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Short Communication

Cancer Screening: A Proposal for Renal Cancer Screening with Computed Tomography

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Abstract

It has been estimated that every year in Europe and in the USA about 26,000 and 13,000 people die of renal cell carcinoma, respectively. For localized disease 5-year relative survival rate is 92.8% whereas for regional and metastatic disease is 64, 2% and 11.9% respectively. Thus, there are conditions to elaborate a screening program for renal cancer, in particular for a subset of population which is at high risk (eg smokers, obese), in which the prevalence of the disease is higher.

The most accurate imaging test for the diagnosis of renal masses is CT, in particular for the small renal masses, in which there are more therapeutic options and for whom there a higher survival rate.

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- Ultrasound

ABBREVIATIONS

CT: Computed Tomography; US: Ultrasound; RCC: Renal Cell Cancer

INTRODUCTION

It has been estimated that every year in Europe and in the USA about 26,000 and 13,000 people die of Renal Cell Carcinoma (RCC), respectively. While in the case of localized disease renal cell carcinoma is a potentially curable disease, in the case of metastatic disease, the median survival is about 2 years [1-3].

In particular, for localized disease 5-year relative survival rate was 92.8% in 2002 whereas for regional and metastatic disease was 64, 2% and 11.9% respectively [2]. Thus, the necessity of elaborating a screening program for renal cancer. Actually, a screening program, in order to be valid, should be applied to potentially curable disease in which an early diagnosis could change the history of the disease and decrease mortality rate [4].

Turney et al. have proposed a screening program with ultrasound in 2006, but it was criticized since it would not be of net benefit in older populations, in which renal cancer is more

prevalent [5]. Moreover, for renal cancer diagnosis, the most accurate diagnostic technique is Computed Tomography (CT), in particular for the small renal masses, in which there are more therapeutic options [6,7].

Renal cancer diagnosis

The most accurate imaging test for the diagnosis of renal masses is CT. Helical Multidetector CT may identify RCC with a sensitivity of 100% and specificity of 88-95% [6-9]. Ultrasound (US) can be used in patients with suspected renal masses [6,7]. Ultrasound, however, has some major limitations: it has shown a lower accuracy for smaller lesions compared with CT. In a study by Jamis-Dow et al., ultrasonography detected 58% of lesions sized 15 to 20 mm, compared with CT, which detected 100% of the lesions in 21 patients. In general, for lesion greater than or equal to 1.5 cm US provides a sensitivity of 80% [8].

Screening program for renal cancer

The aim of a screening program is to identify a cancer early, when the tumor is small, localized, and still treatable. Screening programs are most efficient if they target high-risk populations. Since the incidence of renal cancer varies with gender, age, and ethnicity, a en efficient screening should be addressed to men, preferably African American older than 60 years [1,12,13].

In fact, the incidence of RCC is higher in men compared to women, with a man to woman ratio of 3/2; it increases with age, with a peak incidence occuring in the sixth decade, (80% of the cases within the 40 to 69-year-old population) [13]; and it is higher in African Americans [12,13].

Smoking, obesity, hypertension, family history, multi-parity for women, end-stage renal disease, and exposure to carcinogens are related to an increased risk for developing RCC.

A higher incidence of RCC in smokers has been shown, with an estimated 2.3 fold increased risk when compared to non-smokers [14].

Some studies relate a higher incidence of RCC with high body mass index. The relative risk was found to be 3.3 in males and 2.3 in females [15].

A study on Swedish population showed that hypertension act as an independent risk factor RCC [16].

Concerning family history, a family history of kidney cancer (kidney cancer in first-degree relatives) is associated with a 4.3-fold significantly increased risk of RCC [17].

The identification of risk factors allows a screening program to be targeted at high-risk populations.

In a population selected on the basis of risk factors for RCC, (eg smoking patients, obese and older than 60 years), it is estimated that the incidence of kidney cancer would be equal to 400 per 100,000 people. Shea MW proposed the use of a clinical algorithm for the recognition of patients at risk for RCC; in particular, certain risk factors including the age (>60 years), smoking habit, systolic blood pressure (especially >170 mmHg), family history of cancer and renal dialysis should be taken into close account [1].

An analysis of the incidentally detected renal tumours (eg. incidentalomas) in asymptomatic patients showed that RCC were smaller when compared to symptomatic tumours [19]. Imaging in asymptomatic patients can identify renal masses earlier, when they are smaller and potentially curable, when minimally invasive therapies are still an option. Thus, a screening program in a high risk population could eventually reduce mortality, since for localized disease RCC shows a 5-year relative survival rates of 92.8% whereas for advanced disease the survival rate spans from 64, 2% to 11, 9% [2].

The potential harms include an increase of radiation exposure and an increasing in costs for the diagnosis and the treatment and the fact that there might be no mortality benefit over active surveillance in patients aged over 75 years old [20].

