ISSN 2320-7795
Jan 2018 Volume 6 Issue I

Journal of Odontological Research

Official Publication of
Indira Gandhi Institute of Dental Sciences
Nellikuzhy, Kothamangalam 686 691, Kerala, India

Journal of Odontological Research

Official Publication of
Indira Gandhi Institute of Dental Sciences
Nellikuzhy, Kothamangalam 686 691, Kerala

Journal of Odontological Research is the official publication of the Indira Gandhi Institute of Dental Sciences, Nellikuzhy P. O., Kothamangalam 686 691, Kerala. It is a peer-reviewed journal published bi-annually. The journal will cover studies related to dentistry and applied basic subjects. The articles will be published under the categories of Original Research, Review, Case Reports and Guest Column. The manuscripts for publication may be sent to the journal's e-mail : jorigids@gmail.com / journal@igids.org

TABLE OF CONTENTS

RESEARCH ARTICLE

DIAGNOSTIC VALUE OF AUTO ANTIBODIES IN PATIENTS WITH RHEUMATOID ARTHRITIS

Authors:

Dhanya P[1]
Sudheesh M[2]

[1]Senior Lecturer
Department of Biochemistry,
Indira Gandhi Institute of Dental Sciences,
Nellikkuzhy P.O., Kothamangalam,
Ernakulam District, Kerala State, India.

[2]Reader & HOD
Department of Biochemistry,
Indira Gandhi Institute of Dental Sciences,
Nellikkuzhy P.O., Kothamangalam,
Ernakulam District, Kerala State, India.

Address for Correspondence

Dr. Dhanya P
Sr. Lecturer
Department of Biochemistry
Indira Gandhi Institute of Dental Sciences
Nellikkuzhy P.O., Kothamangalam,
Ernakulam, Kerala, India
Email: sudhidhanya09@gmail.com

ABSTRACT

Arthritis, an autoimmune disease, is a form of joint disorder which involves inflammation of one or more joints causing many complications. Early diagnosis of rheumatoid arthritis (RA) is important in order to prevent crippling and also helps the accurate interpretation of medical history and clinical examination. A study was conducted to find out the involvement of CCP Antibodies in RA suspected individuals. The level of CCP was determined in clinically suspected RA patients. In addition, the level of Rheumatoid Arthritis Factor and CRP level of the patients were also determined. A total of 110 patients with clinically suspected RA are included in the study. Anti CCP and RA measured and CCP positivity was compared in RAF positive and negative individuals. CRP level was measured in CCP positive patients. 40% of the clinically suspected RA patients were positive for RF. Thus it is concluded that among clinically suspected RA patients, measurements of CCP antibody is more specific for diagnosis. Substantial proportions have elevated CRP levels which are associated with high risk for future cardiovascular events.

Key Words: Rheumatoid arthritis, CCP antibodies, CRP level, fillagrin, ELISA.

J Odontol Res 2018;6(1)5-13.

Introduction

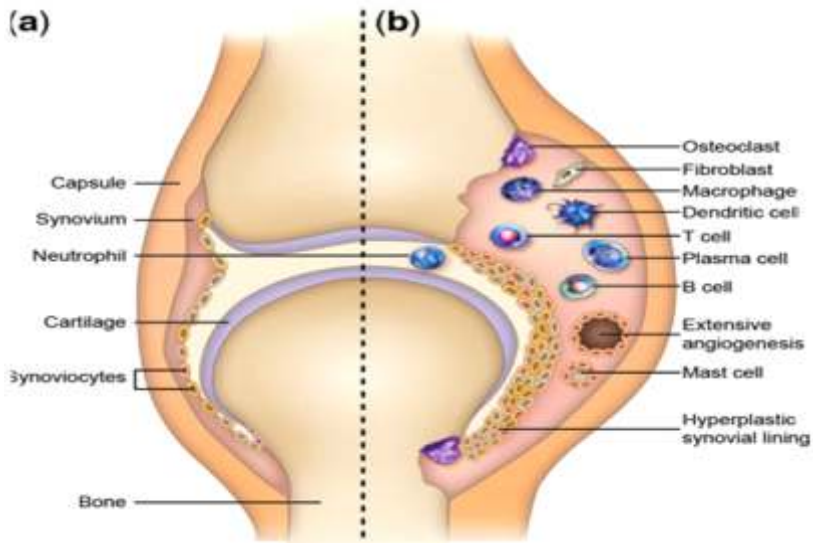
Rheumatoid arthritis (RA) is a chronic, systemic inflammatory disorder primarily affecting the joints resulting in deformed and painful joints that can lead to loss of function. It is an autoimmune disorder which have signs and symptoms in organs other than joints also [1]. It affects almost 1% of the world's population and can lead to severe disability. The disease has been associated with a higher risk of mortality, higher risk of heart disease, and also a higher risk of lymphoma than the general population. Another point of interest is that smoking has been identified as a risk factor for developing rheumatoid arthritis[2].

The primary symptoms associated with rheumatoid arthritis include: joint pain, joint swelling or effusion, joint stiffness, redness and/or warmth near the joint, restricted range of motion, Rheumatoid nodules (firm lumps under the skin), found on elbows and hands of about one-fifth of rheumatoid arthritis patients, Fatigue and noticeable loss of energy, low grade fever and sometimes flu-like symptoms, loss of appetite, weight loss, anemia associated with chronic diseases, depression, dry eyes and dry mouth associated with a secondary condition Sjogren's syndrome, joint deformity and instability from damage to cartilage, tendons, ligaments, and bone, limited range of motion in affected joints etc [3].

