Critical Validation of Ultrasound Doppler in the Diagnosis of Torsion of Undescended Testis

Nadav Slijper MD[1], Igor Sukhotnik MD[1], Aurora Toubi MD[2] and Jorge Mogilner MD[1]

Departments of [1]Pediatric Surgery and [2]Radiology, Bnai Zion Medical Center, Haifa, Israel
Affiliated to Rappaport Faculty of Medicine, Technion-Israel Institute of Technology, Haifa, Israel

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Abstract

Background: Testicular torsion associated with undescended testis is uncommon but requires immediate treatment. Ultrasound Doppler is recognized as the preferred imaging modality for testicular torsion due to its high specificity, sensitivity and availability.

Objectives: To determine the accuracy of ultrasound Doppler in diagnosis of torsion of undescended testis.

Methods: We describe three patients with known undescended testis who were admitted with groin pain and had preoperative ultrasound Doppler. The discrepancy between these and the intraoperative findings is discussed.

Results: In two patients incarcerated inguinal hernia was diagnosed with ultrasound Doppler; however, surgery revealed torsion of an undescended testis. In the third patient ultrasound Doppler diagnosed torsion of undescended testis, but at surgery incarcerated inguinal hernia was found, without evidence of testicular torsion.

Conclusions: Torsion of undescended testis should be a clinical rather than radiologic diagnosis.

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Testicular torsion is a common pediatric surgery emergency. Physical examination and scintigraphic and ultrasonographic findings of the testicular torsion are well established. Because of its high sensitivity, better specificity and greater availability compared to scintigraphy, ultrasound Doppler is recognized as the preferred imaging method of suspected testicular torsion.

The association of torsion with cryptorchidism is not common and is related primarily to spastic neuromuscular disease [1]. In those cases the sonographic accuracy is not well documented. We describe three patients who were admitted to our department in the last 6 months for groin pain and history of cryptorchidism. Preoperative ultrasound Doppler was performed in all three patients; we discuss these findings in relation to the intraoperative findings.

Patients

Patient 1

A 12 month old boy with known left undescended testis was admitted to the emergency room because of a left groin mass that appeared several hours earlier. On physical examination a tender mass was seen in the left groin; the left testis was not palpated. Ultrasound Doppler was performed, demonstrating a left undescended testis. Both testes had normal homogenous architecture. Around the left testis a heterogenic multilayer structure was shown and was identified as a small bowel loop, hence the diagnosis of an incarcerated inguinal hernia [Figure 1]. An attempt to perform manual reduction failed and the child was taken to the operating room. During surgery torsion of the left testis with severe ischemia was found, but there was no evidence of inguinal hernia. A detorsion and fixation of the left testis and a fixation of the right testis was performed. The postoperative course was uneventful and the boy was discharged on the second postoperative day.

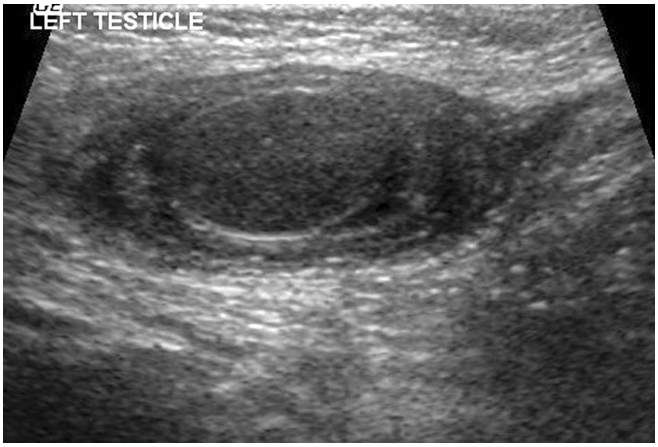

Figure 1. A homogenous testis surrounded by a multilayer structure

Patient 2

An 11 month old boy, known to have a right undescended testis, was admitted to the pediatric ward because of agitation of several hours. On physical examination a tender groin mass was palpated over the internal ring zone. The right testis was not palpable. Ultrasound Doppler examination showed a groin mass, 2 x 3 cm, with echogenic center, hypoechoic margins and containing gas [Figure 2]. A diagnosis of incarcerated hernia was made. An attempt to perform manual reduction failed and the boy was taken to the operating room. Surgery revealed torsion of the right testis with severe ischemia but no evidence of inguinal hernia. The testis was derotated and fixated as close as possible to the scrotum. The postoperative course was uneventful, and the boy was discharged on the second postoperative day. An ultrasound performed after 10 days revealed a heterogenic testis with impaired perfusion. Two months later the right testis was atrophic on physical examination.

