Are Too Many Imaging Tests Being Performed in Women With an Adnexal Mass?

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Abstract

Objective: To evaluate the patterns of radiologic imaging requested by family physicians and gynaecologists in the work-up of women found to have an adnexal mass on pelvic ultrasound, and to evaluate whether advanced imaging tests are associated with more appropriate referral of women with a high-risk adnexal mass to gynaecologic oncologists.

Methods: Centralized provincial databases of health care usage were used to identify women aged 45 and older who had a pelvic ultrasound examination between 2006 and 2008. Subsequent imaging tests ordered were identified according to physician specialty. For women who proceeded to laparotomy, logistic regression was performed to determine which imaging tests enabled primary physicians to make appropriate referrals of women with high risk adnexal tumours to a gynaecologic oncologist.

Results: We identified 193 261 women aged 45 and older who had a pelvic ultrasound. Of these, 19 949 (10.3%) had a subsequent laparotomy; 2223 women were categorized as having a benign adnexal mass, 627 were categorized as having a malignant adnexal mass, and the remainder had another diagnosis such as uterine fibroid. Up to 12% of women had a pelvic MRI, and 58% of women had a CT scan after a pelvic ultrasound. Family physicians referred 95% of women with a high-risk ovarian mass to a gynaecologic surgeon rather than to a gynaecologic oncologist, and gynaecologists referred 47% of such women to a gynaecologic oncologist after imaging. Gynaecologic oncologists operated on 55% of women with a malignant adnexal mass. On multivariate analysis, a preoperative CT scan (OR 3.58; $P < 0.001$) and a CT scan and MRI (OR 7.78; $P < 0.001$) were associated with surgery performed by a gynaecologic oncologist, but a preoperative MRI alone was not significantly associated (OR 1.86; $P = 0.09$). After ultrasound alone the mean time to surgery was 100 days; this increased significantly when further imaging tests were performed (with additional CT to 131 days, with MRI to 170 days, and with CT and MRI to 179 days; $P = 0.002$).

Conclusion: Performing a pelvic MRI after a pelvic ultrasound does not increase the rate of referral of women with a high-risk adnexal mass to a gynaecologic oncologist. A consensus on appropriate imaging and triage is needed when an adnexal mass is identified on ultrasound.

Key Words: Pelvic mass, imaging patterns, referral patterns

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Résumé

Objectif : Évaluer les tendances en ce qui concerne les tests radiologiques d'imagerie demandés par les médecins de famille et les gynécologues dans le cadre du bilan des femmes chez qui la présence d'une masse annexielle a été constatée par échographie pelvienne, ainsi qu'évaluer si la tenue de tests d'imagerie avancée est associée à une orientation plus adéquate des femmes qui présentent une masse annexielle les exposant à des risques élevés vers des gynécologues-oncologues.

Méthodes : Des bases de données centralisées provinciales sur l'utilisation des soins de santé ont été utilisées pour identifier les femmes de 45 ans ou plus qui avaient subi un examen échographique pelvien entre 2006 et 2008. Les tests d'imagerie demandés subséquemment ont été identifiés en fonction de la spécialité du médecin. Pour ce qui est des femmes qui en sont venues à subir une laparotomie, une régression logistique a été menée pour déterminer quels ont été les tests d'imagerie qui ont permis aux médecins primaires d'orienter adéquatement les femmes qui présentaient une masse annexielle les exposant à des risques élevés vers un gynécologue-oncologue.

Résultats : Nous avons identifié 193 261 femmes de 45 ans ou plus qui avaient subi une échographie pelvienne. Parmi ces femmes, 19 949 (10,3 %) en sont venues à subir une laparotomie; 2 223 femmes ont été catégorisées comme présentant une masse annexielle bénigne, 627 ont été catégorisées comme présentant une masse annexielle maligne et le reste de ces femmes ont obtenu un autre diagnostic (comme celui de fibrome utérin). Jusqu'à 12 % des femmes ont subi une IRM pelvienne et 58 % des femmes ont subi une tomodensitographie à la suite de l'échographie pelvienne. Les médecins de famille ont orienté 95 % des femmes qui présentaient une masse ovarienne les exposant à un risque élevé vers un gynécologue-chirurgien plutôt que vers un gynécologue-oncologue; les gynécologues ont orienté 47 % de ces femmes vers un gynécologue-oncologue à la suite de l'imagerie. Les gynécologues-oncologues ont opéré 55 % des femmes qui présentaient une masse annexielle maligne. Dans

