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Tracheostomy in the Surgery of the Thyroid Gland

Tracheostomia w chirurgii tarczycy

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Abstract

Background. Thyroid surgery is connected with postoperative respiratory obstruction which may necessitate tracheostomy.
Objectives. The aim of the study was to assess the indications, course, and outcomes of patients who underwent thyroidectomy requiring tracheostomy at Wroclaw University 1st Department and Clinic of General, Gastroenterological, and Endocrinologic Surgery between 1996 and 2008.
Material and Methods. The clinical data of patients who underwent thyroidectomy with tracheostomy were retrospectively analyzed based on their hospital records.
Results. Of the 4971 patients operated on for various diseases of the thyroid, tracheostomy was necessary in 13 (0.26%). The decision to perform tracheostomy was taken intra-operatively because of locally advanced thyroid cancer in 7 (54%) patients (4 patients with anaplastic cancer, 2 with follicular cancer, and 1 with medullar cancer). There were 5 patients requiring tracheostomy because of bilateral injury of the recurrent nerves; 2 had a secondary thyroid operation and 3 had hyperthyroid goiter. Tracheostomy was necessary for one patient who had postoperative hematoma and dyspnea.
Conclusions. There are many preoperative factors for the development of serious respiratory complications, such as a secondary procedure on the thyroid, thyroid cancer, huge goiter, retrosternal extension, tracheal deformity with narrowing, or preoperative recurrent laryngeal nerve palsy (**Adv Clin Exp Med 2009, 18, 4, 385–388**).

Key words: thyroid surgery, tracheostomy, complications.

Streszczenie

Wprowadzenie. W przebiegu operacyjnego leczenia schorzeń tarczycy istnieje możliwość wystąpienia poważnych zaburzeń oddechowych, wymagających wykonania tracheostomii.
Cel pracy. Ocena wskazań do wykonania tracheostomii u pacjentów poddanych operacji tarczycy w I Katedrze i Klinice Chirurgii Ogólnej, Gastroenterologicznej i Endokrynologicznej w latach 1996–2008.
Materiał i metody. Analizie retrospektywnej poddano dokumentację medyczną pacjentów leczonych chirurgicznie z powodu różnych schorzeń gruczołu tarczowego, u których istniała konieczność wykonania tracheostomii.
Wyniki. Spośród 4971 pacjentów, leczonych chirurgicznie z powodu różnych schorzeń tarczycy, tracheostomię wykonano u 13 (0,26%). U 7 (54%) decyzję o wykonaniu tracheostomii podjęto śródoperacyjnie ze względu na dużą masę guza nowotworowego, naciekającego tchawicę i okoliczne tkanki, niepoddającego się radykalnej resekcji. Byli to pacjenci z rakiem anaplastycznym (4), rakiem rdzeniastym (1), rakiem pęcherzykowym (2). Innym wskazaniem do wykonania tracheostomii była ostra niewydolność oddechowa spowodowana obustronnym porażeniem strun głosowych, która wystąpiła u 5 pacjentów. Spośród tych chorych wskazaniem do zabiegu operacyjnego było wole nawrotowe z podejrzeniem zmiany nowotworowej, u 3 wole toksyczne. Jeden pacjent wymagał wykonania tracheostomii w trybie pilnym z powodu narastającego krwiaka w ranie pooperacyjnej, który spowodował nagłe zatrzymanie krążenia.
Wnioski. Czynnikami predysponującymi do wystąpienia niewydolności oddechowej po operacji tarczycy są zabiegi wtórne na gruczole tarczowym, schorzenia nowotworowe, wole olbrzymie, zamostkowe umiejscowienie wola, przemieszczenie i przewężenie tchawicy oraz przedoperacyjne porażenie strun głosowych (**Adv Clin Exp Med 2009, 18, 4, 385–388**).

Słowa kluczowe: chirurgia tarczycy, tracheostomia, powikłania.

The surgical treatment of thyroid disease is connected with a risk of respiratory complications which quite often require tracheostomy. The procedure requires surgical exposure and incision of the anterior wall of the trachea. It is carried out in emergent life-threatening conditions as well as in patients who are at the risk of developing respiratory failure [1–3]. Most thyroid diseases develop slowly and their symptoms appear rather late. Surgery in the early phase of thyroid disease is safe and the postoperative rate of complications is low, at about 3–5% [4, 5]. However, there are still been patients, especially in endemic regions, with very large substernal goiter or cancer infiltrations who present respiratory disorders in the pre- or postoperative period [6, 7].

