Peer reviewed article

Differentiated thyroid carcinoma

Follow-up of 264 patients from one institution for up to 25 years

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Summary

The optimum treatment for differentiated thyroid carcinoma (DTC) is still debated. Results obtained using a selective treatment strategy for papillary (PTC) and follicular (FTC) thyroid carcinoma over 25 years in one institution are reported. 149 patients (mean age 46 yrs) had *PTC* in TNM stages I-IV in 58%, 26%, 15% and 1% respectively. Total thyroidectomy and remnant ^{131}I ablation (43%) were carried out in TNM high-risk patients (stages III and IV) and in low-risk patients (I and II) at risk for a (curable) recurrence (stages pN_1 and/or pT_4). Hemi- or total thyroidectomy, without radioiodine, was used in 76% of pT_{1-3} N_0 tumours (68%). Central and/or lateral lymphadenectomy was performed in 42% of patients (electively in the last 4 years). The mean follow-up was 7 years. *Results:* 6 patients died of PTC and 8/143 patients treated for cure had a recurrence (6 nodal, 1 contralateral, 1 local). In low-risk patients – including 68% of patients aged ≥45 yrs – the cause specific 25-year survival rate was 100%, vs. 62% (at 15 years) ($p < 0.0001$) in high-risk patients. In stage I and stage II the recurrence-free survival rates at 25 years were 95% and 100% respectively. Risk factors for recurrence were macroscopic ($p < 0.0001$) but not microscopic local invasion (pT_4); stage pN_1 ($p = 0.0004$). Only 1/107 patients initially judged node-negative had a nodal recurrence. *FTC* (n = 115; mean age 56 yrs; mean follow-up 8 yrs): Cause-related death (n = 8) or serious recurrence (n = 3) occurred in 10/53 grossly invasive FTC, in 1/45 minimally invasive FTC with vascular invasion, and in none of 17 FTC with capsular invasion (CI) alone, under radical treatment (^{131}I) in 75%, 33%, and 12% respectively. 20-year disease-free survival in grossly and in minimally invasive FTC was 78% and 95.5% respectively ($p = 0.0007$). Patients aged <45 yrs and patients with minimally invasive FTC with CI alone (all ages) had 100% 20-year disease-free survival vs. 80% ($p = 0.013$) in the remainder. There was no curable recurrence in FTC. The ratio of grossly invasive FTC decreased ($p < 0.0001$) during the study period.

Conclusions:

– Risk-0 groups may be defined and selected for a reduced extent of treatment (PTC pT_{1-3} N_0; FTC <45 yrs, or CI alone).
– Older (≥45 yrs) patients with PTC in stages I and II have an excellent prognosis (risk 0).
– With selective (therapeutic) lymphadenectomy the risk of nodal recurrence may be very low in node negative tumours, without use of radioiodine. Meticulous lymphadenectomy is indicated in pN_1 tumours with nodal recurrences despite ^{131}I (5/36 patients).
– The technique of capsular dissection for extracapsular total uni- or bilateral thyroidectomy provides excellent oncological and surgical results.
– A decrease in the incidence of FTC parallels a decrease in endemic goitre in Switzerland.

Keywords: papillary thyroid cancer; follicular thyroid cancer; selective therapy; prognostic TNM classification; capsular dissection; 25-year follow-up

Introduction

Differentiated thyroid carcinomas (DTC) are biologically unique tumours. Prognostic classifications serve to segregate a majority of patients with near-0 risk of tumour-related death from a minority at much greater risk [1–8]. Major risk factors are patient's age, tumour size, grade, extent (invasion) (pT_4), metastases (M_1), and completeness of resection for papillary (PTC), and invasiveness for follicular (FTC) thyroid carcinoma [9–14]. Several prognostic classification systems based upon these factors (AGES, AMES, MACIS, age-related TNM classification) [1, 2, 5, 13, 15] have proven

useful for defining low-risk and high-risk patients; less appropriate systems do not consider age [16, 17], albeit the most important prognostic factor. On the basis of prognostic classification, treatment results may be compared and patients selected for a risk-related scale of treatment. Selective treatment is now widely considered appropriate [1, 2, 6, 7, 12, 14, 18, 19–23]. In low-risk patients with PTC adequate treatment should also prevent (curable) recurrences, which are most frequent in tumours with nodal (pN_1) or locally invasive (pT_4) disease at diagnosis [5, 21].

