

La Radiologia Medica - Radiol Med 74: 312-315, 1987
 Edizioni Minerva Medica - Torino

Diagnostic and prognostic role of infrared thermography

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A series of 469 breast cancer studied by physical examination (PE), mammography (M) and infrared thermography (TH) is discussed. Follow-up was performed up to 5 years later.

The poor diagnostic role of TH is proven for the low sensitivity in the total series (0.47) and, particularly, in T1 cancers (0.26).

TH does not increase significantly the cumulative sensitivity (0.98 vs. 0.97 in the total series). Its limited advantage is offset by the great number of useless biopsies due to TH false positive.

A correlation between TH pattern and prognosis is evident only when TH is considered independently from other reliable prognostic indicators such as the T or N categories.

If survival curves are stratified by T or N or if a multivariate analysis based on TH, T and N variables is performed, all correlations between TH pattern and prognosis disappear; for this reason the use of TH as a prognostic indicator in the clinical practice is disregarded.

PAROLE CHIAVE: Breast cancer - Thermography - Prognostic factors.

Introduction

Infrared thermography (TH) has been widely used in the past as a diagnostic test for primary breast cancer [1, 4]. Its limited diagnostic accuracy and particularly its low sensitivity for small cancers has been frequently reported [1, 7, 8, 13, 17, 20] and recently the method is less often used for diagnostic purposes in many institutions.

A poor prognosis has been reported [6, 9, 10, 14, 16, 19] for breast cancer patients showing thermographic abnormalities, suggesting the possible use of TH as a prognostic indicator, though the few reported observations need to be confirmed by further studies.

TH has been used as a diagnostic test for breast cancer at the Centro per lo Studio e la Prevenzione Oncologica (CSPO) in Florence since 1976. The test was used in addition to physical examination (PE) and mammography (M) in selected cases. The diagnostic reliability of TH was evaluated and reported in 1982 [18] and due to its limited sensitivity its use was progressively reduced and in 1983 the test was almost abandoned. Up to that time more than 6,800 women had been examined by TH and 469 breast cancer cases were detected and followed-up regularly. The aim of the present study is to evaluate the diagnostic accuracy of TH compared with PE and M and to deter-

Ruolo diagnostico e prognostico della teletermografia

Gli autori valutano una serie di 469 casi consecutivi di cancro della mammella studiati con esame clinico (PE) mammografia (M) e teletermografia (TH) e seguiti per 5 anni. La TH non sembra avere alcuna rilevanza quale test diagnostico: la sua sensibilità è assai bassa sia nella serie globale (0,47) che, in particolare, nei cancri T1 (0,26). In aggiunta a PE e M la TH non migliora significativamente la sensibilità complessiva (0,98 vs. 0,97) e tale modesto beneficio è bilanciato negativamente dall'eccesso di biopsie inutili dovute ai falsi positivi della TH. La TH risulta essere correlata alla prognosi solo quando la si consideri separatamente da altri noti e validi indicatori prognostici quali le categorie T e N. La valutazione della sopravvivenza dopo stratificazione per T o N o l'analisi multivariata basata sulle variabili TH, T e N non dimostrano alcuna correlazione significativa della TH con la prognosi e pertanto anche l'uso della TH come indicatore prognostico è da proscrivere.

KEY WORDS: Carcinoma mammario - Termografia - Fattori prognostici.

mine whether TH patterns are correlated to prognostic outcome.

Material and methods

From January 1976 until December 1983 6,832 women were examined by infrared thermography using an AGA-Thermovision 680 equipment. TH was performed after PE and M as an additional test in women selected on a clinical basis without well defined criteria (about 10% of all self-referred women examined at CSPO in that period). For all cases in the study series the available data were age, diagnostic conclusion from PE, M and TH and cytologic or histologic diagnosis if any. For study purposes diagnostic tests were coded as negative-benign or suspect-positive. TH was classified according to Amalric [2] and TH4-TH5 patterns were assumed to be suspect-positive. The sensitivity was determined according to Habbema et al [11] assuming as cancers (either true positives or false negatives) all the cases in which a cancer of the breast had been histologically confirmed within 6 months from the date of the test. In most cases a direct follow-up and an histologic breast cancer registry operating in the Florence Province since 1973 permitted the identification of false

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Pervenuto alla Redazione il 18.11.1986; revisionato il 10.12.1986; restituito corretto il 26.6.1987; accettato per la pubblicazione il 10.7.1987.

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