

Practique Clinique et Investigation

Correlation of Salivary Stone Disease with an imbalance of Bone Remodeling Processes

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ABSTRACT

Introduction: Salivary Stone Disease is the most common pathology of the salivary glands. In the modern view of etiopathogenesis, there is no single theory explaining the processes of stone formation in the salivary glands, which also determines the high risk of postoperative complications and relapses of sialolithiasis.

Aim: increasing the treatment effectiveness of patients with salivary stone disease in the violation of bone remodeling on the background of thyroid pathology.

Materials and Methods: On the examination and treatment there are 80 patients aged 25-50 with calculous sialadenitis of the submandibular gland. The study was about the patients' state of bone remodeling and thyroid status.

Results: In the presence of subclinical hypothyroidism, mineral metabolism indices showed an imbalance of bone remodeling with suppression of the bone formation phase, with subclinical hyperthyroidism - the resorption phase predominance.

Conclusion: Patients with sialolithiasis need to study bone-remodeling processes, which imbalance can be considering as the cause of stone formation (lithogenesis). The thyroid status of all patients with salivary stone disease with subclinical hypo- and hyperthyroidism in the pre- and post-surgery period should be correcting by an endocrinologist, which positively affects the stabilization of processes in the gland.

KEYWORDS: *Salivary stone disease; Bone remodeling; Salivary glands; Sialolithiasis, Hyperthyroidism; Hypothyroidism*

INTRODUCTION

Currently the salivary stone disease is the most common pathology of the salivary glands, which accounts for 20.5%-61.1% of the diagnosed facts of this diseases [1-4]. In the contemporary view of aetiopathogenesis, there is no unified theory

Citation: Anastasia Sergeevna Belyakova, Correlation of Salivary Stone Disease with an imbalance of Bone Remodeling processes. *Prac Clin Invest* 2(1): 61-65.

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explaining the processes of stone formation (Lithogenesis) in salivary glands, which also determines the high risk of postsurgical complications and recrudescence of sialolithiasis [5-8].

According to Lastovki AS [7] after calculus removing from the duct of submandibular salivary gland, patients showed full or partial cicatricial stricture of the excretory duct (68%), chronic sialadenitis recurrence (76%) and stone formation recrudescence (52%).

Previous diseases *intra vitam* and current somatic pathology can lead to morphological and functional changes in salivary glands, which are manifested in the salivation decrease, in the saliva viscosity increase, in the total protein content in mixed saliva increase, and in the calcium-phosphoric metabolism change, which can contribute to the calculi formation [9]. Patients with salivary stone disease often have denticles, tartar deposit (plaque, calculus), as well as internal organs concomitant pathology, accompanied by the presence of calculi in the gall bladder and organs of the urinary system, which once again emphasizes the significant role of the mineral metabolism state in the stone formation pathogenesis. According to some authors the incidences of urolithiasis in patients with sialolithiasis is 43%-50%. [10-13] In that regard, Martynov GV [13] proposed introducing the concept of primarily multiple bio lithiasis [8,14,15].

Among the factors, contributing to the course of salivary stone disease, general diseases are considered, accompanied by a bone remodeling violation [7,13,16-18]. Thyroid hormones affect phosphorus-calcium metabolism directly (through the osteogenic cell activity regulation) and indirectly (through the calcium-regulating hormones secretion) [19].

Subclinical hypothyroidism and hyperthyroidism are preclinical forms without clinical symptoms, therefore, there are current discussions in the literature about the necessity of the thyroid status correction in this pathology [20].

Aim of the study is increasing the treatment effectiveness of patients with salivary stone disease in the violation of bone remodeling on the background of thyroid pathology.

MATERIAL AND METHODS

On the examination and treatment 80 patients aged 25-30 with calculous sialadenitis of the submandibular gland. The entry criterion in the study were patients with a history of salivary stone disease and thyroid pathology who did not receive correction from an endocrinologist.