This study of 149 patients with PTC and 115 patients with FTC from one institution over a period of 25 years confirms that low-risk patients can be defined in whom no tumour-related deaths and very few curable recurrences are observed after selective risk-dependent therapy.

Patients and methods

A total of 264 unselected consecutive patients with DTC were treated and followed up from 1974 to 1999. The records of 166 patients described previously [19] have been updated. Clinical and diagnostic aspects have been reported recently [20]. The patients were operated on by one surgeon (E.G.) or with his assistance. The histopathological assessment was conducted prospectively by one pathologist (Ph.U.H.) and his staff according to the WHO classification [13, 19]. PTC were classified according to the age-related prognostic TNM-classification system [24] (Table 1). Extrathyroidal (pT_4) PTC were subdivided into gross invasion based on macroscopic intraoperative evidence (pT_4 ma), and thyroid capsular penetration as a microscopic finding only (pT_4 mi). Follicular carcinomas (FTC) were classified as minimally or grossly invasive [3, 4, 13]; minimally invasive FTC were subdivided into those with vascular invasion (VI), and those with exclusively capsular invasion (CI) [10, 13].

The treatment strategy consisted in a restricted interventional approach in selected low-risk patients [19, 20][1]. 120/264 (45%) patients underwent total thyroidectomy with radioiodine. Total thyroidectomy (n = 184) was achieved in 62 patients (34%) by completion thyroidectomy, after definitive histological diagnosis. Some patients (7%) refused completion total thyroidectomy or use of radioactive iodine, as proposed by the therapeutic scheme. Up to 1995 lymphadenectomy was performed for macroscopically involved nodes (selective therapeutic lymphadenectomy). From 1996 an elective routine (diagnostic, prophylactic) lymphadenectomy of the central compartment was introduced for pre- or intraoperatively confirmed PTC [25]. Technically complete extracapsular (no subtotal or near total) lobar excision was performed by capsular dissection [20, 26, 27] on the side of a suspicious or carcinomatous nodule.

261/264 patients were followed up 0,5–25 years. Mean follow-up was 7 years (median 6) for PTC, and 8 years (median 7) for FTC. 14 patients had died from thyroid carcinoma and 28 from unrelated causes without tumour manifestation. 10 patients had been lost since the last follow-up.

Table 1

Age-related TNM classification system. From UICC [24]. pT_1: <1cm; pT_2: >1–4 cm; pT_3: >4 cm; pT_4: extends beyond gland; N_1: regional lymph node metastasis; M_1: distant metastasis.

Stage	age <45 years	age ≥45 years
I	$pT_{1-4}\ N_{0,1}\ M_0$	$pT_1\ N_0\ M_0$
II	$pT_{1-4}\ N_{0,1}\ M_1$	$pT_{2-3}\ N_0\ M_0$
III		$pT_4\ N_0\ M_0$
		$pT_{1-4}\ N_1\ M_0$
IV		$pT_{1-4}\ N_{0,1}\ M_1$

Data analysis

For statistical analyses the programs Stat View 4.51 (Abacus Concepts, Inc.) and SPSS for Macintosh Release 6.1.1 were used. Continuous variables are presented as mean ± standard deviation and were analysed using the Mann-Whitney test. Nominal variables are presented as number of patients (%) and were compared using the chi-square test or Fisher's exact test when appropriate.

Late results were analysed using the method of Kaplan and Meier.

Survival curves were compared using the log-rank test. The effect of tumour diameter on survival curves was analysed using Cox regression. P-values below 0.05 are considered significant.

