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Improvement of treatment guidelines for patients with gingival fibromatosis considering interdisciplinary approach

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gingival fibromatosis, magnetostrictive ultrasonic scaling, professional oral hygiene, interdisciplinary approach

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Abstract

Our paperwork is the result of medical literature, life science journals, menegment protocols analysis, and our own practical experience of managing a patient with gingival fibromatosis and observations of doctors' work and medical errors in the course of the treatment. In the first part the work is a highlight of basic theoretical knowledge on gingival fibromatosis. The next part was analysis of scientific works with respect to an interdisciplinary approach in the treatment of this pathology. As a result of the analysis, we found a lack of communication between internists and dentists at the stage of dental treatment right before surgery, which is a common medical mistake. We want to focus doctors' attention to early therapeutic treatment before surgery, an important part for preventing particular complications in the course of gingivectomy and inflammatory responses exacerbation. This paper proposes improved treatment guidelines for patients with gingival fibromatosis for prevention of possible medical errors and emphasis on doctors communication in the course of treatment.

Part 1

Gingival fibromatosis classification

According to the International Classification of Diseases of the 10th revision (ICD 10), gingival fibromatosis (K06.1) refers to diseases of the digestive system (K00- K93), diseases of oral cavity, salivary glands and jaws (K00-K14), other disorders of gingiva and edentulous alveolar ridge (K06). Danylevskii N.F. in his classification of periodontal diseases (1994) referred fibromatosis to benign parodontome (Danilevsky et al. 2002).
Depending on the length of the pathologic process, gingival fibromatosis may be in local, diffuse or total form. In case of local disease, gingival enlargement reaches certain groups of teeth. Dense formations appear on gingiva. Formations have the same color as gingiva and are painless on palpation. Gingival enlargements have smooth surface, dense consistency and regular rounded shape. Such form mainly develops in the frontal area of the jaws. In case of diffuse fibromatosis, the excess tissue may cover the crowns along the entire length. Complete destruction of the alveolar bone and its replacement by fibrous tissue is typical for total fibromatosis. It leads to the deformation of upper and lower parts of the face and complicated closing of lips. Such deformation is called gingival elephantiasis (Pavlenko et al. 2015). This anomaly

is classified by form into two types: nodular form and symmetric form. Multiple gingival overgrowth is typical for local nodular form (Maksimovsky et al. 2002).

Epidemiology of gingival fibromatosis

Hereditary gingival fibromatosis is a rare disease, gene frequency is 1: 350 000. The prevalence of phenotypes is 1 case per 175 000 of population. Mostly there are several cases in one family, only 20% occur without a family medical history. It makes possible to trace similar cases of family medical history in 80% of gingival fibromatosis cases. Hereditary gingival fibromatosis can occur alone or as part of syndromes. It represents an autosomal dominant inheritance, although its penetrance and expressiveness are different. Disease is more common for adults and adolescents, but there are cases for children with Down`s syndrome (Kather et al. 2008; Tripathi et al. 2014).

Etiological factors of gingival fibromatosis

According to etiology, gingival fibromatosis is classified into five groups:

