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Surgery for Graves' Disease: Total versus Subtotal Thyroidectomy—Results of a Prospective Randomized Trial

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Abstract. The effect of surgery on Graves' orbitopathy (GO) is still controversial. Retrospective analyses of many authors (including our own group) demonstrated GO improvement after subtotal thyroid resection in up to 70% of operated patients, so the question arose whether total thyroidectomy could add anything to this pronounced positive effect on GO. We therefore performed a prospective randomized trial on 150 patients with Graves' disease (125 women, 25 men; mean thyroid volume 80.5 ml) comparing three surgical procedures (bilateral subtotal thyroid resection—total remnant < 4 ml; unilateral hemithyroidectomy with contralateral subtotal thyroid resection—remnant < 4 ml; total thyroidectomy) and their effect on postoperative GO changes, postoperative thyroid-stimulating hormone receptor (TSH-R) antibody titers, and postoperative complication rates. After a period of at least 6 months (6–36 months) GO had improved in 71% to 74% of all patients regardless of whether total or subtotal thyroidectomy was performed. TSH-R antibody titers showed no differences for the three surgical groups. Postoperative recurrent hyperthyroidism occurred in two patients with subtotal resections, and early postoperative hypoparathyroidism was more frequently detected in patients with total thyroidectomy than in those with subtotal thyroid resection (28% vs. 12%; $p < 0.002$). In respect to possible postoperative hypoparathyroidism and a lack of difference in postoperative GO changes, we do not advocate total thyroidectomy for patients with Graves' disease and Graves' orbitopathy but prefer radical subtotal thyroid resection with a remnant of less than 4 ml.

Surgical treatment of Graves' disease resolves hyperthyroidism by subtotal or total thyroid resection. In comparison to radioiodine treatment, the number of operated patients has decreased in recent years; and surgery is indicated mainly in patients of young age, pregnant women with Graves' disease and patients with goiters larger than 60 ml [1–7]. Some authors also recommend surgery for patients with troublesome endocrine orbitopathy (GO) [1, 3–5, 8–10], where radioiodine treatment does not seem to have a positive effect [11–15]. The present data on GO after various therapeutic modalities have been accumulated mainly from retrospective analyses questioning the clinical value of these studies [1, 5, 8, 10, 13, 15, 16]. Thus only scanty information exists about the importance of remnant size on postoperative GO changes and on changes in postoperative thyrotropin receptor antibody (TSH-R-Ab) titers [17].

After 6 years of thyroid surgery for Graves' disease at the Department of Surgery in Düsseldorf on 462 patients with no mortality, low morbidity, and satisfying functional outcome (recurrent hyperthyroidism of less than 5%), we started a prospective randomized trial. We investigated whether total thyroidectomy might be superior to subtotal thyroidectomy (bilateral or unilateral remnants of less than 4 ml) in respect to the adverse effect on immunologic parameters and endocrine orbitopathy, as has been suspected by Winsa et al. [10]. The upper limit of 4 ml total thyroid remnant size was chosen because of the higher incidence of recurrent Graves' disease in patients with larger thyroid remnants [8, 17–24]. In addition to the effect of thyroid surgery on immunologic factors in Graves' disease, we compared subtotal and total thyroidectomy for their postoperative morbidity. The following study therefore compares total thyroidectomy to subtotal thyroid resection in Graves' disease patients. It demonstrates for the first time their effect on ophthalmopathy and TSH-R-Ab titers in a prospective randomized trial.

Patients and Methods

Between January 1993 and May 1995 a total of 150 patients with clinically or biochemically proven Graves' disease were randomized into three surgical groups. After the patients consented to the prospective randomized trial, 50 were randomized to total thyroidectomy, 50 to unilateral total and contralateral subtotal thyroid resection, and 50 to bilateral subtotal thyroid resection.

Altogether, 125 women and 25 men with a mean age of 30.2 years (range 12–73 years) were included. Of these 150 patients, 136 (90.7%) had been treated conservatively prior to surgery for a mean interval of 34.2 months (range 2–300 months). As is common medical procedure, 145 patients received antithyroid drugs alone or in combination with β-adrenergic blocking drugs ($n = 58$, 40.0%), thyroid hormone substitution ($n = 59$, 40.7%), or a combination of the two. One patient had taken only β-adrenergic-blocking drugs, and four patients had not been treated with any antithyroid drug or β-adrenergic-blocking drug prior to surgery (Table 1).

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Table 1. Preoperative medical treatment in 150 patients with Graves' disease.

Treatment	No. of patients
Antithyroid drugs only[a]	87
Antithyroid drugs with β-blockers[a]	58
β-Blocker only	1
No medication	4

[a]In combination with thyroxine ($n = 59$).

Table 2. Graves' disease: indications for operation.

