

Thyroid screening in elderly hospital patients

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SUMMARY

A screening programme of thyroid disease in 214 elderly patients attending hospital was undertaken incorporating clinical and biochemical assessment. The prevalence of untreated hypothyroidism was 2.8%, treated hypothyroidism 2.8%, untreated hyperthyroidism 0.9%, sub-clinical hypothyroidism 4.7%, and non-thyroidal illness 3.3%. One patient with hypopituitarism was identified. Clinical judgement alone was poor. The costs of such a screening programme are discussed and the benefits highlighted.

INTRODUCTION

Thyroid disease in the elderly often presents atypically, and the traditional clinical criteria for diagnosis of both hypothyroidism and hyperthyroidism may be masked and therefore unhelpful.¹ As effective treatment is available, routine screening tests in the elderly of thyroid function have been advocated.^{2,3} However, considerable debate continues as to the benefit of screening the healthy elderly living in the community.⁴⁻⁷

The aim of this study was to determine the prevalence of undiagnosed thyroid disease in all elderly patients presenting to the Geriatric Medical Unit at the Royal Victoria and Throne Hospitals, Belfast, and to assess the benefits of such a routine screening programme.

METHOD

New patients aged 65 years and over, referred to the Geriatric Unit between August 1986 and January 1987 for admission, outpatient and day hospital attendance, were assessed and screened for the presence of thyroid disease.

A standard proforma was completed for each patient at the first attendance, and included assessment of weight loss, energy, temperature preference, hair and skin changes, current medication and previous thyroid treatment. Clinical examination was carried out with particular reference to the presence or absence of signs of thyroid disease, including goitre, lid lag and retraction and delay of the tendon reflexes. Judgement was then made regarding the overall clinical impression of thyroid status and recorded as either hypothyroid, euthyroid or hyperthyroid.

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Blood was sampled for serum total thyroxine (total T₄) and thyroid-stimulating hormone (TSH) estimation. Serum total T₄ was measured by a solid-phase radioimmunoassay⁸ and serum TSH measured by radioimmunoassay.⁹ If initial results were abnormal, a second sample was sent for repeat total T₄ and TSH estimation. In addition, measurement of thyroid antibody titres, free T₄ and response to thyrotropin-releasing hormone (TRH) were performed as clinically indicated. The criteria used for a diagnosis of hypothyroidism were total T₄ repeatedly less than 50 nmol/l with an accompanying elevation of TSH above 5 mU/l. Hyperthyroidism was diagnosed if the total T₄ was greater than 150 nmol/l and accompanied by a diminished TSH response to an intravenous challenge with 200 µg of TRH.

RESULTS

Two hundred and fourteen subjects (160 females, 53 males) were studied, with a mean age of 80.6 years, mean total T₄ of 82.2 nmol/l and mean TSH of 3.1 mU/l. Normal thyroid function tests were found in 182 patients (85%), of whom 48 were male (mean age 76.2 years) with a mean total T₄ of 82.9 nmol/l and a mean TSH of 1.6 mU/l, and 134 female (mean age 82.1 years) with a mean total T₄ of 86.3 nmol/l and a mean TSH of 1.8 mU/l. Initial clinical assessment alone incorrectly judged three of this group as hypothyroid and five as hyperthyroid. Abnormal thyroid function tests were present in 32 patients (15%) (Table I).

TABLE I
Categories of patients with abnormal thyroid function results

	Number	Mean age (years)	Male	Female	% of total
Untreated hypothyroid	6	79	—	6	2.8%
Treated hypothyroid	6	88	1	5	2.8%
New hyperthyroid	2	72	1	1	0.9%
Normal total T ₄ with raised TSH	10	79.5	1	9	4.7%
Low total T ₄ with normal TSH	8	83.3	2	6	3.8%

Untreated hypothyroidism

Six new cases of hypothyroidism were identified (Table II) with a mean total T₄ of 32.9 nmol/l and a mean TSH of 32.8 mU/l. Initial clinical assessment of this group correctly judged one patient as hypothyroid and the remainder were assessed incorrectly as euthyroid. One patient died from cardiac failure, while the remainder improved considerably after treatment with resolution of many non-specific symptoms, accompanied by increased mobility, enabling a return to continuing independence at home.

Treated hypothyroidism

Six patients (5F, 1M) were identified with a previous history of hypothyroidism and thyroxine replacement therapy, with a mean total T₄ of 90.5 nmol/l and a mean TSH of 8.0 mU/l. Two of this group were receiving an inadequate dose of thyroxine and were correctly judged to be clinically hypothyroid.

Hyperthyroidism

Two patients were found to have elevated total and free T₄ levels, flat TSH response to TRH; they were judged to be hyperthyroid and treated with radioactive iodine and carbimazole respectively. Neither case was identified on initial clinical assessment alone.

Normal total T₄ with raised TSH

Ten patients had normal levels of total T₄ with elevated TSH levels. On repeat measurement, the level of TSH returned to normal in three patients, while seven remained abnormal (Table III). Two of this group had been incorrectly judged clinically to have hyperthyroidism.

