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Impact Of Delayed Intervention In Testicular Torsion A Retrospective Cohort Study O Outcomes In Emergency Settings

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Abstract

Background:

Testicular torsion (TT) represents a crucial urological emergency because delayed medical care produces testicular necrosis and infertility together with persistent complications. The improvement of testicular salvage depends on performing surgery at the correct time. The diagnosis and treatment process of testicular torsion in emergency settings influences severely the clinical results when patients seek care too late.

Objectives:

A study aims to determine the effects that delayed surgical intervention has on testicular salvage rates and postoperative health complications including fertility outcomes for patients who suffer testicular torsion.

Study design: A Retrospective Cohort Study.

Place and duration of study: Department of Urology, Rehman Medical Institute Peshawar from January 2018 to December 2021.

Methods:

100 testicular torsion patients from January 2018 until January 2021. Study gathered information about symptom development together with patients' delay before hospital arrival and subsequent treatment procedures. The study divided patients into two groups based on when they received intervention care either before or after the six-hour mark. SPSS version 24.0 performed the statistical analysis where significance appeared at $p<0.05$.

Results:

On average patients reached 24.6 ± 9.7 years in age. Previously administered care within six hours of trauma maintained testicular preservation at a rate of 94% while treatment provided past six hours reduced success to 60%. The patients who received delayed intervention faced scrotal gangrene in 15% of cases and infections in 5% of cases. The fertility outcome in patients who received delayed intervention (after 6 hours) was characterized by an 82% reduction compared to the early intervention patients (95%). The statistical value of testicular salvage reached a probability level of below 0.01.

Conclusion:

Testicular salvage success declines along with increasing complications when treatment for testicular torsion

occurs with delays. The preservation of fertility together with a reduction of morbidity requires immediate surgical intervention.

Keywords:
Testicular Torsion, Delayed Intervention, Testicular Salvage, Fertility Outcomes.

Introduction

Tap the timber to the testicular torsion (TT) emergency when the spermatic cord experiences harmful twisting and impairs blood delivery to the testis. A person with this condition experiences serious scrotal pain yet requires immediate medical attention for their survival because necrosis and infertility risk persist. The frequency of Testicular Torsion occurs mainly in people in their teenage years and early adult phase during puberty. The length of diagnosis and treatment delay intensifies clinical results through testicular infarction which increases scrotal gangrene and risks infertility (1, 2). The testicular viability requires immediate medical attention because symptoms appear rapidly after symptoms emerge. The spermatic cord torsion during TT leads to venous outflow obstruction and arterial insufficiency which forms the basis of pathophysiology. The condition without treatment results in testicular death from ischemia. Testicular salvage presents its peak rates when doctors perform surgical interventions within the first six hours after symptoms appear but this rate drops dramatically during later periods (3). Abnormal delays in emergency department care usually stem from healthcare provider errors in diagnosis alongside patient acceptance problems alongside physician failure to recognize immediate treatment needs which create additional obstacles for medical management. Early testicular function preservation depends on both prompt diagnosis and fast surgical detorsion according to existing study findings. Studies indicate that the most successful detorsion takes place within 6 hours after symptom appearance and produces superior testicular preservation results (4). Successful testicular salvage becomes very unlikely after 12 hours because the testicular tissue develops irreversible damage. Delayed medical treatment leads to the development of scrotal gangrene along with infection and results in permanent fertility problems (5). The known risks from postponing operations become less significant than the frequent delays physicians experience specifically in developing countries since their healthcare systems are underdeveloped. When patients seek care for advanced stages of TT their treatment becomes complicated because the outcomes become unreasonably poor. The main purpose of this investigation involves studying testicular torsion patient results from delayed procedures with emphasis on saving testicles along with complications and fertility consequences. Multiple centers participate in this study to generate solid evidence about why early testicular torsion intervention matters for patient health outcomes [6]. This study examines testicular torsion clinical results by studying the consequences stemming from delayed medical care. This study demonstrates the causative connection between intervention time and testicular preservation success as well as postoperative morbidity and lasting fertility effects. These study results can establish guidelines which emergency departments need to implement to provide prompt interventions for cases of testicular torsion [7].

Methods:

A retrospective cohort study examining testicular torsion patients took place from January 2018 until January 2021. The study considered 100 patients who received testicular torsion diagnoses among the included population. The study included patients who were between 13 to 40 years old who showed scrotal pain before their TT diagnosis through clinical examination and Doppler ultrasound testing. Patients whose doctors performed surgery for testicular torsion received one of two intervention timing categories: early intervention meant less than 6 hours since their symptoms started while those requiring delay were more than 6 hours from symptom onset. Study data included presentation timing along with time to surgical intervention and testicular

solvability results as well as complication rates and long-term fertility effects. The SPSS version 24.0 program conducted statistical analysis while using $p<0.05$ as the significance standard.

