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A Clinico-Epidemiological Profile of Scrotal Swellings among Adults in a Tertiary Care Hospital

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Abstract

Scrotal swellings are a common clinical presentation among adult males, and they arise from a variety of causes, like infections, trauma, or tumours. This study aimed to examine the clinico-epidemiological profile of adult patients presenting with scrotal swellings at a tertiary care hospital. A cross-sectional study was conducted over one year, involving 194 adult male patients admitted to the Department of General Surgery at Sree Balaji Medical College Hospital. Comprehensive clinical examinations, high-resolution ultrasonography, and, where applicable, surgical interventions were employed to diagnose and treat the cases. The study found that the majority of scrotal swellings were caused by hydrocele (29.4%), followed by orchitis (19.1%), varicocele (14.9%), and spermatocele (13.4%). Surgical intervention was necessary in 71% of the cases, with Jaboulay's procedure being the most commonly performed. Conservative management was applied in 29% of cases. Postoperative complications were observed in 45.4% of the patients, with scrotal edema being the most frequent complication. Age distribution indicated that the majority of cases (31.4%) occurred in patients aged 39-48 years, with the incidence decreasing in both younger and older age groups. In conclusion, scrotal swellings in adult males present a diverse array of etiologies, with hydrocele being the most prevalent. High-resolution ultrasonography plays a pivotal role in early diagnosis and treatment, minimizing complications and improving patient outcomes. Surgical intervention, when indicated, was effective, though postoperative complications such as scrotal edema require careful management.

Keywords: *Hydrocele, Orchitis, Scrotal Diseases, Testicular Torsion, Ultrasonography, Varicocele.*

Introduction

Scrotal swelling is a frequent and significant clinical presentation encountered in surgical outpatient departments (OPD), particularly in adult males. The scrotum, which contains the testicles, epididymis, and other crucial structures of the male reproductive system, can become enlarged due to a variety of underlying causes. These may range from benign conditions such as hydrocele and varicocele to more serious conditions like testicular torsion and malignancies. The incidence of scrotal swelling has increased over the last few decades, making it essential to understand its etiology and management to improve patient outcomes [1-3].

The underlying causes of scrotal swellings have evolved considerably, with hydrocele, orchitis, and varicocele being the most common. Hydrocele, the accumulation of fluid in the sac surrounding the testicles, is commonly seen in both newborns and adults, though its exact etiology may differ [4,5]. In adults, it often results from trauma, inflammation, or infection. Orchitis, an inflammation of the testicle often associated with epididymitis (epididymo-orchitis), is typically caused by bacterial infections such as urinary tract infections or sexually transmitted

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infections (STIs) [6-8]. Varicocele, which is a dilation of the veins within the scrotum, is particularly significant because it can lead to infertility in males if left untreated [9].

The early identification and management of scrotal swellings are crucial, as conditions such as testicular torsion can rapidly lead to testicular necrosis if not treated within a few hours. Testicular torsion, characterized by the twisting of the spermatic cord, compromises blood flow to the testis, leading to ischemia. Without prompt surgical intervention, the affected testicle may suffer irreversible damage within 6-12 hours, making it a urological emergency [10]. Other conditions, such as testicular tumours, require timely intervention due to the malignant potential [11].

A major challenge in diagnosing scrotal swellings is the wide variety of etiologies that present with overlapping clinical symptoms. Patients typically present with non-specific complaints such as scrotal swelling, pain, and sometimes discolouration of the scrotum. These symptoms can be caused by a variety of conditions ranging from simple fluid accumulation (hydrocele) to serious malignancies. For example, a painless swelling in the scrotum could be indicative of a benign condition like a hydrocele [12], or it could signal a testicular tumour. Similarly, painful swellings are often associated with infections, torsion, or trauma [13].