Results

During the study the ratio of PTC increased from 35% to 66% (p = 0.03), whereas that of grossly invasive FTC decreased from 41% to 9% (p <0.0001) [20]. A concomitant benign nodular goitre was more frequent in patients with a grossly invasive FTC than in PTC (45% vs. 18%; p = 0.002); the same was true for nodular goitre with functional autonomy (19% vs. 3%; p = 0.0007) [20].

[1] hemi- or total thyroidectomy for (a) PTC $pT_{1,2,[3]}\ N_0$, (b) minimally invasive FTC $pT_{1,2}$ age <45 yrs, or CI alone; total thyroidectomy and ^{131}I remnant ablation for (a) pT_4 and pN_1 PTC, (b) grossly invasive FTC and minimally invasive FTC age ≥45 yrs

Papillary carcinoma

Age groups

68/149 patients (46%) were in the young (<45 yrs) and 81 (54%) in the older age group (≥45 yrs). *N_1-status* (27%) was more common in young than in older patients (35% vs. 20%; p = 0.033), and in pT_4 than in pT_{1-3} tumours (65% vs. 17%; p <0.0001). A *pT_4 tumour* (21%) was found in 18% of young and 23% of older patients (p = ns); gross extrathyroidal invasion was present in 9%.

M_1 status

All patients with haematogenous metastases (7/149; 5%) had extensive nodal disease (pN_1), 5

patients had a pT_4 tumour. 5/68 (7%) young patients had diffuse pulmonary radioiodine uptake on the post-remnant ablation scan, and in 2/81 older patients (2.5%) pulmonary metastases were seen on preoperative chest radiography.

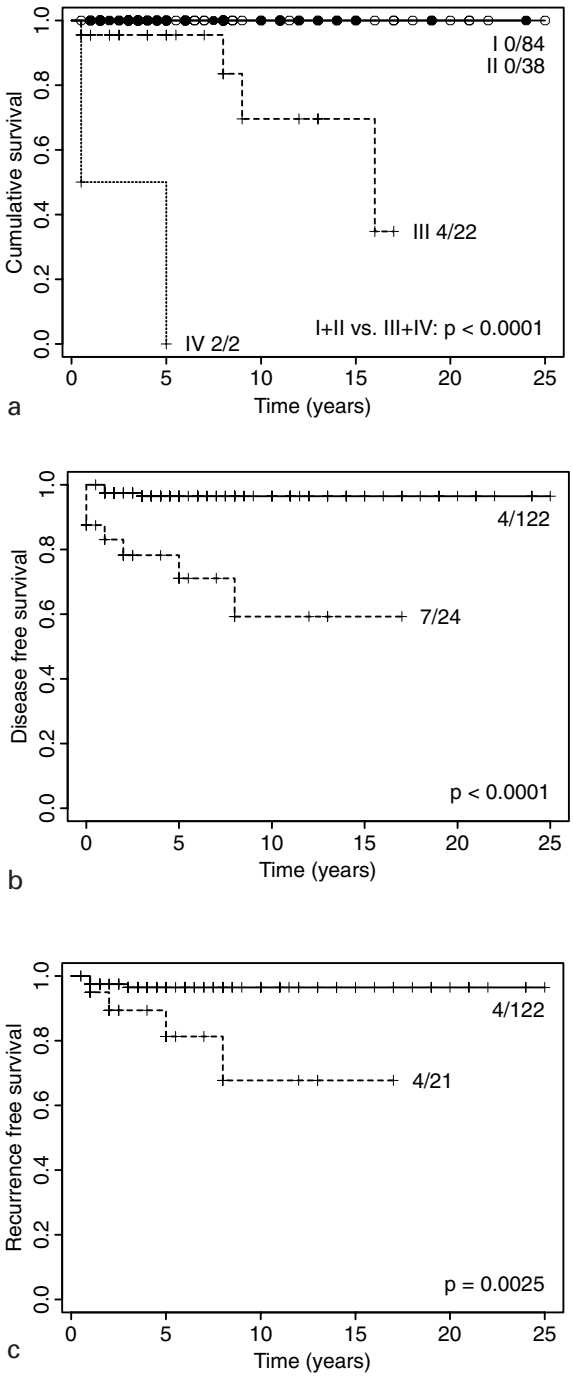

Figure 1

Late results of treatment of PTC.
a. Cause-specific survival in stages I-IV (I: solid line, open circles; II: solid line, closed circles; III: broken line, +; IV: dotted line, +).
b. Disease-free survival in TNM low-risk (solid line) and high-risk (broken line) groups.
c. Recurrence-free survival of patients treated for cure in TNM low-risk (solid line) and high-risk (broken line) groups.

