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Original article

Overdiagnosis of thyroid cancer in the Marne and Ardennes Departments of France from 1975 to 2014

*Évaluation du surdiagnostic du cancer de la thyroïde dans les départements de la Marne et des
Ardennes de 1975 à 2014*

Caroline Saint-Martin^a, Moustapha Dramé^{b,c,*}, Sandrine Dabakuyo^a, Lukshe Kanagaratnam^{b,c},
Patrick Arveux^d, Claire Schwartz^a

^a Thyroid Cancer Registry, Institut Jean-Godinot, 51100 Reims, France

^b EA 3757, University of Reims Champagne-Ardenne, Faculty of Medicine, 51095 Reims, France

^c Department of Research and Innovation, Reims Teaching Hospitals, Robert-Debré Hospital, rue du Général-Koenig, 51092 Reims, France

^d Côte-d'Or Breast Cancer Registry, Georges-François-Leclerc Center, 21000 Dijon, France

Abstract

Objectives. – Incidence of thyroid cancer has increased considerably in France in recent years, but the mortality rate has declined only slightly. Part of this increased incidence could be attributable to overdiagnosis. We aimed to estimate the contribution of overdiagnosis to the incidence of papillary thyroid cancer. **Material and methods.** – Incidence rates were calculated based on data from the specialised Marne-Ardennes thyroid cancer registry, for cancers diagnosed between 1975 and 2014, by age category and by five-year period. The population was divided into two groups according to pTNM classification at diagnosis (i.e. localised or invasive). Overdiagnosis was defined as the difference in incidence rates between the invasive cancer and localised cancer groups. This rate was then divided by the incidence rate in the localised cancer group for the most recent period (2010–2014) to obtain the proportion of cancers attributable to overdiagnosis. **Results.** – In total, 2008 patients were included. The proportion of incidence attributable to overdiagnosis for the period 2010–2014 was estimated at 7 and 62% in men and women aged < 50 years respectively, and at 65 and 73% respectively in men and women aged ≥ 50 years. **Conclusion.** – We observed a high proportion of cancers attributable to overdiagnosis. This finding raises the issue of patient management, with the risk of overtreatment, and the repercussions on quality of life for patients diagnosed with cancer.

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Keywords: Thyroid neoplasms; Thyroid gland; Incidence; Overdiagnosis

Résumé

Objectif. – L'incidence du cancer de la thyroïde a beaucoup augmenté en France, pourtant le taux de mortalité n'a que très faiblement diminué. La possibilité d'un surdiagnostic est souvent évoquée. L'objectif de notre étude était d'estimer la part de surdiagnostic dans l'incidence du cancer de la thyroïde de type papillaire. **Matériels et méthodes.** – Les taux d'incidences (TI) ont été calculés à partir des données du « Registre spécialisé du cancer de la thyroïde Marne-Ardennes » diagnostiqué entre 1975 et 2014, par tranches d'âge et par périodes quinquennales. La population a été séparée en 2 groupes définis par la classification pTNM au diagnostic (« cancer localisé » et « cancer étendu »). Le surdiagnostic a été défini par la différence entre l'évolution du TI dans le groupe « cancer étendu » et dans le groupe « cancer localisé ». En divisant ce taux par le TI du groupe « localisé » de la dernière période (2010–2014), un pourcentage estimant la part de surdiagnostic a été obtenu. **Résultats.** – Notre étude a porté sur 2008 patients. Les parts de l'incidence attribuables au surdiagnostic, pour la période 2010–2014, ont été estimées chez les hommes et les femmes de moins de 50 ans à 7 et 62 %, respectivement. Les estimations chez les hommes et les femmes de plus de 50 ans étaient de 65 % et 73 %, respectivement.

* Corresponding author. Department of Research and Innovation, Reims Teaching Hospitals, Robert-Debré Hospital, rue du Général-Koenig, 51092 Reims, France.

E-mail address: mdrame@chu-reims.fr (M. Dramé).

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Conclusion. – Les taux attribuables au surdiagnostic retrouvés dans notre étude sont importants. Se posent alors les problèmes de la prise en charge du patient avec les risques de surtraitement et des conséquences sur la qualité de vie de l'annonce du diagnostic de ce type de cancer.