Clinical examination alone is often insufficient to accurately diagnose the cause of scrotal swelling. Physical examination, which includes palpation and assessment of tenderness, can sometimes be hindered by pain or edema. In these cases, high-resolution ultrasonography (USG) in conjunction with colour Doppler imaging has become the gold standard for evaluating scrotal swellings. Ultrasound is particularly valuable in differentiating between intratesticular and extratesticular swellings, as intratesticular swellings are more likely to be malignant, while extratesticular swellings are typically benign [14,15]. The history of scrotal conditions, particularly testicular torsion and hydrocele, dates back centuries. Early physicians such as Morgagni and Hunter documented cases of hydrocele and testicular torsion in the 18th and 19th centuries. Advancements in medical technology, particularly in ultrasonography and surgical interventions, have revolutionized the management of these conditions. Despite these advancements, challenges remain in the timely diagnosis and treatment of scrotal swellings, especially in resource-limited settings [16].

The need for this study stems from the diverse clinical manifestations of scrotal swelling, which often complicate diagnosis and management. In a busy tertiary care hospital setting, where patients present with varying stages and types of scrotal conditions, understanding the clinical presentation and appropriate therapeutic modalities is essential. This study aims to explore the clinico-epidemiological profile of adult patients presenting with scrotal swellings, assess their quality of life, and understand the demographic factors influencing the condition.

The primary aim of this study is to investigate the clinical presentation, underlying etiologies, and management of scrotal swellings in adult patients at a tertiary care hospital. The objectives are to assess the quality of life of affected patients, identify demographic parameters such as age and socio-economic status, correlate clinical symptoms with ultrasonographic findings to improve diagnostic accuracy and evaluate outcomes of conservative and surgical management strategies. Achieving these goals will provide valuable insights into the epidemiology of scrotal swellings and contribute to improving diagnostic and therapeutic approaches for managing these conditions.

Materials and Methods

Study Design and Setting

This study was designed as a cross-sectional observational study conducted at the

Department of General Surgery, Sree Balaji Medical College Hospital (SBMCH), Chrompet. The study focused on adult male patients, aged 18 years and older, presenting with scrotal swellings over a period of one year. The study aimed to assess the clinical presentations, underlying etiologies, and management approaches for scrotal swellings. Scrotal swellings included conditions such as hydrocele, orchitis, varicocele, spermatocele, and testicular cancer.

Study Population

The population for the study consisted of male patients aged 18 years and above who presented with scrotal swelling. A total of 194 patients were included in the study based on predefined inclusion and exclusion criteria.

Sampling Method

A purposive sampling method was employed to select participants who met the inclusion criteria. The sampling method was chosen to ensure that all relevant cases of scrotal swellings could be assessed within the time constraints of the study. The sample size was calculated using a hypothesized percentage frequency of 56%, with a confidence interval of 95% and a design effect of 1, yielding a total of 194 patients.

Inclusion Criteria

The inclusion criteria for this study required male patients aged 18 years and older who presented with scrotal swelling at the General Surgery Outpatient Department (OPD). Eligible participants were those who provided informed consent, allowing their data to be used for analysis. These criteria ensured the selection of adult patients who could accurately report their symptoms and participate fully in the study process.

Exclusion Criteria

The exclusion criteria included patients with swellings of the inguinoscrotal region, such as inguinal hernias, and those with scrotal swellings arising from the skin, including sebaceous cysts or papillomas. Additionally, patients diagnosed with Fournier's gangrene or those with systemic medical conditions causing scrotal swelling, such as decompensated liver disease (DCLD), were excluded to avoid confounding variables that could affect the study outcomes.

Study Tools

The study utilized a combination of clinical evaluations, imaging techniques, and laboratory tests to diagnose and manage scrotal swellings. The primary diagnostic tool used was high-resolution ultrasonography (USG) combined with colour Doppler imaging, which allowed for a detailed evaluation of scrotal structures, differentiating between intratesticular and extratesticular swellings.

Data Collection

Data collection for the study involved gathering demographic details, clinical symptoms, imaging findings, and treatment outcomes. Patients underwent a comprehensive physical examination, which included palpation of the scrotal contents, assessment of swelling, pain, and related symptoms such as fever. The data collected encompassed age, socio-demographic status, occupation, and the history of scrotal swelling, including its duration, progression, and any associated trauma or infection. Medical history, particularly regarding urinary tract infections (UTIs) or sexually transmitted infections (STIs), was noted. Imaging data, including ultrasonography and colour Doppler findings, were recorded along with the treatment approach (conservative or surgical) and postoperative complications like scrotal edema, hematoma, and infection.