Chronic inflammation of RA results in thickening of the normally thin synovium and also makes the joints swollen and puffy. Individuals with the disease produce a group of auto antibodies called Rheumatoid factor. These auto antibodies are reactive with the determinants in the Fc region of IgG. The classic rheumatoid factor is an IgM antibody with that reactivity. They bind with normal circulating IgG, forming IgM-IgG complex and gets deposited in the joints. These immune complexes can activate the complement cascade, resulting in a type III hypersensitivity reaction, which leads to chronic inflammation of the joints.

Auto antibodies such as rheumatoid factor (RF) and anti-cyclic Citrullinated peptide (ACCP) antibodies have important diagnostic value for the disease. Both these antibodies belong to a family of autoantibodies directed against citrullinated fillagrin, an epithelial cell protein. Citrullination is a posttranslational modification of the aminoacid, arginine to citrulline by the action of the enzyme peptidyl arginine deaminase (PAD). This process occurs naturally during inflammation, apoptosis and keratinization. When fillagrin is found absent in synovium, several citrullinated proteins present in RA synovium like fibrinogen and fibronectin, other citrullinated epitopes etc have been identified as targets of highly RA-specific autoantibodies.

RF has been widely used as a screening test for patients with arthritis. RF constitutes one of the classification criteria proposed by the American College of Rheumatology (ACR). Conventionally, the serology test routinely used in RA for the determination of serum Rheumatoid Factor (RF), which possess acceptable sensitivity, but modest specificity, particularly in the early course of the disease[4]. In addition, RF is present in patients with other autoimmune and infectious diseases, and even in a noticeable propor-



Schematic view of a normal joint (a) and a joint affected by RA (b) (Smolen and Steiner, 2003).

tion of normal healthy subjects, particularly in old individuals[5].

More recently determined auto antibodies for the diagnosis of RA are anti-cyclic citrullinated peptide antibodies (anti-CCP antibodies). A new serologic test, (Anti–cyclic citrullinated peptide [anti-CCP] enzyme-linked immunosorbent assay [ELISA]) was developed to determine the presence of antibodies directed towards citrullinated peptides, using a synthetic peptide designed for this purpose. The synthetic peptide used in this assay represents a relatively small set of antigenic determinants that do not entirely encompass the antigenic determinants present on the as yet unknown antigenic molecule in the joint[6]. In patients with early arthritis, the correlation with anti-CCP was significant, thus indicating that this assay may be used even in the early phases of the disease. Anti-CCP test is particularly useful in the diagnosis of RA and it is able to predict the severity of the disease and the irreversible damage[7].

Earlier studies have shown that the anti- CCP antibodies are moderately sensitive but highly specific for the diagnosis of RA, and their specificity is higher than RF[8]. It is claimed that, the presence of anti-CCP antibody in a patient could be the sign of RA with a rate of 90-95%[9]. About 35-40% of the RF-negative patients are anti-CCP antibody positive. Although negative RF results are consistent with conditions other than RA, they do not rule out RA[10]. The goal of this prospective study is to analyze the value and prognostic significance of anti-CCP titer quantification in RA subjects.

Materials and Methods

Almost 110 clinically suspected RA patients participated in the study with informed consent. 25 healthy subjects having no known health disorders formed the control group. Blood was drawn from the participants in a clot activator tube (Red tube), waited for 10 minutes and serum was separated by centrifugation at a speed of 1000 rpm for 15 minutes. Serum was used as the specimen for investigation.

Parameters estimated in patients with elevated CCP levels and also in control subjects:

1. Anti-CCP:

Enzyme-linked immunosorbent assay (ELISA) was used for qualitative determination of IgG antibodies to Cyclic Citrullinated Peptides (CCP) in human sera[11].

Principle: Anti-CCP antibody kit is based on an ELISA method. The test utilizes microtiter plate wells coated with citrullinated synthetic peptides (antigen). Diluted serum of the patient was applied to the wells and were kept for incubation. If specific antibodies are present, they will bind to the antigen in the wells. Unbound materials are washed away and any bound antibody is detected by adding horse radish peroxidase (HRP) labeled anti-human IgG, followed by a second washing step and an incubation with substrate. The presence of reaching antibodies will result in the development of color, which is proportional to the quantity of bound antibody which is determined photometrically.

Specimen collection: Collect venous blood specimens using acceptable medical techniques. Allow the blood to clot and separate the serum by centrifugation. Test serum should be clear and non-hemolyzed. Specimen may be refrigerated at 4-80^{0}C for maximum 48 hrs and for prolonged storage, freeze at -200 C. Avoid repetitive freezing and thawing of serum samples which may result in variable loss of autoantibody activity. Testing of heat-inactivated sera is not recommended.

Procedure: Prepare a sufficient number of microplate modules to accommodate control and prediluted patient samples [Mix 10µL sample in a tube with 490µL dilution buffer]. Pipette 100µL of calibrators, controls and prediluted patient samples in duplicate in to the wells. Incubate for 60min at room temperature (18-25^{0}c). Discard the contents of the microwells and wash 3 times with 300µL of wash solution. Dispense 100µL of the enzyme conjugate to each well. Incubate for 30min at room temperature. Discard the content of the microwells and wash 3 times with 300µL of wash solution. Dispense 100µL of TMB substrate solution to each well. Incubate for 30min at room temperature. Add 100µl of stop solution to each well of the module and incubate for 10min at room temperature. Read the optical density at 450nm and calculate the result. Biochromatic measurement with a reference at 600-690nm is recommended. The color developed will be stable for at least 30min. Read the optical density during this time. Calculate the absorbance (optical density) ratio for the control and for each sample using the equation.

$$\text{Absorbance Ratio} = \frac{\text{Control or Sample OD}}{\text{Reference control OD}}$$

In a normal range study with serum samples from healthy blood donors the following ranges have been established with anti-CCP test:

Samples with result <25 U/ML are defined as negative.

