TETANY AS A COMPLICATION AFTER STRUMEKTOMY

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The study presented a case of a 54-year old woman who developed a fully symptomatic tetany syndrome with tachycardia and Chvostek’s (++) sign during the initial 24 hours after subtotal strumectomy. Laboratory parameters demonstrated hypokalemia and hypocalcemia. After the intravenous injection of calcium chloride with simultaneous oral administration of alfacalcidiol, both the calcium and potassium levels returned to normal values.

Postoperative tetany is observed in 0.2 to 5.8% of cases, according to literature data. Postoperative hypoparathyroidism may develop after total or subtotal thyroidectomy, as a result of the accidental excision of the parathyroid glands, their damage or vascularization. According to many authors postoperative hypoparathyroidism may result from the ligation of the lower thyroid artery, since these glands, both upper and lower, are supplied by blood in over 90% by the branches of these arteries. Other investigators maintain that tetany may also develop as a result of calcium metabolism disorders. Parathyroid ischemia may also result from pressure of the hematoma formed at the site of the removed thyroid lobes. The above-mentioned complication was probably influenced by a number of factors.

Key words: tetany, strumectomy

The enlargement of the thyroid gland, the so-called “nodular goiter” was already known in ancient China. Surgical removal of the goiter is the most effective therapeutic method. Every surgical procedure is burdened with the risk of possible complications. In case of strumectomy the following complications are most often observed: postoperative hypoparathyroidism, damage to the recurrent laryngeal nerves, and hypothyroidism. The operative technique elaborated by Kocher more than 100 years ago was subject to slight modifications, due to the introduction of novel instruments and technologies (1).

The occurrence of postoperative hypoparathyroidism is connected with the extent of the operation (2, 3). It is sometimes observed after total or subtotal strumectomy. The above-mentioned complication results from accidental parathyroidectomy, their damage or vascularization (4, 5). The human anatomy shows that the inferior parathyroid arteries branch of the inferior thyroid artery in 95% of cases, while the superior in 86% of cases (6, 7). Parathyroid vascularization is also possible from the superior thyroid artery, which is ligated after subtotal resection (8). The ligation of the thyroid arteries during total strumectomy significantly reduces the vascularization of the parathyroid glands, which might result in postoperative hypoparathyroidism (9). In case of subtotal strumectomy there is no relationship between the operative technique applied and the occurrence of hypoparathyroidism. Delicate preparation and proper hemostasis during the procedure play an important role (10, 11). The influence of ligation of the inferior thyroid arteries on postoperative damage or parathyroid ischemia is under discussion in literature data (12, 13).

Hypocalcemia is the most evident sign of parathyroid hormone insufficiency (14), clinically manifested by the development of symptomatic tetany (15). Postoperative hypoparathyroidism is usually observed during the initial days after the operation, although may also occur several hours after surgery. There exist cases where tetany developed several
years after surgery. The blood calcium level is the index of the condition of the parathyroid gland (12). Scientific research demonstrated that the lowest calcium and parathormone levels were observed 24 hours after strumectomy, regardless the surgical technique used (16). With time the calcium level increases.

Hypocalcemia is usually of transient character. Early hypocalcemia is connected with transient parathyroid gland ischemia observed during the procedure. In case of low calcium levels lasting several days one may suspect the so-called “bone hungry syndrome”. The above-mentioned is connected with early increased calcium resorption, as a consequence of the activity of thyroid hormones. This leads towards an increased blood calcium level. At the time of thyroidectomy the level of hormones produced by the gland decreases, calcium is once again incorporated into the bone, thus, its blood level is reduced. The above-mentioned phenomenon depends on the level of thyroid hormones after strumectomy (17, 18).

Some patients continue to present with hypocalcemia symptoms for more than 6 months, and thus, should be diagnosed with persistent hypocalcemia. Clinical symptoms in case of the above-mentioned include latent tetany, cardiovascular complications, cataract, skin dryness, and bone structure changes (9).