TNM risk groups

86 (58%), 38 (26%), 23 (15%) and 2 (1%) patients were in the TNM risk groups I, II, III and IV respectively, resulting in a low- (I + II) and a high- (III + IV) risk population of 84% vs. 16%. In low- and high-risk patients respectively, extrathyroidal invasion (pT_4), nodal involvement, and distant disease at primary therapy were present in 12 (10%) vs. 19 (76%), (p <0.0001); 24 (19%) vs. 16 (64%), (p <0.0001), and 5 (4%) vs. 2 (8%), (p = ns).

Follicular carcinoma

53 patients (46%) had a high-risk (grossly invasive) and 62 patients (54%) a low-risk (minimally invasive) FTC. The ratio has changed to 25% high-risk and 75% low-risk patients (p = 0.0003) since 1995, due to the declining rate of grossly invasive FTC. 17 (27%) of minimally invasive FTC had capsular invasion alone. On the average, grossly invasive FTC were 1.6 cm larger in diameter than minimally invasive FTC (p <0.0001), and the patients were 15 years older (p <0.0001). 4 patients (3.5%) had nodal disease and 1 (0,9%) had pulmonary metastases on the initial chest x-ray.

Node staging, lymphadenectomy

In 62/149 of patients with PTC (42%), and in 15/115 with FTC (13%), central and/or lateral lymphadenectomy was performed, with pN_1 status in 27% of PTC and 3,5% of FTC. Absence of node metastases was based on macroscopic appearance (cN_0), without lymphadenectomy, in 58% and 87% respectively. Elective vs. selective lymphadenectomy (PTC) resulted in a significant increase of pN_0 status (p = 0.03) and a non-significant increase of N_1 status [20, 25].

Treatment results by risk groups

Papillary carcinoma (n = 146, follow-up ≥0.5 yr)

20/24 (83%) of TNM high-risk and 43/122 (35%) of TNM low-risk patients had total thyroidectomy and radioiodine (p <0.0001) (Table 2). All 6 patients who died from carcinoma were in the TNM high-risk category, including 3 patients with non-curative primary treatment. In 8/143 patients a recurrence (1 contralateral, 1 local, and 6 nodal) developed 1–8 years following primary treatment for cure, resulting in death in 3 of the 4 TNM

Table 2

Papillary thyroid carcinoma (n = 146). Primary treatment and outcome, by risk groups. (No of patients [%])

Treatment	TNM stage				total	TNM	
	I	II	III	IV		low risk	high risk
Hemithyroidectomy	26[a]	8	3[c]	0	37 (25%)	34 } (65%)	3 } (17%)
Total thyroidectomy	32[b]	13	1	0	46 (32%)	45 } (65%)	1 } (17%)
Total thyroidectomy, ^{131}I	26[b]	17	18[b, c]	2[c]	63 (43%)	43 (35%)	20 (83%)
Total	84	38	22	2	146	122 (84%)	24 (16%)

Postoperative events:
curable recurrences (n = 5), (occurring 1–3 years after primary therapy):
[a] contralateral (n = 1) ($pT_{2a}N_0$)
[b] nodal (n = 4) ($1pT_2N_0$, $2pT_4N_1$ [stage I]; $1pT_1N_1$ [stage III])
deaths (n = 6) (occurring $^1/_2$ –16 years after primary therapy):
[c] ($1pT_4N_0$, $3pT_{3,4}N_1$, $2pT_4N_1M_1$)