The exclusion criterion was patients with hyper- and hypofunction of thyroid gland who were treated by an endocrinologist, as well as the gastrointestinal tract pathology, chronic obstructive bronchitis, the kidneys and cardiovascular system diseases and the postmenopausal period female patients.

To determine thyroid function, thyroid-stimulating hormone (TSH), free thyroxin (T_4) were studied. The mineral metabolism state was assessed by the systemic exposure (after an overnight fast) of calcium-regulating hormones: parathyrin (PTH (pg/ml)) and calcitonin (CAT (pg/ml)), as well as serum-bone turnover marker - Cross-laps (ng/ml) and bone formation - osteocalcin (ng/ml).

The research was conducted in two stages. In the first - patients with sialolithiasis, depending on the thyroid function state, were divided into groups:

I - 43 patients (15 men and 20 women) with subclinical hypothyroidism (T₄ normal, TSH above control figure);

II - 36 patients (10 men and 16 women) with subclinical hyperthyroidism (T₄ normal, TSH below control figure).

The control group consisted of 30 healthy individuals (16 women and 14 men) without salivary gland pathology.

At the second stage after studying the mineral metabolism state in preclinical forms of thyroid pathology, 80 patients with salivary stone disease depending on the endocrinological correction were divided into subgroup:

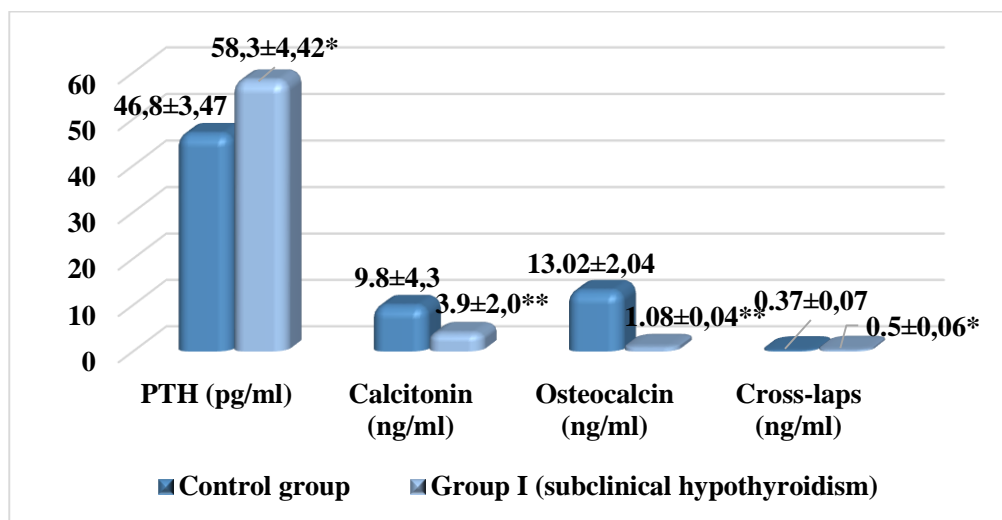
A: 54 patients (20 men and 34 women) with the thyroid status pre-surgical correction by the endocrinologist;

B: 26 patients (11 men and 15 women) without the thyroid status correction by endocrinologist.

The gland secretory function in post-surgical period (calculus removal) was rated by the sialometry results.