Indication	No. of patients
Recent hyperthyroidism/early relapse	56 (37.4%)
Goiter size/malignancy (mechanical obstruction)	38 (25.3%)
Graves' orbitopathy	29 (19.3%)
Medical discomfort	27 (18.0%)

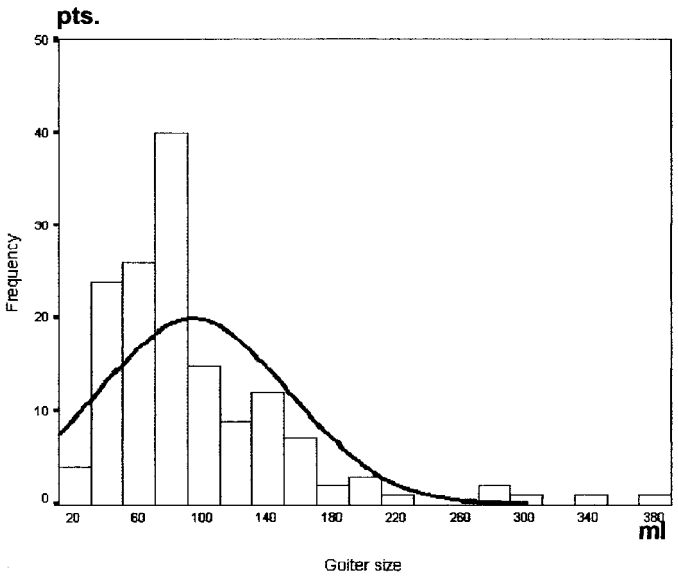

Fig. 1. Distribution of preoperative thyroid volume in 150 patients (pts.) with Graves' disease.

The indications for operation in these 150 patients were recurrent hyperthyroidism after medical treatment in 56 (37.4%), subjective complaints of discomfort with the medical treatment in 27 (18%), increased endocrine orbitopathy in 29 (19.3%), and mechanical obstruction by a large goiter in 38 (25.3%) (Table 2).

The mean preoperative thyroid volume was 80.5 ml (range 17–376 ml) (Fig. 1). Total remnant size was intended to be less than 1 ml in patients after total thyroidectomy and less than 4 ml in both groups with subtotal thyroid resection. In case of specific technical demands, surgeons were allowed to change the recommended procedure individually for the patient's advantage. This situation occurred in four patients where expected total thyroidectomy ($n = 3$) or bilateral subtotal thyroid resection ($n = 1$) was changed to unilateral total and contralateral subtotal thyroid resection, respectively (Table 3).

Comparing the three randomized groups (intended treatment) and the three groups of actual treatment (four patients with treatment different from that assigned by randomization) no systematic difference was present in respect to age, goiter size, preoperative conservative treatment, preoperative TSH-R-Ab titers, or endocrine orbitopathy (Table 3).

Preoperative and postoperative TSH-R-Ab titers were measured, and endocrine orbitopathy was investigated. GO was estimated clinically, using the modified scale system of the American Thyroid Association (ATA) [9], by general practitioners or ophthalmologists and by the patients themselves.

The TSH-R-antibodies were preoperatively measured in 128 of the 150 patients (85.3%) and demonstrated pathologic findings in 99 (77.3%). In 29 patients (22.7%) the TSH-R-Ab titers were within the normal range (Table 4). In these patients clinical measurement of endocrine orbitopathy and ultrasonography of the thyroid gland had confirmed the suspected Graves' disease. Of the 150 patients, 98 (65.3%) suffered from visible and clinically measurable endocrine orbitopathy, with its severity estimated by the above-mentioned modified ATA score system.

Early postoperative complications until discharge from hospital were noted and documented, as was the preoperative data and the operative treatment, on a computerized database with more than 50 single factors. Thus postoperative serum calcium levels and the need for calcium substitution was investigated. All patients were checked by certified ear, nose, and throat physicians for recurrent laryngeal nerve paralysis. Long-term results of changes in endocrine orbitopathy (GO), serum calcium levels, vocal cord motility, and TSH-R-Ab titers were measured between 18 and 58 months after thyroid operation.

All data were examined prospectively. Nominal data were presented as numbers, percentages, or both. Interval variables were given as medians and ranges. Statistical comparisons of nominal data between groups were carried out using the chi-square test or Fisher test. For qualitative data the Mann-Whitney test (two groups) or the Kruskal-Wallis test (three groups) was used.

Results

Subtotal thyroid resection was performed in 103 patients with an attempt to leave less than 4 ml total remnant. The actual postoperative remnant was measured by ultrasonography in 82 of these 103 patients (80%) 3 to 6 months postoperatively. It revealed remnants of less than 1 ml in 23 patients (28%), a total remnant of 1 to 2 ml in 26 patients (32%), and remnants of 2 to 4 ml in 23 patients (28%). Of these 82 patients, 10 (12%) proved to have larger remnants than expected (5–10 ml). Most of the patients with large remnants were seen in the group with unilateral total and contralateral "subtotal" thyroid resection (Fig. 2).

Postoperative TSH-R-Abs were measured in 107 of the 150 patients (71.3%). Of the 99 patients with elevated TSH-R-Ab preoperatively, 75 were controlled 6 to 36 months postoperatively. In 57 of these 75 patients (76%) the TSH-R-Ab reverted to normal, whereas 18 patients (24%) continued to demonstrate pathologically high titers. Of these 18 patients, 2 demonstrated clinical hyperthyroidism, whereas all other patients were euthyroid under L-thyroxine ($L\text{-}T_4$) medication. Of 29 patients with proven normal preoperative TSH-R-Abs, 22 were controlled postoperatively more than 6 months after the operation. In 2 of these 22 patients pathologic TSH-R-Ab titers were measured. None of the 22 suffered from recurrent hyperthyroidism (Table 4).