1. Fibromatosis associated with non-genetic diseases. Gingival enlargement can be directly or indirectly associated with malnutrition (vitamin C deficiency), changes in the endocrine system (pregnancy or puberty), blood dyscrasias (leukemia), Wegener's granulomatosis, facial granulomatosis, pyogenic granuloma and sarcoidosis. It can also be associated with pseudotumors, benign neoplasms (giant cell fibroma, papilloma, giant cell granuloma) and malignancies (oral squamous cell carcinoma, salivary gland tumors, melanoma, adenoma and mucoepidermoid carcinoma) (Bakaeen, Scully 1998).
2. Gingival fibromatosis associated with hereditary factors and related genetic diseases and syndromes - hereditary gingival fibromatosis (HGF). Goddard and Gross in 1856 first described and identified hereditary gingival fibromatosis as a rare condition characterized by slow, progressive, non-hemorrhagic, fibrous gingival enlargement due to the increase of submucous component in connective tissue (Bakaeen et al. 1998). Anegundi, Sudha, Nayak distinguish this pathology as separate disease or part of the next syndromes: Retherford, Jones, Murray-Pyuretic-Drescher, Laband, Ramon, Cross and Zimmerman-Laband (Pavlenko et al. 2015). In most cases, gingival fibromatosis is inherited in autosomal dominant form, but also can occurs in recessive forms. Non-syndromic autosomal dominant forms of gingival fibromatosis have been localized to chromosomes 2p21-p22 and 5q13-q22. One of the most common is single nucleotide polymorphism (SNP) in the Son of Sevenless-1 (SOS-1) gene (Gaglinao et al. 2008). Gingival fibromatosis pathological manifestation includes excessive accumulation of extracellular matrix proteins, mainly of type I collagen (Gawron et al. 2016).
3. Drug Induced Gingival Overgrowth - DIGO. Taking phenytoin and cyclosporine can lead to gingival overgrowth in 25-50% of patients; nifedipine, diltiazem, felodipine, amlodipine, sodium valproate and estrogenic drugs (oral contraceptives and conjugated estrogens), especially in large driven by calcium channels disorder through gingival fibroblast membranes. It leads to changes of homeostasis in cells, collagenase activity and local immunity.
4. Idiopathic gingival fibromatosis (unknown etiology). This acquired gingival fibromatosis is characterized by painless, benign enlargement; it extends to marginal or free gingiva, alveolar, attached and interdental gingiva (Shetty et al. 2010). Local factors also play an important role in the development of gingival fibromatosis: abnormal frenal attachments, malocclusions, teeth malalignment (teeth crowding, hyperdontia), poor oral hygiene, dental prosthesis.

Gingival fibromatosis pathogenesis

Gingival fibromatosis pathologic features are abnormal accumulation of extracellular matrix proteins, including type I collagen. However, molecular and biochemical mechanisms causing this pathological process are not yet fully researched.

Gingival fibromatosis morphological traits

For final diagnosis, samples of the removed tissue are going for histologic examination. Sample is fixed in a buffered neutral solution of 10% formalin. The prepared paraffin histologic specimens are stained and studied under electron microscope by making photographs. Collagen fibers are formed by microfibril aggregation, have pink color in the process of hematoxylin and eosin stain; blue or green color in the process of three-chromium stain; brown-yellow color in the process of silver impregnation. Thus, depending on stain, we will see the characteristic color of excess type 1 collagen. Connective tissue consists of excess collagen, but has relatively few fibroblasts and vessels. Enlarged fibroblasts alternate with thin and thick collagenic fibrils. Elastic fibers are also present in case of gingival fibromatosis. In contrast to the usual gingivae morphology, bundles of coarse and thin dense collagen fibers are oriented in all directions (Gaglinao et al. 2008).

Local form of gingival fibromatosis

Thickened epithelium with para- and hyperkeratosis events, acantosis with cavities of different sizes which are filled with hyperchromic cells with nuclei of big sizes, sometimes dinuclear. Stroma is characterized with fibroblasts proliferation and myofibroblasts, enlargement of fibrous connective tissue with unexpressed vascularization (Pavlenko et al. 2015).

Diffuse form of gingival fibromatosis

Dilation and fullness of capillaries and vessels were reported. Epithelium is thinned, acanthosis and parakeratosis are present. Along with the changes typical for local form, there is also a formation of fibrous substances with presence of granulomas from lymphohistiocytic cells, which are represented by cells with hyperchromic nuclei and perinuclear cells. Granulomas contain a significant number of plasmablasts with perinuclear inclusions bodies. Granulomas contain a significant number of plasmablasts and plasma cells, as well as eosinophilic granulocytes (Gaglinao et al. 2008).

Total form of gingival fibromatosis

In addition to morphological changes of local and diffuse forms along with edema and separation of stromal tissue, total form characterizes with leukocyte infiltration by banded neutrophils with subsequent purulence, circulatory disorders, edema in stroma, formation of specific granulomas with a large number of plasmablasts and plasma cells (Gaglinao et al. 2008).

Gingival fibromatosis clinical picture

Gingival fibromatosis is a painless, benign, slowly progressive gingiva and gingival papillae enlargement and covers labial, palatal, buccal and lingual jaw surfaces. It extends to the marginal and attached part of the gingiva and gingival papilla, but does not extend beyond the mucogingival junction. Gingiva is pink in color, fibrous in texture, similar to outer ear cartilage in touch. Atypical growths cover the teeth partially or completely, which can lead to diastema, displacement or retention of teeth and to cause masticatory, phonetic dysfunction and psychological, aesthetic problems. It can be localized or generalized. Clinically, the disease begins during the period of mixed dentition (puberty). In some cases, gingival fibromatosis is observed at birth (Pedro et al. 2017).