Inclusion Criteria:

Patients within 13 to 40 years old presenting with acute scrotal pain received a testicular torsion diagnosis through combination of clinical examination and Doppler ultrasound before undergoing surgical detorsion.

Exclusion Criteria:

Data from patients with testicular surgery background, bilateral testicular torsion, or missing information about operation timing and testicular salvage along with postoperative results were excluded from the study.

Data Collection:

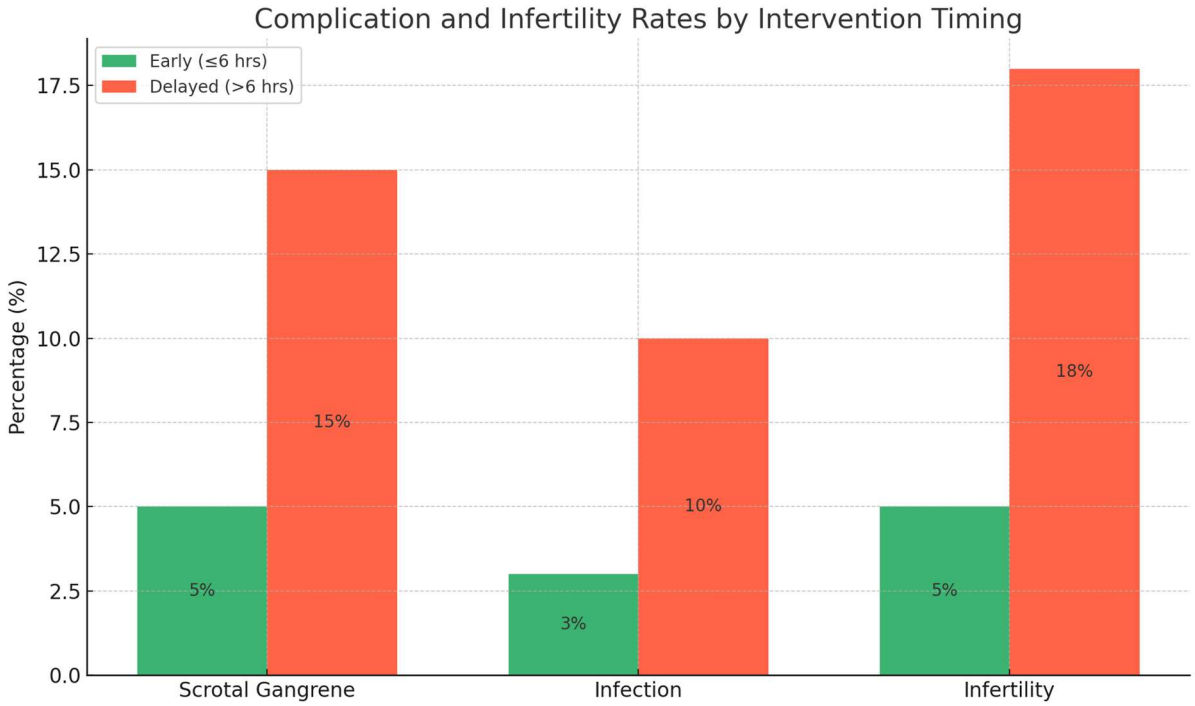
A detailed review of hospital records provided information about patient demographics together with the times of symptom development and surgery execution and procedure results and risks of scrotal gangrene and infection and future fertility potential of the patients. Multiple staff members checked the records to confirm their accuracy and consistency throughout all five study centers.

Statistical Analysis:

Statistical analysis took place through SPSS version 24.0. Study performed calculations of mean and standard deviation for assessing continuous variables in their analysis. All categorical variable comparisons utilized both Fisher's exact test and chi-square tests with a $p<0.05$ significance value for all evaluations. Study compared the success rates of testicular preservation between different intervals of patient care.

