Intra-Testicular Papaverine Injection for Testicular Salvage after Blunt Testicular Trauma: A Case Report

Kevin Keatingа Paulette C. Dreherb Jason Levyb Brian McGreenc Daniel Edwardsb Susan Tarryb

аLiberty University College of Osteopathic Medicine, Lynchburg, VA; bDepartment of Urology, Hahnemann University Hospital/Drexel University College of Medicine, Philadelphia, PA, USA

Key Words
Papaverine • Testicular trauma

Abstract
Blunt trauma is the most common mechanism of injury to the scrotum and testicle. Surgical exploration with primary repair, hematoma evacuation, and de-torsion are common surgical interventions. A 20-year-old male with no previous medical history presented after a high-speed motor vehicle collision. Ultrasonography demonstrated heterogeneous changes of the tunica albuginea and decreased arterial flow to bilateral testicles. He was subsequently taken to the operating room for surgical exploration, which revealed bilateral mottled testes with questionable viability. Papaverine was injected into each testicle, which resulted in visibly increased perfusion and subsequent preservation of the testicles. Conclusion: Current evidence on the use of papaverine is isolated to testicular torsion. Additional research should be conducted on the use of papaverine in blunt testicular trauma. Papaverine injection may be a valuable treatment option when inadequate perfusion is observed intra-operatively.

Introduction
Traumatic scrotal injuries contribute to less than 1% of all trauma-related injuries and blunt trauma is the most prevalent mechanism of trauma to the scrotum [1, 2]. Surgical exploration has shown to improve the testis salvage rate when performed early [3]. While primary re-
pair, hematoma evacuation, and de-torsion are common surgical interventions, there is little more that the urologist can do to improve testicle viability and outcomes in the setting of a compromised testicle. We present a case of blunt testicular trauma with decreased flow on ultrasound and poor perfusion noted on surgical scrotal exploration with subsequent intra-testicular papaverine injection that ultimately supported salvage of both testes.

**Case Presentation**

A 20-year-old male presented to the trauma service as an unrestrained passenger in a high-speed motor vehicle collision. Secondary trauma survey revealed a 2 cm scrotal laceration that was repaired by the trauma team during an exploratory laparotomy for other injuries. The patient remained intubated and sedated as a result of his extensive injuries and tenuous stability.

A scrotal ultrasound was performed in the 24-hour post-operative period which demonstrated decreased, nearly absent, arterial flow of bilateral testes with heterogeneous appearance of the tunica albuginea (fig. 1). On physical exam the patient was noted to have significant scrotal ecchymosis with an intact 2 cm inferior scrotal laceration repair and palpable, firm, and enlarged testes bilaterally with a non-palpable right vas deferens.

A delayed scrotal exploration was performed due to patient’s hemodynamic instability. The tunica albuginea was intact bilaterally. Both testes appeared to be poorly perfused and darkly mottled with few areas well-perfused, pink testis consistent with decreased testicular perfusion and possible compartment syndrome. An incision was made into the tunica albuginea of bilateral testicles with minimal extrusion of seminiferous tubules. At this point, 60 mg of papaverine was injected directly into each testicle. The tunica was subsequently closed and bilateral testes were fixated to the dartos fascia. At this point, the testicles appeared pink and visibly perfused with notable improvement compared with the prior mottled appearance. Ultimately, the patient’s clinical condition improved and he was discharged to an acute rehab facility. Unfortunately, the patient failed to follow-up for repeat imaging and exam.

*Fig. 1. Scrotal ultrasound prior to surgical intervention demonstrating testicular heterogeneity and low flow on duplex (a transverse view; b left with duplex; c right with duplex).*
Discussion

This is the first reported case in available literature illustrating the use of papaverine in the setting of blunt testicular trauma. A single case report of an 18-year-old male with testicular torsion highlights a favorable outcome after the testicle was bathed in papaverine [4]. Papaverine is a vasodilatory agent with a range of applications including use in cerebral vasospasms and erectile dysfunction [5, 6]. The mechanism of papaverine is unknown, but it is thought that it causes tissue relaxation by inhibiting phosphodiesterase leading to an increase in cyclic adenosine monophosphate and cyclic guanosine monophosphate [7]. Another proposed mechanism of action includes the relaxation of tissue through the efflux of calcium ions from the cell membrane of smooth muscle [8].

Two animal studies sought to elucidate the effect of papaverine administration after testicular torsion. Ultimately both studies were inconclusive, although the second, which utilized serial intra-peritoneal injections of papaverine, suggested a decrease in sperm quality long term [9, 10]. In humans, several studies and case reports have reported the utility of intra-arterial injections of papaverine as a treatment modality for vasospasms after subarachnoid hemorrhage. While the efficacy of papaverine in these scenarios is inconclusive, intra-arterial injections of papaverine after subarachnoid hemorrhage have shown to improve cerebral blood flow by increasing vessel diameter, improving circulation time and improving cerebral oxygenation [11]. In a similar manner, we suggest that the injection of papaverine into an ischemic testicle may reverse the hypoxic effects by maintaining a diluted arterial system and improve patient outcomes.

Conclusion

Few options are available when testicles display signs of incomplete ischemia. Papaverine injection into the testicle may offer an option to increase salvage rates of testes with questionable viability. Additional studies are necessary to determine the effect and outcomes of papaverine injection into the testicle to reverse ischemia and improve testis viability.

References