Table 3. Distribution of various parameters in randomized surgical groups, comparing actual treatment and intention to treat.

	Intended treatment			Actual treatment		
	A (n = 50)	B (n = 50)	C (n = 50)	A (n = 49)	B (n = 54)	C (n = 47)
Age (years)						
Median	35.5	41	38	36	41	38
Range	12–73	17–66	19–68	16–73	12–66	21–68
Gender						
Male	7 (14%)	9 (18%)	9 (18%)	6 (12.2%)	10 (18.5%)	9 (20.5%)
Female	43 (86%)	41 (82%)	41 (82%)	43 (87.8%)	47 (81.5%)	35 (79.5%)
Goiter size (ml)						
Median	72.5	85	84	73	83	84
Range	28–294	17–376	27–203	28–294	17–376	27–203
Preop. conservative treatment (months)						
Median	44.5	30.5	27.5	46	30.5	26
Range	3–229	2–170	2–300	3–229	2–170	3–300
Preop. TSH-R-Ab level [U/L]						
Median	59	26	35	55.5	34	41
Range	0–520	0–330	1–366	0–520	0–330	3–366
Preop. GO						
Yes	32 (64%)	33 (66%)	33 (66%)	32 (65.3%)	33 (61.1%)	33 (70.2%)
No	18 (36%)	17 (34%)	17 (34%)	17 (34.7%)	21 (38.9%)	14 (29.8%)
Length of preop. GO (month)						
Median	5	7	8	7	4	9
Range	4–185	1–203	3–261	4–185	1–203	3–261

None of the differences between/among groups was significant: $p > 0.05$, chi-square test.

A: bilateral subtotal thyroid resection; B: total unilateral with subtotal contralateral thyroid resection; C: total thyroidectomy; GO: Graves' orbitopathy; TSH-R-Ab: thyroid-stimulating hormone (thyrotropin) receptor antibody.

Table 4. TSH-R-Ab values preoperatively and postoperatively.

Operation	No. of pts.	TSH-R-Ab postoperatively		
		Elevated	Normal	Unknown
High preop. TSH-R-Ab				
Dunhill	36	4	22	10
Bilat. sub. res.	31	9	15	7
Tx	32	5	20	7
Normal preop. TSH-R-Ab				
Dunhill	11	2	7	2
Bilat. sub. res.	11	0	8	3
Tx	7	0	5	2
Unknown preop. TSR-R-Ab				
Dunhill	7	2	1	4
Bilat. sub. res.	7	0	1	6
Tx	8	1	5	2
Total		23	84	43

Results are the number of patients.

Dunhill: total unilateral with subtotal contralateral thyroid resection; Bilat. sub. res.: bilateral subtotal thyroid resection; Tx: total thyroidectomy.

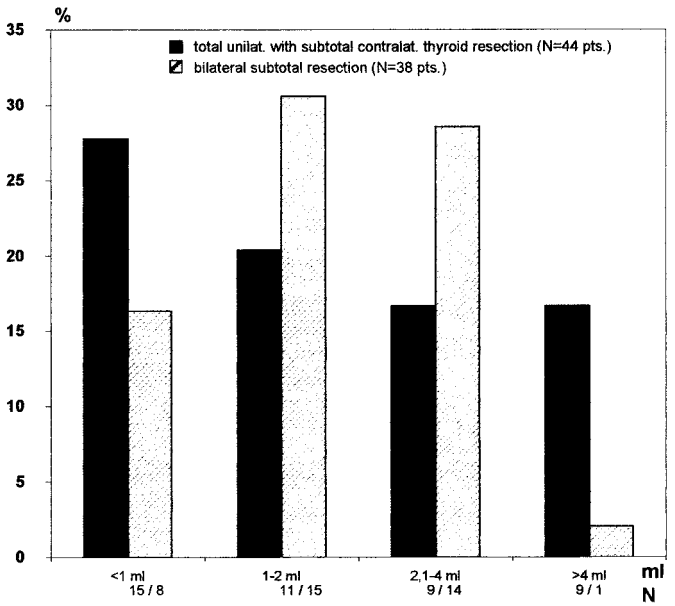

Fig. 2. Actual postoperative total remnant size in Graves' disease (n = 82) measured by ultrasonography after bilateral subtotal thyroid resection (n = 38) or total unilateral (unilat.) with subtotal contralateral (contralat.) thyroid resection (n = 44).

When comparing the individual TSH-R-Ab titers in patients of the three surgical procedure groups pre- and postoperatively, no difference was seen. Thus the mean TSH-R-Abs decreased in all three groups almost equally but demonstrated a wide spectrum of individual minimal to significant changes in various patients. Among the patients with bilateral subtotal resection and those with total thyroid resection, one patient each had pathologic TSH-R-Ab levels preoperatively that increased during the postoperative phase, as did two patients with unilateral lobectomy and contralateral subtotal resection. Two of these four patients developed recurrent Graves' disease with clinically manifest hyperthyroidism, and one patient experienced worsening of her eye symptoms (Fig. 3).