Routine blood tests were conducted upon admission to assess inflammatory markers, including C-reactive protein (CRP), lactate dehydrogenase (LDH), and D-dimer levels, particularly in patients suspected of having

infectious or inflammatory causes of scrotal swelling. The ultrasonography scans were performed by experienced radiologists, with special attention given to identifying intratesticular masses (potential malignancies) and vascular flow (to diagnose conditions like testicular torsion).

Clinical Examination

A comprehensive physical examination was conducted on all patients. Scrotal palpation was performed to assess tenderness, size, and the consistency of the swelling. In patients presenting with painful swellings, clinical suspicion for testicular torsion or epididymo-orchitis was high, and urgent ultrasonography was performed.

Imaging

Ultrasonography was the primary imaging modality used for diagnosis. High-resolution USG helped differentiate between benign extratesticular lesions and potentially malignant intratesticular swellings. Colour Doppler imaging was used to assess blood flow to the testicles, aiding in the diagnosis of testicular torsion and identifying varicoceles.

Treatment Modalities

Treatment was divided into conservative and surgical approaches based on the diagnosis. Conservative management included the use of antibiotics for infections like epididymo-orchitis and pain relief for cases of mild hydrocele or varicocele. Surgical interventions were employed in cases where conservative treatment was ineffective or in conditions such as large hydroceles, testicular torsion, or malignancy. The most common surgical procedures included Jaboulay's procedure, which involved the evacuation and eversion of the hydrocele sac in patients with hydrocele; orchidectomy, the removal of the testicle in cases of testicular torsion or malignancy; and varicocelectomy, which involved the ligation of dilated veins in patients with symptomatic varicocele.

Data Analysis

Data was managed and analyzed using SPSS 23 software. Categorical variables are presented as percentages and proportions, while continuous variables are expressed as means with standard deviations (SD). The relationship between demographic factors (e.g., age) and clinical outcomes (e.g., complications) was analyzed using chi-square tests or Fisher's exact test, as appropriate. Analysis of variance (ANOVA) was used to compare outcomes based on the type of surgical intervention performed.

Ethical Considerations

Informed consent was obtained from all patients before inclusion in the study. Patients were informed about the purpose of the study, the diagnostic and treatment procedures they would undergo, and their right to withdraw from the study at any point. The study was conducted by the ethical guidelines for research involving human subjects and received approval from the institutional ethics committee.

Results

The study included 194 male patients with scrotal swellings, and their ages ranged from 18 to over 58 years. The majority of the patients (31.4%) are in the 39-48 year age group, followed by the 29-38 year age group (29.4%). The least affected age group was 18-28 years, representing 9.8% of the cases. This indicates that scrotal swellings predominantly affect middle-aged males. Scrotal swelling was the most common presenting feature in 45.8% of the cases. A combination of swelling and pain was seen in 36% of patients, while swelling, pain, and fever were present in 18% of the cases. This suggests that while swelling is a common symptom, it is frequently associated with other signs of inflammation, such as pain and fever. Of the 194 patients studied, the most common diagnosis was hydrocele, accounting for 29.4% of the cases. Orchitis (19.1%),

varicocele (14.9%), and spermatocele (13.4%) were also common diagnoses. Testicular cancer was identified in only one patient, accounting for 0.5% of the cases, highlighting the rarity of malignancy as a cause of scrotal swelling in this cohort. Other conditions identified included chylocele (6.2%), pyocele (5.7%), and epididymal cyst (10.8%) (Figure 1a-c).