Samples ≥25 U/ML are defined as positive.

2. C-reactive protein

Principle: CRP is a classic acute phase protein of human serum, synthesized by hepatocytes. Normally, it will be present only in trace amounts in serum, but it can increase as much as 1,000 fold, in response to injuries or infections. Clinical measurement of CRP in serum, therefore, appears to be a valuable screening test for organic diseases and is a sensitive index of disease activity in inflammatory, infections and ischemic conditions [12].

Specimen collection: Collect venous blood specimens using acceptable medical techniques. Allow the blood to clot and separate the serum by centrifugation. Test serum should be clear and non-hemolyzed. Specimen may be refrigerated at 4-80 C for a maximum 48 hrs and for prolonged storage, freeze at -200 C. Avoid repetitive freezing and thawing of serum samples which may result in variable loss of autoantibody activity. Testing of heat- inactivated sera is not recommended.

Procedure: Place 50µL diluted saline buffer to each of five circles of the slide. Using a 50µL micro pipette, add 50µL serum sample to the drop of saline buffer in 1stcircle. Using the same micro pipette, mix the sample with saline by aspirating back and forth several times. Aspirate 50µL from 1st circle and transfer to 2nd circle. Repeat the same operation up to 5th circle and discard. Dilutions obtained are ½, ¼, 1/8, 1/16 & 1/32 etc. Then add 1 drop of CRP latex reagent to the above circles. Mix and rock the slide gently to and fro for 2 minutes, observe the agglutination under good source of light. Concentration of CRP in serum can be calculated as:

CRP Conc. (mg/L) = sensitivity × titre (highest dilution serum showing agglutination), Where, CRP sensitivity = 6 mg/L.

RHEUMATIOD FACTOR (RF)

Principle: Rheumatoid factors are a group of antibodies directed to the determinants in the Fc portion of the immunoglobulin G molecule (IGg). Although rheumatoid factors are found in a number of rheumatoid disorders, such as systemic lupus erythematosus (SLE) and sjogrens syndrome as well as in non rheumatic conditions, its central role in clinics lies in its utility as an aid in the diagnosis of rheumatoid factors (RA) [12].

Specimen collection: Collect venous blood specimens using acceptable techniques. Allow the blood to clot and separate the serum by centrifugation. Test serum should be clear and non-hemolyzed. Specimen may be refrigerated at 4-80^{0}C for maximum 48hrs and for prolonged storage, freeze at -20^{0}C. Avoid repetitive freezing and thawing of serum samples. Testing of heat- inactivated sera is not recommended.

Procedure: Place 50µL diluted saline buffer on to each of five circles of the slide. Using a 50µL micro pipette, add 50µL of the serum sample to the drop of saline buffer in 1stcircle. Using the same micro pipette, mix the sample with saline by aspirating back & forth several times. Aspirate 50µL from 1st circle and transfer to 2nd circle. Repeat the same operation up to 5th circle. Aspirate 50µL from 5th circle and discard. Dilution obtained as ½, ¼, 1/8, 1/16,1/32. Then add 1 drop of RF latex reagent to the above circle, mix and rock the slide gently to and fro for 2 minutes; observe the agglutination under good source of light. The Rheumatoid factor (RF) level in serum can be calculated as :

RF Conc. (IU/mL) = sensitivity titre (highest dilution of serum showing agglutination), Where, RF Sensitivity = 8.0IU/mL.

Results

Specificity of the data's are given below: Out of the 110 cases,

- Patients positive for RF is 40%.
- Patients positive for both RF and CCP is 88%.
- Patients negative for CCP but positive for RF is 12%.
- 6% of the clinically suspected RA patients are positive for CCP antibodies and negative for RF.
- 25% of the CCP positive individuals have elevated CRP level.

These data's determine the various factors that are intended for the cause of Rheumatoid arthritis.

Discussions

Present study focussed on the various factors that are involved in the causes of disease condition, Rheumatoid arthritis. The study was conducted on patient's serum sample with informed consent. For the study, about 110 clinically suspected RA patients were involved. 25 healthy individuals having no known health disorders were taken as control group. Blood samples were drawn from each individual for study; serum was separated by centrifugation and used as the specimen for investigation. The RF titre of the participants were measured by turbidometry, the level of CCP antibodies were determined by ELISA technology and CRP level were measured by turbidometry.

The study was done mainly on RA and Anti-CCP. And also, the CCP positivity was compared in case of RAF positive and negative individuals. CRP level was measured in patients having CCP positive. The findings in our data shows that the RA positive patients were positive for both RF and CCP and in some other cases negative for CCP but positive for RF. From these results, we can observe that CCP antibody is more specific for RA diagnosis. One of the substantial proportions of the elevated CRP level in RA is associated with high risk of cardiovascular events in future.