The presented case demonstrates a patient with tetany symptoms, which developed after subtotal strumectomy.

CASE REPORT

G.S. a 54-year old female worker (med. record 3427/2008) was admitted to the Department of General Surgery, Specialist hospital in Wroclaw with the following diagnosis: struma nodosa.

The patient had a family history of thyroid disorders. Since 1998 the patient complained of occasional shortness of breath, fatigability, general weakness, mood swings, and skin dryness.

Laboratory parameters showed an increased TSH level, which after the administration of L-thyroxin returned to normal values, and symptoms regressed. The patient received Letroz at a dose of 125 µg. For the past two years the patient was treated for hypertension, headaches and dizziness. Duodenal (2001) and cervical (2005) polipectomies were performed. The patient gave birth twice without complications. The last menstrual period was observed at the age of 43 years. The patient was on the following medication: Vinpocetin 5 mg – 2x1, Venoruton forte 1x1, Metocard 50 mg – 1x1, Diuresin SR 1.5 mg (1x1 tabl daily), and in case of increased blood pressure levels – Captopril 12.5 mg s.l.

On the day of admission patient presented with the following parameters: HR – 60/min, RR – 130/90, height – 160 cm, weight – 70 kg. Laboratory parameters were as follows: blood type B Rh+, Hb – 15.3 g% Ht – 45.16 RBC – 5310000, WBC – 5700, MCV – 85.9, platelets – 300 000, glucose level – 99%, urea – 24 mg%, creatinine – 0.63 mg%, TSH – 2.47, APPT – 25.4, prothrombin level – 114.29%, INR – 0.87, Na – 137.5 mmol/ml, and K – 4.22 mmol/ml. The ECG showed sinus rhythm, 60/min. The physical examination proved normal.

On April 2, 2008 the patient was subject to subtotal strumectomy (the operation lasted between 8.30 and 10.50). The collar section nearly 1cm above the jugular incisure of the sternum exposed the enlarged thyroid gland. After ligating the superior and inferior vessels of the lower pole, and central vein, the left thyroid lobe was exposed from adhering tissues, and completely excised. This was followed by capsulorrhaphy. The right lobe was similarly removed. The laryngeal nerves and parathyroid glands were identified during the procedure. Two Redon drains were placed. The skin and muscles were sutured. The operation lasted 2 hours and 20 minutes. The patient received the following intravenous solutions: 1000 ml PWE, 500 ml 5% glucose, 500 ml 0.9% NaCl, and enoxaparin at a dose of 0.6 ml.

On April 3, 2008, at 9.45 am the patient developed tachycardia (120/min) without tetany symptoms. Due to the fact that there were no B-blockers or selective calcium antagonists at the time of tachycardia occurrence the patient received 1/2 ampoule of Digoxin intravenously, and 1 ampoule of Diphergan intramuscularly. This was followed by capsulorrhaphy. The right lobe was similarly removed. The laryngeal nerves and parathyroid glands were identified during the procedure. Two Redon drains were placed. The skin and muscles were sutured. The operation lasted 2 hours and 20 minutes. The patient received the following intravenous solutions: 1000 ml PWE, 500 ml 5% glucose, 500 ml 0.9% NaCl, and enoxaparin at a dose of 0.6 ml.

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administration of 20 consecutive calcium chloride ampoules. Additionally, oral Alfadiol 2x1ug was recommended. The laboratory parameters were as follows: Na – 137.6 mmol/ml, K – 3.25 mmol/ml (N: 3.5-5.1), Ca – 1.98 mmol/ml (N: 2.09-4.55), Mg – 2.50 mmol/ml, P – 1.90 mmol/ml, and Cl – 105 mmol/ml.

The determination of the parathormone level after the operation was not possible, due to the lack of the appropriate reagent.

