ORIGINAL ARTICLE

A new grading system for testicular trauma and one-year follow-up results on male testicular function: Gülhane Grading System

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ABSTRACT

BACKGROUND: This study reports our seven-year experience of one-year follow-up results after scrotal and testicular trauma, classified according to the Gülhane Grading System (GGS). We provide detailed hormonal analyses, ultrasound (US) evaluations, and spermiogram results. There are no previous studies that focus on all these detailed topics in relation to a grading system.

METHODS: Between October 2016 and October 2022, a total of 41 patients with testicular trauma were classified according to GGS. Patients with Grade 1 (G1) trauma were followed up without surgical intervention. Patients with Grade 2 (G2) trauma underwent surgical repair, while patients with Grade 3 (G3) trauma underwent orchiectomy. After the resolution of the emergency period, we recorded the following parameters at the one-year follow-up: follicle-stimulating hormone (FSH), luteinizing hormone (LH), total testosterone, free testosterone; testicular size, other testicular size, testicular parenchyma appearance in ultrasound; total sperm count, sperm concentration, total motility, progressive motility, and morphology in the spermiogram.

RESULTS: A total of 41 patients with a mean age of 25.56±6 years (range: 16-39) had testicular trauma. The trauma was bilateral in 10 patients (25%), right-sided in 14 patients (34%), and left-sided in 17 patients (41%). At the one-year follow-up, patients with unilateral G1 trauma had normal FSH, LH, total testosterone, and spermiogram levels. Patients with unilateral G2 or G3 trauma had slightly elevated FSH and LH levels, but normal testosterone and sperm parameters. Patients with combined G3 and G1 trauma had significantly elevated FSH and LH levels to maintain normal testosterone levels, though their morphology was lower than in the normal population. Patients with G3 + G2 trauma had significantly elevated FSH and LH levels to maintain normal testosterone levels, but all sperm counts were lower than the normal population. Patients with G3 + G3 trauma had significantly elevated FSH and LH levels, but all other hormonal and sperm parameters were zero.

CONCLUSION: Our new grading system provides a practical and usable grading scale for evaluating scrotal and testicular trauma. Patients with unilateral trauma experienced good recovery, regardless of trauma grade. Bilaterally affected patients, however, were more likely to experience testosterone deficiency and poor spermiogram parameters.

Keywords: Trauma; repair; testis; injury.

INTRODUCTION

Scrotal and testicular injuries are rare, accounting for less than 1% of all traumatic injuries. This rarity is due to the anatomical location, hypermobility, cremasteric reflex, and the dense structure of the testicular tunica albuginea.[1] The mechanisms of scrotal and testicular injuries can be categorized as blunt, penetrating, or thermal in origin.

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Blunt trauma is the most common type, accounting for 63-80% of cases, and typically occurs during motorcycle accidents or sports activities.[2] Blunt injuries can result in scrotal hematoma, hematocele, testicular torsion, spermatic cord injury, and most commonly, testicular rupture. Testicular rupture, which occurs in approximately 50% of blunt scrotal traumas, is defined as a tear in the tunica albuginea with extrusion of the seminal components.

Penetrating injuries, primarily caused by gunshot wounds, account for 10.8-37% of scrotal and testicular traumas.[3] These injuries often require surgical intervention and carry a higher risk of morbidity.

Thermal injuries are the rarest form of scrotal and testicular trauma, with only a few case reports in the literature. One interesting case involved testicular trauma caused by an electric rifle, which was managed through monitoring alone.[4]