Few studies have empirically assessed the prevalence of CVD's in RA. Several traditional risk factors such as obesity, dyslipidemia, type 2 diabetes mellitus (T2DM), metabolic syndrome (MetS), hypertension, physical inactivity, advanced age, male gender, family history of CVD, hyperhomocysteinemia, and tobacco have been associated with CVD in RA patients [13,14]. In fact, seropositive RA may, like diabetes, act as an independent risk factor for CVD [15]. A proinflammatory state, insulin resistance[16], hyperhomocysteinemia [17] and oxidative stress [18] are common characteristics of both RA and atherogenesis. The relative frequency shows that there is doubly the risk of developing CVD in patients possessing RA than non- RA population [18,19]. In fact, IHD secondary to artherosclerosis is the most prevalent cause of death associated with CVD in patients with RA[20]. Some other studies show that Methotrexate use is associated with a reduced risk of CVD in patients with RA. This suggests that, reducing the inflammation in RA using MTX not only improves disease-specific outcomes but may also reduce collateral damage such as arterosclerosis. The Anticyclic citrullinated protein antibodies are an implication for development of RA in CVD. The Anti-CCPs are key players in the inflammatory and proatherogenic status of RA patients. The effects are specific of the immune cell targeted, promoting over expression of thrombotic, inflammatory, and pro-oxidative markers in monocytes, pro-oxidative status in neutrophils and proinflammatory profile in lymphocytes. Targeting these autoantibodies would be an excellent strategy to prevent the development of cardiovascular disease in RA[20,21].

From our study on rheumatoid arthritis we can observe that Anti-CCP and RF are associated with the cause of this systemic autoimmune disease with chronic joint inflammation. Any elevated level of these factors in serum would also be associated with the risk of formation of CVD and other disease conditions.

Conclusion

The study conducted was mainly focussed on the biochemical parameters elevated in Rheumatoid Arthritis. The biochemical parameters checked are Anti-CCP antibodies, RF and CRP. The Anti-CCP antibodies were measured by ELISA technology and RF and CRP were measured by nephlometry and turbidometrically. Out of 110 cases, the patients positive for RF is 40%, positive for both CCP and RF is 88%, positive for RF and negative for CCP is about12% and CCP positive with elevated CRP is 25%.

From these results, it can be concluded that the Anti-CCP is a superior marker than RF for the disease condition, Rheumatoid arthritis. Elevated CRP level in arthritis increases the incidence of cardio vascular diseases in patients with rheumatoid arthritis.

References

1. Shah, Ankur. Harrison's Principle of Internal Medicine (18thed.). United States: McGraw Hill. p. 2738.
2. Maradit-Kremers H, Crowson CS, Nicola PJ, Ballman KV, Roger VL, et al. Increased unrecognized coronary heart disease and sudden deaths in rheumatoid arthritis: a population-based cohort study. Arthritis Rheum.2005;52:402-11.
3. Rheumatoid Arthritis. (2007). American College of Rheumatology, June14.
4. Westwood OM, Nelson PN, Hay FC. Rheumatoid factors: Rheumatology (Oxford). 2006;45:379-85.
5. van Jaarsveld CH, ter Borg EJ, Jacobs JW, Schellekens GA, Gmelig-Meyling FH, et al. The prognostic value of the antiperinuclear factor, anticitrullinated peptide antibodies and rheumatoid factor in early rheumatoid arthritis. Clin Exp Rheumatol. 1999;17:689-97.
6. Hayashi N, Kumagai S. [Anti-cyclic citrullinated peptide antibodies and rheumatoid arthritis]. Rinsho Byori. 2010;58:466-79.6. Hayashi N, Kumagai S. [Anti-cyclic citrullinated peptide antibodies and rheumatoid arthritis]. Rinsho Byori. 2010;58:466-79.
7. Lee DM, Schur PH. Clinical utility of the anti-CCP assay in patients with rheumatic diseases. Ann. Rheum. Dis. 2003;62:870-4.
8. Kakumanu P, Sobel ES, Narain S. Citrulline dependence of anti-cyclic citrullinated peptide antibodies in systemic lupus erythematosus as a marker of deforming/erosive arthritis. J Rheumatol. 2009 Dec.
9. Fariba Binesh, Hossein Soleimani Salehabadi, Nasim Behniafard, Kian Ranginkaman and Nasrin Behniafard. “A Comparative Assessment of the Diagnostic Value of Anti-cyclic Citrullinated Peptide Antibodies and Rheumatoid Factor in Rheumatoid Arthritis”.J. Clin.Exp.Pathol. 2014;4:2.
10. Meyer O, Labarre C, Dougados M, Goupille P, Cantagrel A, et al. “Anticitrullinated protein/peptide antibody assays in early rheumatoid arthritis for predicting five year radiographic damage”. Ann Rheum Dis 62 (2003): 120-6.
11. Frederick, Wolfe. Arthritis and Rheumatism 1991:34; 951-60.
12. Stavropoulos-Kalinoglou A, Metsios GS, Panoulas VF et al. “Associations of obesity with modifiable risk factors for the development of cardiovascular disease in patients with rheumatoid arthritis”. Annals of the Rheumatic Diseases”. 2009;68:242-5.
13. Goodson NJ, Wiles NJ, Lunt M, Barrett EM, Silman AJ and Symmons DPM. “Mortality in early inflammatory polyarthritis: cardiovascular mortality is increased in seropositive patients”. Arthritis and Rheumatism.2002;46: 2010-9.
14. Kitas GD and Gabriel SE. “Cardiovascular disease in rheumatoid arthritis: state of the art and future perspectives”. Annals of the Rheumatic Diseases.2011;70:8-14.
15. Sattar N, McCarey DW, Capell H, and McInnes IB. “Explaining how "high-grade" systemic inflammation accelerates vascular risk in rheumatoid arthritis”. Circulation. 2003;108:2957-63.
16. Whittle SL and Hughes RA. “Folate supplementation and methotrexate treatment in rheumatoid arthritis: a review”. Rheumatology. 2004;43:267-71.
17. Kim SH, Lee CK, Eun YL et al., “Serum oxidized low-density lipoproteins in rheumatoid arthritis”. Rheumatology International. 2004; 24:230-3.
18. Aviña-Zubieta JA, Choi HK, Sadatsafavi M, Etminan M, Esdaile JM and Lacaille D. “Risk of cardiovascular mortality in patients with rheumatoid arthritis: a meta-analysis of observational studies”. Arthritis Care and Research. 2008;59:1690-7.
19. Lindhardsen J, Ahlehoff O, Gislason GH, Madsen OR, Olesen JB, Svendsen JH et al. “Risk of atrial fibrillation and stroke in rheumatoid arthritis: danish nationwide cohort study”. British Medical Journal. 2012,vol.344.
20. Cisternas M, Gutiérrez MA, Klaassen J, Acosta AM, and Jacobelli S. “Cardiovascular risk factors in Chilean patients with rheumatoid arthritis”. Journal of Rheumatology, 2002; 29, 8: 1619-22.
21. Smolen JS, Steiner G. (2003). Therapeutic strategies for rheumatoid arthritis. Nat. Rev. Drug Discov.;2:473-88.