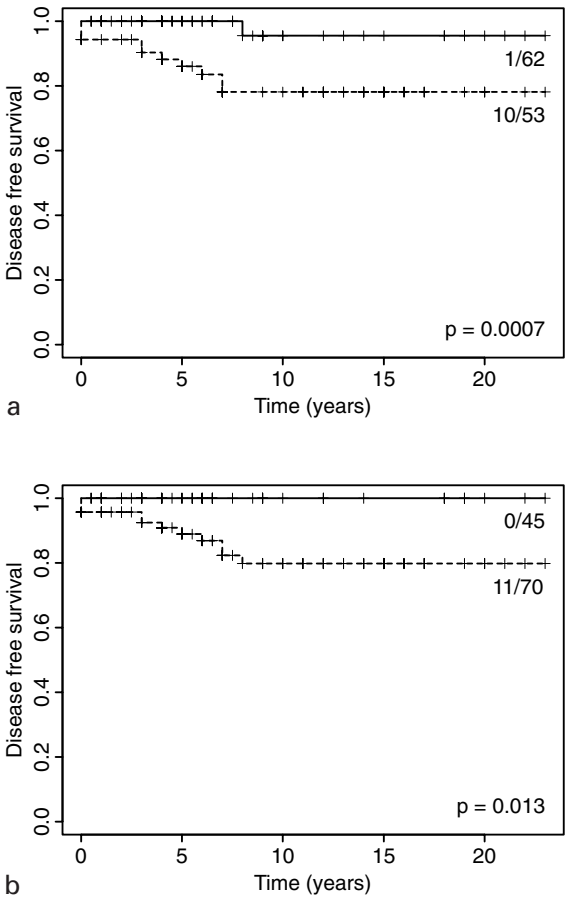

Figure 2

Late results of treatment of FTC.
a. Disease-free survival of patients with minimally invasive (solid line) and with grossly invasive (broken line) FTC.
b. Disease-free survival of patients with CI alone or age <45 years (solid line) compared to remaining patients (broken line) with FTC.

high-risk and in none of the 4 TNM low-risk patients. Thus, there were 5 curable recurrences (Table 2). Only 1/107 nodal recurrence was observed in patients with a primary node negative tumour, vs. 5/36 with a pN_1 tumour (p = 0.0004, log-rank test). In 3/83 patients without radical initial therapy a postoperative event occurred (1 death; 2 curable recurrences, 1 contralateral, 1 nodal).

Late results of treatment of PTC are plotted by TNM risk groups in Figure 1. In low-risk patients the cause-specific 25-year survival rate and the disease-free survival rate was 100% and 96.5% respectively, vs. 62% and 59% (at 15 years) respectively in high-risk patients (p <0.0001). Age ≥45 yrs vs. <45 yrs significantly influenced survival (p = 0.01), but not disease-free and recurrence-free survival (Table 3). Macroscopic (pT_4 ma), but not microscopic extrathyroidal invasion was a significant risk factor for outcome in the entire series (p <0.0001), and for recurrence in the low risk (TNM I and II) group (p = 0.0002). Stage pN_1 vs. N_0 had a significant impact on outcome. Gender, hemithyroidectomy vs. total thyroidectomy, or use vs. non-use of ^{131}I did not influence the results.

Follicular carcinoma

The risk-dependent treatment and the late results are shown in Table 4. In minimally invasive FTC 1/62 patient died, from pulmonary metastases from 12 years after total thyroidectomy. 3/53 patients with grossly invasive FTC died 2-7 years after non-curative primary treatment, and 7 further patients developed a serious recurrence leading to death in 4 patients 6-12 years after primary treatment; the remaining 3 patients are living with disease 4-8 years after radical treatment. Patients with an adverse outcome (11/115) were aged 55-80 (mean 71) years.

The disease-free survival for minimally and for grossly invasive FTC are plotted in Figure 2a. Patients aged <45 yrs or those with CI alone had cumulative survival and disease-free survival of 100% (Fig. 2b, Table 5). In univariate risk factor analyses grossly invasive tumour, stage pT_4, nodal involvement, and tumour size had an adverse effect on survival and/or disease-free survival (Table 6). The adverse effect of ^{131}I clearly reflects patient selection.