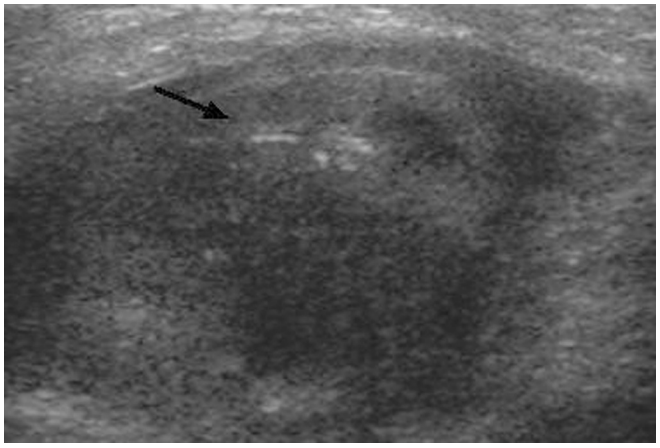

Figure 2. A heterogenic 2 x 3 cm mass containing air (arrow) and surrounded by edema

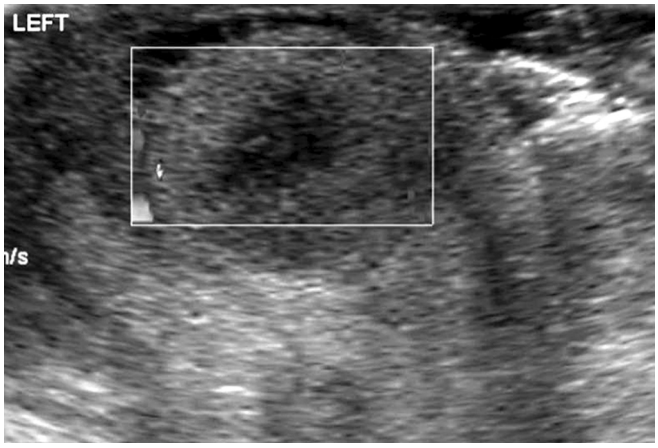

Figure 3. A heterogenic testis shown with edema and with slight peripheral blood flow

Patient 3

A 4 month old boy, known to have a left undescended testis, was admitted to the emergency room with agitation of several hours, vomiting and a left groin tender mass. On examination a tender left groin mass 1 cm in diameter was palpated, without edema or redness of the groin region. Ultrasound Doppler demonstrated an edematous and heterogenic testis, with edema and fluid around it. Blood supply to the testis was inadequate [Figure 3]. Ultrasound Doppler findings indicated torsion of the testis. At emergency surgery an incarcerated left inguinal hernia was found with an ischemic intestinal loop within the sac, which recovered and did not require resection. The testis was hypotrophic without signs of acute ischemia. The testis was fixated in the scrotum. The postoperative course was uneventful, and the boy was discharged on the third postoperative day.

Discussion

Torsion of the testis is a common pediatric surgery emergency. Two mechanisms of torsion have been shown – intravaginal and extravaginal. The intravaginal mechanism relates to torsion of a testis with a "bell clapper" deformity. The tunica vaginalis covers the epididymis and the spermatic cord, rather than being attached to them, creating a free testis within the tunica, with no fixation, allowing the rotation around the cords axis. The extravaginal refers to cases with no deformity, when the torsion occurs within the investing tunica vaginalis [1,6].

Although cryptorchidism is considered a risk factor of testicular torsion, there is little evidence in the literature supporting this concept. Torsion of undescended testis is misdiagnosed because of its low incidence and because it may mimic other emergencies as an acute abdomen (ectopic testis) or incarcerated inguinal hernia (inguinal testis) [2,4,5].

Ultrasonography using power Doppler has been accepted as the preferred imaging modality when testicular torsion is suspected, having a sensitivity of 80–100% and specificity of 95%, in prepubertal patients with testicular torsion [3]. However, there is little evidence in the literature regarding the role of ultrasound Doppler in the diagnosis of torsion of undescended testis, especially in neonates and infants. Traubici et al. [7] divided the sonographic features of testicular torsion in neonates into three types: type I included marked enlargement of the affected testicle with heterogeneity in echogenicity, with no detectable Doppler flow in the testicle; type II showed normal sized testicle with heterogenic echogenicity and peripheral hyperechogenicity; and type III consists of markedly diminished testicle with only a small amount of testicular tissue persisting and areas of increased echogenicity scattered throughout the testicle. Type I was associated with the acute-phase testicular torsion, and types II and III reflected the later phases of progressive atrophy of the parenchyma [7]. Papatsoris and co-workers [4] reported a case of testicular torsion within the inguinal canal in an adult man with Down's syndrome. Power Doppler ultrasonography revealed compromised vascular perfusion. On exploration, a gangrenous testis was found. Candocia [1] reported a case of a 7 month old infant suffering from testicular torsion in the inguinal canal. The sonographic examination revealed many of the classic findings seen in testicular torsion and compromised blood supply. On exploration a necrotic testis was found, and orchiectomy was performed. Bokyung [8] reported three cases of acute groin region: one was torsion of an undescended testis, and the others were epididymo-orchitits and a huge abdominoscrotal hydrocele respectively. In all three cases the correct diagnosis was made with sonography, which enabled the physician to choose the appropriate treatment.

