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Disparity in the management of Graves' disease observed at an urban county hospital: a decade-long experience

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Abstract

BACKGROUND—The objective of this study was to determine whether health care disparities exist in management of Graves' disease.

METHODS—Patients treated for Graves' disease from 1999 to 2009 were divided into medical and surgical treatment groups. A comparative analysis of age, sex, race, health insurance, and income was completed. Address and/or zip code were geocoded and median income was determined from census data.

RESULTS—A total of 634 patients were treated for Graves' disease; 535 (84%) medically and 99 (16%) surgically. Mean age (40 ± 15 vs 43 ± 11 y), percentage of women (84% vs 91%), and racial distribution were similar in the 2 groups ($P > .05$). In the surgical group, median income was lower ($31,530 vs $34,404; $P = .07$) and 52% of patients were uninsured compared with 30% of patients treated medically ($P < .0001$).

CONCLUSIONS—A disproportionate number of uninsured patients underwent thyroidectomy for Graves' disease. Social and economic factors may have a role in determining definitive therapy for Graves' disease.

Keywords

Graves' disease; Thyroidectomy; Social disparity

Graves' disease (GD) is an autoimmune disorder caused by thyroid-stimulating immunoglobulins that bind to the thyrotropin receptor on the follicular epithelial cells of the thyroid gland. This results in increased synthesis of thyroid hormone, symptoms of hyperthyroidism, and the development of diffuse goiter. Patients also may develop extrathyroidal manifestation including infiltrative ophthalmopathy, pretibial myxedema, acropachy, and proximal muscle weakness. The annual incidence of GD in the United States is approximately .04%.[1] It is 4 to 6 times more common in women and it occurs most often in women between the ages of 20 and 50 years.[1]

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There are 3 treatment options for GD: antithyroid drug therapy, radioiodine ablation, and thyroidectomy. Most patients with GD are treated initially with antithyroid drug therapy to normalize free T4 and free T3 levels and minimize the symptoms of thyrotoxicosis. Remission of GD occurs in up to 50% of patients after 12 to 18 months of antithyroid drug therapy.[2] Lifelong maintenance therapy is one treatment option for failure of remission after 18 months of antithyroid drug therapy. Resection of the thyroid gland emerged as a therapeutic option for GD in the mid-1800s, but it was not until the early 1900s that thyroidectomy could be performed with acceptable morbidity. Radioiodine ablation therapy for GD was introduced in 1942 and it quickly replaced thyroidectomy as the primary method for definitive treatment of GD. In the United States, GD traditionally has been treated with antithyroid drugs and/or radioiodine ablation and surgical therapy has been reserved for selected indications.

In a survey of endocrinologists in the United States, only 2% of endocrinologists reported that thyroidectomy was recommended for treatment of GD.[3] At our urban, county-subsidized hospital, we have noted a comparatively larger than expected number of patients undergoing thyroidectomy as their initial treatment for GD. Although multiple studies have documented a relationship between socioeconomic status and outcome of surgery for complex cardiovascular and oncologic procedures, few studies have examined the role of socioeconomic factors and primary payer status on definitive therapy. The purpose of this study was to determine whether social and/or economic disparities exist in the management of GD at our institution over the past decade.

Methods

From 1999 to 2009, all patients with the International Classification of Diseases, 9th revision, diagnosis of thyrotoxicosis with diffuse goiter (242.00) and thyrotoxicosis with diffuse goiter and thyroid storm (242.01) were identified from an outpatient electronic medical record system at MetroHealth Medical Center; an urban, county-subsidized, tertiary care hospital in Cleveland, Ohio. Patients who underwent definitive therapy (radioiodine therapy or thyroidectomy) before 1999 were excluded from the study. Because relevant data were not available for patients who underwent definitive treatment at other institutions, they were excluded from the study. The study was reviewed and approved by the institutional review board at MetroHealth Medical Center.