A 46-year-old woman was preoperatively treated with antithyroid drugs because hyperthyroidism had recurred twice. TSH-R-Ab levels were elevated preoperatively (33 U/L), but she showed no signs of GO. At 13 months after bilateral subtotal resection with minimal thyroid remnant size (total <2 ml) the TSH-R-Ab titer increased, and the patient suffered from recur-

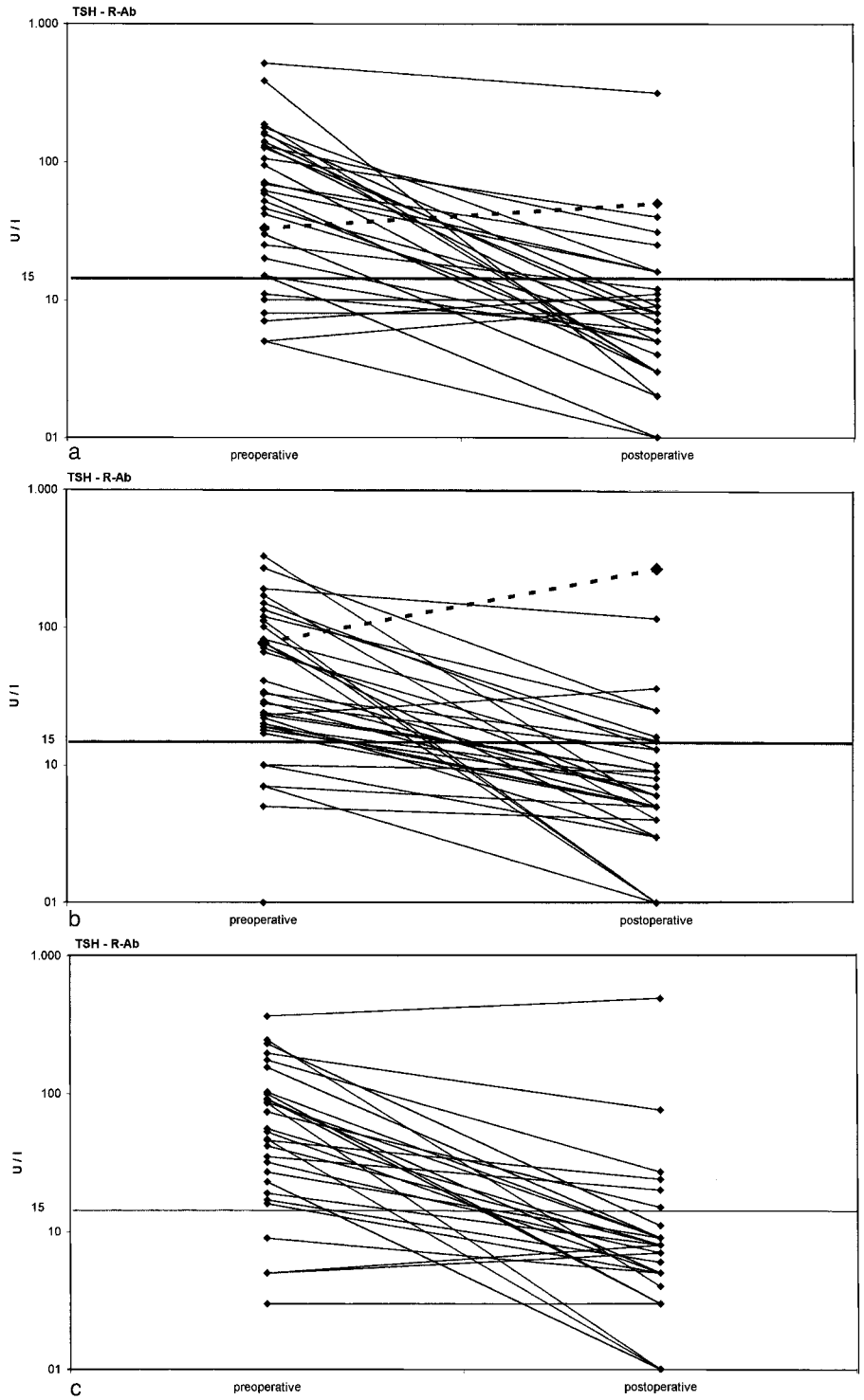

Fig. 3. Thyroid-stimulating hormone receptor antibody (TSH-R-Ab) values pre- and postoperatively after **(a)** bilateral subtotal thyroid resection ($n = 31$); **(b)** total unilateral with subtotal contralateral thyroid resection ($n = 35$); and **(c)** total thyroidectomy ($n = 30$).

rent hyperthyroidism. She was then treated with radioiodine, became hypothyroid, and was put on thyroxine.