TABLE- 1:

Subject	Number	Percentage (%)
No: of patients with clinically suspected RA	110	-
No: of patients positive for RF	44	40
No: of patients positive for RF and CCP	39	88
No: of patients negative for CCP but positive for	5	12

FIGURE -1:

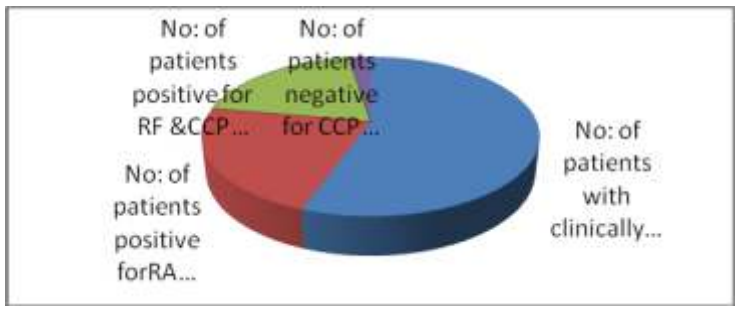


TABLE –II:

Subject	Number	Percentage (%)
No: of patients	110	-
No: of patients with RF negative and CCP positive	7	6

TABLE III:-

Subject	Number	Percentage (%)
No: of patients	110	-
No: of patients with CCP positive	46	51
No: of patients with CCP positive with elevated CRF	12	25

FIGURE-III:

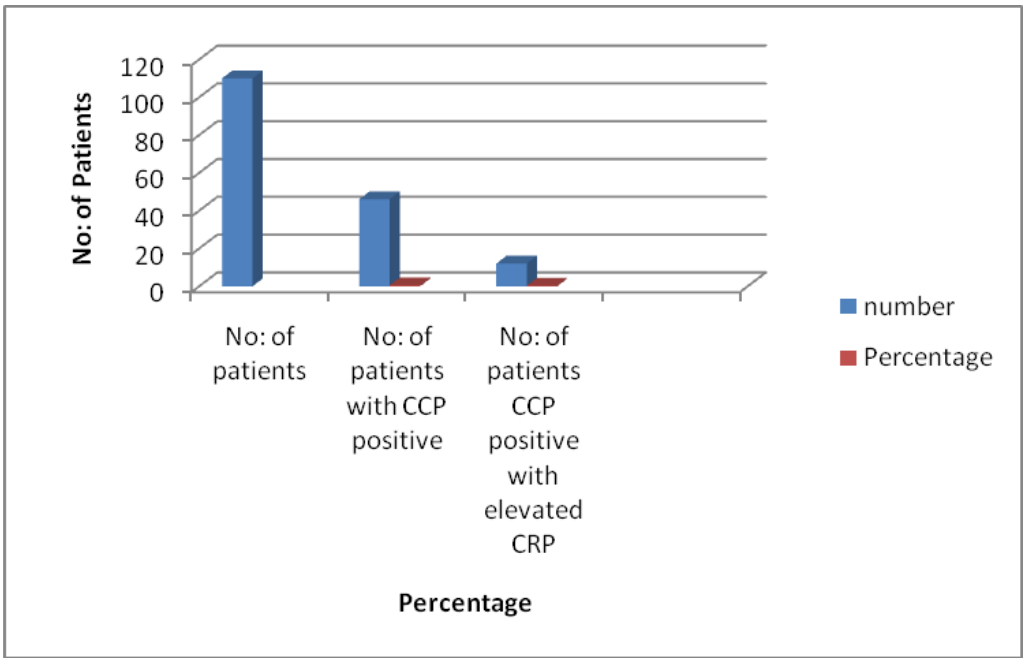


TABLE- 4: RF titre of clinically suspected patients with that of healthy controls.