On April 4, 2008 the electrolyte levels were as follows: Na – 141.5 mmol/ml, K – 5.42 mmol/ml, Ca – 2.01 mmol/ml, Mg – 2.03 mmol/ml, P – 3.35 mmol/ml, and Cl – 108 mmol/ml.

The dose of calcium chloride was consequently reduced and the patient received Alfadiol at a dose of 2x1 µg.

On April 7, 2008 the electrolytes were as follows: Na – 139.9 mmol/ml, K – 4.61 mmol/ml, Ca – 2.16 mmol/ml, Mg – 2.07 mmol/ml, P – 3.13 mmol/ml. The endocrinologist recommended Alfadiol at a dose of 1x1 µg and Ostegel 1x5 ml. Control electrolytes after 2 weeks, and TSH after one month.

The patient was discharged from the hospital on April 8, 2008 in good general condition.

DISCUSSION

Postoperative tetany is observed in 0.2 to 5.8% of cases, depending on the authors (19-23). The above-mentioned complication was usually observed during the first day after the surgical procedure, regressing after standard treatment, being in accordance with data published by other authors (24, 25).

The first publications concerning postoperative tetany occurrence were described by Kocher and Reverdin. Kocher mentioned the possible connection with wound infection, while Reverdin with thyroid insufficiency (20). In 1892, a French physiologist (Gley) demonstrated the dependency between the occurrence of tetany symptoms and excision of the parathyroid glands (20). The accidental excision of the parathyroid glands during the procedure is also possible, especially in case of nodular goiter, since the parathyroid glands are encrusted into the thyroid. Localization anomalies are also possible connected with embryonic development disturbances (19, 26). According to many authors the ligation of the inferior thyroid arteries has significant influence on the development of postoperative hypoparathyroidism. This is probably connected with the fact that both the inferior and superior glands are supplied in blood by the inferior thyroid arteries in 90% of cases (13, 27, 28).

Fibak (29) doubts the sense of ligating any of the arteries in case of non-toxic goiter procedures. Kallionaki and co-authors (13) compared patients subject to surgery without ligation of the inferior thyroid arteries with those where ligation was performed. The parathyroid gland function was determined on the basis of calcium levels and retrograde tubule phosphorus absorption. No statistically significant differences were observed between both groups. Literature data mentioned the role of parathyroid anomalies, such as variable gland localization and damage to blood supplying vessels on postoperative tetany symptom occurrence (23). The authors of the above-mentioned consider the significant role of calcium metabolism disturbances on tetany occurrence. Sznapka (30), and Wilkin and co-authors (31) showed the influence of calcitonin released during the surgical procedure on the reduction of the calcium level. Michie and co-authors (32, 33) evaluated the calcitonin level in patients subject to surgery, due to toxic goiter, showing that its low level had no significant influence on calcium level reduction. Calcitonin activity lasts between 3 and 8 hours, which also is evidence that postoperative hypocalcemia is not caused by calcitonin (34). Parathyroid ischemia can be caused by hematoma compression, which developed at the site of the excised glandular lobes. The restoration of complete blood supply after thyroid artery ligation is either longer or shorter. Tetany symptoms usually develop and regress after parathyroid blood supply improvement (24). Many authors underline the need to perform a precise and bloodless operation, maintaining the parathyroid gland vascularization (10, 11). In order to maintain good parathyroid blood supply, only one of the inferior thyroid arteries should be ligated. An alternative would be the ligation of only one inferior thyroid artery, the closest to the thyroid capsule (24).

More and more authors see the need for intraoperative iPTH monitoring, in order to detect patients endangered with postoperative hypoparathyroidism. However, due to the high
costs the above-mentioned procedure is not routinely performed (35, 36). There also exist publications demonstrating the benefits of postoperative intravenous calcium administration, at a low cost (37).

The development of tetany symptoms in the presented case was probably triggered by many factors. Tetany is a rare complication and was observed in our Department in only a dozen or so patients.

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Received: 24.07.2009 r.
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