

RADIOLOGY THROUGH IMAGES

Usefulness of magnetic resonance imaging in the postsurgical assessment of patients with inflatable penile prostheses[☆]



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Abstract

Objective: To describe the types of penile prostheses and their components, to review the appropriate magnetic resonance imaging (MRI) acquisition protocol, and to describe the normal imaging findings and possible complications in patients with inflatable penile implants.

Conclusion: Three-piece inflatable penile prostheses are the last link in the treatment chain for erectile dysfunction. They can develop complications, which are classified as non-infectious related to the surgical technique, infectious, or due to mechanical failure of the device. MRI is the most appropriate imaging technique for the postsurgical evaluation of penile prostheses. Images are acquired in three planes using sequences with high spatial resolution, first with the prosthesis at rest and then with the prosthesis activated.

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PALABRAS CLAVE

Prótesis de pene;
Disfunción eréctil;
Complicaciones postoperatorias;
Complicaciones postquirúrgicas;

Utilidad de la resonancia magnética en la valoración postquirúrgica de pacientes con prótesis hidráulica de pene

Resumen

Objetivo: Describir los tipos de prótesis de pene y sus componentes, revisar el protocolo de adquisición adecuado en resonancia magnética (RM), describir los hallazgos de imagen normales y las posibles complicaciones en pacientes con prótesis hidráulica de pene.

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Conclusión: Las prótesis hidráulicas tricompartmentales de pene son el último eslabón en la cadena terapéutica de la disfunción eréctil. Pueden presentar complicaciones, que se clasifican en no infecciosas vinculadas a la técnica quirúrgica, infecciosas y por fallo mecánico del dispositivo. La RM es la técnica de imagen más adecuada en la evaluación postquirúrgica de las prótesis de pene. Se realiza con secuencias de alta resolución espacial con la prótesis en reposo y en los tres planos del espacio, y se repite la adquisición triplanar con la prótesis activada.

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Introduction

Erectile dysfunction is characterized by the "inability to achieve or maintain an erection for a satisfactory sexual life".¹ Prevalence is high, around 20 per cent of male population between 25 and 70 years of age.² Management is usually gradual, starting by modifying the risk factors and then adding phosphodiesterase-5 inhibitor drugs, vacuum devices, and intracavernose injections. The last step of clinical management is implanting a penile prosthesis, but it is reserved for cases where prior therapies have failed, or when there are reasonable contraindications for its administration.³ When it is necessary to implant a penile prosthesis in patients with erectile dysfunction, this becomes an effective alternative to therapy, above all, thanks to last-generation devices or three-compartment hydraulic prostheses highly satisfactory for patients and their spouses compared to other therapeutical alternatives.³ Also, the evolution and perfection of the surgical technique, and the new and modern devices available today make this therapy an adequate therapeutical option for the management of erectile dysfunction.

The goal of our work is to describe the different types of penile prostheses that exist and their different components, review the acquisition protocol necessary for the performance of MRIs, describe what normal imaging findings look like, and eventually discuss all the possible complications that patients with penile hydraulic prostheses may experience.

Types of penile prostheses, and typography in the male pelvis

There are basically two (2) types of penile prostheses⁴:

- Semi-rigid prostheses: they may be flexible or malleable, and keep the penis in a permanent semi-erect state since it is never flaccid, or in complete erection.
- Hydraulic or inflatable prostheses: they may have two or three compartments, being the latter the most modern ones and most widely used today; this paper focuses on such prostheses (Fig. 1a).

On the functional level, three-compartment hydraulic prostheses are the most complex of all, which means that they are capable of simulating an erection as close as

possible to physiology passing from a flaccid state to a rigid state while the patient is in total control.

Its architecture is based on two (2) inflatable cylinders that are filled up with fluid and then implanted inside the corpora cavernosa, pump, and reservoir located in the scrotum and the intra-abdominal prevesical space, respectively. The three compartments are communicated among each other through a system of silicone tubes (Fig. 1b).

Postsurgical MRI assessment of patients with penile prostheses

The study of the possible postoperative complications after penile prosthesis placement in patients with erectile dysfunction, through physical examination or ultrasound, or both, has its own limitations,⁴ which are mainly complications associated with the cylinders.⁵ It is usually more convenient to see most anomalies through an MRI,⁶⁻⁹ which happens to be today's imaging modality of choice for the study of these complications. MRIs provide images of excellent definition and contrast of soft tissues and parts of the device in the three planes of space (Fig. 1c),¹⁰ without patient exposure to ionizing radiation.¹¹ When it comes to compatibility, there is no risk of damage to the implant, or lesion to the patient when conducting an MRI because today's manufacturers do not use any metallic components in these devices, and there are no other contraindications.¹² In the past, there were implants with ferromagnetic parts with the corresponding risk of displacement, excessive transmission of heat, induction of electric current, and image artifacts due to the effects of the magnetic field.¹³ The MRI findings have a good correlation with surgically confirmed final diagnoses (95.8 per cent diagnostic sensitivity¹⁴).

Protocol of magnetic resonance imaging

Multichannel phased array antennas and high spatial resolution sequences are used, such as fast spin-echo sequences (FSE), and T2-weighted sequences, and in the three planes of space (axial, coronal, and sagittal),⁴ with elevated sizes of the matrix, small fields of view, and thin cuts (3 mm). This study was conducted in a first phase with the penis in anatomical position¹⁵ lying flat on the abdomen in a flaccid state, while images in the three planes of space were acquired; in a second phase, the triplanar acquisition should

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