Traditionally, blunt trauma, especially when associated with a defect in the tunica albuginea, is treated surgically. However, in some cases, it is difficult to determine if surgical repair is absolutely necessary. In a series by Cass et al., patients underwent either early or late exploration. The group explored early had a lower orchiectomy rate compared to the late group.[5] Chang et al. also reported a 90% recovery rate when repair was performed within 72 hours, which dropped to 30% if managed after 72 hours.[6] On the contrary, Redmond et al. managed 37 cases of blunt scrotal trauma conservatively, regardless of ultrasound (US) findings, and reported only four (8%) cases of atrophic testis at the 3-month follow-up.[7] These two distinct approaches reflect the difficulty in diagnosing true tunica albuginea rupture preoperatively. Preoperative US may help detect tunica albuginea defects; however, reports yield mixed results regarding the accuracy of US in scrotal trauma. According to a study by Guichard et al., if only the tunica albuginea breach is considered a sign of rupture, the sensitivity and specificity are 50% and 76%, respectively.[8] When other signs, such as testicular parenchyma heterogeneity and loss of contour regularity, are considered along with the tunica albuginea breach, sensitivity increases to 100%, but specificity drops to 65%. This means increased detection rates, but also a rise in false negative results.[8]

Considering these factors, we have proposed a new grading system for scrotal and testicular trauma: the Gülhane Grading System (GGS) for scrotal and testicular injuries.[9] Although US still contributes only limited value to this grading system, it appears useful in guiding patient management. This system classifies trauma into three stages, which facilitates easier decision-making.

In this study, we present six years of experience with one-year follow-up results for scrotal and testicular trauma according to the GGS. We provide detailed hormonal, US, and spermiogram findings. No other studies in the literature have focused on all these detailed aspects in relation to a grading system.

MATERIALS AND METHODS

This study was approved by the Ethical Committee of our university and adhered to the institution's Review Board of Human Subject Guidelines, approval number 2023-280.

Between October 2016 and October 2022, a total of 41 patients presented with testicular trauma. A detailed history, particularly focusing on the type of trauma, was obtained from the patients or their relatives. All patients underwent a thorough physical examination, with special attention given to scrotal blunt tenderness, hematoma, or lacerations. After the physical examination, patients were evaluated using scrotal color Doppler ultrasound. Patients were then categorized according to the GGS. Prophylactic antibiotics were administered to all patients.

Grade 1 (G1) trauma involved scrotal conditions such as contusion or hematocele, which did not require surgical repair. Grade 2 (G2) trauma involved hematoceles exceeding a three-fold size increase compared to the contralateral scrotum, as advised by European Association of Urology (EAU) guidelines, and a tunica albuginea defect that required surgical repair. Grade 3 (G3) trauma involved a tunica albuginea defect that could not be repaired surgically and necessitated orchiectomy.

For G1 trauma, patients were followed up without any surgical intervention. For G2 trauma, patients underwent surgical treatment, including hematoma excavation, debridement of nonviable tissue, and repair of the testicular tunica albuginea.[10] During the operation, a sample of testicular tissue was sent for cryopreservation to preserve sperm if deemed suitable. For G3 trauma, orchiectomy was performed.

After the operations, the results of testicular seminal tissue sperm finding and the formation of scrotal abscesses during the postoperative period were recorded. We also inquired about any previous illnesses or surgeries that could have caused testicular dysfunction after the patients had recovered from the emergency situation.

Following the resolution of the emergency period, patients were followed up for 12 months. Blood levels of follicle-stimulating hormone (FSH), luteinizing hormone (LH), total testosterone, and free testosterone were measured. Testicular size, other testicular size, and testicular parenchyma appearance on US were also assessed. Additionally, spermiogram results, including total sperm count, sperm concentration, total motility, progressive motility, and morphology, were documented.

Statistical Analysis

The power analysis was performed using the G*Power software. Due to the rarity of testicular trauma, it was determined that 37 patients would be sufficient for the study. Statistical

analysis was conducted using Statistical Package for the Social Sciences 26.0 software (SPSS 26.0 for Windows, Chicago, USA) by an expert biomedical statistician. The Shapiro-Wilk, Kolmogorov-Smirnov, Kurtosis, and Skewness tests were used to assess the normality of the variables. Descriptive statistics for nominal data were expressed as numbers and percentages, while descriptive statistics for scale data were expressed as mean ± standard deviation (minimum-maximum). The Chi Square Test was used to compare pre- and post-procedure independent nominal parameters. Kendall's Correlation Test or Spearman's Correlation Test was used to assess the correlation between two nominal variables. A probability value of $p<0.05$ was considered statistically significant.