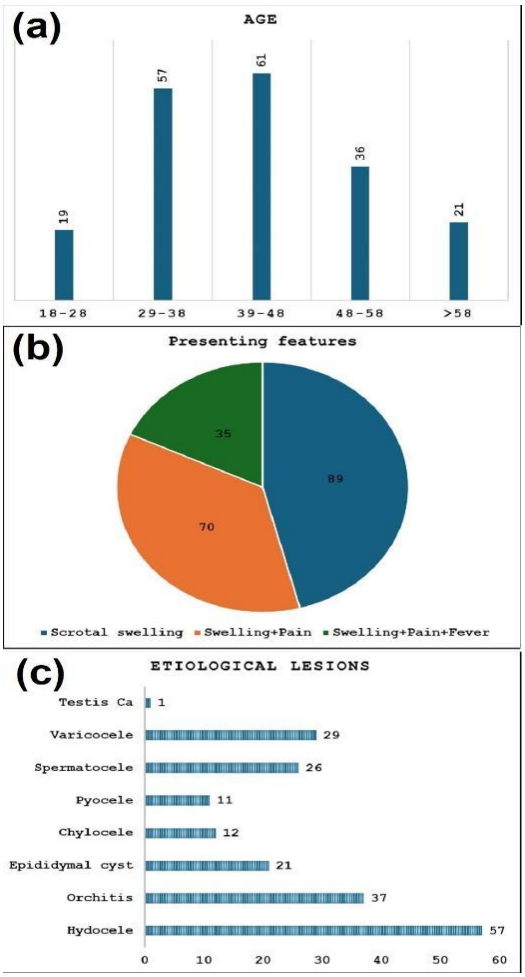

Figure 1. Frequency Distribution of: a) Age in Years, b) Presenting Features, c) Etiological Lesions.

A total of 137 patients (71%) underwent surgical treatment, while 29.4% were managed conservatively. The most frequently performed surgical procedure was Jaboulay's procedure, which was employed in 28.9% of the cases, primarily for treating hydroceles. Excision of lesions, such as spermatoceles or cysts, was performed in 20.6% of patients. Varicocelectomy was done in 8.3% of the cases, and high inguinal orchidectomy was required for a single patient with testicular cancer. Bilateral scrotal swellings were the most common, seen in 41.8% of the cases, followed by right-sided swelling in 33% and left-sided swelling in 25%. This distribution highlights that scrotal conditions can affect both sides, though bilateral cases were more prevalent (Figure 2a-c).

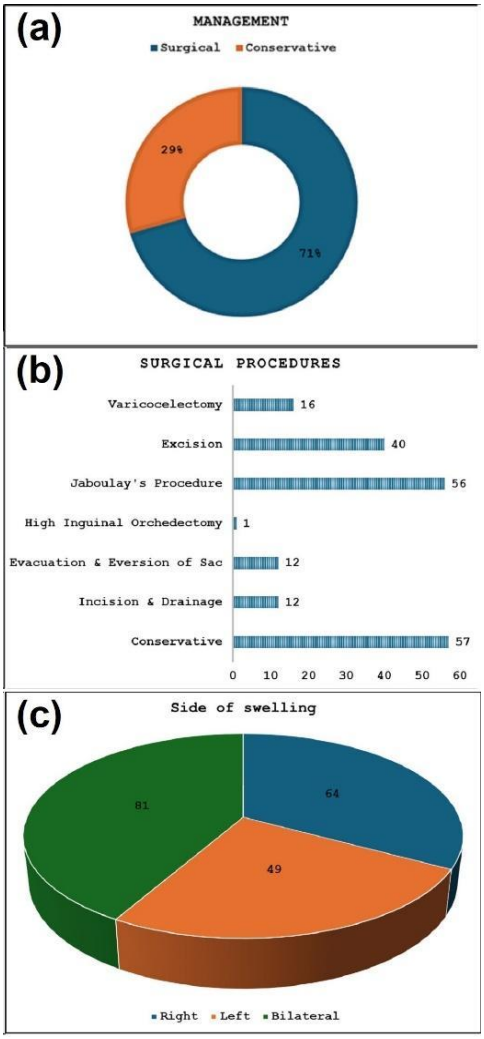

Figure 2. a) Percentage Distribution of Management, b) Frequency Distribution of Surgical Procedures, c) Frequency Distribution of Side of Swelling.