Surgical morbidity

One patient, an 83-year-old man (0.4%) died of cardiac failure after operation for a large infiltrating papillary carcinoma. 5/264 patients (1.9%) developed permanent hypoparathyroidism, representing 3% of those with total thyroidectomy. Unilateral recurrent-nerve paralysis developed in 4 patients (1.5%) or in 1% of nerves at risk (n = 407). Seven of the 8 patients with morbidity had a concomitant recurrent benign goitre, completion total thyroidectomy, extensive central nodal involvement, or a grossly invasive FTC respectively.

Table 3

Risk factors in PTC (n = 146) by univariate analysis.

Variable	survival	disease-free survival	recurrence-free survival
TNM high risk vs. low risk	<0.0001	<0.0001	0.0025
Age ≥45 vs. <45	0.01	ns	ns
Stage T_4 vs. T_{1-3}	<0.0001	<0.0001	0.008
Stage T_4 macroscopic vs. T_{1-3}, T_4 microscopic	<0.0001	<0.0001	<0.0001
Stage N_1 vs. N_0	0.001	<0.0001	0.006
Stage M_1 vs. M_0	0.008	0.009	
Ø cm	0.001	0.005	ns

Table 4

Follicular thyroid carcinoma (n = 115). Primary treatment and outcome, by risk groups (no of patients [%]).

Treatment	minimally invasive (n = 62)		grossly invasive (n = 53)	total
	capsular invasion alone (n = 17)	vascular invasion (n = 45)		
Hemithyroidectomy	10 } 88%	26 } 67%	5 } 25%	41 } 50%
Total thyroidectomy	5	4[a]	8[a]	17
Total thyroidectomy, ^{131}I	2 (12%)	15 (33%)	40[b, c] (75%)	57 (50%)
Total	17	45	53	115

Postoperative events (n = 11): deaths (n = 8): [a] 1 death; [b] 6 deaths; [c] serious recurrence (n = 3)

Table 5

Cause-specific survival rates in subgroups of FTC.
( ) = patients at risk.

Survival	minimally invasive	grossly invasive	CI alone or patients <45 yrs
5 yr	100% (35)	96% (42)	100% (27)
10 yr	100% (15)	85% (29)	100% (11)
20 yr	92% (4)	81% (3)	100% (3)

Table 6

Risk factors in FTC by univariate analysis.

Variable	survival	disease-free survival
Grossly vs. minimally invasive tumour	ns	0.0007
T_4 vs. T_{1-3}	<0.0001	<0.0001
N_1 vs. N_0	<0.0001	<0.0001
Ø cm	ns	0.05
Use of ^{131}I vs. no ^{131}I	ns	0.03
Hemithyroidectomy vs. total thyroidectomy	ns	ns

Discussion

This study has the advantages of precise prospective documentation and uniform conditions with respect to surgery and pathology. The duration of follow-up was relatively short, due to an increasing number of annually referred patients. However, though late deaths may occur [9], curable recurrences and those heralding an unfavourable course are seen most frequently during the first 5–10 years [5, 9, 21, 22] – 1–8 years in our 16/255 patients with primary therapy for cure.

During the 25-year period the proportion of FTC decreased significantly, from 65% to 34% of all DTC, due to a decrease in grossly invasive FTC. Therefore, PTC became the most frequent tumour. For the 30-year period 1944–1973 a decrease in FTC from 52% to 38% was found in a series of 550 pathological specimens of thyroid carcinoma in Switzerland [28]. These data reflect a continuous decrease in the incidence of FTC, which parallels a decrease in the prevalence of simple goitre [29] and of its toxic nodular variant [30] over decades in Switzerland.