RESULTS

A total of 41 patients with testicular trauma were included in the study. The mean age of the patients was 25.56±6 years (range: 16-39). None of the patients reported any prior illnesses or surgeries that could have caused testicular dysfunction. There were 21 (51.2%) cases of trauma caused by explosives, 17 (41.5%) cases of blunt trauma, and three (7.3%) cases of stabbing trauma. Ten (25%) cases involved bilateral trauma, 14 (34%) involved right-sided trauma, and 17 (41%) involved left-sided trauma. Physical examination revealed two (4.9%) cases with normal testicle appearance but tenderness, 22 (53.7%) cases with scrotal hematoma, four (9.8%) cases with scrotal tear without tunica albuginea defect, 12 (29.3%) cases with a clearly visible tunica albuginea defect, and one (2.4%) case of testicular migration to the inguinal canal. Ultrasound findings showed that 22 (53.7%) patients had a tunica albuginea defect, 17 (41.5) had testicular hematoma without a tunica albuginea defect, and two (4.9%) had a normal testicle appearance.

For bilaterally affected patients, the more severely affected testicles were graded as G3 in all 10 patients. The less affected testicles were graded as G1 in two patients, G2 in seven (70%) patients, and G3 in one patient. For unilaterally affected patients, the trauma grades were G1 in 15 (54.2%) patients, G2 in 10 patients, and G3 in six (25%) patients. In total, there were 17 cases of G1 trauma, 17 cases of G2 trauma, and 17 cases of G3 trauma. Twenty-six patients with G2 and G3 trauma underwent surgical intervention, while the other 15 patients with unilateral G1 trauma were followed up without surgical intervention. Six patients with unilateral G3 trauma underwent unilateral orchiectomy, and 10 patients with unilateral G2 trauma underwent unilateral surgical repair. For bilaterally affected patients, two patients with G3 and G1 trauma underwent orchiectomy on one side and follow-up on the other side, seven patients with G3 and G2 trauma underwent orchiectomy on one side and tunica albuginea repair on the other side, and one patient with bilateral G3 trauma underwent bilateral orchiectomy (Fig. 1).

During the operations, only two patients had seminal tissue sperm sampling for cryopreservation, but no sperm were found in the seminal tissue. Only one patient developed a scrotal abscess after the operations. Comparing the final outcomes with the US findings, a significant positive correlation was observed (p=0.044). The majority of patients (22, or 53.7%) had scrotal hematomas. The sensitivity of US detection was 60%, with 100% specificity. Additionally, US identified a tunica albuginea defect in nine of these patients before surgery. Ultrasound also identified an intact tunica al-

