were reexamined; in 32 of them (59%) the motility of the vocal cords proved to be normal, slightly impaired without causing clinical symptoms in 15 (28%), and absent in 7 (13%) (Table 2).

Reinvestigation of all 54 patients with primary p.o. laryngeal nerve paralysis by an authorized ENT-colleague demonstrated minor vocal cord motility in 15 (68%) of the 22 patients with permanent r.l.n.p. Whether the vocal cord motility of the 15 patients (28%) with only minor changes possibly reflects the result of early otological training, or is an effect of only partial nerve destruction can only be hypothesized.

Bilateral subtotal resection was the surgical treatment that showed the highest number of late p.o. r.l.n.p. (Table 3).

Permanent hypoparathyroidism

Early p.o. hypoparathyroidism, defined as the necessity to substitute calcium and/or vitamin D beyond the date of discharge, was seen in 35 patients (1.1%) (Table 1). Long-term results were demonstrable in all 35 patients (100%), 17 of them (49%) needed no further, and 18 (51%) continuing treatment. All but 1 patient on treatment or without any specific medication were well, and 10 out of 18 patients whose treatment was continued were allowed to reduce their primary medications. 7 patients took only calcium substitutions, while 10 patients are still on combined treatment of calcium (1-3 g/d) and Vitamin D (Table 4).

Discussion

The most common complications of thyroid surgery are p.o. r.l.n.p. and p.o. hypoparathyroidism.

Mandatory dissection of the recurrent laryngeal nerve and visualization of the parathyroid glands in all patients with benign thyroid diseases reduces p.o. recurrent laryngeal nerve paralysis and p.o. hypoparathyroidism to less than 1%, as demonstrated in our patients. This reduced p.o. complication rate owing to meticulous techniques was already suspected by *Zornig* et al. (12) and *Jatzko* et al. (3) who compared the literature on recurrent nerve paralysis after thyroid surgery. Thus early p.o. laryngeal nerve paralysis was reported to be as high as 7.7 and 7.9% respectively, but dissection of the nerve decreased its occurrence to 3.0%. Even more important, the permanent paralysis could be decreased from 5.0 and 5.2% respectively to 0,9 and 1.2%. These literature findings are in accordance with our own experience of 0.9% of permanent functional disturbances of the recurrent laryngeal nerve.

Reoperations of thyroid tumors are burdened with high complication rates, above 20% of early p.o. recurrent laryngeal nerve paralyses, and above 10% of permanent laryngeal nerve paralysis (1, 7, 8, 11). This supports our own experience with early p.o. recurrent nerve paralysis of 9% and permanent lesion of 3.2%. To avoid p.o. r.l.n.p. in recurrent surgery, some authors recommend a lateral approach or intracapsular resection without seeing the r.l.n. (1, 7, 8, 10, 11). In our experience, however, only the early detection of the laryngeal nerve may help to avoid this problem. Nevertheless, reoperation is a major risk of recurrent nerve paralysis in benign thyroid diseases. In some cases, the lateral approach between the sternocleidomastoid muscle and the infrahyoid muscle is recommended. In this way it is easier to demonstrate the r.l.n. within the area of scarred tissue in the anatomic triangle of common carotic artery, trachea and inferior thyroid artery.

Early p.o. hypoparathyroidism after thyroid surgery for benign thyroid diseases was reported to be 1.5% by *Jatzko* et al. (3). With our strict definition of hypoparathyroidism, as patients being under specific medication at the date of discharge, we obtained 35 patients (1.1%) who had this complication. The long-term results of 17 of these these patients (49%) who had no further need of calcium and/or vitamin D proved normal function of their parathyroid glands; in 18 patients (0.6%) their physicians were reluctant to relieve them from medication. Thus further examinations will be necessary to prove, whether the majority of these patients could also be taken off specific medication without any disadvantage.

This demonstrates that meticulous surgical dissection of the recurrent laryngeal nerve and visualization of at least 2, if possible all 4 parathyroid glands can decrease laryngeal paralysis and hypoparathyroidism to less than 1%.

An exception of this rule might be the isolated nodules of the isthmus with only limited resection where a meticulous routine dissection of the laryngeal nerve is not necessary.

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Invited Commentary to: "Recurrent Nerve Palsy and Hypocalcemia after Surgery of Benign Thyroid Diseases"

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Witte et al. (9) studied two important aspects of thyroid surgery in a retrospective study on 3246 thyroidectomized patients, the frequency of nervus recurrens pareses and hypoparathyroidism. These data are of great value for quality assessment. The paper at issue concludes that consistent exposure of recurrent nerve and parathyroid glands can limit the rate of recurrent laryngeal nerve paresis and hypoparathyroidism to less than 1%. The results of the follow-up after a mean period of 56 months proved that by that time 66% of early post-operative recurrent nerve paresis had subsided, and that half of the patients with hypoparathyroidism were back to normal serum calcium values, a fact known to me from my own studies (1). As the authors relate rates of recurrent nerve paresis to patient numbers and not, as would be correct, to operated sides ("nerves at risk"), the results look even more favorable. Another well known fact the study proves is that patients with autoimmune hyperthyroidism (Graves' disease) and those with recidivation operations suffer more frequently from complications, 2.4% and 9% of early post-operative recurrent nerve pareses respectively. 2.6% of early post-operative recurrent nerve pareses, which must be assumed to have resulted partly or predominantly from retrosternally located struma, occur in euthyroid nodular goiter. The paper does not differentiate between the various struma sites. It is impossible to assess inhowfar various surgical methods are prone to complications because the authors do not include the numbers of the particular operations when relating the retrogression of re-

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current nerve pareses to the different surgical methods used. According to general experience, the so called subtotal resections carry the highest risk besides recidivation operations, and retrosternal struma locations because many surgeons do not consistently expose the nervus recurrens in the above cases, contrary to what they do in thyroidectomy and hemithyroidectomy. The studies of *Chang-Chien*, however, showed that it is exactly the "subtotal" resection of nodular goiter that normally carries the highest risk because in 1.5 to 3% of cases the nodes laterally and anteriorly dislocate the nerves of the vocal cords, and in 2.5 to 10% of cases even tunnelling under the nodular struma may occur. When the struma is exposed and removed, the nervus recurrens can be damaged by pulling and pressing.