The majority of patients (32%) had experienced symptoms for less than six months, while 24% had symptoms for 6-12 months. A smaller proportion of patients had symptoms lasting between 1-2 years (18%) and 2-5 years (16.5%). Postoperative complications were observed in 45.4% of patients. Scrotal edema was the most frequent complication, occurring in 45.4% of cases, followed by wound infections (3%) and hematoma formation (2%). Despite these complications, the majority of patients (51%) had a postoperative hospital stay of less than 5 days, indicating that recovery was generally uneventful in most cases (Figure 3a-c).

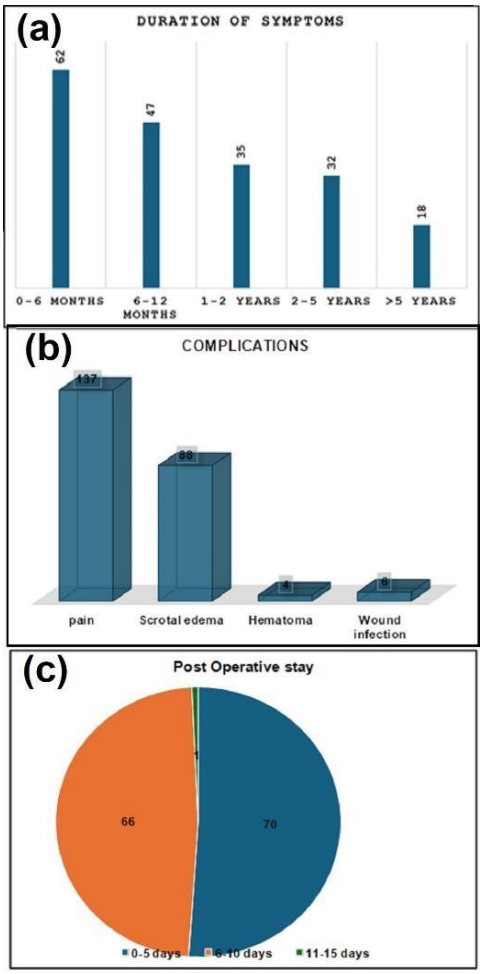

Figure 3. a) Frequency Distribution of Duration of Symptoms, b) Frequency Distribution of Post OP Complications, c) Frequency Distribution of Post Operative Stays.

Discussion

Scrotal swellings in adult males present a significant clinical concern due to the variety of underlying causes, which range from benign conditions to surgical emergencies such as testicular torsion or malignancy. This study, aimed to investigate the clinico-epidemiological profile of scrotal swellings in adults presenting to a tertiary care hospital and assess their management outcomes. The findings align with previous literature, suggesting that hydrocele is the common cause of scrotal swelling, followed by orchitis, varicocele, and spermatocele.

Hydrocele, characterized by the accumulation of fluid around the testicle, was the common cause of scrotal swelling in our study, accounting for 29.4% of cases. This finding is consistent with other studies, such as the one conducted by Baria et al., which also reported hydrocele as the leading cause of scrotal swelling [17]. Hydroceles are typically benign, painless, and can be effectively treated surgically through procedures like Jaboulay's operation. In our study, Jaboulay's procedure was the most frequently performed surgical intervention, and it had a favourable outcome in most patients. Despite being a relatively simple procedure, the development of postoperative scrotal edema was a common complication, emphasizing the need for careful postoperative care to manage this issue.

Orchitis, the second most common cause of scrotal swelling in our study (19.1%), is

frequently associated with infections. Epididymo-orchitis, the inflammation of both the testicle and epididymis, is caused by bacterial infections, including urinary tract infections (UTIs) and sexually transmitted infections (STIs) [6-8]. The majority of cases in our study were treated with antibiotics and anti-inflammatory medications, with surgical intervention reserved for cases with abscess formation or testicular necrosis. The high incidence of orchitis, particularly among younger patients, is a reflection of the importance of timely diagnosis and antibiotic therapy to prevent complications. Previous studies, including one by Kailashnath et al., also noted orchitis as a leading cause of scrotal swellings [18].