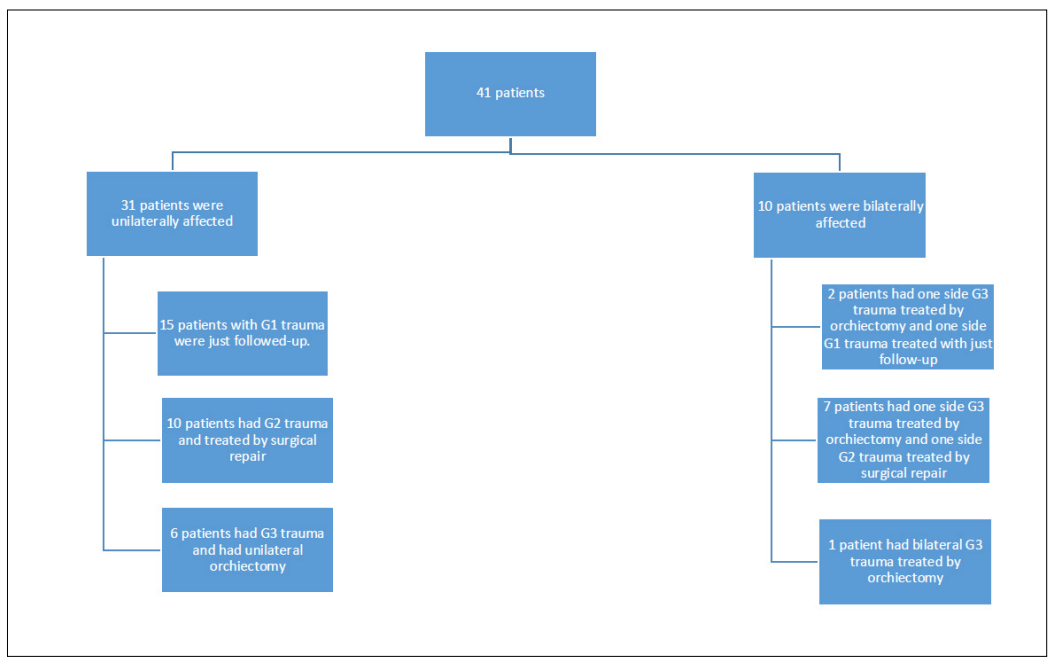

Figure 1. Distribution of patients by trauma grade.

Table 1. One-year follow-up results after trauma

	Unilateral G1 Trauma (n=15)	Unilateral G2 Trauma (n=12)	Unilateral G3 Trauma (n=6)	One Side G3 and Contralateral G1 Trauma (n=2)	One Side G3 and Contralateral G2 Trauma (n=7)	Bilateral G3 Trauma (n=1)
FSH mIU/mL	7.15±5.2 (2.79-15.6)	12.2±7.2 (9.2-15.6)	11.06±8.16 (6.15-20.49)	93.35±52.59 (22.4-148)	79.34±41.23 (16-125)	70.5
LH mIU/mL	4.3±1.69 (2.35-5.44)	10±1.69 (8.2-11.6)	5.78±1.19 (4.45-6.77)	54.6±31.11 (11.4-85)	30.7±13.98 (13-49)	42.5
Total Testosterone ng/dL	316.66±164.49 (160-448)	342.28±200.32 (152-461)	350.66±43.66 (317-400)	270.6±138.17 (157-498)	256.5±238.41 (40-658)	0
Free Testosterone pg/mL	10.87±4.61 (5.82-14.82)	11.2±3.75 (10-13)	11.77±1.73 (10.55-13)	5.83±4.76 (1.85-11.12)	6.22±4.37 (1.59-11.63)	0
Sperm Count×106/mL	4.8±1.69 (3.6-6)	4.7±1.40 (2-7)	127.5±21.92 (112-143)	42±56 (2-82)	0.33±0.57 (0-1)	0
Sperm Motility (%)	54.5±17.6 (42-66)	50.4±18.5 (37-67)	68.5±2.12 (67-70)	43±61.51 (0-87)	33±0.57 (0-100)	0
Progressive Sperm Motility (%)	58±11.31 (50-66)	47±10.2 (42-63)	62±2.82 (60-64)	41±60.1 (0-85)	25±0.45 (0-74)	0
Sperm Morphology (%)	8±6 (1-15)	4±1 (0-6)	12±11.21 (4-20)	2±2.8 (0-4)	0±0 (0-0)	0

buginea in eight of these patients. For the remaining five patients, US could not determine the exact condition. This resulted in 90% sensitivity and 72% specificity.

The patients with unilateral G1 trauma had a FSH level of 7.15±5.2 mIU/mL (range: 2.79-15.6), a LH level of 4.3±1.69 mIU/mL (range: 2.35-5.44), a total testosterone level of 316.66±164.49 ng/dL (range: 160-448), and a free testosterone level of 10.87±4.61 pg/mL (range: 5.82-14.82). Ultrasound revealed an affected testicle size of 8.7±5.18 mL (range: 1-12), with four cases showing heterogeneous testis appearance. The sperm count was 4.8±1.69x106 count/mL (range: 3.6-6) with sperm motility of 54.5±17.6% (range: 42-66%), progressive sperm motility of 58±11.31% (range: 50-66%), and normal sperm morphology of 8±6% (range: 1-15%) at the 12-month follow-up (Table 1).