Subject	Number	Mean	SD	t	P
Control	25	2.5	0.65	17.46	<0.01
RA	110	35.8	9.5		

FIGURE-III.A:

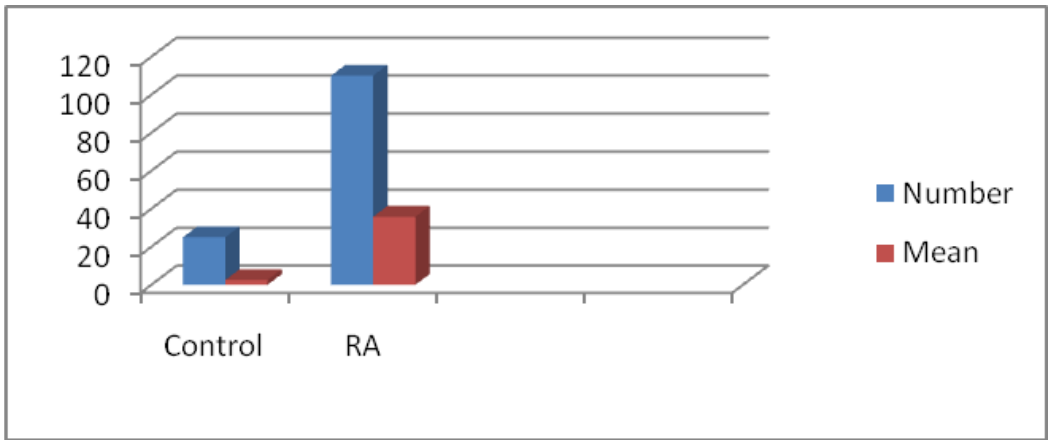


TABLE -5: Level of CCP antibodies of clinically suspected patients with that of healthy controls.

Subject	Number	Mean	SD	t	P
Control	25	2.9	0.9	15.62	>0.01
RA	110	20.5	5.6		

FIGURE-IV.A:

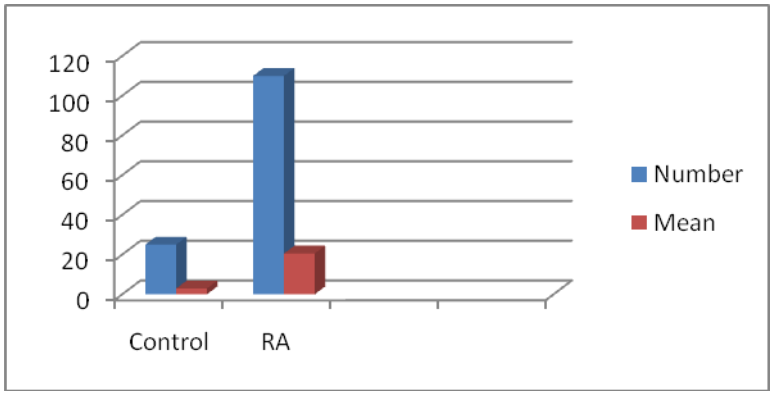
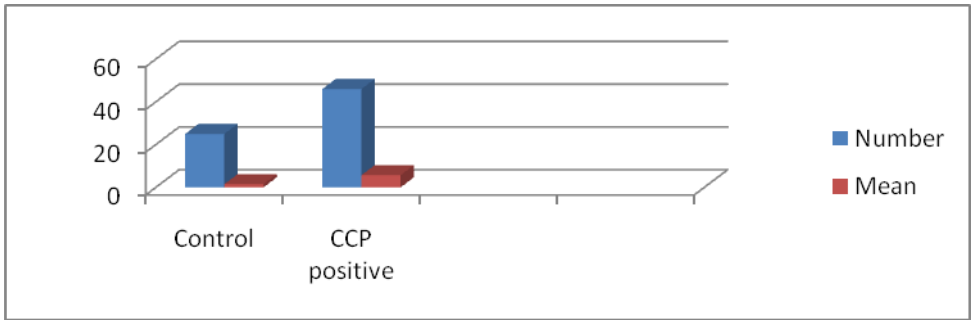


TABLE- 6: CRP titre of clinically suspected patients with that of healthy controls.

Subject	Number	Mean	SD	t	P
Control	25	1.5	0.25	10.68	>0.01
CCPpositive	46	5.7	1.95		

FIGURE-V.A:



SOLITARY NEUROFIBROMA ON THE FLOOR OF THE MOUTH: A RARE CASE REPORT AND REVIEW OF LITERATURE

ABSTRACT

Neurofibroma is an uncommon benign tumor of oral cavity derived from cells that constitute nerve sheath. The cases of oral cavity that involves neurofibroma with no other signs of neurofibromatosis is rare. Neurofibromas may present either as a solitary lesions or as a part of the generalised syndrome of neurofibromatosis or Von Recklinghausen's disease of the skin. Clinically, oral neurofibromas usually appear as a pedunculated or as sessile nodules, with slow growth and mostly without pain. The diagnosis can be confirmed by histological examination. Neurofibromas are immunopositive for the S-100 protein, indicating its neural origin. Treatment is surgical and the prognosis is excellent. Neurofibroma arising from the floor of the mouth is extremely rare. Here we present an unusual case of neurofibroma of the floor of the mouth.

Key words: solitary neurofibroma, neurofibromatosis, immunohistochemistry.

J Odontol Res 2018;6(1)14-7.