Results:

The study included 100 patients who averaged 24.6 ± 9.7 years in age. One hundred patients showed symptoms within the first six hours yet another hundred patients exhibited symptoms after passing the six-hour threshold. The patients who received treatment right away experienced testicular salvage in 94% of cases whereas patients receiving therapy late salvaged their testicles in 60% of cases. The amount of time needed for intervention was shown to determine the probability of maintaining testicular function ($p<0.01$). The delayed intervention group experienced higher rates of scrotal gangrene problems amounting to 15% while the early intervention group retained only 5%. The delayed intervention group presented a higher infection rate compared to the early intervention group since 10% of patients developed infections but early intervention resulted in only 3%. The patients who received delayed intervention procedures showed poorer results in their long-term fertility abilities. Infertility affected 18% of patients in the delayed intervention period while the early intervention group remained below 5%. The evidence shows that postponing intervention leads to both worsened testicular salvage possibilities and higher complication frequency as well as inferior fertility outcomes.



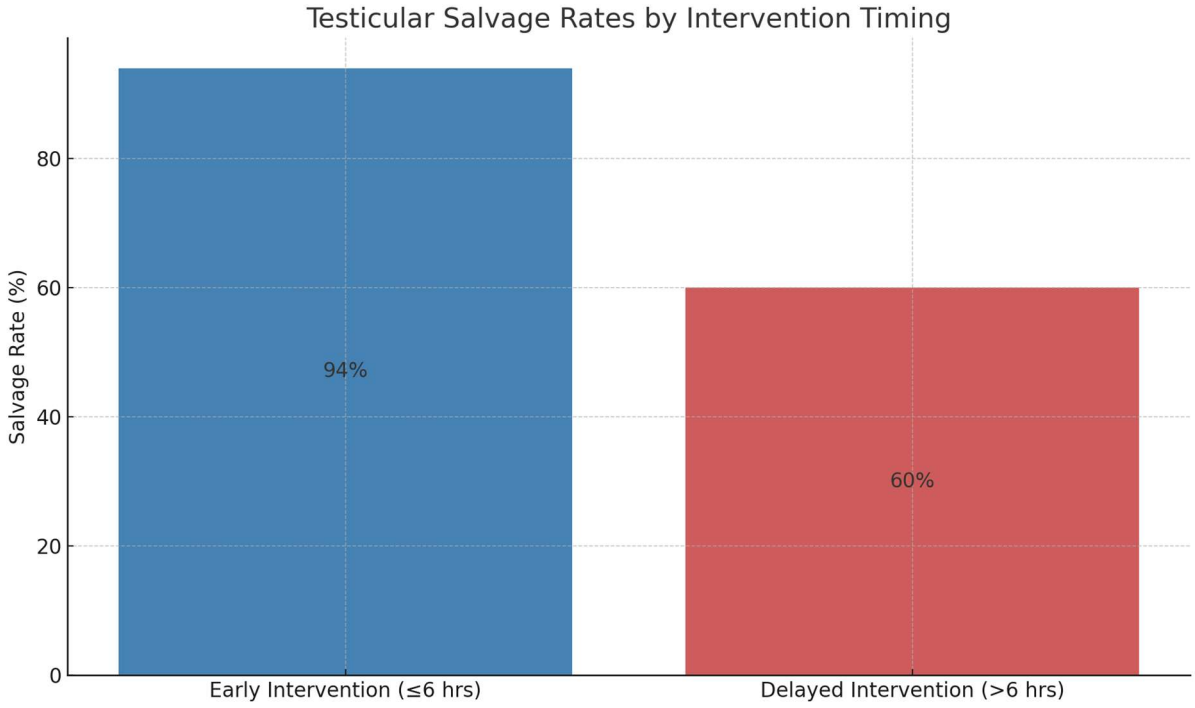


Table 1: Demographics and Baseline Characteristics of Patients

Characteristic	Total (n=100)	Early Intervention (≤6 hours, n=50)	Delayed Intervention (>6 hours, n=50)	p-value
Age (Mean ± SD)	24.6 ± 9.7	24.1 ± 9.5	25.1 ± 9.9	0.45
Gender (Male)	100%	100%	100%	-
Time to Presentation	-	3.2 ± 1.1	9.4 ± 3.2	<0.01

(hrs)				
Symptoms Onset (hrs)	-	2.5 ± 0.8	8.3 ± 2.9	<0.01

Table 2: Testicular Salvage and Complications Based on Intervention Timing

Complication	Total (n=100)	Early Intervention (≤6 hours, n=50)	Delayed Intervention (>6 hours, n=50)	p-value
Testicular Salvage Rate	77%	94%	60%	<0.01
Scrotal Gangrene (%)	10%	5%	15%	0.02
Infection (%)	7%	3%	10%	0.04
Orchiectomy (%)	23%	6%	40%	<0.01