The patients with unilateral G2 trauma, treated with surgical intervention including hematoma excavation, nonviable tissue debridement, and testicular tunica albuginea repair, had an FSH level of 12.2±7.2 mIU/mL (range: 9.2-15.6), an LH level of 10±1.69 mIU/mL (range: 8.2-11.6), a total testosterone level of 342.28±200.32 ng/dL (range: 160-448), and a free testosterone level of 11.2±3.75 pg/mL (range: 10-13). Ultrasound revealed an affected testicle size of 9.7±2.25 mL (range: 9-11), with six cases showing heterogeneous testis appearance. The sperm count was 4.7±1.40×106 count/ml (range: 2-7), with sperm motility of 50.4±18.5% (range: 37-67), progressive sperm motility of 47±10.2% (range: 42-63), and normal sperm morphology of 4±1% (range: 0-6%) at the 12-month follow-up (Table 1).

The patients with unilateral G3 trauma, treated with orchiectomy, had n FSH level of 11.06±8.16 mIU/ml (range: 6.15-20.49), an LH level of 5.78±1.19 mIU/ml (range: 4.45-6.77), a total testosterone level of 350.66±43.66 ng/dl (range: 317-400), and a free testosterone level of 11.77±1.73 pg/ml (range: 10.55-13). Ultrasound revealed an intact testicle size of 12.1±1.12 ml (range: 11.3-13.1), with one case of heterogeneous intact testis appearance. The sperm count was 127.5±21.92x106count/mL (range: 112-143), with sperm motility of 68.5±2.12% (range: 67-70%), progressive sperm motility of 62±2.82% (range: 60-64%), and normal sperm morphology of 12±11.21% (range: 4-20%) at the 12-month follow-up (Table 1).

The patients with G3 trauma on one side, treated with orchiectomy, and G1 trauma on the contralateral side had an FSH level of 93.35±52.59 mIU/ml (range: 22.4-148), an LH level of 54.6±31.11 mIU/ml (range: 11.4-85), a total testosterone level of 270.6±138.17 ng/dl (range: 157-498), and a free testosterone level of 5.83±4.76 pg/ml (range: 1.85-11.12). Ultrasound revealed the other testicle size to be 11.5±0.7 ml (range: 11-12), with 2 cases showing heterogeneous contralateral testis appearance. The sperm count was 42±56x106 count/mL (range: 2-82), with sperm motility of 43±61.51% (range: 0-87), progressive sperm motility of 41±60.1% (range:

0-85), and normal sperm morphology of 2±2.8% (range: 0-4%) at the 12-month follow-up (Table 1).

The patients with one side G3 trauma treated with orchiectomy and contralateral G2 trauma treated with surgical intervention, including hematoma excavation, nonviable tissue debridement, and testicular tunica albuginea repair, had a FSH level of 79.34±41.23 mIU/ml (range: 16-125), an LH level of 30.7±13.98 mIU/ml (range: 13-49), a total testosterone level of 256.5±238.41 ng/dl (range: 40-658), and a free testosterone level of 6.22±4.37 pg/ml (range: 1.59-11.63). Ultrasound (US) revealed the contralateral testicle size as 6.2±1.5 ml (range: 4-7.3), with 2 cases showing heterogeneous appearance. The sperm count was 0.33±0.57×106 count/ml (range: 0-1), with sperm motility of 33±0.57% (range: 0-100), progressive sperm motility of 25±0.45% (range: 0-74), and no sperm with normal morphology (0±0%) at the 12-month follow-up (Table 1).

The patient with bilateral G3 trauma treated with bilateral orchiectomy had an FSH level of 70.5 mIU/ml, an LH level of 42.5 mIU/ml, a total testosterone level of 0±0 ng/dl, a free testosterone level of 0±0 pg/ml, no measurable testicle size (0±0 ml) on US, a sperm count of 0±0×106 count/ml, sperm motility of 0±0%, progressive sperm motility of 0±0%, and no sperm with normal morphology (0±0%) at the 12-month follow-up (Table 1).