Our results confirm that the prognostic classification of FTC on the basis of invasiveness is valid. The outcome was unfavourable in 10/62 patients with grossly invasive FTC, in 1/45 minimally invasive FTC with VI, and in none of the 17 minimally invasive FTC with CI alone. The cause-specific disease-free survival rates at 20 years were 78% for grossly invasive and 95.5% for minimally invasive FTC (p = 0.0007). In agreement with De Groot et al. [9], no curable recurrence was observed in FTC. No adverse outcome was noted in young (<45 yrs) patients and – independently of the patient's age – in tumours with CI alone (mean age 54 yrs). Nodal involvement (3.5%) was clinically and intraoperatively obvious, and no metachronous nodal disease occurred. Routine lymphadenectomy is therefore not indicated in FTC [1, 4, 12, 14]. Multifocal and contralateral involvement (7%) was grossly evident and led to total thyroidectomy. Our results are in agreement with studies where subgroups without deaths [9, 10] or with near 100% survival rates [11, 31] were noted, or in which hemithyroidectomy vs. total thyroidectomy did not adversely influence survival or recurrence [11, 12].

In definable patients without risk of systemic disease complete removal of the local tumour tissue by total primary hemithyroidectomy or total thyroidectomy is essential, whereas remnant ablation does not appear rational. Follicular neoplasia (as evidenced by high cellularity on fine needle aspiration biopsy) [32] should be treated by diagnostic primary hemithyroidectomy, avoiding ipsilateral reoperation with its increased morbidity and potentially incomplete local tumour excision [20, 22].

For PTC the multivariate age-related TNM classification [24] proved to be valuable for defining low-risk (stages I and II) and high-risk (stages III and IV) patients, with significantly different rates of survival (100% vs. 62% at 15 years; p <0.0001), disease-free survival (97% vs. 59%; p <00001), and recurrence-free survival (i.e. after primary treatment for cure) (96.5% vs. 80%; p = 0.0025). Treatment strategy was radical treatment in high-risk patients and in those low-risk patients at risk for curable recurrence (N_1 or T_4 status) [4, 5, 14, 16, 21, 23, 25, 33]. Our results confirm the impact of age on survival: young (<45 yrs) patients had a mortality rate of 0% in spite of stage T_4 in 18%, N_1 in 35%, and M_1 in 7%. The same tumour characteristics determine a much less favourable outcome in older, i.e. high-risk patients. However, in the absence of these characteristics, i.e. in pT_{1-3} N_0 M_0 tumours, older patients belong to the low-risk category and have an excellent prognosis, with no deaths and even with no instance of a curable recurrence in our study. Stages I and II did not have a significantly different prognosis, thus confirming the data of Hundahl et al. [8]. These authors mention the "opportunity for simplifying the current TNM prognostic system further". Our results indicate that a reduced scale of treatment may be adequate for pT_{1-3} N_0 tumours, independently of the patient's age. In this subset (66% of all PTC) no death occurred, and there was only 1/36 contralateral recurrence after hemithyroidectomy and only 1/107 nodal recurrence in patients without

initial nodal involvement (though 80% had no lymphadenectomy, and 74% had no ^{131}I). After hemithyroidectomy, contralateral recurrences were noted in 4% [6], and in 14% [5, 33] of low-risk patients; several authors report very low rates (0.9%–3%) [18, 21, 33] of nodal recurrence in patients who were initially node-negative without use of radioiodine. In pT_{1-3} N_0 tumours it has not been shown that ^{131}I ablation offers any advantage in improving the already excellent results [16, 19]. On the other hand, radioiodine does not prevent nodal recurrence in patients with initial node disease [5, 21, 22, 34, 35]. In low-risk patients with primary lymph node metastases ^{131}I is also indicated for detection and treatment of diffuse pulmonary metastases. Extensive nodal disease is a marker for disseminated pulmonary disease [21, 22, 36], which was detected in 5 (7%) of our young patients (21% of those with initial nodal disease) on the post-ablation scan (none of these patients developed a recurrence). In rare, anecdotal low-risk patients with PTC a fatal outcome was reported [37, 38]. These patients had gross invasive nodal disease [38, 39].