The commented paper, a series of other studies, the results of which are being evaluated, and my own experience of many years (1) show that consistent exposure of recurrent nerve and parathyroid glands is a safe method to minimize the risk of damaging these structures in thyroid surgery. This has also forensic repercussions, as non-exposure of or inattention to nervus recurrens and parathyroid glands are increasingly seen as inadequate care in lawsuits. The "opponents" of exposing nervus recurrens and parathyroid glands rely on studies of *Hermann* et al. of *Keminger*'s study group (3), *Horch* et al. (4), *Vara-Thorbeck* (8), and *Rieger* (5), which were in part conducted in large populations (3) but are open to criticism as regards form and contents (3, 4, 5, 8). In the study of *Rieger* et al., for example, criticism concentrates on the fact that conclusions on recurrent nerve pareses rates are drawn from a comparison of two patient groups, one with and the other without ligature of the arteria thyroidea inferior. This conclusion is problematic insofar as the nervus recurrens was not exposed in either of the two groups. Moreover, such a ligature, which according to standard should be done at the de Quervain point, actually poses no risk for the nervus recurrens. Other studies too offer some nonsensical stuff but discussing that would go beyond the scope of this commentary. In any case, these studies are not of a nature to prove beyond doubt that the results achieved with non-exposure of recurrent nerve are qualitatively similar to those after exposure. The commentaries on some of these studies are worth reading (6, 7). Another fact diminishes the persuasive power of the pleading for non-exposure even further. Almost all of these authors are highly experienced thyroid surgeons who can prove that with large numbers of patients they have treated for thyroid disease, and according to what they say, they too expose the nervus recurrens if they do thyroidectomies and other difficult operations. Thus it has to be assumed that their rich expert knowledge makes them "pay a different kind of attention" than inexperienced thyroid surgeons to regions which in case of non-exposure present a particular risk for these structures. It remains to be affirmed that the exposure of nervus recurrens and parathyroid glands is an absolute must in all thyroid operations extending into the lateral region and thus coming near to the recurrent nerve and the parathyroid glands.

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Extraperitoneale endoskopische Hernienplastik – Erfahrungen nach 825 Eingriffen

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Schlüsselwörter: Leistenhernien – endoskopisch – Patch-Plastik – extraperitonealer Zugang.

Key-words: Inguinal hernia – endoscopic – total extraperitoneal approach – patch plasty.

Zusammenfassung: Grundlagen: Seit 1990 sind die überkommenen Methoden der Leistenhernienreparationen im deutschsprachigen Raum zunehmend in Frage gestellt worden, zum einen wegen der langen Rekonvaleszenz und zum anderen wegen der in Qualitätskontrollstudien belegten unerwartet hohen Rezidivquoten. So erwecken einerseits spannungsfreie Patch-Methoden via konventionellem Zugang und andererseits endoskopische Techniken großes Interesse.
Methodik: Vorgestellt wird die total extraperitoneale endoskopische Hernienplastik. Hierbei wird unter Verwendung des laparoskopischen Equipments eine Flickenplastik zur Verstärkung der Leisten- und Femoralbruchlücken durchgeführt. Der Zugang nutzt die anatomischen Gegebenheiten der Rektusscheide aus, so daß der Peritonealraum nicht berührt wird. Die Dissektion des Extraperitonealraumes wird durch ein Ballondissektionssystem erleichtert, eine Patch-Fixierung oder Einschneidung erfolgt nicht.
Ergebnisse: Vom 29. 4. 1994 bis 28. 4. 1996 wurden 825 Hernien in dieser Technik bei 616 Patienten versorgt. Neben 5 verwachsungsbedingten Umstiegen kam es perioperativ lediglich zu 2 Blasenläsionen, 35 Hämatomen und 3 Nervenläsionen. Die postoperative stationäre Verweildauer betrug 3,5 Tage, die durchschnittliche Arbeitsunfähigkeit 18,7 Tage. In der 1-Jahres-Kontrolle (zur Zeit 70% nachuntersucht) wurden bisher 3 laterale Rezidive bei 286 Hernienoperationen festgestellt.
Schlußfolgerungen: Bei der totalen extraperitonealen endoskopischen Hernienplastik handelt es sich um ein komplikations- und rezidivarm durchführbares Verfahren, das die logische Weiterentwicklung der transperitonealen laparoskopischen Technik darstellt.

(Acta Chir. Austriaca 1996;28:364-368)

Total Extraperitoneal Endoscopic Inguinal Hernioplasty – Experience of 825 Procedures

Summary: Background: Since 1990 the traditional methods of inguinal hernia repair are more and more questioned in Germany. This was on one hand due to the long convalescence and on the other to higher recurrence rates than expected shown by quality control studies. So tension free patch methods using the conventional approach as well as endoscopic techniques became more and more fascinating.

Methods: Shown is the total extraperitoneal endoscopic hernioplasty. Using the laparoscopic equipment a patchplasty of inguinal and femoral region is performed with an approach which

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