DISCUSSION

Scrotal and testicular trauma is a rare condition among all traumatic injuries. These injuries may be blunt, penetrating, or thermal in nature, affecting the scrotum and the testis. Most cases have been reported to result from blunt trauma. In a review of 382,036 medical records, blunt scrotal and testicular trauma accounted for 668 cases (0.174%), highlighting the rarity of this condition.[11] Another review demonstrated the infrequency of penetrating injuries. A total of 8,076 patients were reviewed, and 162 (0.02%) of them suffered from genital penetrating trauma, with only 44% involving scrotal and testicular penetration.[12] Testicular rupture was first described in 1905, and since then, only a few cases have been reported in the literature.[13]

The management of scrotal and testicular trauma is primarily handled through two approaches: conservative treatment, which includes scrotal support, antibiotics, pain control, ice packs, and bed rest,[1] or surgical treatment, which involves hematoma excavation, nonviable tissue debridement, and testicular tunica albuginea repair.[10] The EAU guidelines recommend surgical treatment for hematoceles that cause a threefold increase in testis size compared to the intact testis, if there is a rupture of the testicular tunica albuginea, or in cases of penetrating scrotal and testicular trauma.[2,14,15] There are many reports on the success of both conservative treatment and surgical intervention. Cass et al. demonstrated favorable outcomes with early exploration, reporting a 9% orchiectomy rate compared to a 45% orchiectomy rate with delayed exploration. They also noted that neglected hematoceles could lead to testicular necrosis, abscess formation, and eventually testicular atrophy with impaired spermatogenesis.[5] In a series of gunshot injuries, Blurjin et al. found a 65% testicular salvage rate 65% with early exploration, necrotic tissue debridement, and tension-free reconstruction of the tunica albuginea.[12] Lee et al. studied 74 patients with ruptured testicles, 64 of whom were treated surgically, while the remainder received conservative treatment. The testicular salvage rates were 82% and 80%, respectively, showing good outcomes with both approaches.[16] Cobillous et al. conducted a study of seven patients with testicular rupture managed conservatively and found no cases of testicular atrophy at the 4-month follow-up.[17] Chandra et al. reported six patients with intratesticular hematoma, five of whom were managed conservatively, with successful recovery observed on ultrasound at the 6-week follow-up.[18] Redmont et al. reported on 37 consecutive patients, 23 of whom were diagnosed with significant testicular injury. All patients were managed conservatively regardless of US findings. Only four patients developed testicular atrophy at the 3-month follow-up, none experienced chronic pain, and none required late orchiectomy. Four patients underwent repair for post-traumatic hydrocele.[7]

In our research, the majority of our patients experienced trauma caused by explosions or stabbings. The rate of blunt trauma in our study is lower than the rate reported in the literature. This is due to our hospital being a tertiary referral center for military injuries, which results in a higher rate of penetrating and bilaterally affected testicles. The GGS was also helpful in categorizing the severity of our patients' injuries in a rational manner. Grade 1 trauma reflects only scrotal injuries, where US may show hematocele, scrotal wall thickening, and a normal testis. The G2 trauma reveals a large hematocele and a defect in the testicular tunica albuginea. The US may show a tunica albuginea bridge, contour irregularity, testicular heterogeneity, along with hematocele or scrotal wall thickening. The G3 trauma indicates total testicular loss. For us, US seemed to have a limited role in grading the severity, and the actual grade often became clear only after surgery. However, we graded the patients using our new GGS and managed them accordingly. We considered conservative treatment appropriate only for G1 trauma. The G2 trauma patients were treated with early surgical repair, while G3 trauma patients underwent orchiectomy. If a patient had unilateral G1 trauma and was treated with observation alone, the hormonal and spermiogram parameters were not different from those of the normal population. If a patient had unilateral G2 trauma and was treated with surgical repair, the FSH and LH levels increased slightly to maintain normal testosterone levels. The spermiogram parameters were also similar to those of the normal population. If a patient with G3 trauma was treated with unilateral orchiectomy, the hormonal and spermiogram parameters resembled those of patients with unilateral G2 trauma. For patients with bilaterally affect-