Authors:

Nirupa Thomas[1]
Asif Ismail[2]
John Joseph Methippara[2]

[1]Senior Lecturer,
Oral Pathology and Microbiology,
Annoor Dental College and Hospital
Muvattupuzha, Ernakulam

[2]Senior lecturer
Pedodontics
Annoor Dental College and Hospital
Muvattupuzha, Ernakulam

Address for Correspondence

Dr.Nirupa Thomas
Department of Oral Pathology and Microbiology,
Annoor Dental College and Hospital,
Puthuppady P O, Perumattom,
Muvattupuzha, 686 673
Phone: 9495975648
E-mail: nirupathomas@gmail.com

Introduction

Localized or solitary neurofibroma develops along a peripheral nerve as a focal mass with well-defined margins but is never encapsulated. It is seen either as a solitary lesion or as a part of the generalized syndrome of neurofibromatosis called as Von Recklinghausen disease of the skin.[1] Since the first description of solitary neurofibroma (neurilemmoma, schwannoma) of the oral cavity in 1954 by Bruce, only few cases have been reported in the literature.[2] The oral lesions seldom transform into sarcoma but may become large enough to interfere with the proper functioning of the tongue, which may be a hindrance to the patient.

Clinically, oral neurofibromas appear as pedunculated or sessile nodule, with slow growth. They are usually painless, but pain or paresthesia may occur due to nerve compression. Skin is the frequent location of neurofibromas but lesions in oral cavity are also not uncommon. The most frequent location is the tongue, although they may occur at any site, especially on the palate, buccal mucosa and floor of the mouth. On rare occasion the tumor can arise centrally within the bone. [3]

Case report

A 38 year old female patient reported in the department of oral medicine in Annoor dental college, Muvattupuzha with a complaint of a painless swelling in the floor of the oral cavity. The swelling had started about two years back and gradually to attain its present size. On examination, a well circumscribed 2.5x3cm lesion was seen on the floor of the oral cavity lingual to mandibular left premolars.(fig:1) The mucosa over the lesion was normal with no redness or draining sinuses seen over it. On palpation, the swelling was non- tender, firm in consistency, nodular and fixed to the underlying tissues. The lesion was non-pulsatile and non reducible. Careful examination was done to rule out Lisch's nodules and Crowe's sign. The patient was moderately built and nourished and did not have any other swellings palpable elsewhere in the body. A provisional diagnosis of a benign tumour was made and an excisional biopsy was planned under local anesthesia. The excised specimen was almost 4cm in length. It was sent for histopathological examination. The excised specimen appeared as a firm whitish mass which had a shiny surface.

Hematoxylin and eosin stained soft tissue section showed hyperkeratinized hyperplastic stratified squamous epithelium with evidence of basilar hyperplasia. The underlying connective tissue was composed of dense bundles of spindle shaped cells with wavy nuclei suggestive of nerve cells with collagen bundles. Numerous mast cells and blood capillaries were also evident. On corelating clinical and histopathological evidence the lesion is suggestive of neurofibroma. (fig:2,3)

Discussion

Neurofibroma of the oral cavity is a rare, benign, non-odontogenictumor.[4] Neurofibromatosis (Von Recklinghausen's disease) is an autosomal dominant disease which affects the neural crest cells that give rise to ectodermal and mesodermal derivatives. This genetic disorder affects 1 in every 3000 of the population and has the highest mutation rate among genetic disorders.[5]

Von Recklinghausen's disease which occurs as a result of an abnormality of chromosome 17 and have the characteristic features of Café au lait spots, multiple neurofibromas, Lisch nodules (hamartomas of the iris) and Crowe's sign (axillary and inguinal freckling). Solitary neurofibroma, by definition is seen in those patients who do not have neurofibromatosis.[6,7] Only few cases of solitary neurofibroma have been reported in the literature. [8]

A solitary neurofibroma must be differentiated from a schwannoma. A schwannoma is encapsulated, eccentric to the nerve and composed of Schwann cells. A neurofibroma on the other hand, incorporates the nerve (which may or may not be identifiable) and it is composed of Schwann cells, perineural-like cells, fibroblasts and transitional cells. [4]

Neurofibromas occur in people of all age groups, but they are most commonly diagnosed in young adults. Neurofibromas demonstrated 10 variants: classic,

cellular, myxoid, hyalinized, epithelioid, plexiform, diffuse, pigmented, granular cell, and pacinian.[9] Subsequently, new variants were incorporated, as dendritic cell neurofibroma with pseudorosettes, lipomatous, and hybrid tumors.[10] The most commonly affected site is the tongue.[11] Here we reported a case of neurofibroma which is located in the floor of the oral cavity, which is not a common location.

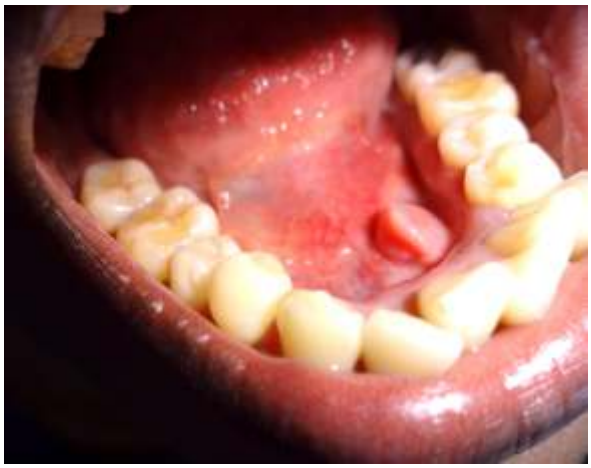
Over time, neurofibromas have propensity for progression into neurofibromatosis. Although these are originally benign lesions they also have tendency for malignant transformation. Almost 6-29% of malignant transformation has been reported.[12,13] Surgical excision by conserving the nerve of origin is the treatment of choice. [14]

