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Ultrasound and MRI in the diagnosis of penile induration (Peyronie’s Disease)


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Abstract. Penile induration, a disease of connective tissue, requires the precise delineation and differentiation of inflammatory changes (plaques) for accurate therapy. Seventy-two patients with clinically suspected induratio penis plastica (IPP) underwent ultrasound examination between 1984 and 1991. In 37 patients (aged 18 to 80) the diagnosis was proven by ultrasound. Out of this group 27 patients were examined with magnetic resonance imaging (MRI), 15 of them with additional intravenous application of Gd-DTPA (Gd-DTPA). All examinations were performed within four weeks. The results showed that ultrasound was able to detect plaques and changes of the tunica albuginea in all 37 cases, but MRI was more sensitive in the detection of possible inflammatory changes (T2 prolongation and moderate Gd-DTPA enhancement in gradient-echo sequences).

MRI revealed inflammatory changes in 22 of 27 examined patients while ultrasound detected only nine such cases out of 37. Ultrasound is the method of choice in diagnosing IPP, due to the overall sensitivity to plaques and changes in the tunica. On the other hand MRI offers valuable additional information with respect to inflammatory changes particularly after Gd-DTPA. Therefore MRI has the potential to improve therapeutic planning and should be used in monitoring therapeutic effects.

Key words: Induratio penis plastica (IPP) - Peyronie’s Disease - Ultrasound - MRI - Gadolinium-enhanced

Introduction

Induratio penis plastica (IPP) is a rare disease with an incidence of 0.3 to 0.7% of all urological patients [1, 2]. It was first described by François de la Peyronie, physician to King Ludwig XIV, in 1743. There exist several theories to explain the etiology of penile induration. Presently the disease is defined as being poly-etiologic but monopathogenetic [3]. A fibroplastic inherent disposition seems to be a cofactor to primary vascular endothelial changes. Clinically the patients complain of painful erection of the penis and penile deviation. In the early stage the histology reveals an inflammatory reaction in the layer between tunica albuginea and corpora cavernosa. Subsequently local edema and proliferation of fibroblasts lead to sclerosis and plaque formation [4].

In order to evaluate the diagnostic impact of ultrasound and MRI, a prospective study was initiated. Sonographic staging with high frequency transducers following the proposals of Kelamy is essential for therapeutic management [5]. To further define the inflammatory reaction the magnetic resonance tomography was used in comparison to sonography.

Methods

Between 1984 and 1991, a total of 72 patients with suspected induratio penis plastica underwent sonographic examination. In 37 patients the diagnosis of IPP was confirmed on ultrasound; in 27 patients out of this group MRI was performed and Gd-DTPA was used additionally in 15 patients.

Ultrasound was carried out with a linear transducer including a water bath and a frequency range of 5 to 7.5 MHz. Patients were in a supine position and using a special plastic support, longitudinal and transversal planes were obtained. Time gain compensation curves had been accurately focused to the cutis/subcutis. The evaluation of the sonographic results followed the staging of Kelamy (Table 1) which describes the presence of plaques, tunica albuginea changes and therapeutic reactions.

The MR examinations were performed on a 1.5 Tesla superconducting system using a 5 cm surface coil (FOV = 200). T1-weighted (550/15/2) and T2-weighted (2000/15/90) images were acquired in multiplanar orientations. T1-weighted images were been obtained before and
Fig. 1. MRI, axial T1-weighted image after Gd-DTPA: Signal enhancement right corpus cavernosum and left tunica as well as septum; right corpus cavernosum normal.

Fig. 2a, b. a Ultrasound, longitudinal, right corpus cavernosum: Plaque with distorted tunica and hypoechoic partial surrounding (halo) - suspicion of inflammation. b MRI, longitudinal, T1 weighted images pre- and post-Gd-DTPA: Slight irregularity of tunica, enhancement close to plaque indicating inflammation.

Fig. 3a-c. Ultrasound transversal: Calcified plaque, dorsal, septal, with corresponding acoustic shadow. Second plaque without shadow in left corpus cavernosum possibly cartilagenous. No detectable inflammatory signs. b MRI, longitudinal: Signal loss in center of right corpus cavernosum due to plaque (proven by US), tunica slightly inhomogeneous. c MRI, longitudinal, T1 after Gd-DTPA: Slight signal increase in right tunica and corpus cavernosum, indicating inflammation.