ed testicles, the results were markedly different. Patients who had orchiectomy on one side for G3 trauma and observation for G1 trauma on the other side had significantly elevated FSH and LH levels to maintain normal testosterone levels. Their sperm count and motility were similar to those of the normal population, but the morphology was lower than in the normal population. Patients with G3 trauma on one side treated with orchiectomy and G2 trauma on the other side treated with surgical repair had significantly elevated FSH and LH levels, with normal testosterone levels. Unfortunately, their spermiogram parameters were notably affected, with lower sperm count, motility, and morphology compared to the normal population. Patients who underwent bilateral orchiectomy had markedly elevated FSH and LH levels, but testosterone levels and sperm parameters were zero.

Another grading system has been proposed by the American Association for the Surgery of Trauma (AAST) for scrotal and testicular trauma.[9] However, this system classifies scrotal and testicular injuries using two different grading scales, which seems unsuitable for assessing the pathological condition of a specific organ using two different grading scales.

The preoperative US results in our study were similar to those reported in the literature. There was 60% sensitivity and 100% specificity for the detection of scrotal hematoma, and 90% sensitivity and 72% specificity for the detection of tunica albuginea defects. In the study by Guichard et al., using the presence of a tunica albuginea breach as an indicator of rupture yielded 50% sensitivity and 76% specificity. When combined with additional signs, such as testicular parenchyma heterogeneity and loss of contour regularity, the sensitivity increased to 100%, though specificity decreased to 65%. This indicated higher detection rates but also an increase in false-negative results.[8] In our study, we used tunica albuginea rupture, parenchyma heterogeneity, and loss of contour regularity together to estimate tunica albuginea rupture. The low sensitivity for detecting scrotal hematoma and the high false-positive rate for estimating tunica albuginea rupture were attributable to our approach of classifying results as indicative of tunica albuginea rupture to avoid missing any patients with actual rupture. The US in our study was also helpful in estimating testicular size at the 12-month follow-up. According to our findings, after G1 trauma, the testicular size decreased but remained above 10 cc. However, after G2 trauma, the testicular size decreased to below 10 cc.

In the literature, there are reports on the cryopreservation of testicular sperm during surgery. Healy et al. also described a seminal vesicle aspiration technique up to 12 days after injury.[19] In our study, we were able to perform seminal tissue examination in only two patients. However, no sperm were detected in the seminal tissue during this emergency situation. Another reason for the low rate of this application was the difficulty in obtaining the liquid medium used to transport the seminal tissue to the cryopreservation laboratory in an emergency. The absence of sperm in the seminal tissue in this emergency setting led us to believe that it is difficult to find sperm under such emergency conditions.

Limitation

The main limitation of the study was the sample size, particularly in the group of patients with bilateral G3 trauma. A larger sample size would provide more detailed results. The second limitation was the low rate of seminal tissue sampling during surgery, which was due to the difficulty in accessing the liquid medium needed to transport the seminal tissue to the cryopreservation laboratory in an emergency. The third limitation was the reliance on older references, as there are only a few related studies in the literature due to the rarity of this condition.

CONCLUSION

Our new grading system provides a usable grading tool for assessing scrotal and testicular trauma. Unilaterally affected patients showed good recovery, regardless of the trauma grade. However, bilaterally affected patients were more likely to experience testosterone deficiency and impaired spermiogram parameters.

We recommend early monitoring of testosterone levels and sperm cryopreservation as soon as possible after traumatic injury, especially in bilaterally affected patients, to protect fertility and prevent possible testosterone deficiency.

Ethics Committee Approval: This study was approved by the Gulhane Training and Research Hospital Ethics Committee (Date: 20.06.2023, Decision No: 2023-280).

Peer-review: Externally peer-reviewed.