A second woman, 40 years of age, was treated with antithyroid drugs preoperatively and demonstrated an elevated TSH-R-Ab titer that decreased to normal under antithyroid drugs preoperatively. She additionally suffered from GO symptoms. After hemithyroidectomy and contralateral resection, the hyperthyroidism recurred 10 months later with a significantly elevated TSH-R-Ab titer (268 U/L). Despite the large remnant (10 ml) and the recurrent hyperthyroidism, the ATA score had improved postoperatively. She was then put on high dose antithyroid drugs with L-T_4 substitution.

The endocrine orbitopathy in 98 of the 150 patients (65%) was controlled in 82 (83.7%). Of these 82 patients, 61 (74%) had

Table 5. Postoperative clinical course of GO and preoperative and postoperative differences in GO using the modified ATA scale system:

	Intended treatment			Actual treatment		
Parameter	A (n = 50)	B (n = 50)	C (n = 50)	A (n = 49)	B (n = 54)	C (n = 47)
Course of GO						
Improved	21 (72.4%)	20 (74.1%)	22 (71%)	21 (72.4%)	20 (74.1%)	22 (71%)
Equal	5 (17.2%)	6 (22.2%)	7 (22.6%)	5 (17.2%)	6 (22.2%)	7 (22.6%)
Worsened	3 (10.3%)	1 (3.7%)	2 (6.5%)	3 (10.3%)	1 (3.7%)	2 (6.5%)
Diff. of GO (patients)						
Median	0	5	1	0	5	1
Range	−12 to 21	−10 to 23	−4 to 36	−12 to 21	−10 to 23	−4 to 36
Diff. of GO (ophthalmologists)						
Median	2.5	2	2	2.5	2	2
Range	−3 to 15	−4 to 15	−9 to 30	−3 to 15	−4 to 15	−9 to 30

There were no significant differences between groups. Comparison of the three operative groups including intention to treat and actual treat demonstrates no significant difference ($p > 0.05$, chi-square test).

Diff. of GO: difference in GO values pre- and postoperatively according to the American Thyroid Association scale judged by patient or ophthalmologists.

documented improvement of their eye symptoms, but 21% had no difference. Four patients (5%) complained of worsening of their endocrine orbitopathy postoperatively (Table 5). Of the 57 patients with no GO symptoms preoperatively, 5 (8.7%) developed a postoperative endocrine orbitopathy. Comparing the surgical procedures and individual- and group-specific changes in eye symptoms, no difference could be detected between total and subtotal thyroidectomy (p = n.s.) (Fig. 4).

Early postoperative complications were mainly laryngeal nerve paralysis, hypoparathyroidism, and wound infection. Early postoperative unilateral vocal cord paralysis was detected in four patients after unilateral total and contralateral subtotal resection (7.4%), in one patient with bilateral subtotal resection (2%), and in one patient with total thyroidectomy (2.1%). Further follow-up demonstrated normalization of vocal cord function in four of these six patients; one patient after unilateral thyroidectomy with contralateral subtotal resection and one patient after total thyroidectomy with permanent laryngeal nerve paralysis (1.9%). In respect to laryngeal nerve paralysis the three surgical procedures demonstrated no statistical significant difference (p = n.s.).

Early postoperative hypoparathyroidism, defined as calcium below 2.0 mmol/L or necessary calcium substitution for at least 5 days, was seen in two patients with unilateral hemithyroidectomy and contralateral resection (4%). Altogether, 6 patients with bilateral subtotal resection (12%) and 14 patients with total thyroidectomy (28%) suffered from early postoperative hypoparathyroidism. This difference in early postoperative hypoparathyroidism was statistically significant for the three operative groups and highly statistically significant for total and subtotal thyroidectomy ($p < 0.005$) (Table 6).

Long-term results of hypoparathyroidism indicated the need for calcium substitution in eight patients (6.7%) to achieve serum calcium levels of more than 2.2 mmol/L. Altogether, there was a tendency toward higher long-term hypoparathyroidism in patients after total thyroidectomy versus subtotal thyroidectomy but the numbers did not reach statistical significance ($p = 0.06$) (Table 6).

Wound infections and postoperative bleeding were recorded for two patients after unilateral thyroidectomy with contralateral subtotal resection (4%), one patient after bilateral subtotal thyroid resection (2%), and two patients after total thyroidectomy (4%) (Table 6).

Discussion

Endocrine orbitopathy is the main problem in patients with Graves' disease when hyperthyroidism is effectively and definite treated by radioiodine or thyroid surgery [12]. Thus Graves' orbitopathy may produce a wide range of clinical symptoms, ranging from only minimal clinical discomfort to hazardous, dangerous loss of sight [9, 14, 25]. In recent years many retrospective studies have compared the effect of endocrine drugs, radioiodine, and thyroid surgery on changes in GO; more favorable results were seen after surgery than after radioiodine treatment [1, 5, 14, 26, 27]. This stands in contrast to reports of worsening eye symptoms after total thyroidectomy by Werner et al. [15] and after subtotal thyroidectomy by Catz and Perzik [16]; and it questions whether thyroid surgery has a direct effect on additional immunologic side effects of Graves' disease, such as GO.