We present here three patients with a history of undescended testis who were admitted to the emergency room because of restlessness and a painful groin mass. In all patients preoperative ultrasound Doppler was performed. In contrast to the cases described above, this modality yielded findings that confused clinical diagnosis in all three patients. In two patients ultrasound Doppler diagnosed incarcerated hernia, but at surgery torsion of undescended testis without evidence of incarcerated hernia was found. In the third case, ultrasound Doppler demonstrated testicular torsion, but surgery revealed incarcerated inguinal hernia without evidence of testicular torsion.

This report indicates the need for clinicians to be wary of

the diagnosis of undescended testis torsion. The diagnosis of this condition may be difficult, and ultrasound Doppler findings may be misleading. We conclude therefore that torsion of undescended testis is a clinical diagnosis and should not be made radiologically by ultrasound Doppler.

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Correspondence: Dr. J. Mogilner, Dept. of Pediatric Surgery, Bnai Zion Medical Center, P.O. Box 4940, Haifa 31048, Israel.
Phone: (972-4) 835-9647
Fax: (972-4)835-9620
email: olguer@bezeqint.net

Capsule

FDA safety alert about rituxan treatment in SLE patients

The Rituxan antibody is a genetically engineered chimeric murine/human monoclonal antibody directed against the CD20 antigen found on the surface of normal and malignant B lymphocytes. The antibody is an IgG1 kappa immunoglobulin containing murine light- and heavy-chain variable region sequences and human constant region sequences [Genentech: Product information – Rituxan. www.rituxan.com/rituxan/pi]. Rituximab binds specifically to the CD20 antigen located on pre-B and mature B lymphocytes. This antigen is also expressed on > 90% of B cell non-Hodgkin's lymphomas (NHL), but is not found on hematopoietic stem cells, pro-B cells, normal plasma cells or other normal tissues. CD20 regulates early steps in the activation process for cell cycle initiation and differentiation, and possibly functions as a calcium ion channel. CD20 is not shed from the cell surface and does not internalize upon antibody binding. B cells are believed to play a role in the pathogenesis of several autoimmune diseases. In this setting, B cells may act at multiple sites in the autoimmune/inflammatory process, through production of autoantibodies including the rheumatoid factor, antigen presentation, T cell activation, and pro-inflammatory cytokine production.

Rituxan has been marketed since 1997 for the treatment of NHL with or without chemotherapy, and lately has also been marketed for the treatment of rheumatoid arthritis in combination with methotrexate. As this agent acts specifically on B cells, causing their depletion, several clinicians have extended their use for refractory cases of different autoimmune diseases, among them autoimmune thrombocytopenia including ITP, systemic lupus erythematosus (SLE), autoimmune hemolytic anemia, cold agglutinin disease, mixed cryoglobulinemia, myasthenia gravis, multiple sclerosis, IgM-related polyneuropathies, Wegener's granulomatosis and dermatomyositis [*Autoimmun Rev* 2005;4:436]. Among the several adverse reactions linked to Rituxan treatment listed by the manufacturer are the emergences or reactivation of several viral infections, among them: hepatitis B virus reactivation with fulminant hepatitis, hepatic failure and death, JC virus causing progressive multifocal leukoencephalopathy (PML), cytomegalovirus, herpes simplex virus, parvovirus B19, varicella zoster virus, West Nile virus, and hepatitis C. The majority of patients who experience these viral diseases received Rituxan in combination with chemotherapy. In some cases, the viral infections occurred up to one year following discontinuation of Rituxan and resulted in death.

In 2006 the Rituxan label was updated to include post-marketing reports of cases of PML. Twenty-three confirmed cases of PML were reported in patients with lymphoid malignancies either during or after completion of rituxan treatment. In a safety warning on 18 December 2006 the FDA send an alert to healthcare professionals and patients treated with Rituxan concerning the occurrence of PML in two SLE patients treated with rituxan. This CNS infection occurred as late as 12 months after their last dose. Since SLE is not an approved indication for Rituxan, the director of FDA's Center for Drug Evaluation and Research stressed that patients under or after treatment with Rituxan should alert their physicians if they experience any major change in vision, balance or coordination, or if they experience confusion. It should be remembered that PML has occurred in patients not treated with Rituxan. Most cases have been in patients with a compromised immune system either due to medical conditions (hematologic malignancies, HIV), or medical treatment (chemotherapy and immunosuppressive treatment).

Martine Szyper Kravitz