Patient age, sex, race, health insurance status, address, and zip code; the indications for surgical therapy; and the surgical pathology results were extracted from the electronic medical record. Patients' were stratified by primary payer status into 1 of 4 categories: private insurance, Medicare, Medicaid, and uninsured (self-pay). Patient addresses were geocoded using ArcView software (version 9.3; ESRI, Redlands, CA) to obtain the census block of residence for each individual. Median income for each census block was obtained from the 2000 US census. For addresses that could not be geocoded, income was obtained based on the zip code of residence using the 2000 US census data.

Patients were divided into 2 groups: those who were managed with definitive long-term antithyroid drug therapy or radioiodine ablation and those who were managed surgically. All patients who underwent thyroidectomy were treated with an antithyroid drug to normalize their free T4 and free T3 levels before surgery. Only patients who did not undergo thyroidectomy, however, were included in the medical management group. Age, sex, racial distribution, health insurance status, and income level were compared between the 2 groups to determine if any disparities existed among patients who underwent medical versus surgical therapy for GD. Endocrinology clinic visits were screened for cancellations and no-shows for each patient during the study period.

Postoperative complications from thyroidectomy were recorded for the surgical cohorts. Postoperative hypocalcemia was defined as a serum calcium level less than 8.4 mg/dL (normal range, 8.4–10.4 mg/dL). Symptomatic hypocalcemia was recorded for patients who experienced acral or perioral tingling and/or paresthesias, carpopedal spasm, and/or tetany. Patients who required calcium and vitamin D supplementation to maintain normocalcemia for greater than 6 months after the initial surgery were defined as having permanent hypoparathyroidism.

All statistical analysis were performed using the R statistical software program (R Foundation for Statistical Computing, Vienna, Austria). Continuous variables were compared using the Student *t* test, and categoric variables were compared using the Fisher exact test. A *P* value of less than .05 was considered statistically significant.

Results

A total of 898 patients with GD were identified: 264 underwent definitive therapy at another institution or before 1999 and thus were excluded. A total of 634 patients constituted the study population; 535 (84%) were treated medically and 99 (16%) underwent total thyroidectomy. All thyroidectomies were performed by a single surgeon. Within the medical treatment group, 87 (16%) patients underwent radioiodine therapy for their Graves' disease.

When comparing the patients who underwent medical versus surgical therapy the mean age for the groups were as follows: 40 ± 15 (range, 5–95) years versus 43 ± 11 (range, 22–87) years ($P = .08$). Both groups had a predominance of female patients (medical, 84%; vs surgical, 91%; $P = .90$). The racial distribution was similar in the medical versus surgical groups ($P > .05$) and are outlined in Table 1. African American patients made up the largest racial group, followed by Caucasian patients, Hispanic patients, and Asian patients. There was a median number of 3 (range, 0–32) no-shows/cancellations for patients treated medically versus a median number of 2 (range, 0–15) no-shows/cancellations in the surgically treated group ($P = .03$).

The median income was lower in the surgical group ($31,530 vs $34,404; $P = .07$). Fifty-two percent of surgical patients were uninsured compared with 30% of patients treated medically ($P < .0001$) (Table 2). For patients in the medical treatment group who had insurance, 191 (51%) patients had private insurance coverage and the remainder of the patients had either Medicaid or Medicare. In the surgical group in which 47% of patients had insurance, only 6 patients (6%) had private insurance. Forty-four of the 99 patients in the surgical group underwent thyroidectomy based on preference after the treatment options were explained to them. Of these 44 patients, only 1 patient (2%) had private insurance. The rest of the patients were divided equally between patients without insurance and patients with Medicaid.

The principal indications for surgery were patient preference (n = 44; 44%), compressive symptoms (n = 42; 42%), noncompliance (n = 7; 7%), failed radioiodine (n = 5; 5%) and an associated thyroid nodule (n = 1; 1%). Patient preference was assigned to those patients who had no other specific indication for surgery but preferentially elected definitive surgical therapy rather than radioiodine or long-term antithyroid drugs.