The question arises how radical lymphadenectomy is to be performed for detection of (occult) nodal disease, adequate staging, and stage-dependent treatment. Interestingly, no significant increase in node positivity, and no influence on therapeutic results were observed in our series with routine vs. selective lymphadenectomy [25]. In one report routine lymphadenectomy resulted in a high incidence of N_1 status (82%) and to improvement of survival and recurrence [35]. More radical lymphadenectomy may itself improve therapeutic results by stage migration [40]: occult N_1 tumours are eliminated from the N_0 group, and N_1 groups are enlarged with more favourable tumours with only occult nodal disease (Will Rogers phenomenon) [40, 41]. In sum, the impact of elective (prophylactic) node dissection on outcome remains uncertain [25].

In some apparently intrathyroidal tumours the pathologist may document penetration of the thyroid capsule. We classified these tumours as stage pT_4. Woolner et al. [3, 4] classified only tumours with gross local infiltration as "extrathyroidal" (10%; 9% in our series), without however detracting from the excellent outcome in the "intrathyroidal" and "occult" (i.e. pT_{1-3}) categories. Accordingly, in our patients only macroscopic, but not microscopic penetration significantly influenced outcome. Special therapeutic measures such as external percutaneous irradiation are not warranted on the basis of microscopic penetration only.

Our study confirms that it is possible to select patients with FTC or PTC who require radical therapy, and those in whom technically correct hemithyroidectomy or total thyroidectomy without remnant ablation provides a virtually perfect prognosis. In PTC prognostic classification systems may accurately segregate low and high risk for death, but TNM stages I and II englobe an inhomogeneous population with respect to recurrence; N_1 and/or T_4 status are indicators for radical therapy in young patients with PTC. For clinical PTC without nodes we prefer total to hemithyroidectomy, to eliminate the problem of potential contralateral recurrence. However, some patients feel invalidated by loss of a vital organ and prefer hemithyroidectomy with acceptance of low risk of curable contralateral recurrence. We also favour routine (prophylactic) central lymph node dissection [1, 20, 21, 33], but the possible advantages should not be compromised by damage to the parathyroids or recurrent laryngeal nerves. In 0-risk patients cure of disease should not be compromised by postoperative iatrogenic disease (exogenous hyperthyroidism for TSH suppression) or excessive follow-up measures [1, 2, 6, 14, 23].

Are the surgeon's tactics and technique prognostic factors [37]? Capsular dissection [26, 27, 42], with fine preparatory technique is essential (a) for low morbidity in thyroid surgery [43], and (b) for oncological adequacy [20]. The technique was first used by Kocher [44, 45], who deliberately opposed it to a less subtle and anatomically different operative practice [44]; hence variance in operative technique is still of concern [27, 46]. Incomplete tumour resection may result in a fatal outcome even in low-risk patients [37, 47].

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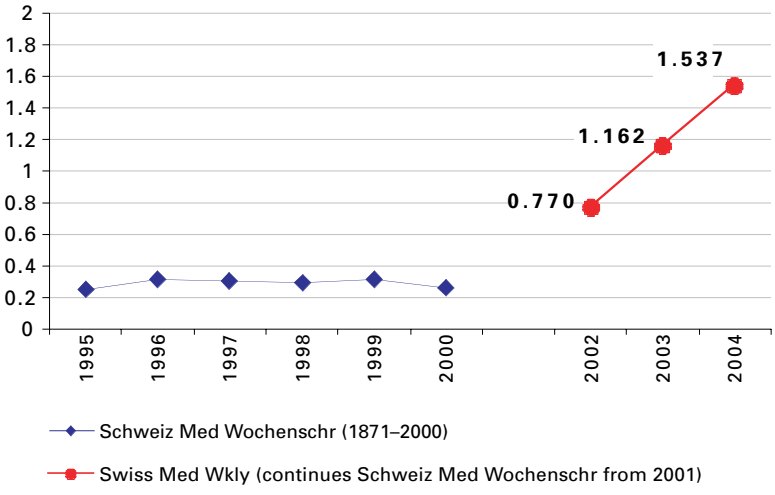

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