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Original Article

Preoperative staging of rectal cancer with MRI: correlation with pathologic staging

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ABSTRACT

Introduction: An accurate preoperative rectal cancer staging is crucial to the correct management of the disease. Despite great controversy around this issue, pelvic magnetic resonance (RM) is said to be the imagiologic standard modality. This work aimed to evaluate magnetic resonance accuracy in preoperative rectal cancer staging comparing with the anatomopathological results.

Methods: We calculated sensibility, specificity, positive (VP positive) and negative (VP negative) predictive values for each T and N. We evaluated the concordance between both methods of staging using the Cohen weighted *K* (K_w), and through ROC curves, we evaluated magnetic resonance accuracy in rectal cancer staging.

Results: 41 patients met the inclusion criteria. We achieved an efficacy of 43.9% for T and 61% for N staging. The respective sensibility, specificity, positive and negative predictive values are 33.3%, 94.7%, 33.3% and 94.7% for T1; 62.5%, 32%, 37.0% and 57.1% for T2; 31.8%, 79%, 63.6% and 50% for T3 and 27.8%, 87%, 62.5% and 60.6% for N. We obtained a poor concordance for T and N staging and the anatomopathological results. The ROC curves indicated that magnetic resonance is ineffective in rectal cancer staging.

Conclusion: Magnetic resonance has a moderate efficacy in rectal cancer staging and the major difficulty is in differentiating T2 and T3.

Estadiamento pré-operatório do câncer do reto por ressonância magnética: correlação com estadiamento anatomopatológico

Palavras-chave:
Câncer do reto

RESUMO

Introdução: Um estadiamento pré-operatório do Câncer do Reto (CR) é essencial na gestão da doença. Apesar de grande controvérsia, a ressonância magnética pélvica (RM) é apontada

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Ressonância magnética pélvica
Acuidade
Sensibilidade
Especificidade

como modalidade imagiológica standard. Com este trabalho pretendeu-se avaliar a acuidade da RM no estadiamento do CR, comparando com os resultados anatomopatológicos da peça cirúrgica.

Materiais e métodos: Calculou-se a sensibilidade, especificidade, valor preditivo positivo (VP positivo) e negativo (VP negativo) para T e N. Avaliou-se a concordância entre ambas as formas de estadiamento através do valor de K de Cohen ponderado (Kw) e, através de curvas ROC, avaliou-se a precisão do estadiamento por RM.

Resultados: 41 doentes cumpriram os critérios de inclusão. Obteve-se uma eficácia de 43.9% para T e 61% para N. Verificou-se uma sensibilidade, especificidade, VP positivo e negativo, respectivamente, de 33.3%, 94.7%, 33.3% e 94.7% para T1, 62.5%, 32%, 37.0% e 57.1% para T2, 31.8%, 79%, 63.6% e 50% para T3, 27.8%, 87%, 62.5% e 60.6% para N. A concordância calculada foi pobre para T e N. As curvas ROC indicaram que o estadiamento do CR por RM foi ineficaz.

Conclusão: A RM apresenta acuidade moderada no estadiamento do CR, onde a maior dificuldade está na distinção entre T2-T3.

Introduction

The incidence and mortality of oncological diseases have increased at an alarming rate worldwide, and according to World Health Organization, the incidence of cancer will increase to 22 million/year in the next two decades.[1]

In Portugal, colorectal cancer (CRC) is the second most frequent cancer in both men and women, with an overall incidence of 14.5% and 15.7% mortality. In 2012, this disease was appointed as the second leading cause of cancer death in both genders.[2] Rectal cancer (RC), in particular, exhibited in northern region of this country in 2008 an incidence of 24.6/1,00,000 inhabitants; a progressive increase in this value since 1999 was found. In the district of Braga, its incidence in this year was 16.8/1,00,000 inhabitants.[3]

RC prognosis has improved greatly in recent decades and this was mainly due to advances in preoperative staging, which was reflected in the therapeutic approach,[4] where a change was observed, from a purely surgical treatment to a multidisciplinary approach,[5,6] lowering the lower local recurrence rate to 11% and improving the survival rate at 5 years to 58%,[7] compared to previous values (27 and 48%, respectively).[5]

Preoperative staging of RC is divided into local and remote staging.[8–10] The information (both clinical and pathological) gathered from the staging is grouped according to "Tumor-Node-Metastasis" (TNM) classification of the American Joint Committee on Cancer in different prognostic groups or anatomical stages.[11,12] T and N stages are the best determinants of prognosis, being critical components of preoperative staging.[13] Thus, in addition to the use of a reliable imaging modality and with high accuracy in preoperative staging of CR be a crucial prognosis factor,[14] this procedure also helps in choosing the best therapeutic strategy, enabling a balance between oncological safety and quality of life of the patient.[10,12]

Nowadays, there are several imaging modalities for preoperative staging of RC, including computed tomography (CT), pelvic magnetic resonance imaging (MRI), endorectal ultrasound (EUS), and positron emission tomography (PET).[10]

EUS and MRI are the main instruments of preoperative staging.[15] However, there is no consensus about the best method.[5,16] Several studies suggest MRI as being superior to EUS,[9,17–20] and therefore MRI is the routine imaging modality for preoperative staging of RC.[5,21] As to T staging, MRI shows an acuity between 55 and 86%; as to N staging, the accuracy varies from 39 to 95%.[5]

In RC staging, the main role of MRI lies in the evaluation of tumors in advanced and occlusive stages.[15,22] With respect to stages T3 and T4, sensitivity and specificity of 74 and 76% (for T3) and 82 and 96% (for T4) were observed, respectively.[22] For T1 and T2 stages, MRI is less sensitive versus EUS, with no difference relative to T3 and T4 stages.[16]

Detection of N is the biggest challenge of any imaging examination, with 66% sensitivity of MRI in its evaluation and 76% specificity.[5]

This study aims to evaluate the accuracy of MR in the preoperative staging of RC, compared to the anatomopathological result of the surgical specimen.

Materials and methods

Population

The target population for this study consists of 216 patients with histological diagnosis of RC treated in the General Surgery Service, Hospital de Braga (HB) between January 1st, 2007 and December 31, 2013.

Inclusion criteria for this study were: patients with histological diagnosis of rectal adenocarcinoma; patients with a conclusive preoperative staging by MRI, and patients with pathology staging results based on the surgical specimen.

Exclusion criteria were the following: patients with a histological diagnosis differing from the above; patients with a diagnosis of RC who did not undergo MRI or for whom such analysis was inconclusive; patients without results from pathology staging, and patients undergoing primary treatment.