Upsala J Med Sci 81: 93–95, 1976

# Preoperative Recurrent Laryngeal Nerve Paralysis in Patients Subjected to Thyroid Surgery

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## ABSTRACT

**All cases of preoperative recurrent nerve paralysis have been analysed in an unselected material of patients subjected to thyroid surgery at the Surgical Clinic in Falun during the period of 1969–74. The preoperative finding of recurrent nerve paralysis as a malignant sign is discussed.**

## INTRODUCTION

Hoarseness is a sign of malignancy, when found during the preoperative clinical examination of patients who present with a goitre (1). This is a classical statement.

Hoarseness is due to loss of function in the recurrent laryngeal nerve and/or the superior laryngeal nerve and is usually caused either by CNS damage or mechanically by section, pressure, or traction somewhere along the course of the nerve. This damage need not always be due to malignancy (2).

To illustrate this, we have studied the occurrence of pre-operative recurrent laryngeal nerve paralysis in a series of patients subjected to thyroid surgery during the 5-year period, 1969 to 1974.

## MATERIAL AND METHOD

This study is based on the records of patients admitted for thyroid surgery to the surgical clinic at Falun between 1969 and 1974. During this period a total of 476 thyroid operations were performed. Thyroid cancer was present in 31 cases and benign goitre in 445. The vocal cord function of all patients was checked preoperatively.

Those patients with recurrent nerve paralysis have been followed up for 1 to 5 years and their vocal cord function has been checked at intervals after the operation.

Further operative findings, pathological diagnosis, roentgenological examinations and clinical observations at the initial admission when paralysis of the recurrent nerve was found, were recorded.

## RESULTS (Table I and II)

Among 445 patients without carcinoma 5 cases of recurrent laryngeal nerve paralysis—one was partial—were found preoperatively. In 4 of these the paralysis has persisted in one case the nerve function recovered completely.

At operation, 3 patients had large adenomas, one patient a nodular goitre and in one patient a bulging carotid artery was found. In 3 cases the nerve was seen to be compressed by an adenoma; in one of these the adenoma was calcified.

The pathological diagnosis in 4 cases was nodular colloid goitre. In one case no pathological findings were present. In 2 cases X-ray examination showed extreme tracheal compression.

In 3 patients the history of hoarseness began less than 2 weeks before admission; in one of these the nerve function returned later. In another 2 patients hoarseness had been present for longer. The scintigram performed on the patient with a bulging carotid artery showed a small impression on the thyroid lobe on the side of the paralysis. Of the 31 patients with thyroid cancer, there were 5 cases of recurrent laryngeal nerve paralysis.

## DISCUSSION

The recurrent nerve innervates the intrinsic muscles of larynx and passes the inferior thyroid artery in a variable fashion (3).

When the nerve is injured, ordinary hoarseness occurs and the ipsilateral vocal cord is primarily immobilized in the paramedian or intermediate position (3, 4, 5).

The superior laryngeal nerve innervates the cricothyroideus and the inferior phacyngeal constrictor muscle. It accompanies the superior thyroid artery

Table I. *Preoperative recurrent laryngeal nerve paralysis in benign goitre*

| Patient's age, sex | Onset of paralysis less than 14 days before admission | Preoperative paralysis (+). Postoperative recovery (R) | PAD from the operative spicement | Tracheal compression on X-ray | Operative findings, gross pathology |
|---|---|---|---|---|---|
| 42 ♀ | + Hoarseness and acute growth | sin.+R | Cystic thyroid tissue+ nodular colloid goitre with haemorrhage | Not performed | Big adenoma on left side |
| 54 ♀ | – Tumor to the right in jugulum. Scintogram: small impression on the right thyroid lobe. | dx+(partial) | – | Not performed | Bulging carotic artery on right side in jugulum. Otherwise nothing. |
| 79 ♀ | + | bilat. + | Nodular colloid goitre | Extensive compression | Nodular goitre and "thin recurrent nerve" |
| 67 ♀ | – Onset paralysis 30 years earlier at the end of a pregnancy—"goitre already then" | dx + | Nodular colloid goitre | Not performed | Right-sided thyroid adenoma, "Big as a fist". "The recurrent nerve firmly pressed by the adenoma where it is calcified." |
| 60 ♀ | + | sin. + | Nodular colloid goitre | Extensive compression | The goitre bigger on left side "the recurrent nerve pressed flat behind the biggest adenoma". |

medially. It is usually covered by the fascia of the inferior constrictors, but in 15% it is found in the thyroid sheath and in another 6% the nerve courses among the branches of the superior thyroid artery (3, 6).

The first effect of laryngeal nerve injury is a reduction in the vocal cord range, particularly in the higher register. The affected cord moves but lies at a lower level than normal (7). The vocal cord is also irregular or wavy in outline (8). This is easy to foresee clinically. Simple hoarseness due to recurrent laryngeal nerve damage is the commonest sign and can be explained anatomically.

In about 40% (3, 9, 10) (some variation of the figures for different authors) the nerve divides into two or more branches, 5 cm or more below the level of the cricothyroid joint. On entering the larynx the branches may be as much as 6 cm apart (11). Furthermore, in 10% the nerve penetrates the thyroid gland before entering larynx (3, 12).

The branches of the recurrent nerve thus form a delta before entering the larynx and this branch

Table II. *Preoperative recurrent laryngeal nerve paralysis in patients subjected to thyroid surgery in the years 1969–74 at the surgical clinic in Falun*

| | Thyroid cancer | | Benign goitre | | Total | |
|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | *n* | % |
| No recurrent nerve paralysis | 26 | 83 | 440 | 99 | 466 | 98 |
| Recurrent nerve paralysis | 5 | 17 | 5 | 1 | 10 | 2 |
| | 31 | 100 | 445 | 100 | 476 | 100 |

delta can be partly or totally fixed in the thyroid tissue.

Local swelling of the gland in the region of the delta can exert considerable traction on the diverging branches of the nerve and produce distortion particularly at the branching point, i.e. affecting the whole nerve. An unbranched nerve would of course move more easily and adapt itself to the change of form in the surrounding tissue.

General or specific local growth of the thyroid gland can thus damage the recurrent nerve. The lesion can be caused by tense, diffusely growing processes like cancer or Riedel's goitre but local changes such as local cancer, cystic adenoma, nodular goitre or acute subcapsular haemorrage can also cause similar damage.

In our material of patients subjected to thyroid surgery from 1969 to 1974 (Table II) (cancer patients included), we have found 10 cases with preoperative paralysis of the recurrent nerve. 5 of those 10 had no cancer. Although 50% of the cases of paralysis belong to the cancer group, we think it is an exaggeration to describe the preoperative finding of recurrent nerve paralysis as a sign of malignancy.

A statistical reservation must be made concerning the figures in this study. The figures are collected from a patient material in a goitre region. The local goitre frequency clearly affects the probable cause of preoperative recurrent nerve paralysis. Consequently in a region with less goitre a preoperative nerve paralysis may be more relevant as a malignant sign.

It is worth noting therefore that "locality" may influence the clinical significance of the presence of preoperative recurrent laryngeal nerve paralysis.

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*Received January 19, 1976*

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