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Mini Review

Multiparametric Magnetic Resonance Tomography (Mp-Mri) Is Of Great Importance In The Diagnosis of Prostate Cancer And Other Related Diseases

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Abstract

In this review, we analyzed the role of multiparametric magnetic resonance imaging (mp-MRI) of the prostate in the diagnosis of prostate cancer (PCa). Magnetic resonance imaging (MRI) is increasingly entering practice as an objective, highly effective method of investigation. In the opinion of many authors, MRI with high soft tissue contrast should be included in the diagnostic complex of prostate gland (PG) investigations as a mandatory method. According to the literature, mp-MRI in patients with prostate cancer has a great advantage over other clinical and radiation diagnostic methods in determining the localization, true size of the tumor and the degree of its aggressiveness. Many authors believe that mp-MRI should also be performed in patients with negative biopsy results (both primary and repeated) and/or with high or suspiciously moderately high prostate-specific antigen (PSA) levels (with levels in the grey zone, i.e.., 4-10 ng/ml). However, mp-MRI of the PG after a negative primary or secondary biopsy should preferably be performed at least 4 weeks later to avoid artefacts, as the signal from glandular hemorrhage is similar to that from the contrast agent.

Keywords: multiparametric magnetic resonance imaging; prostate biopsy; prostate cancer

Introduction

Historically, prostate MRI was initially based on morphological assessment using T1 and T2 weighted pulse series, and their role was in grading local staging of patients with proven prostate cancer. However, these methods have been limited in differentiating benign tissue and clinically insignificant cancer from clinically significant cancer[1].

As a result, MRI has increasingly entered into practice as an objective, highly effective method of investigation. According to many authors, MRI with high soft tissue contrast should be included as a mandatory method in the diagnostic complex of prostate examinations. All these technologies offer the opportunity to: 1) improve the detection of clinically insignificant cancer; 2) increase confidence in the detection of benign diseases and dormant malignant neoplasms that are unlikely to cause morbidity during a man's lifetime[2-6].

According to the literature, mp-MRI in patients with prostate cancer has a great advantage over other clinical and radiological diagnostic methods in determining the localization, true size of the tumor and the degree of its aggressiveness (6). These authors believe that prostate mp-MRI should be performed in patients with negative biopsy results (both primary and repeated) and/or with suspiciously "moderately" high PSA levels in the so-called "grey" zone (4-10 ng/ml). However, it should be taken into account that not all patients with high PSA levels are indicated for mp-MRI, as PSA may be elevated in inflammatory diseases of the prostate and in the case of benign prostatic hyperplasia[7]. Also, when performing mp-MRI of the prostate after a negative result of primary or secondary biopsy in the early postbiopsy period, there are difficulties in the qualitative diagnosis of prostate cancer, because the signal from hemorrhages in the gland is similar to the signal from the contrast agent [8].

According to the literature, the detection rate of prostate cancer in standard transrectal biopsy under 10-12-point TRUS monitoring ranges from 31% to 42% and the number of false negatives remains excessively high (up to 40% of cases) [9-10]. Consequently, there is a high probability of missing a clinically significant prostate cancer. False-negative patients

are the group who subsequently need to undergo repeated biopsies. According to the authors, the introduction of mp-MRI into clinical practice and using its data for perform targeted biopsy can significantly increase the detection of intermediate- and high-risk prostate cancer both at primary biopsy and at repeat and tertiary biopsies [11-12].

Also, mp-MRI is used to detect suspicious areas and more accurately confirm the diagnosis with a targeted biopsy (TB) [13].

Most recent studies have shown that the use of mp-MRI and Fusion biopsy to detect and localize clinically insignificant prostate cancer in previously biopsy-free patients [17-22, 23-25].

Compared with traditional TRUSIBP, Fusion biopsy has been reported to reduce the detection of clinically insignificant cancer, while increasing the detection of clinically significant cancer[26-28]. MRI biopsy provides an opportunity to perform selective localization procedure for detection of clinically insignificant cancer while using fewer injections. This has led to improved diagnosis of clinically significant cancer in men with suspected prostate cancer. Researchers have shown that if mp-MRI did not reveal suspicious foci in the PG, immediate performance of TRUSIBP can be safely avoided [29-30]. Numerous single and multicenter randomized trials have confirmed the superiority of mp-MRI and MR guided biopsy (MRBP) over TRUSIBP[17-22].

Similar results were obtained in the PIVOT trial, albeit with significantly higher overall mortality rates by 10 years mainly due to poor patient selection [33]. All these data, according to many authors, support the indication of active surveillance for all men with low-risk cancers, regardless of the grade of prostate cancer at initial biopsy. Moreover, the recent introduction of a study modality such as mp-MRI may also add value to properly expanding the indication for active surveillance for all low-risk men. Initial negative mp-MRI at the start of active surveillance has been shown to reduce the number of misclassified prostate cancer[34]. Low-risk men with a negative mp-MRI may have a truly favorable outcome at active surveillance, regardless of the extent of cancer detected on biopsy within “low malignancy” [32,35,36].

However, the diagnosis of prostate cancer is made only after a biopsy of the prostate gland. At the same time, combined biopsy (systematic + targeted biopsy) is superior in detecting cancer in the case of biopsy performed only by targeted biopsy and only by systematic biopsy [14-16]. According to the multicenter study conducted by PROMIS, PRECISION. biopsy is preferably performed when the risk of PIRADS-v2 grade 3-5 is detected by mp-MRI [31].

Based on the above data, it is clear that the importance of mp-MRI in the diagnosis of prostate cancer is increasing every year. mp-MRI should be performed in patients with moderately high PSA values (4-10 ng/ml), as well as in patients with negative results of primary multifocal prostate biopsy, in the presence of high PSA levels (more than 4 ng/ml), in patients with a small prostate volume (less than 60 ml) and in the absence of inflammation (BMI) in the prostate. Also, further studies are needed to clarify the advantages of MR biopsy over routine TRUS biopsy.

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