Postoperatively, there was 1 patient with transient bilateral recurrent laryngeal nerve palsy requiring tracheostomy. Her tracheostomy was removed 8 weeks after surgery with complete resolution of her symptoms and return of normal vocal cord function documented with laryngoscopy and a video-swallow study. Sixty-eight patients (69%) developed transient hypocalcemia (<8.4 mg/dL) postoperatively, which was symptomatic in 25 (25%). At the 6-month follow-up evaluation, all but 2 patients were off all calcium

supplementation, one patient with a normal serum parathyroid hormone level who remained on 1 g of elemental calcium daily and eventually was diagnosed with vitamin D deficiency, treated with vitamin D, and her calcium was discontinued and the other patient who was treated with 4 g of elemental calcium and 1.0 μg rocaltrol daily and was diagnosed with permanent hypoparathyroidism. No patient developed a neck hematoma or permanent recurrent laryngeal nerve injury.

There were 2 (2%) patients whose final surgical pathology revealed an incidental microcarcinoma. One patient had a .5-cm papillary thyroid carcinoma and the other patient had a .4-cm follicular variant of papillary thyroid carcinoma.

Comments

In the United States, radioiodine ablation and antithyroid drugs are used most commonly for GD treatment. Surgical resection traditionally has been reserved for patients with severe ophthalmopathy, a concomitant suspicious or malignant thyroid nodule; intolerance to antithyroid medications in pregnancy; a desire for pregnancy; compressive symptoms; and failure of medical treatment. A survey conducted by the American Thyroid Association revealed that surgical resection was recommended as the primary treatment modality in only 2% of all patients with GD and only 7% of patients with GD and a large goiter.[3] Over the years, we have noticed a higher than expected number of patients with GD at our hospital being referred for thyroidectomy. Given that our institution is an urban, county-subsidized, tertiary medical center where a significant percentage of the patient population either has no insurance or Medicaid, we sought to determine whether health care disparities exist in the treatment of patients with GD.

The study population consisted predominately of women in their fifth decade, which is a typical cohort of patients with GD. Sixty-one percent of the study population was a racial minority. Thyroidectomy was the primary treatment in 16% of patients with GD who were managed at our institution over a 10-year period, which is significantly higher than the 2% rate that has been reported in the literature.[3] Patients who underwent thyroidectomy for definitive treatment of GD had a lower median income and were less likely to have health insurance than their medically treated counterparts.

One surgeon performed all the thyroidectomies for patients who were referred by their endocrinologists for surgical therapy. In all the patients referred for surgery, the treatment options were reviewed with the patient by the same surgeon. The 2 most common indications for surgical therapy were patient preference (44%) and a large goiter causing compressive symptoms (42%). Of the 44 patients who decided to proceed with primary surgical therapy based on preference alone, only 1 (2%) had commercial insurance. Ninety-four percent of the entire surgical cohort were either without insurance or had Medicaid insurance. The lack of insurance and lower income observed in patients with GD treated with thyroidectomy may be an indicator of various social determinants of health such as level of education, access to information, access to medical care, or ability to take the necessary time away from employment for the frequent follow-up visits required for the medical treatment of GD. Given that patient preference was the most common indication for thyroidectomy, we believe that social and economic factors may have had an influential role in determining the definitive treatment for patients with GD.