There is a three degrees of gingival hypertrophy:

- the first degree characterized by gingival margin and gingival papillae excessive growth throughout the affected area and increasing by 1/3 of teeth crown section; the shape changes (round, oval, often irregular),
- at the second degree, gingiva covers 1/2 of teeth crown section height,
- at the third - 2/3 and more.

Often gingival enlargement coincides with the eruption of secondary incisor teeth. In addition, the presence of teeth seems necessary for hereditary fibromatosis of the gums, as the condition disappears or recedes with adentia. Although gingival enlargement does not directly affect the alveolar bone, plaque accumulation and bone loss may occur due to pseudopockets (Shetty et al. 2010).

Drug Induced Gingival Overgrowth (DIGO) usually occurs as generalized (diffuse) enlargement that occurs ad oculus within a few months after systemic treatment, in contrast to hereditary GF characterized by slow, progressive growth of gingival tissue. Gingival Overgrowth are usually normal in color or may be erythematous (Maksimovsky et al. 2002).

Gingival fibromatosis diagnosis

Hereditary gingival fibromatosis is a clinical diagnosis based on the clinical and periodontal examination, medical, family history and laboratory tests. These studies determine:

- inherited or acquired condition,
- coexistent diseases,
- history of previous treatment in the anamnesis,
- stage of gingiva hypertrophy,
- gingival fibromatosis form (local, diffuse, pathological).

Periodontal examination, including X-ray and histopathological examination allow to choose the best treatment option (Jordan 2004).

Gingival fibromatosis differential diagnostics

Differential diagnosis can be based on the available data and clinical experience. Subsequently, after detailed examination, the doctor makes final diagnosis or diagnosis by exclusion (Agrawal 2015). Gingival fibromatosis can be differentiated with hypertrophic gingivitis of fibrous and granular forms. Patients with fibrous gingivitis also have gingival pseudopockets and have no subjective complaints or complain for unusual gingiva appearance and shape. The disease follows a slow clinical course, sometimes catarrhal inflammation precedes the proliferative process. Hypertrophied gum is in the form of thickened torulus, papillae are round, hypertrophied. Gingival papillae are pale pink, close to the tooth, although enlarged and deformed, do not bleed. Depth of the gingival pockets depends on the degree of gingivae hypertrophy, usually without discharge. In case of gingivae hypertrophy of II or III degree, especially in case of diffuse process distribution, its growth is equally expressed from vestibular and glossal surfaces. On palpation, hypertrophied gingivae areas are dense and usually painless, bleeding is either absent or insignificant. Depending on the severity, there are I, II and III degree of gingival papillae hypertrophy (Danilevsky et al. 2002).



Fig. 1, 2. Patient, 27 years old. Diagnosis: gingival fibromatosis, diffuse form. Extraoral and intraoral examination.

Granular form of hypertrophic gingivitis occurs more often than fibrous form. For this gingivitis form is typical hyperplasia of the gingival papillae, pastosity, tissue looseness, pain on palpation and increased bleeding. Increased gingival papilla is covered with granulations as a result of severe tissue edema and hyperplasia.

Hyperplasia gingival pockets of various depth with serous or serous-purulent exudate are formed as a result of marked tissues edema. Dental epithelial connection intact (Danilevsky et al. 2002). For differential diagnosis should be used gingival indexes (PMA for example) and histological examination for the final diagnosis.

Part 2

Clinical case

A 27-year-old woman was admitted to the maxillofacial department with complaints for gingival enlargement, inability to chew food and difficulty breathing (Fig. 1, 2).

Anamnesis vitae: The patient had pathological amenorrhea during puberty. The patient was observed by an endocrinologist-gynecologist for the treatment of endocrine pathology.

Anamnesis morbi: physical examination of the patient found functional abnormality of chewing and phonetic functions, dissymmetric facial profile due to bimaxillary gingival overgrowth of cartilaginous consistency, which led to deformation of the lower face region. Gingival enlargement led to incomplete closing of lips, complication of phonetic and chewing function. It is known that the disease began to develop gradually from 10-11 years (mixed dentition period). There was no history of gingival fibromatosis in the family.