TABLE II
Untreated hypothyroid patients identified by the screening programme

	Age	Sex	Total T ₄ nmol/l	TSH mU/l	Thyroid antibodies	Presenting illness
1.	90	F	46	10	—	Osteoarthritis
2.	75	F	34	20	—	Chest infection
3.	86	F	22	60	—	Cardiac failure
4.	82	F	35	26	—	Lack of energy
5.	75	F	6.3	25	—	Arthritis
6.	66	F	48	57	+	Myelofibrosis

TABLE III
Sub-clinical hypothyroidism: normal total T₄ with TSH greater than 5.0 mU/l on initial screening test

Age/ Sex	Total T ₄ nmol/l (initial test)	TSH mU/l	Total T ₄ nmol/l (second test)	TSH mU/l	Thyroid antibodies	Presenting illness
79 F	63	6.7	60	5.9	—	Epilepsy
80 F	59	5.4	72	5.4	—	Cardiac failure
78 F	84	5.9	60	5.7	—	Osteoarthritis, diabetes mellitus
71 F	83	5.3	70	3.0*	—	Gout
83 F	60	8.2	54	4.2*	—	Cerebrovascular disease
78 F	63	6.1	70	6.6	—	Partial thyroidectomy for thyrotoxicosis
78 F	61	26.5	62	16.2	+	Cerebrovascular disease
78 F	96	5.8	92	2.9*	—	Cerebrovascular disease
95 F	80	5.7				Terminal bronchopneumonia
75 F	68	8.9	59	7.0	+	Pernicious anaemia

*TSH returned to normal on repeat estimation.

Low total T₄ with normal TSH (non-thyroidal illness)

Eight patients (six female and two male; mean age 83.3 years) with lowered levels of total T₄ and normal TSH levels were identified. The mean total T₄ was 37 nmol/l and TSH 2.1 mU/l. A diagnosis of hypopituitarism was confirmed in one subject. Five patients were seriously ill and subsequently died, and two were recovering after operative fixation of femoral neck fracture. Three of this group were suspected on clinical grounds to have hypothyroidism.

DISCUSSION

Untreated hypothyroidism was detected in 2.8% of the elderly hospital patients, a figure comparable to that of 2.3% recorded in hospital inpatients,¹ and higher than the prevalence rate of 0.94% reported from the elderly in the community.⁵ The overall prevalence rate of untreated and treated hypothyroidism combined was 5.6%. Hyperthyroidism was less common with a prevalence rate of 0.9% in comparison with 0.47% reported from the elderly in the community.⁵ The diagnosis of hypothyroidism on clinical grounds alone was poor, with detection of only one of the six new hypothyroid patients. That clinical diagnosis alone is difficult is further supported by the finding that the majority of this group had attended other hospital departments in the preceding months without detection of the hypothyroidism. This highlights the non-specific clinical presentation of hypothyroidism in the elderly¹ and is an important factor in support of an elective screening programme of the elderly attending hospital rather than reliance on clinical diagnosis alone.

One area of concern is that routine screening will reveal the presence of equivocal results, with resultant difficulty of interpretation and commitment to long-term follow-up. Seven patients had repeatedly normal total T₄ levels with moderate elevation of TSH but without clinical evidence of hypothyroidism. This group may be deemed to have sub-clinical hypothyroidism¹⁰ and will require regular monitoring of thyroid function to detect progression to overt hypothyroidism at an early stage. If thyroid antibodies are also present, then the risk in females of progression to overt hypothyroidism is particularly increased and estimated at 5% per year.¹¹ A second group of eight subjects were identified with low total T₄ levels and normal TSH level. A diagnosis of hypopituitarism was confirmed in one patient and appropriate cortisone and thyroxine replacement therapy commenced, with resolution of confusion and immobility. Five of this second group were seriously ill and subsequently died. Two were recovering from major surgery, confirming a relationship with severe illness previously attributed to lowered protein and thyroxine binding globulin levels and inhibitors of binding.¹² Thus, the majority of elderly patients will fall into one of five distinct categories whose management is straightforward.

Screening of each elderly hospital patient will have an add-on cost to the laboratories of approximately £3, with the cost of total T₄ measurement approximately £1 and TSH £2 per sample. Costs may be reduced by screening using only TSH¹³ or total T₄ estimation, but neither alone will accurately identify the 3% of the patients with sub-clinical hypothyroidism, a proportion of whom may benefit from thyroxine therapy.¹⁴ The total cost of screening 214 patients was approximately £650, resulting in expenditure of around £100 to detect each case of previously undiagnosed hypothyroidism. Treatment costs with thyroxine replacement are small and we would deem the overall financial cost of such thyroid function screening to be cost-effective.

There are considerable variations in the practice of geriatric medicine and selective procedures for admission throughout the UK, and thus reliance on prevalence figures from other reported studies may be misleading. This study has enabled us accurately to establish the prevalence of thyroid disease in the population of sick elderly patients presenting to this geriatric medical unit. It is our belief that the yield of both hypothyroidism and hyperthyroidism previously undetected is an important and worthwhile task and fully justifies screening of the sick elderly. Appropriate treatment has afforded considerable clinical benefit, symptomatic relief and improvement of the elderly patients' quality of life. Reliance on clinical diagnosis alone of thyroid disease in the elderly is inadequate, with many patients remaining undetected and denied effective treatment. Elective screening for thyroid disease in the elderly hospital patient is therefore an important, cost-effective, worthwhile and rewarding task.

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