le cadre d'une analyse multivariée, une tomodensitographie préopératoire (RC, 3,58; P < 0,001) et une combinaison tomodensitographie-IRM (RC 7,78; P < 0,001) ont été associées à l'exécution d'une chirurgie par un gynécologue-oncologue, mais la seule tenue d'une IRM préopératoire n'a pas présenté une association significative (RC, 1,86; P = 0,09). À la suite de la seule tenue d'une échographie, le délai moyen avant la chirurgie était de 100 jours; ce délai a connu une hausse considérable lorsque d'autres tests d'imagerie ont été menés (131 jours dans le cas d'une tomodensitographie additionnelle, 170 jours dans le cas de l'IRM et 179 jours dans le cas de la combinaison tomodensitographie-IRM; P = 0,002).

Conclusion : La tenue d'une IRM pelvienne à la suite d'une échographie pelvienne ne donne pas lieu à une hausse du taux d'orientation des femmes qui présentent une masse annexielle les exposant à un risque élevé vers un gynécologue-oncologue. Un consensus quant à ce qui est adéquat en matière d'imagerie et de triage, lorsqu'une masse annexielle est identifiée au moment de l'échographie, s'avère requis.

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INTRODUCTION

The purpose of an imaging test in the evaluation of a pelvic mass in women is to identify the location of the mass, to describe the characteristics of the mass, and to enable the ordering physician to determine the next steps in referring the patient to the appropriate surgical specialist. Imaging tests cannot provide a histologic diagnosis, nor can they provide the stage of early ovarian cancers accurately.

The Society of Obstetricians and Gynaecologists of Canada's initial evaluation and referral guidelines for management of pelvic/ovarian masses state that if findings on ultrasound and the clinical scenario are suspicious for malignancy, then further radiologic evaluations such as CT and MRI scans before subspecialty referral are unlikely to be beneficial.[1]

The American Congress of Obstetricians and Gynecologists' guidelines on the management of adnexal masses state that for the evaluation of adnexal masses adding other imaging modalities to transvaginal ultrasound is of limited value. In fact, the sensitivity, specificity, and positive likelihood ratio for malignancy for ultrasound and for MRI are the same and are superior to those of CT scans.[2]

ABBREVIATIONS

CIHI	Canadian Institute for Health Information
CT	computed tomography
LHIN	Local Health Integration Networks
MRI	magnetic resonance imaging
OHIP	Ontario Health Insurance Plan

There is evidence to demonstrate that there are significant gains in length of survival for women with early and advanced ovarian cancer when they are operated on and have clinical management provided by gynaecologic oncologists instead of general gynaecologists and surgeons.[3]

The purpose of this population-based study was to determine the patterns of imaging of pelvic masses in women over the age of 45 in the province of Ontario by the specialty of the ordering physician, and to determine whether imaging tests influenced the referral of women with a high-risk ovarian mass to a gynaecologic oncologist in the years 2006 to 2008.

METHODS

We performed a retrospective population-based study using data at the Institute of Clinical Evaluative Sciences, which contains the health records for 12.5 million residents in the province of Ontario. Using OHIP billing codes, we identified all women on whom a pelvic ultrasound had been performed between January 1, 2006, and December 31, 2008, with identification of an adnexal mass. The OHIP contains physician billing claims per individual patient for medical and surgical services dating from July 1, 1991. Exclusion criteria were age under 45 years; having had a pelvic ultrasound or pelvic-abdominal CT or MRI in the previous five years; any previous gynaecologic, colorectal, genitourinary, or breast cancer; any previous gynaecologic surgery; any previous small or large bowel resection; or any prior history of inflammatory bowel disease or diverticulitis up to the day before the index pelvic ultrasound. The study cohort comprised women who satisfied the inclusion and exclusion criteria and who went on to have a laparotomy for management of the mass within two years of the initial pelvic ultrasound.

Variables obtained from the Registered Persons Database and Canadian Census were age, income quintiles, urban versus rural dwelling, and residential location within each of the province's 14 Local Health Integration Networks.

Linkage of the cohort to the OHIP database and CIHI-Discharge Abstract Database, (which records procedure codes from all inpatient and outpatient hospital admissions) was performed to obtain data regarding investigations and procedures completed within two years after the initial pelvic ultrasound, such as repeat pelvic or transvaginal ultrasound, preoperative pelvic or abdominal CT and/or MRI, and the date and type of surgical procedure. Links to the OHIP and the Corporate Physicians' Database (which contains data on physician specialty in the province of Ontario) produced data on consultations carried out by