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Mots clés : Néoépithéliomes thyroïdiens ; Glande thyroïdienne ; Incidence ; Surdiagnostic

1. Introduction

The incidence of thyroid cancer has been increasing for several decades [1,2]. In France, in 1980, the incidence rate per 100,000 inhabitants was 1.0 in men and 2.9 in women [3]. By 2012, this rate had risen to 5.5 in men and 13.8 in women [4]. This increase is mainly driven by an increase in the number of papillary cancers, and particularly, small tumours (< 20 mm) [2,5]. Several authors have proposed possible explanations for this phenomenon [5,6], and progress in diagnostic techniques is regularly cited [7,8]. However, although there has been a substantial increase in the rate of thyroid cancer in France, the mortality rate has only slightly declined, from 0.4 in men and 0.6 in women in 1980, to 0.2 in both men and women in 2012 [4], and the mortality rate has even remained stable in the USA [6].

These circumstances suggest the likelihood that part of this increase in incidence is due to overdiagnosis. Overdiagnosis is defined as the diagnosis of disease that would otherwise not go on to cause symptoms or death [9], and this phenomenon has already been studied in the context of breast and prostate cancer [9,10]. To the best of our knowledge, the impact of overdiagnosis on thyroid cancer incidence has never been studied in France.

Therefore, we aimed to estimate the proportion of the increase in differentiated papillary thyroid cancer incidence that could be attributed to overdiagnosis in the Marne and Ardennes Departments of France between 1975 and 2014 using data from the Marne-Ardennes thyroid cancer registry.

2. Subjects and methods

2.1. Study design

Observational, descriptive, longitudinal, historical cohort study using data from the specialised thyroid cancer registry of the Marne-Ardennes Departments in France.

2.2. Study population

We included all subjects living in the Marne or Ardennes Departments of France and who were diagnosed with papillary thyroid cancer between 1975 and 2014. We excluded patients in whom cancer stage was not determined.

2.3. Variables recorded

We recorded socio-demographic variables, i.e. age at diagnosis and sex. Cancer characteristics were also recorded, namely year of diagnosis, International Classification of Diseases (ICD)

10th revision code [11] associated with the papillary cancer, and the pTNM 2002 status [12]. Patients with cancers classed as ICD codes 8260, 8340, 8341, 8342, 8343, 8344, 8350 were included.

Cancer stage was defined using the pTNM classification at diagnosis, and based on this classification, patients were divided into two groups according to the size of the tumour, the extent of spread beyond the thyroid, lymph node involvement, and presence of metastasis at diagnosis. The “localised cancer” group comprised patients with cancers classified as pT1 or pT2, pN0 or Nx, or M0. The “invasive cancer” group comprised patients with cancer classified as stage pT3 or pT4 and/or pN1 or M1.

2.4. Statistical analysis

Quantitative variables are described as mean \pm standard deviation (SD) or median, and qualitative variables as number (percentage).

2.4.1. Incidence rate for papillary thyroid cancers

All calculations of incidence rates were stratified by sex. Incidence rates were calculated per 100,000 person-years (PY), by 5-year age groups (0–4 years, 5–9 years, 10–14 years etc) and by 5-year periods (1975–1979, 1980–1984, 1985–1989, 1990–1994, 1995–1999, 2000–2004, 2005–2009, 2010–2014). The numerator was the number of newly diagnosed cases of papillary cancer, and the denominator was the population of the Marne and Ardennes Departments, by age category and by 5-year period, and by sex (population data from the National Institute of Statistics and Economic Studies, France [13]). The number of person-years was calculated as the sum of the population on 1st January of each of the 5 years (for example, for women for 1975–1979, the number of person-years was the number of women on 1st January 1975 + on 1st January 1976 + on 1st January 1977 + on 1st January 1978 + on 1st January 1979). Direct age standardization was performed using the world population as reference [14,15].

2.4.2. Incidence rate of overdiagnosis

All overdiagnosis analyses were stratified by age and sex. The population was divided into two age groups, namely above and below the median age at diagnosis of the study population.

Overdiagnosis is defined as the diagnosis of disease that would otherwise not go on to cause symptoms or death, and was calculated by comparing the incidence rate of the localised cancer group and that of the invasive cancer group, according to the methodology used in a recent study [16].

In view of the increase in the incidence rate (IR) of thyroid cancer since 1975, the IR for the most recent

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