Varicocele was identified in 14.9% of cases in our study. This condition, which involves the dilation of veins within the scrotum, can result in discomfort, swelling, and even infertility. Varicocele was more common in younger males, particularly those in their 20s and 30s, which is consistent with the findings of other studies. The primary management for varicocele in our study was varicocelectomy, a procedure that has been shown to improve semen parameters and alleviate symptoms. Although varicocele is often asymptomatic, the decision to proceed with surgical management is usually based on patient symptoms or fertility concerns [19].

Although less common, testicular torsion represents a urological emergency that requires immediate surgical intervention to prevent testicular necrosis. In our study, only a small number of cases involved testicular torsion, reflecting the condition's relative rarity in adult males compared to adolescents. However, the time-sensitive nature of this condition underscores the importance of prompt diagnosis through clinical examination and ultrasonography. Delayed treatment, as indicated by other studies, often leads to testicular loss, necessitating orchiectomy [20,21]. Spermatoceles and epididymal cysts were identified in 13.4% and 10.8% of cases, respectively. These are benign fluid-filled sacs located near the epididymis and generally do not cause significant symptoms unless they grow large enough to cause discomfort or pain. The management of these conditions typically involves observation, with surgical excision reserved for symptomatic cases. Our study found that excision was performed in a moderate number of cases, with good postoperative outcomes.

Only one case of testicular cancer was diagnosed in our cohort, accounting for 0.5% of the cases. While rare, testicular cancer is a highly curable malignancy if detected early. The patient in our study underwent a high inguinal orchidectomy, which is the standard treatment for testicular cancer. This finding underscores the importance of ultrasonography in differentiating benign from malignant testicular masses. Studies like that of Mehdi et al. also report a low incidence of testicular cancer in cases of scrotal swelling, yet the need for early diagnosis and treatment remains critical [22].

In our study, 71% of the cases required surgical intervention, while 29% were managed conservatively. Conservative management, which included antibiotics and pain relief, was effective in treating cases of epididymo-orchitis and small, asymptomatic hydroceles. Surgical intervention, however, was necessary for larger hydroceles, varicoceles, and malignancies. The high rate of surgical management highlights the importance of timely surgical evaluation and the role of ultrasonography in guiding treatment decisions.

Postoperative complications occurred in 45.4% of cases, with scrotal edema being the most frequent issue. Other complications, such as hematoma and wound infection, were less common. These findings are consistent with other studies that have reported similar complication rates following surgical management of scrotal swellings. Scrotal edema, in particular, is a common but

manageable complication following procedures like Jaboulay's operation. The majority of patients in our study had short postoperative hospital stays (less than 5 days), reflecting the generally favourable outcomes of the surgical interventions.

Our findings align with previous studies that have examined the etiology and management of scrotal swellings. For example, the study by Kamble et al. also reported hydrocele as the common cause of scrotal swelling, followed by epididymo-orchitis and the study by Rambau et al. highlighted the importance of surgical intervention in managing scrotal swellings and emphasized the use of ultrasonography for accurate diagnosis [23,24].

The results of this study have important clinical implications. First, high-resolution ultrasonography remains the cornerstone of scrotal swelling diagnosis, providing critical information for distinguishing between benign and malignant conditions. Second, early surgical intervention, particularly in cases of hydrocele and varicocele, can improve patient outcomes and prevent long-term complications. Third, postoperative care is essential for managing complications such as scrotal edema, and appropriate follow-up is necessary to ensure complete recovery.

Conclusions

Scrotal swellings in adult males encompass a wide range of conditions, from benign hydroceles to urgent surgical emergencies like testicular torsion. In this study, hydrocele was the most common cause, with most cases successfully managed through surgical intervention. Ultrasonography proved essential in differentiating the underlying etiologies and guiding management. Postoperative complications were common but manageable, with scrotal edema being the most frequent. Early diagnosis and appropriate treatment are key to reducing morbidity and ensuring favorable patient outcomes, emphasizing the need for prompt evaluation of scrotal swellings in clinical practice.

Conflict of Interest

The authors declare that there is no conflict of interest.

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