Material and Methods

The aim of the study was to evaluate the indications and predisposing factors for conducting tracheostomy in patients who had thyroid surgery. The course of the disease was also evaluated. The analysis was based on the medical documentation of patients treated at the Department of General, Gastroenterological, and Endocrine Surgery for various thyroid diseases in the period of 1996–2008. All patients were in the euthyroid state. Before surgery they had laboratory tests (RBC, biochemical tests), chest X-ray, thyroid ultrasonography, and laryngological examination to evaluate vocal cord function. The patients were informed of the possibility of complications and possible tracheostomy as a risk of thyroid surgery.

During thyroid surgery, identification of the recurrent laryngeal nerve was routinely done by visualization. Tracheostomy was performed only in the operative room under proper anesthesiological care. Tracheostomy was routinely done at the level of segments 2–4 of the thyroid cartilage. A plastic tracheostomy tube was initially used and was changed two days later to a metallic tube composed of two separate elements.

Results

In 1996–2008, 4971 patients were operated on for various diseases of the thyroid gland. Tracheostomy was performed in 13 patients (0.26%). The indications for tracheostomy are shown in the Tables 1 and 2.

Tracheostomy was most frequently performed in the group of patients treated for thyroid cancer (3.93%). In 7 patients the decision to perform tracheostomy was taken during the operation due to a large tumor mass infiltrating the trachea and surrounding tissues, where radical resection was not possible. There were 4 patients with anaplastic cancer, 2 with follicular cancer, and 1 with medullar cancer. The first symptoms of thyroid disease appeared more than 5 years before in 4 patients. Two patients with anaplastic cancer and 1 with medullar cancer had a disease history shorter than 1 year. All patients with malignancies had second-degree goiter according to the WHO classification and suffered from compressing symptoms. On radiological examination, 6 of these 7 patients had symptoms of dislocation and stenosis of the trachea and 5 had substernal goiter. In the patient with medullar cancer, preoperative computed tomography revealed a thyroid tumor entering the upper mediastinum and metastases in the lung and pleura. One female with anaplastic cancer and giant substernal goiter

Table 1. The patients and the kind of thyroid disease in which tracheostomy was performed

Tabela 1. Liczba chorych, u których wykonano tracheostomię w różnych schorzeniach tarczycy

Thyroid disease (Choroba tarczycy)	Number of patients (100%) (Liczba pacjentów)	Patients in whom tracheostomy was performed (Pacjenci, u których wykonano tracheostomię)	%
Nodular goiter (Wole guzkowe)	2832	1	0.04
Toxic goiter (Wole toksyczne)	1617	3	0.18
Thyroiditis (Zapalenie tarczycy)	110	–	–
Thyroid cancer (Rak tarczycy)	178	7	3.93
Recurrent goiter (Wole nawrotowe)	234	2	0.85
Total (Suma)	4.971	13	0.26

Table 2. Indications for tracheostomy in thyroid diseases

Tabela 2. Wskazania do wykonania tracheostomii

Number of thyroid operations (Liczba operacji tarczycy) n (%)	4971 (100)
Necessity of tracheostomy (Wskazania do wykonania tracheostomii) n (%)	13 (100)
– thyroid cancer (infiltration, tracheal stenosis)	7 (54)
– iatrogenic laryngeal nerve palsy	5 (38)
– increasing hematoma in the wound	1 (8)

had upper vena cava syndrome. Preoperative laryngological examination showed 2 patients with unilateral paresis of the vocal cords. One patient with stridor had bilateral paresis of the laryngeal cords. In the group of 7 patients with cancer, advanced neoplastic infiltration of the trachea and surrounding tissues was found during surgery in 6, and for this reason partial thyroidectomy with tracheostomy was performed. In 1 patient, near total resection of the thyroid gland was done, but tracheostomy was conducted due to clinical suspicion of anaplastic cancer and a high possibility of rapid disease progression. Bilateral paresis of the vocal cords as an iatrogenic complication of retropharyngeal nerve injury was the indication for tracheostomy in 5 patients (38%). Two patients in this group had recurrent goiter with suspicion of malignancy and three had a diagnosis of nodular goiter and hyperthyroidism with significant symptoms of compression. The average age of the patients was 77. These patients had suffered from thyroid disease for more than 10 years. All the patients who had vocal nerve palsy after the operation had substernal goiter with dislocation and stenosis of the trachea, confirmed by radiological examination. Unilateral vocal pulsy was diagnosed in 2 patients with recurrent goiter on laryngological examination before the surgery. One patient with huge goiter had emergency surgery for significant dyspnea and intensive stridor. In 3 patients, lobectomy on one side and subtotal thyroidectomy on the other lobe were performed and in 2 patients bilateral subtotal lobectomy. Two patients required prolonged intubation after surgery due to respiratory disorders and a suspicion of tracheomalacia. In all 5 patients, stridor and dyspnea occurred directly after the operation. Tracheostomy was conducted in these patients after laryngological examination on the 4^{th}–7^{th} day after the operation. The patients were treated in the Laryngology Department, where adequate phoniatric rehabilitation was carried out. Eight to twelve months after tracheostomy, the patients were decannulated to perform glottis surgery. In 3 cases a chordectomy was done and in 2 cases vocal cord laterofixation.