Authorship Contributions: Concept: T.E., C.S., N.G.B.; Design: T.E., N.C.B., C.S.; Supervision: H.G.İ., S.B., S.S.; Resource: A.E.C., S.S., S.B.; Materials: T.E., N.G.B., Ö.Ç.; Data collection and/or processing: T.E., N.G.B., C.S.; Analysis and/or interpretation: H.G.İ., A.E.C., S.B.; Literature search: S.S., S.B., H.G.İ., Ö.Ç.; Writing: S.A.E.C., S.S., Ö.Ç.; Critical reviews: T.E., H.G.İ., S.S., A.E.C.

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ORİJİNAL ÇALIŞMA - *ÖZ*

Testis travması için yeni bir dereceleme sistemi ve bir yıllık takip sonuçları: Gülhane Dereceleme Sistemi

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AMAÇ: Testis travmaları için kullanışlı bir derecelendirme sistemi bulunmamaktadır. American Association for the Surgery of Trauma (AAST) skrotal ve testiküler travmaları ayrı ayrı derecelendirmiştir. Bu durum kullanışlılığı bozmaktadır. Literatürler incelendiğinde de cerrahi kararı verme safhasında bu sınıflandırma sisteminin kullanılmadığını görilmektedir. Biz bu eksikliği gidermek amacı ile literatürleri inceleyip Gülhane Dereceleme Sistemini (GDS) geliştirdik. GDS'ye göre sınıflandırılmış skrotal ve testis travması sonrası bir yıllık takip sonuçlarına ilişkin altı yıllık deneyimimizi sunmaktayız. Çalışmamızda ayrıntılı hormonal, ultrasonografi (USG) ve spermiogram sonuçlarını bildirilmiştir. Tüm bu ayrıntılı konulara bir derecelendirme sistemine göre odaklanan hiçbir çalışma yoktur.

GEREÇ VE YÖNTEM: Ekim 2016 ile Ekim 2022 tarihleri arasında toplam 41 hastada testis travması meydana geldi. Hastaları GDS'ye göre sınıflandırdık. G1 travması olan hastalar herhangi bir cerrahi müdahale yapılmadan sadece takip edildi. G2 travması olan hastalar cerrahi onarımla ameliyat edildi. G3 travması olan hastalara orşiektomi uygulandı. Acil dönem geçtikten sonra 1 yıllık takipte kan FSH, LH, toplam testosteron, serbest testosteron; testis boyutu, diğer testis boyutu, USG'de testis parankimi görünümü; toplam sperm sayısı, sperm konsantrasyonu, toplam motilite, progresif motilite ve spermiogramda morfoloji durumu kaydedildi.

BULGULAR: Hastaların yaş ortalaması 25,56±6 (16-39) idi. 10 (%25) bilateral, 14 (%34) sağ ve 17 (%41) sol taraflı travma vardı. Bir yıllık takipte, tek taraflı G1 travması olan hastaların FSH, LH, total testosteron ve spermiogram seviyeleri normaldi; tek taraflı G2 veya G3 travması olan hastaların FSH, LH seviyeleri hafif artmıştı, ancak testosteron ve sperm parametreleri normaldi; bilateral G3+G1 travması olan hastaların FSH ve LH seviyeleri normal testosteron seviyesini kolaylaştırmak için aşırı derecede artmıştı, ancak sperm morfoloji değeri normal popülasyondan düşüktü; bilateral G3+G2 travması olan hastaların FSH ve LH seviyeleri normal testosteron seviyesini kolaylaştırmak için aşırı derecede artmıştı, ancak tüm sperm parametreleri normal popülasyondan düşüktü; bilateral G3+G3 travması olan hastaların FSH ve LH seviyeleri aşırı derecede artmıştı, ancak diğer hormonal ve sperm parametreleri sıfırdı.

SONUÇ: Derecelendirme sistemimiz skrotal ve testis travmaları için kullanılabilir yeni bir derecelendirme sistemidir. Tek taraflı etkilenen hastalar travma derecesine bakılmaksızın iyi bir iyileşme göstermiştir. İki taraflı etkilenen hastalarda çoğunlukla testosteron eksikliği ve/veya düşük spermiyogram parametreleri gözlenmiştir.

Anahtar sözcükler: Travma; testis; onarım.

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