The present study compared total thyroidectomy versus subtotal thyroid resection to determine if changes in GO parallel the radicality of the thyroid surgery. In contrast to the retrospective evaluation of Winsa et al. [10], we were unable to find any difference between total and subtotal thyroid resection when postoperative TSH-R-Ab levels and postoperative endocrine orbitopathy were measured. Winsa et al. predicted an enhanced decrease in TSH-R-Ab levels after total thyroidectomy compared to those seen after subtotal thyroid resection, but only 19 patients were investigated. In 157 patients with subtotal thyroid resection they found some patients with no changes in TSH-R-Ab postoperatively. Our own investigation on 150 patients demonstrated preoperative pathologic TSH-R-Ab titers in 99 (66%) and *not* in 93% as Winsa et al. had found. These pathologically high TSH-R-Ab levels remained above normal despite subtotal or total thyroidectomy in 16 of 44 patients (36%). Interestingly, eight patients with primarily pathologically high (n = 4) or normal (n = 4) TSH-R-Ab titers demonstrated an increase in these titers postoperatively. Following the results of other authors, who investigated the effect of conservative treatment on Graves' hyperthyroidism and on antibody changes in Graves' disease, our patients with increasing pathologic TSH-R-Ab titers were specifically prone to recurrent hyperthyroidism [10, 28–30]. Thus two of these four patients with primarily elevated TSH-R-Ab titers and subsequently increasing levels of TSH-R-Ab had a

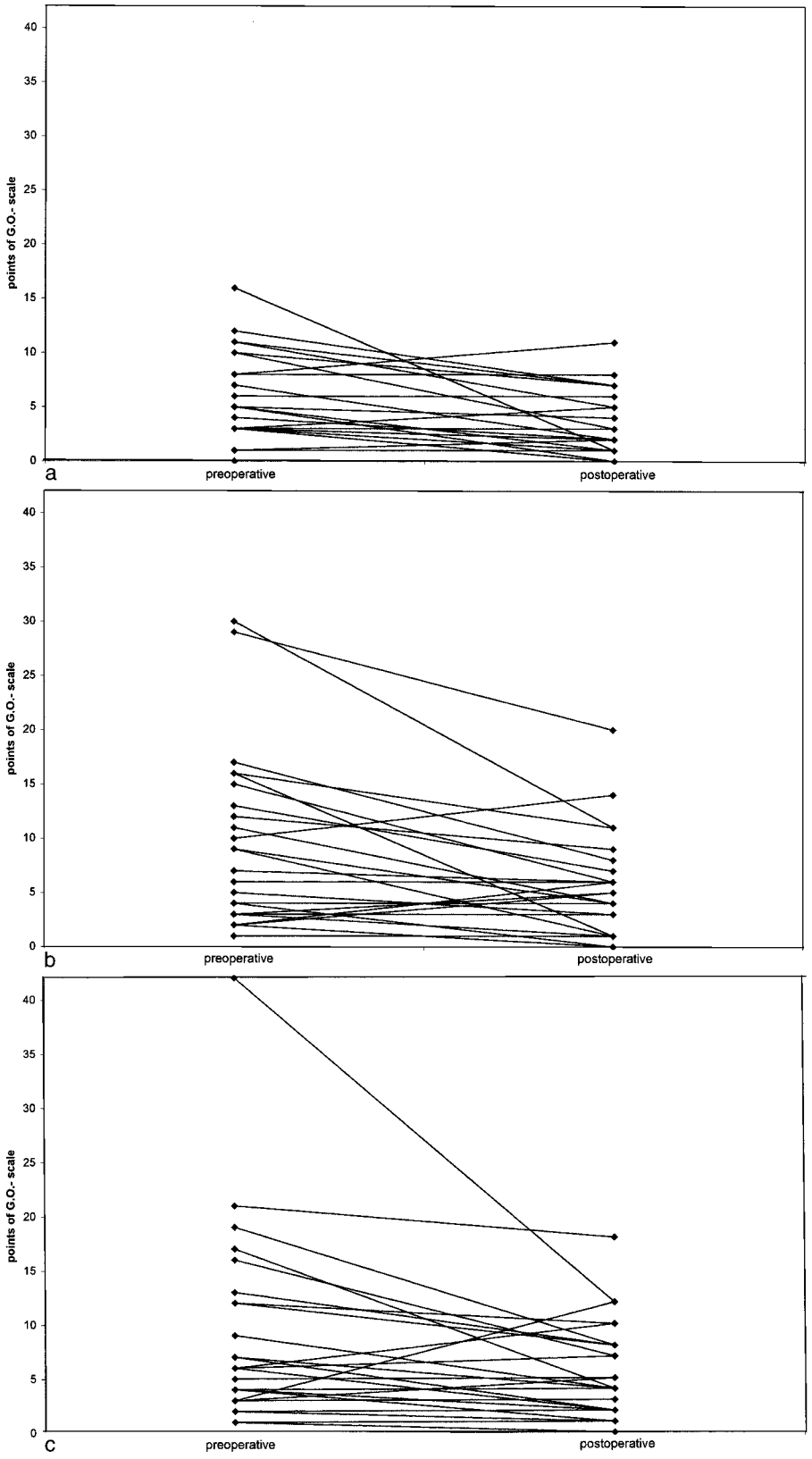

Fig. 4. Clinical courses of Graves' ophthalmopathy (G.O.) in patients measured pre- and postoperatively after **(a)** bilateral subtotal thyroid resection (n = 29); **(b)** total unilateral with subtotal contralateral thyroid resection (n = 27); and **(c)** total thyroidectomy (n = 31) using the modified American Thyroid Association scale system [9].

