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ORIGINAL ARTICLE

Optimizing D'Amico risk groups in radical prostatectomy through the addition of magnetic resonance imaging data☆

R. Algarra[a,*], B. Zudaire[b], A. Tienza[a], J.M. Velis[a], A. Rincón[a], I. Pascual[a], J. Zudaire[a]

[a] *Departamento de Urología, Clínica Universidad de Navarra, Pamplona, Spain*
[b] *Servicio de Radiodiagnóstico, Clínica Universidad de Navarra, Pamplona, Spain*

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Abstract

Objectives: To improve the predictive efficacy of the D'Amico risk classification system with magnetic resonance imaging (MRI) of the pelvis.

Materials and methods: We studied 729 patients from a series of 1310 radical prostatectomies for T1–T2 prostate cancer who underwent staging pelvic MRI. Each patient was classified with T2, T3a or T3b MRI, and N (+) patients were excluded. We identified the therapeutic factors that affected the biochemical progression-free survival (BPFS) time (prostate specific antigen [PSA] levels >0.4 ng/mL) using a univariate and multivariate study with Cox models. We attempted to improve the predictive power of the D'Amico model (low risk: T1; Gleason 2–6; PSA levels < 10 ng/mL; intermediate risk: T2 or Gleason 7 or PSA levels 10–20 ng/mL; high risk: T3 or Gleason 8–10 or PSA levels >20 ng/mL).

Results: In the univariate study, the clinical factors that influenced BPFS were the following: Gleason 7 (HR: 1.7); Gleason 8–10 (HR: 2.9); T2 (HR: 1.6); PSA levels 10–20 (HR: 2); PSA levels >20 (HR: 4.3); D'Amico intermediate (HR: 2.1) and high (HR: 4.8) risk; T3a MRI (HR: 2.3) and T3b MRI (HR: 4.5). In the multivariate study, the only variables that affected BPFS were the following: D'Amico intermediate risk (HR: 2; 95% CI 1.2–3.3); D'Amico high risk (HR: 4.1; 95% CI 2.4–6.8); T3a MRI (HR: 1.9; 95% CI 1.2–2.9) and T3b MRI (HR: 3.9; 95% CI 2.5–6.1). In predictive model using the multivariate Cox models, we assessed the weight of each variable. A value of 1 was given to D'Amico low risk and T2 MRI; a value of 2 was given to D'Amico intermediate risk and T3a MRI and a value 3 was given to D'Amico high risk and T3b MRI. Each patient had a marker that varied between 2 and 6. The best model included 3 groups, as follows: 494 (67.7%) patients in group 1, with a score of 2–3 points (HR, 1), a BPFS of 86% ± 2% and 79% ± 2% at 5 and 10 years, respectively; 179 (24.6%) patients in group 2, with a score of 4 points (HR, 3), a

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* Corresponding author.
E-mail address: ralgarra@unav.es (R. Algarra).

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BPFS of 60% ± 4% and 54% ± 5% at 5 and 10 years, respectively; and 56 (7.7%) patients in group 3, with a score of 5–6 points (HR, 9.3), a BPFS of 29% ± 8% and 19% ± 7% at 5 and 10 years, respectively. The median BPFS time was 1.5 years.
Conclusion: MRI data significantly improve the predictive capacity of BPFS when using the D'Amico model data.
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PALABRAS CLAVE
Cáncer de próstata;
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Clasificación DÁmico

Optimización de los grupos de riesgo de D'Amico en prostatectomía radical añadiendo la información de la resonancia nuclear magnética