At intraoral examination we observed generalized gingival enlargement throughout the dental arch which covered all tooth row of upper and lower jaw from vestibular and oral surface (Fig. 3, 4).

Intraoral examination revealed that the lower face region is asymmetrical compared to upper, due to excessive growth of the gingival margin, gingival papillae. Oral mucosa condition is pale pink without signs of inflammation. We observed only in the frontal part of the lower jaw (32, 31, 41, 42 teeth) an inflammation of gingival margin, probably due to trauma by upper incisors.

To assess prevalence rate and intensity of inflammatory periodontal disease, we used the following indexes:

- index PMA (Parma 1960) - gingivitis is not detected,
- the assessment of the hygienic level was performed using a simplified oral hygiene index OHI-S plaque index (Green-Vermillion 1964) - 2 points, unsatisfactory oral hygiene.

The existing pathological gingival enlargement reaches 3-8 mm in different areas maxillary and mandibular. Fibromatous enlargements can be easily separated with a spatula, with no following bleeding. Gingival hypertrophy on the palatal side impairs respiratory function.

Treatment

I surgical stage

The patient was admitted to the maxillofacial department with gingival fibromatosis, diffuse form. Maxillofacial surgeon performed gingivectomy in the frontal section of lower jaw in the projection from 35 to 45 teeth (Fig. 5, 6). The procedure was

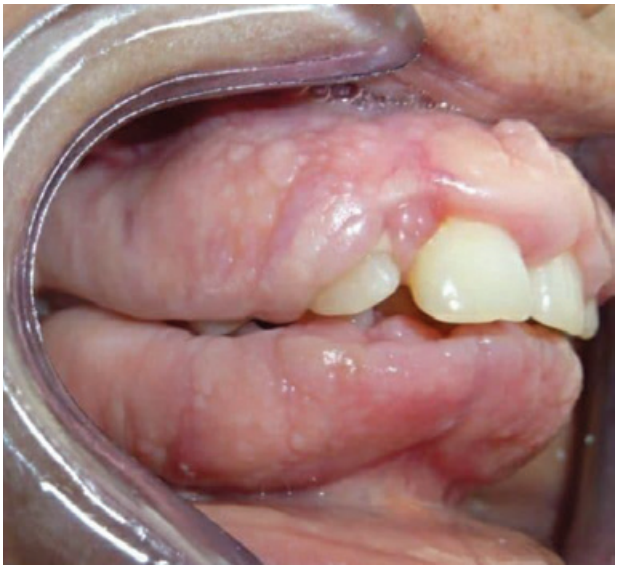



Fig. 3, 4. Intraoral examination.




Fig. 5, 6. I surgical stage of gingivectomy.

performed under local conduction anesthesia (Sol. Ubistesini 4% 1.7 ml). For intraoral antiseptic was used chlorhexidine 0.05% solution. Gingivectomy was performed with a surgical scalpel using electrosurgical coagulator BOWA ARC 10. During gingivectomy surgery, subgingival dental calculus was identified. Dental calculus can potentially cease the gingival tissue regeneration in the postoperative period. Sample of tissue was sent for a histological examination, which confirmed the diagnosis of "gingival fibromatosis".

Maxillofacial surgeon referred the patient to periodontist for therapeutic treatment for professional oral hygiene with the removal of dental plaque). Before performing any surgical interventions related to periodontal tissues, it is recommended to refer the patient for professional oral hygiene. In this clinical case the patient was referred to periodontist only after the first stage of gingivectomy, which can be considered as a medical error. Then internists, maxillofacial surgeon and periodontist jointly developed individual treatment plan in several stages.

I therapeutic stage

Each therapeutic stage of treatment should be performed in the periodontal office before surgery. To prevent inflammation and improve tissue regeneration after surgery, we performed professional oral hygiene using ultrasonic magnetostrictive scaling.

In the process of professional oral hygiene, we followed the next steps:

1. Oral cavity antiseptic wash (chlorhexidine 0.05% solution).
2. Removal of dental calculus (supragingival and subgingival) using a magnetostrictive ultrasonic scaler Cavitron Select SPS.
3. Final polishing of all tooth surfaces with polishing antiseptic low-dispersion pastes (Nupro Sensodyne).




Fig. 7, 8. Befor/after I therapeutic stage of gingivectomy.