Table 6. Postoperative complications after surgery for Graves' disease.

	Intended treatment				Actual treatment			
Complication	A (n = 50)	B (n = 50)	C (n = 50)	p	A (n = 49)	B (n = 54)	C (n = 47)	p
RLNP								
Early	1 (2%)	4 (8%)	1 (2%)	n.s.	1 (2%)	4 (7.4%)	1 (2.1%)	n.s.
Permanent	0	1 (2%)	1 (2%)	n.s.	0	1 (1.9%)	1 (2.1%)	n.s.
Hypoparathyroidism								
Early	6 (12%)	2 (4%)	14 (28%)	0.003	5 (10.2%)	3 (5.6%)	14 (29.8%)	0.002
Permanent	3 (6%)	0	5 (10%)	n.s.	2 (4.1%)	1 (1.9%)	5 (10.6%)	n.s.
Wound infection	1 (2%)	2 (4%)	2 (4%)	n.s.	1 (2%)	2 (3.7%)	2 (4.3%)	n.s.

RLNP: recurrent laryngeal nerve paralysis; Early RLNP: until discharge; Permanent RLNP: after more than 6 months; Early hypoparathyroidism: until discharge; Permanent hypoparathyroidism: after more than 6 months; n.s.: not significant.

Comparison of the three operative groups including intention to treat and actual treatment demonstrates high early postoperative hypoparathyroidism after total thyroidectomy, when compared to subtotal resection (p = 0.002, chi-square test).

Table 7. Description of eight patients with increased TSH-R-Ab titers postoperatively.

			TSH-R-Ab (U/L)		Time of TSH-R-Ab postop.	GO			Points of GO		
Operation	Gender	Age (years)	Preop.	Postop.	(months)	Preop.	Postop.	Course	Preop.	Postop.	Postop. GD status
Titers within normal range											
A	F	45	7	11	5	No	No	—	—	—	Euthyroid with L-T_4
A	M	31	5	9	52	No	No	—	—	—	Euthyroid with L-T_4
C	M	23	5	8	29	No	No	—	—	—	Euthyroid with L-T_4
C	F	37	5	7	20	Yes	Yes	Equal	4	4	Euthyroid with L-T_4
Titers at pathologically high values											
B	F	51	23	36	24	Yes	Yes	Worsened	10	14	Euthyroid with L-T_4
B	F	40	77	268	39	Yes	Yes	Improved	12	09	Recent hyperthyroid
A	F	46	33	50	1	No	No	—	—	—	Recent hyperthyroid
C	F	46	366	493	16	Yes	Yes	Improved	17	04	Euthyroid with L-T_4

GD: Graves' disease; L-T_4: L-thyroxine.

hyperthyroid relapse postoperatively. They were the only 2 of the 150 patients who suffered from hyperthyroid recurrence after surgery for Graves' disease. Endocrine orbitopathy worsened in one of these four patients and was alleviated in two others, including one patient with recurrent hyperthyroidism (Table 7).

Focusing on the TSH-R-Ab titers, we therefore concluded that total thyroidectomy and subtotal thyroid resection produce a similar decrease in TSH-R-Ab levels postoperatively. Moreover, patients with increasingly high TSH-R-Ab titers may be predicted to have recurrent hyperthyroidism, which is rare, however [29].

Changes in clinically evident endocrine orbitopathy after subtotal versus total thyroidectomy was not different in all three operative groups, independently of whether the mean values of each group or individual courses were investigated (Table 6). This stands in contrast to retrospective investigations by Winsa et al., who reported a rather high rate of worsening GO after subtotal thyroidectomy but not after total thyroidectomy. Our own results demonstrated worsening of eye symptoms in 6.5% after total thyroidectomy and 7.1% after subtotal thyroid resection. This is in the range of results found by Winsa et al. in patients with total thyroidectomy (6%).

Comparing endocrine orbitopathy and serum TSH-R-Ab titers postoperatively, we did not find a direct correlation. Because TSH-R-Ab changes postoperatively do not parallel the clinical GO score, the clinical value of measuring TSH-R-Ab postoperatively may be questioned.

Altogether, our prospective randomized trial contrasts with the investigations by Marcocci et al., Bartalena et al., and Tallstedt et al., who found higher rates of worsening GO symptoms after thyroid surgery when cortisone was not administered routinely or when postoperative thyroxine treatment had been delayed [11, 14, 25].

Although the adverse effect of surgery on endocrine orbitopathy and TSH-R-Ab titers may not be different in the three patient groups with remnant sizes of ≤4 ml, the incidence of postoperative complications increased with more radical surgery. Especially damage to parathyroid glands is possible during surgery of such well perfused thyroid glands as are found in Graves' disease patients, and the incidence can be as high as 30% [31].