DISCUSSION

The goal of this short communication is to propose a screening program for renal cancer with CT. In the general population however RCC has a low incidence, making CT (an expensive diagnostic exam) an unsuitable test to screen the general population. Renal cell cancer in fact, shows an incidence of 14 and 6 cases every 100,000 persons per year in males and females respectively in the general population. With such a low incidence, a screening with CT for RCC would be unlikely to show positive results in terms of mortality while determining an increase in terms of radiations and costs.

In a population selected on the basis of risk factors for RCC, (eg smoking patients, obese and older than 60 years), however, it may be useful to undertake a screening with CT ; to date the most accurate diagnostic procedure for the recognition carcinoma of the kidney.

In this selected population, it is estimated that the incidence of kidney cancer would be equal to 400 per 100,000 people. Shea MW proposed the use of a clinical algorithm for the recognition of patients at risk for RCC; in particular certain risk factors including the age (>60 years), smoking habit, systolic blood pressure (especially if >170 mmHg), family history of cancer and renal dialysis should be taken into close account.

Asymptomatic individuals who do not fall within this subset of the population should not undergo CT because of the low prevalence of RCC in the general population.

CONFLICT OF INTEREST

The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

REFERENCES

1. Shea MW. A proposal for a targeted screening program for renal cancer. Front Oncol. 2013; 3: 207.
2. Cho E, Adami HO, Lindblad P. Epidemiology of renal cell cancer. Hematol Oncol Clin North Am. 2011; 25: 651-665.
3. Protzel C, Maruschke M, Hakenberg OW. Epidemiology, aetiology, and pathogenesis of Renal Cell Carcinoma. Eur Urol. 2012; 52-59.
4. Herman CR, Gill HK, Eng J, Fajardo LL. Screening for preclinical disease: test and disease characteristics. AJR Am J Roentgenol. 2002; 179: 825-831.

5. Turney BW, Reynard JM, Cranston DW. A case for screening for renal cancer. BJU Int. 2006; 97: 220-221.

6. Tsakiris P, de la Rosette J. Imaging in genitourinary cancer from the urologists' perspective. Cancer Imaging. 2007; 7: 84-92.

7. Kang SK, Chandarana H. Contemporary imaging of the renal mass. Urol Clin North Am. 2012; 39: 161-170, vi.

8. Jamis-Dow CA, Choyke PL, Jennings SB, Linehan WM, Thakore KN, Walther MM. Small (< or = 3-cm) renal masses: detection with CT versus US and pathologic correlation. Radiology. 1996; 198: 785-788.

9. Tann M, Sopov V, Croitoru S, Nativ O, Moskovitz B, Bar-Meir E, et al. How accurate is helical CT volumetric assessment in renal tumors? Eur Radiol. 2001; 11: 1435-1438.

10. Silverman SG, Israel GM, Herts BR, Richie JP. Management of the incidental renal mass. Radiology. 2008; 249: 16-31.

11. Fenton JJ, Weiss NS. Screening computed tomography: will it result in overdiagnosis of renal carcinoma? Cancer. 2004; 100: 986-990.

12. Lipworth L, Tarone RE, McLaughlin JK. Renal cell cancer among African Americans: an epidemiologic review. BMC Cancer. 2011; 11: 133.

13. Pascual D, Borque A. Epidemiology of kidney cancer. Adv Urol. 2008;.

14. Hunt JD, van der Hel OL, McMillan GP, Boffetta P, Brennan P. Renal cell carcinoma in relation to cigarette smoking: meta-analysis of 24 studies. Int J Cancer. 2005; 114: 101-108.

15. Renehan AG, Tyson M, Egger M, Heller RF, Zwahlen M. Body-mass index and incidence of cancer: a systematic review and meta-analysis of prospective observational studies. Lancet. 2008; 371: 569-578.

16. Chow WH, Gridley G, Fraumeni JF Jr, Järvholm B. Obesity, hypertension, and the risk of kidney cancer in men. N Engl J Med. 2000; 343: 1305-1311.

17. Clague J, Lin J, Cassidy A, Matin S, Tannir NM, Tamboli P, et al. Family history and risk of renal cell carcinoma: results from a case-control study and systematic meta-analysis. Cancer Epidemiol Biomarkers Prev. 2009; 18: 801-807.

18. Vatten LJ, Trichopoulos D, Holmen J, Nilsen TI. Blood pressure and renal cancer risk: the HUNT Study in Norway. Br J Cancer. 2007; 97: 112-114.

19. Palsdottir HB, Hardarson S, Petursdottir V, Jonsson A, Jonsson E, Sigurdsson MI, et al. Incidental detection of renal cell carcinoma is an independent prognostic marker: results of a long-term, whole population study. J Urol. 2012; 187: 48-53.

20. Lane BR, Abouassaly R, Gao T, Weight CJ, Hernandez AV, Larson BT, et al. Active treatment of localized renal tumors may not impact overall survival in patients aged 75 years or older. Cancer. 2010; 116: 3119-3126.

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