II surgical stage

The interval between each subsequent surgical stage should be 1 month. Therefore, 30 days after therapeutic treatment, the patient was re-referred to the maxillofacial department for complete treatment by surgical extirpation of fibromatous pathological gingival enlargement in the lateral departments in molars area on the lower jaw and all upper jaw.

II therapeutic stage

The second therapeutic stage was the same to the first and included additional prescription of drugs with antibacterial, antimicrobial and anti-inflammatory effect:
Amoxicillin/clavulanic acid 1 pill 2 times per day, up to 7 days.
Loratadine 1 pill 1 times per day, at night - 7 days.
Ointment "Metrogyl denta" 2 times per day, up to 10 day.

Oral cavity antiseptic mouthwash with chlorhexidine 0.05% solution (3-4 times per day after meals) for 2 weeks. The patient was under dispensary observation for 6 months, professional oral hygiene was performed every 3 months. Course of gum healing and regeneration retrospectively occurred quickly, without complications. At the same time, the patient was treated by a gynecologist to correct endocrine disorders associated with pathological amenorrhea. No relapse of gingival fibromatosis and pathological amenorrhea was observed during the year (Fig. 9).



Fig. 9. Six months after gingival fibromatosis treatment.

Gingival fibromatosis treatment guideline

We found and analyzed foreign literature containing clinical protocols for the treatment of gingival fibromatosis (Zhou et al. 2011; http://cgsp.by). Unfortunately, in Ukraine there are only different nonconsolidated recommendations about gingival fibromatosis management (Bernadska, Danko 2013; Doroshenko, Kulginsky 2014). Ukrainian educational literature for students contains no clear and detailed treatment information about this sickness at all (Danilevsky et al. 2002). Based on our own clinical case and analysis of scientific and practical approaches to the treatment of patients with gingival fibromatosis, we have developed an updated treatment guideline for patients with gingival fibromatosis in Ukraine, considering and preventing possible medical errors.

Treatment guideline

Clinical form:
Gingival fibromatosis, diffuse form.

Diagnostic criteria:
Complaints: Painless slowly progressing gum tissue enlargement in the oral cavity, which partially / completely covers dental crowns on one / both jaws, violation of chewing, phonetic function, dissymmetric facial profile.

Common symptoms: General health is normal or there are endocrine disorders and / or taking medications (nifedipine, diltiazem, felodipine, amlodipine, sodium valproate and estrogenic drugs (oral contraceptives and conjugated estrogens).

Local symptoms: Non Painful tumor of elastic consistency and bulging shape (similar to outer ear cartilage in touch). Gingival tissue is replaced by fibrous tissue enlargement, which connect each other and cover dental crowns along the entire length of tooth row. Differential diagnostics of hypertrophic gingivitis of fibrous and granular forms and gingival fibromatosis of total form (at the stage of diffuse form, absence of complete bone resorption).

Examination: Orthopantomogram to determine the level of alveolar bone resorption and fibromatosis form. Histological examination of the sample of tissue, coagulogram and complete blood count to identify possible blood pathologies.

Treatment:
Therapeutic. Professional oral hygiene before each surgical stage (recommended - magnetostrictive ultrasonic scaler). Dispensary observation after the last surgical stage, minimum - 6 months.

Surgical. Simple gingivectomy (recommended - laser, for simultaneous coagulation, minimal invasiveness and rapid postoperative healing). The choice of anesthesia method - conduction anaesthesia (local conduction anesthesia or general anesthesia, depending on the age of physical health and psychological condition of the patient).

Complications: Relapse.
Criteria for treatment effectiveness:
Stable therapeutic effect, normalization of gingival shape and appearance, rapid healing and regeneration of the wound, restoration of respiratory function, chewing, phonetics, lip closure, no deformation of the oral cavity soft tissues; satisfactory somatic condition; change of indicators of laboratory-biochemical researches of hormonal imbalance normalization and radiological picture of alveolar bone tissue condition.

Conclusion
Most scientific works and clinical cases does not contain therapeutic stage in treatment guidelines of gingival fibromatosis. That's why we should help dental students and dentists to focus their attention on early therapeutic treatment before surgery, which is an important component for rapid gingival tissue regeneration. Interdisciplinary approach and communication of particular speciality doctors (dentist, maxillofacial surgeon, family doctor, endocrinologist, gynecologist) is a key to successful and complex patient care. Correct treatment and postoperative follow-up care are important and effective to get the best results in such a difficult disease as gingival fibromatosis.

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