Thyroidectomy results in immediate relief of symptoms of hyperthyroidism associated with GD when compared with radioiodine ablation therapy, which takes a median of 3 months and sometimes multiple doses to alleviate symptoms and correct hyperthyroidism.[4] Although antithyroid medication and radioiodine ablation therapy require frequent monitoring of thyroid function to detect overt or subclinical hypothyroidism, the inevitable

hypothyroidism that occurs after total thyroidectomy is treated with immediate thyroid hormone replacement therapy and requires less surveillance. Thyroid hormone replacement therapy is inexpensive and a yearly follow-up serum thyrotropin level is recommended because the necessary amount of thyroid hormone may change with age. Patients treated with antithyroid drugs or radioiodine had a significantly higher number of no-shows and cancellations recorded for endocrinology visits than for patients who underwent surgical therapy. Patients in the medical group had as many as 32 missed or cancelled appointments during the study period. The prompt resolution of symptoms, reduction in daily medications, as well as less frequent clinic visits required postoperatively to monitor thyroid function make thyroidectomy an attractive option for lower-income patients who do not have the means to afford health care or the time to be away from their employment that is necessary for regular follow-up evaluation.

In this study, social and economic factors were examined in the context of management of GD. Our study showed that patients with GD who either have no insurance or Medicaid were more likely to undergo definitive surgical therapy for their GD. This is in contrast to the general practice in the United States in which an overwhelming majority of patients are managed with radioiodine therapy with or without antithyroid drugs. Thyroidectomy has been the least used treatment option for GD in the United States and this, in part, may be owing to the historical rate of complications attributed to thyroidectomy. Vocal cord paralysis from recurrent laryngeal nerve injury has been reduced to 2% or less when thyroidectomy is performed by a skilled surgeon.[5] The incidence of permanent hypoparathyroidism has been reported by many studies to be as low as .5%.[5–7]

Our incidence of postoperative complications associated with thyroidectomy is comparable with what has been reported in the literature. No patient in our series had a permanent recurrent laryngeal nerve injury, although 1 patient had a transient bilateral recurrent laryngeal nerve palsy that required a temporary tracheostomy for 8 weeks. One (1%) patient had permanent hypoparathyroidism. Because of the reduction in surgical complications associated with thyroidectomy, the reluctance to recommend thyroidectomy for definitive treatment of GD has been challenged in recent years.[1,5,8–10] A study by In et al[2] in 2009 showed that thyroidectomy is more cost effective than either radioiodine ablation or antithyroid medication therapy and offers patients a better quality of life.

There were several limitations to our study. It was a retrospective study of patients with GD treated over a decade in which most of the clinical information was obtained from an electronic medical record. Reliance on address or zip code alone to determine income or socioeconomic status is less accurate than by obtaining income directly from the patient or obtaining other indicators of socioeconomic status such as occupation, highest level of education, and home value. There were patients whose addresses could not be geocoded into the ArcView software to extrapolate their income, and, as a result, their zip codes were used. There may be significant variability in income within a particular zip code and this may have introduced potential error in the estimation of a particular patient's income level. The referral pattern of patients for evaluation of thyroidectomy varied depending on the referring physician, and could have introduced bias in the results we obtained. The possibility of unrecognized miscoding and the potential cross-over within payer groups were other potential limitations.

In conclusion, primary payer status was found to be an important determinant for the method of treatment chosen for GD. A disproportionate number of uninsured patients and patients with Medicaid underwent surgical therapy for GD. We have offered some potential explanations for this trend observed at our institution; however, prospective studies are needed to validate our findings. However, given the recent evidence that thyroidectomy may

be more cost effective and result in a better quality of life for patients with GD, thyroidectomy should be presented as a definitive therapeutic option for all patients with GD.

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Table 1

Racial distribution of patients

	Surgical (n = 99)	Medical (n = 535)
African American	46 (46%)	243 (45%)
Caucasian	39 (39%)	210 (39%)
Hispanic	9 (9%)	54 (10%)
Asian	5 (5%)	8 (2%)
Other/unknown	0	20 (4%)

Table 2

Insurance status of patients

	Surgical (n = 99)	Medical (n = 535)
No insurance	52 (52%)	161 (30%)
Insurance	47 (47%)	374 (70%)
Private	6 (6%)	191 (36%)
Medicaid	41 (41%)	139 (26%)
Medicare	0	44 (8%)