Our experience with early postoperative hypocalcemia and the need for calcium replacement in 4% to 28% of our patients supports use of a less radical procedure, leaving a unilateral remnant of up to 4 ml. The results of our study in respect to postoperative hypocalcemia parallels the findings of Rothmund et al. and Winsa et al. [2, 5, 8, 10, 16], who demonstrated early postoperative hypocalcemia in up to 28% of patients after total thyroidectomy. In contrast to the findings of Bourrel et al. [31], permanent hypocalcemia is not exceptional after thyroid surgery, and patients should therefore be closely followed to detect low calcium levels even if there are no clinical symptoms [32].

Summarizing our data we recommend thyroid surgery for all patients with Graves' orbitopathy. We refrain from performing routine total thyroidectomy and prefer subtotal thyroid resection with a unilateral remnant of up to 4 ml.

Résumé

L'effet de la chirurgie sur l'exophtalmie de la maladie de Basedow est toujours un sujet de débat. Depuis que des analyses rétrospectives de plusieurs auteurs, y compris notre groupe, ont démontré une amélioration de l'exophtalmie après thyroïdectomie subtotale pouvant intéresser 70% des patients, la question a été de savoir si on ne pouvait pas améliorer les résultats de l'exophtalmie en réalisant une thyroïdectomie totale. Nous avons donc réalisé une étude prospective randomisée chez 150 patients ayant une maladie de Basedow (125 femmes, 25 hommes; volume moyen de la thyroïde de 80.5 ml) comparant les effets sur les modifications de l'exophtalmie, les taux d'anticorps TSH-R et le taux de complications postopératoires par trois techniques chirurgicales différentes (thyroïdectomie subtotale bilatérale—intervention laissant moins de 4 ml de parenchyme controlatéral; hémithyroïdectomie avec thyroïdectomie subtotale contralatérale—laissant moins de 4 ml ml de parenchyme contralatéral; thyroïdectomie totale). Après une période d'au moins 6 mois (extrêmes 6–36), l'exophtalmie s'est améliorée chez 71–74% des patients quelle que soit la technique (thyroïdectomie totale ou subtotale) réalisée. Il n'y avait aucune différence entre les trois techniques en ce qui concernait le taux d'anticorps TSH-R. On a observé une récidive d'hyperthyroïdie postopératoire chez deux patients ayant eu une thyroïdectomie subtotale et une hypoparathyroïdie précoce a été observée plus fréquemment chez les patients ayant eu une thyroïdectomie totale que chez les patients ayant eu une thyroïdectomie subtotale (28% vs. 12%; $p < 0.002$). En raison de l'hypoparathyroïdie postopératoire potentielle et d'une absence de différence en ce qui concerne l'action sur l'exophtalmie, nous ne pouvons recommander la thyroïdectomie totale pour maladie de Basedow avec exophtalmie. Nous préférons une thyroïdectomie subtotale radicale, laissant moins de 4 ml de parenchyme.

Resumen

El papel de la cirugía en el orbitopatía de Graves (GO) sigue siendo controvertido. Dado que los análisis retrospectivos, incluidos los de nuestro grupo, demostraban que tras la tiroidectomía subtotal mejoraba el 70% de los pacientes con GO, se cuestionó si la tiroidectomia total podría mejorar los efectos beneficiosos de la ablación tiroidea en pacientes con GO. Con objeto de verificar esta hipótesis realizamos un estudio prospectivo y randomizado en 150 pacientes con enfermedad de Graves. 125 mujeres y 25 hombres; el volumen medio del tiroides fue 80.5 ml. Se compararon las modificaciones postoperatorias en: la GO, titulación de anticuerpos TSH-R y tasa de complicaciones postoperatorias entre tres técnicas quirúrgicas: 1) tiroidectomía subtotal bilateral (dejando un remanente tiroideo menor a 4 ml); 2) hemitiroidectomía unilateral con tiroidectomía subtotal contralateral (el remanente fue menor a 4 ml) y 3) tiroidectomía total. Tras un periodo mínimo de 6 meses (6–36 meses) la GO mejoró en et 71–74% de todos los pacientes, independientemente de la técnica quirúrgica empleada. La titulación de anticuerpos TSH-R no mostró diferencia alguna entre los tres grupos. Hipertiroidismo recidivante postoperatorio se observó en 2 pacientes tratados mediante tiroidectomía subtotal; el hipoparatiroidismo postoperatorio precoz fue más frecuente en pacientes con tiroidectomía total, que en los que sufrieron una tiroidectomía subtotal (28% vs. 12%, $p < 0.002$). Dado el posible desarrollo de un hipoparatiroidismo y la ausencia de diferencias postoperatorias en la evolución clínica de los pacientes con GO, rechazamos la tiroidectomía total prefiriendo, para el tratamiento de la enfermedad de Graves con orbitopatía concomitante, la tiroidectomía subtotal con un remanente tiroideo menor a 4 ml.

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