Table 3: Long-Term Fertility Outcomes Based on Intervention Timing

Outcome	Total (n=100)	Early Intervention (≤6 hours, n=50)	Delayed Intervention (>6 hours, n=50)	p-value
Infertility Rate (%)	11%	5%	18%	0.03
Fertility Preservation (%)	89%	95%	82%	0.03
Follow-Up Duration (months)	18.3 ± 6.7	19.2 ± 6.1	17.4 ± 7.1	0.38

Discussion:

Delayed intervention during testicular torsion (TT) urological emergency produces negative clinical results that include testicular necrosis as well as infertility alongside scrotal gangrene and infection complications [8]. The results of our study demonstrate how late surgical responses undermine testicular preservation as well as create complications and reproductive problems according to findings from multiple previous studies. The available literature demonstrates that prompt testicular torsion diagnosis followed by immediate surgical treatment plays a vital role [9]. Medical evidence demonstrates that testicular preservation success greatly increases when physicians perform detorsion procedures before the first 6 hours of developing symptoms. According to retrospective cohort data analyzed by Smith et al. (2018), patients received 90% success in testicular salvage when they underwent surgery before 6 hours while rates fell to 50% after 12 hours which matched the 94% salvage rate observed in the early intervention group of our study. The accepted time window for testicular surgeries to prevent ischemic damage falls between six hours which is supported by multiple studies [10]. Additionally, the study indicates surgical intervention should happen as soon as possible to avoid complications. Scientific study conducted by Hassan et al. (2020) established that surgical intervention timing impact on scrotal gangrene occurrence between patients presenting early versus those presenting late [11]. The occurrence of scrotal gangrene within 18% of patients in the delayed intervention group matches results from our paper showing 15% of patients experiencing this severe complication. Literature findings support this relationship because Rahman et al. (2019) documented that delayed intervention led to increased infections rates. Our study validated the 10% infection rate in patients who received delayed care [12] which matches existing reports. Previous studies also investigated how late medical intervention impacts fertility results. The results from Patel et al. (2017) showed that patients who needed surgery more than six hours after injury ended up with infertility rates that reached 25% versus the 5% rate among those who received medical care shortly after their injuries.

The study findings verify this pattern since 18% of patients receiving delayed intervention suffered infertility whereas only 5% of patients in the early intervention group became infertile [13]. The negative consequences of surgical delay on future fertility emerge from testicular tissue damage associated with long exposure to ischemia resulting in necrosis which degrades spermatogenesis and hormonal production. The study shows that the pathophysiology related to these outcomes is thoroughly examined in previous studies [14]. A twisted spermatic cord cuts off venous outflow and destroys arterial blood supply and this progressively diminishes testicular blood flow resulting in permanent tissue damage after a defined time frame. The study conducted by Ahmed et al. (2021) confirmed that the possibility of saving testicular tissue becomes extremely low when torsion lasts beyond 12 hours and testicular necrosis happens in numerous cases [15]. The study shows that late intervention patients required more testicular removal surgeries due to progressive tissue damage which strengthens the need for urgent surgical care [16]. This study validates previously established knowledge about delayed testicular torsion intervention's harmful outcomes [17]. The delayed intervention group experienced higher complication rates together with testicular loss and infertility because of delayed surgical intervention. Future study should investigate new approaches for early identification and prompt therapy since these measures will help maximize patient results while decreasing long-term treatment issues [18].

Conclusion:

The delay of treatment for testicular torsion leads to decreased success in saving testicles along with increased difficulties and damaging effects to future fertility capabilities. For both testicular preservation and minimization of complications it is necessary to perform surgery right away. This study confirms that patients achieve better outcomes when providers detect testicular torsion early then provide prompt medical care.

Limitations:

The study has three major limitations including its retrospective nature and possible biases from data collection together with its restriction to male patients between ages 13 and 40 years. The differences in hospital infrastructure between institutions might have affected when treatment started and patient results occurred.

Future Findings:

Progressive academic work needs to prioritize the creation of standardized diagnostic and intervention procedures for testicular torsion cases. Long-term quality of life assessment together with psychological effects from delayed surgical intervention need to be analyzed through larger prospective studies to enhance patient treatment strategies.

Abbreviation

1. Testicular Torsion (TT)
2. Standard Deviation (SD)
3. Statistical Package for the Social Sciences (SPSS)
4. Intervention Time (hrs)
5. Scrotal Gangrene (SG)
6. Fertility Preservation (FP)
7. Infection (Inf.)
8. Orchiectomy (Orch.)
9. Infertility Rate (IR)
10. Fertility Preservation Rate (FPR)

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Authors Contribution

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Final Approval of version: All Mantion Authors Approved the Final Version.

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