One female patient had urgent tracheostomy due to increasing hematoma in the wound and difficulties with intubation. The patient was successfully decannulated 8 weeks later.

In all the patients, classic tracheostomy was performed. Three patients developed complications after tracheostomy: bleeding that required reoperation, pneumonia, and local wound infection. Of the 13 patients with tracheostomy, 1 required further treatment at the intensive care unit and 4 (37%) with thyroid cancer died in the early postoperative period (2–4 days after the operation). The cause of death in 3 cases was respiratory inefficiency and one patient died because of disseminated intravascular coagulation (DIC).

Discussion

The necessity for tracheostomy in the surgery of the thyroid gland occurs very rarely. In the present authors' experience it was only in 0.26% of the patients. Ignjatović et al. had a similar result, reporting 0.7% tracheostomies in 2100 operated patients [8]. In Sudan the rate of performing tracheostomy is much higher, with 6% of patients; however, the surgery was due to giant goiter in an endemic region [9]. During the 13 years of observation in this Department, most (57%) of the tracheostomies were conducted in the course of anaplastic cancer. The decision to perform tracheostomy was made during the surgery as a part of palliative treatment because of neoplasmatic infiltration of the trachea and the surrounding tissues or to prevent tracheal compression in the course of disease progression. Many authors advise tracheostomy in the treatment of anaplastic cancer due to its very dynamic local growth and short time of survival (about 6 months) from the diagnosis [9–12]. In other departments the main indication for tracheostomy in thyroid surgery is tracheomalacia, especially in patients with huge goiter [6, 9, 13]. Other authors describe the necessity for tracheostomy due to tracheal stenosis in the course of thyroid cancer and difficulties with intubation [14]. In recent years the number of patients with tracheomalacia and huge goiter has been decreasing because of better medical education. Moreover, patients with thyroid diseases are diagnosed earlier by GPs and treated surgically.

Another group of patients that require tracheostomy are those after the surgery with bilateral recurrent laryngeal nerve injury, which results in respiratory failure. Kręcicki et al. showed that the most common cause of distal pareses of the vocal cords was operation on the thyroid gland [15]. According to various authors, the rate of vocal cord paresis after thyroid operations ranges from 1 to 7% [15, 16, 19]. The main reasons are direct recurrent laryngeal nerve injury during the operation, compression caused by hematoma or soft tissue edema, and cicatrix lesions as a more remote complication [15]. Authors agree that thyroid reoperation, toxic goiter, and massive and substernal goiter are the main predisposing factors for vocal nerve palsy [9, 11, 17, 18]. In the present material, bilateral vocal nerve palsy occurred in patients who had all the above-mentioned risk factors. Every decision to perform a second surgery on the thyroid gland should be carefully considered because this procedure is among the most common causes

of iatrogenic recurrent laryngeal nerve injury [17]. Some authors advise routine identification of the laryngeal nerve during every operation to prevent its injury [9, 18]. In recent years, neuro-monitoring has been recommended during thyroid operation to show the location of the laryngeal nerve [9, 18–19]. The function of the recurrent laryngeal nerve may return 6–12 months after iatrogenic injury, so adequate phoniatric therapy is very important in the early postoperative period.

Tracheostomy is a safe procedure as long as it is performed by a well-trained medical team with good anesthesiological, laryngological, and surgical experience. Moreover, everyone should know that the quality of life after tracheostomy is very low and uncomfortable for patients. The indications to perform tracheostomy should be discussed in every case. Before performing tracheostomy, evaluation of the respiratory tract should be performed using laryngoscopy, bronchoscopy, or tracheobronchoscopy. After this procedure the patient requires special professional nursing care, with suction of the contents from the brachial tree, adequate humidity of breathing air, and prevention of tracheal decubitus. In case of advanced incurable thyroid cancer it should be considered whether tracheostomy will really improve quality of life.

Before thyroid surgery, each patient should be well informed about the possibility of tracheostomy in the course of treatment. Huge goiter, neoplasm, secondary operations, or toxic goiter may predispose to respiratory disorders which may lead to prolonged intubation followed by tracheostomy. These patients should be treated at experienced centers with adequate surgical and anesthesiological support.

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