Resumen
Objetivos: Se pretende mejorar la eficacia predictora de la clasificación de D'Amico con la resonancia nuclear magnética (RNM) de pelvis.
Material y métodos: Se estudian 729 pacientes de una serie de 1.310 prostatectomías radicales por cáncer de próstata T1-T2 a quienes se realizó RNM de pelvis de estadificación. Cada paciente fue calificado con RNM de T2; T3a o T3b. Se excluyen los pacientes N (+). Se identifican los factores clínicos influyentes en el tiempo de supervivencia libre de progresión bioquímica (SLPB) (PSA > 0,4 ng/ml) (estudio univariado y multivariado con modelos de Cox). Se intenta mejorar el poder predictivo del modelo de D'Amico (bajo riesgo: T1; Gleason 2-6; PSA < 10 ng/ml; riesgo intermedio: T2 o Gleason 7 o PSA 10-20 ng/ml; alto riesgo: T3 o Gleason 8-10 o PSA > 20 ng/ml).
Resultados: Factores clínicos influyentes en SLPB: en el estudio univariado las variables influyentes son Gleason 7 (HR: 1,7); Gleason 8-10 (HR: 2,9); T2 (HR: 1,6); PSA 10-20 (HR: 2); PSA > 20 (HR: 4,3); D'Amico intermedio (HR: 2,1) y alto (HR: 4,8); RNM T3a (HR: 2,3) y RNM T3b (HR: 4,5). En el estudio multivariado solo son influyentes D'Amico riesgo intermedio (HR: 2; IC 95%: 1,2-3,3); D'Amico alto riesgo (HR: 4,1; IC 95%: 2,4-6,8); RNM T3a (HR: 1,9; IC 95%: 1,2-2,9) y RNM T3b (HR: 3,9; IC 95%: 2,5-6,1). Modelo predictivo: utilizando los modelos multivariantes de Cox se valora el peso de cada variable. Se da un valor de 1 a D'Amico de bajo riesgo y a RNM T2; se da valor de 2 a D'Amico de riesgo intermedio y a RNM T3a y valor 3 a D'Amico alto riesgo y RNM T3b. Cada paciente tiene un marcador que oscila entre 2 y 6. El mejor modelo incluye 3 grupos. Grupo 1 (2–3 puntos, HR 1) 494 (67,7%) pacientes; SLPB de 86 ± 2% y 79 ± 2%, 5 y 10 años. Grupo 2 (4 puntos, HR 3) 179 (24,6%) pacientes; SLPB de 60 ± 4% y 54 ± 5%, 5 y 10 años. Grupo 3 (5-6 puntos, HR 9,3) 56 (7,7%) pacientes; SLPB de 29 ± 8% y 19 ± 7%, 5 y 10 años; mediana de SLPB 1,5 años.
Conclusión: El modelo DÁmico mejora significativamente la capacidad de predicción de la SLPB utilizando la información de la RNM.
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Introduction

In order to stratify the recurrence risk of prostate cancer before receiving some form of treatment, in 1998 D'Amico[1] designed some risk groups for biochemical progression (BP) based on 3 clinical parameters with an independent prostatic influence (initial PSA [ng/mL], clinical Gleason and clinical stage). Thus, a patient with PSA < 10 ng/mL, Gleason <7 and stage T1-2a was considered as low risk of disease progression; if PSA was between 10 and 20 ng/mL, the Gleason score 7 or the stage T2b the risk was intermediate, and if PSA was >20 ng/mL, the Gleason score 8–10 or the stage >T2c BP risk was high. Besides having been validated, this classification is characterized by being practical, simple, reproducible and is supported by the fact that it has been used in the clinical guidelines[2] of the American Urological Association (AUA) since 2007. Nuclear magnetic resonance (NMR) is the imaging method which provides the most information about tumor staging. It is reasonable to think that if, to the clinical data provided by the D'Amico classification system, we add those provided by NMR imaging, prognostic prediction might improve.

The aim of our study was, with a significant group of patients and follow-up, analyze if D'Amico classification can be optimized by the clinical data provided by NMR imaging.

Materials and methods

We retrospectively analyzed 729 patients (on the basis of a historical series of 1310 patients who had been operated on in the year 1989) who underwent a pelvic MRI as part of the preoperative study for prostate cancer stage T1–T2, according to TNM criteria, and who were subsequently treated with radical prostatectomy at our center between July 2000 and December 2012.

Before surgery, all patients underwent a detailed clinical history with a physical examination (including a digital rectal exam), PSA (ng/mL) and prostate biopsy. The study was completed with computed tomography scan until July 2000. After that point, we have preferably used NMR (76 patients) with no special criteria, since the initial aim was to assess its diagnostic efficacy.

Up to the year 2000, a bone gammagraphy was done on all patients. From that date onwards, it was only

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