RESULTS AND DISCUSSION

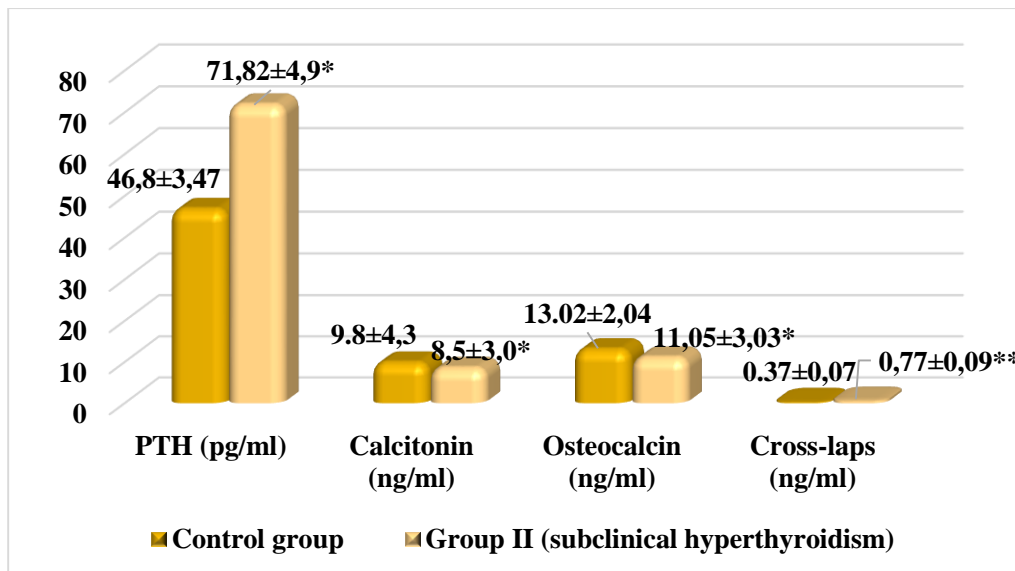
When analyzing mineral metabolism in group I patients in the presence of subclinical hypothyroidism in the blood, there was a tendency to an increase in PTH secretion and a significant 12-fold decrease in the concentration of bone-formation marker, osteocalcin ($p \leq 0.001$), as well as a 2.5-fold ($p \leq 0.01$), which indicated an imbalance of bone remodeling with suppression of the bone formation phase (Graph 1).



Graph 1: The state of mineral metabolism of patients in Group I with salivary stone disease and subclinical hypothyroidism.

Note: Remark: * - $p < 0,05$, ** - $p < 0,01$.

In group II, patients with calculous sialadenitis and subclinical hyperthyroidism showed a significant 53,5% parathyrin increase compared to control value ($p \leq 0,05$), while the calcitonin level remained within normal limits with a significant serum-bone turnover marker increase - Cross laps 2 times ($p \leq 0,001$), which indicates an imbalance in bone remodeling with a predominance of the resorption phase (Graph 2).



Graph 2: The state of mineral metabolism of patients in Group II with salivary stone disease and subclinical hyperthyroidism. Note: Remark: * - p <0.05, ** - p <0.01

Consequently, in individuals with calculous sialadenitis even with subclinical manifestations of thyroid dysfunction bone remodeling imbalance is noted, which can be one of the causes of Lithogenesis.

At the second stage of the research 93% of patients in subgroup A with thyroid status correction in pre-surgical period already on the second day after stone removal had a pain and tissue edema decrease in the surgical wound area and two weeks later this semiology completely leveled out. After a month the phenomena of saliva retention during meals were rejected by all subjects and according to sialometry a complete restoration of the salivary gland function was 2.0 ml ± 1.9 ml.

In all subgroup B patients without pre-surgical correction of thyroid status edema and hyperemia of tissue around the wound persisted up to 10 days. Despite the ongoing bougienage and the submandibular gland duct instillation at the rehabilitation stage in these patients, wound epithelization was accompanied by cicatrices formation which helped to preserve the phenomena of saliva retention during meals. In subclinical forms of thyroid pathology in group B patients complete restoration of the secretory function of the salivary gland did not occur, sialometry data 0.6 ml ± 0.2 ml.

CONCLUSION

Patients with sialolithiasis need to study bone remodeling processes which imbalance can be considered as the cause of Lithogenesis. In all patients with the salivary stone disease with subclinical hypothyroidism and hyperthyroidism in pre- and post-surgical period thyroid status should be corrected by an endocrinologist which positively affects the stabilization of processes in the gland.

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