization laboratory activation
- National STEMI registry establishment to monitor performance, outcomes, and delays
- Public awareness campaigns to reduce patient-related delays in seeking care
- Investment in workforce training and retention, particularly in interventional cardiology and emergency care

Importantly, international guidelines from the European Society of Cardiology emphasize that primary PCI should be delivered within 120 minutes of first medical contact to achieve optimal outcomes [5]. Without a coordinated national framework, this

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target will remain unattainable for the majority of Libyan patients.

The cost of inaction is measured in preventable deaths, heart failure, and lost economic productivity. Conversely, investment in a national primary PCI program represents one of the most cost-effective strategies to reduce premature mortality from non-communicable diseases in Libya.

In conclusion, the establishment of a nationwide primary PCI network is not merely a clinical upgrade—it is a public health imperative and a test of health system leadership. The evidence is clear, the regional models are available, and the need is urgent. The time for decisive policy action is now.

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