Conclusion

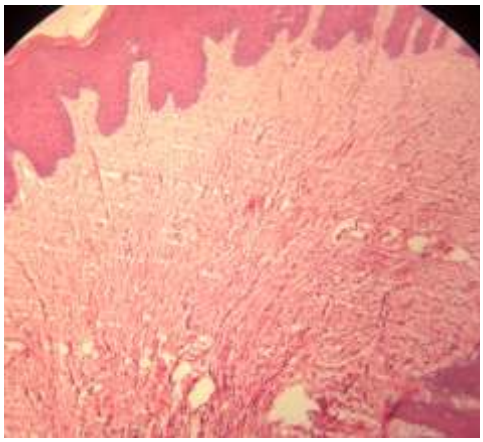
Neuroibromas are benign tumors and have a good prognosis, since they have a propensity for malignant transformation and also chances of progressing into neurofibromatosis, these lesions must be monitored carefully and treated meticulously. The diagnosis of the lesion was made based on the presence of clinical findings and histopathology. Even though neurofibromas are rare in the oral cavity, solitary neurofibromas must be considered in the list for differential diagnoses in cases of intraoral swellings and intraosseous lesions of the jaws.

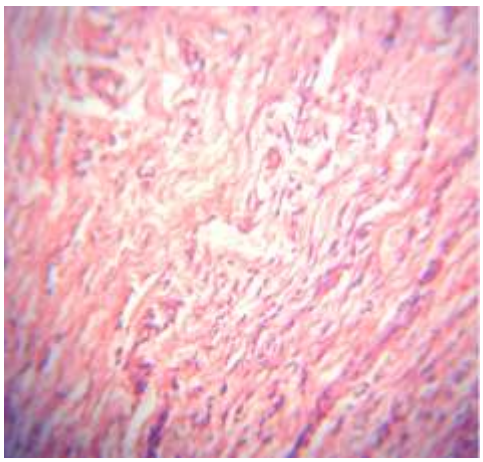
Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.



Soft, pedunculated, non-tender, palepink, mobile single swelling estimating from the junction of lingual attached gingiva /floor of the mouth. (fig.1)





Histopathology shows dense bundles of spindle shaped cells with wavy nuclei suggestive of nerve cells with collagen bundles. Corelating clinically and histopathologically suggestive of neurofibroma. (fig:2,3)

Reference

1. Rosenbaum T, Patrie K.M, Nancy ratner. Neuroibromatosis type1: Genetic and cellular mechanisms of peripheral nerve tumor formation.Neuroscientist.1997;3(6):412-20
2. Zachariades N, Mezitis M, Vairaktaris E, Triantafyllou D, SkouraKafoussia C, Konsolaki-Agouridaki E, Hadjiolou E, Papavassiliou D: Benign neurogenic tumors of the oral cavity. Int J Oral Maxillofac Surg1987;16:70-76.
3. Neville BW, Damm DD, Allen CM, Bouquot JE. Oral and Maxillofacial Pathology. 3rd Saunders publishers; 2010.
4. Burger PC, Scheithauer BW, Vogel FS. Surgical Pathology of the Nervous System and Its Coverings.Philadelphia: Churchill Livingstone. 2002;594-611.
5. Shapiro SD, Abramovitch K, Vandis ML, SkocylasLLLanglias RP, Jorgenson RJ, Young RS, Riccardi VM: Neurofibromatosis oral and radiographic manifestation oral Surg Oral Med Oral Pathol.1988 ;66: 391-6
6. Keel SB, Rosenberg AE. Soft tissue pathology of the head and neck. In: Pilch BZ. ed. Head and Neck Surgical Pathology. Philadelphia: Lippincott Williams and Wilkins;.2001;417-18.
7. Sivapathasundaram B, Lavanya S, Deeplakshmi, Saravanakumar, Ahathya. Solitary neurofibroma of the gingival. J Oral MaxillofacPathol 2004;8:107-9.
8. Mori H, Kakuta.S, yamagichi A, Naguma M: Incidence of solitary neurofibroma of maxilla. J Oral MaxillofacSurg.1993;638-42
9. Megahed, M. Histopathological variants of neurofibroma. A study of 114 lesions, Am J Dermatopathol.1994;16 (5):486-495.
10. Rodríguez-Peralto, J.L., E. Riveiro-Falkenbach, R. Carrillo, 2013. Benign cutaneous neural tumors, Seminars in Diagnostic Pathology. 2013;30:45-57.
11. Apostolidis C, Anterriotis D, Rapidis AD, Angelopoulos AP. Solitary intraosseousneurofibroma of the inferior alveolar nerve: report of a case. J Oral Maxillofac Surg. 2001;59:232-5.
12. Ambrosia JDA, Langlias RP, Young RS: Jaw and skull changes in neurofibromatosis oral Surg Oral Med Oral Pathol.1988;391-6
13. Hustin J, Delaire Y, Loveraval and Sambreville: Unusual Intramandibular neural tumors Oral Surg Oral Med Oral Pathol,1991;71:593-6
14. Alatli C, Oner B, Unur M, Erseven G: Solitary plexiformneurofibroma of the oral cavity A case report. Int J Oral MaxillofacSurg 1996; 25:379-380.

OSTEOMA:
A RARE CASE REPORT

ABSTRACT

Osteomas are rare, benign, slow growing tumorscharacterised by the proliferation of compact or cancellous bone. It accounts for 3% of primary bone tumors, and about 10% of benign tumors. About 80% of osteoid osteoma occurs in long bones, while less than 1% occur in Jaw. The mandible is more commonly affected than the maxilla, with the site predilection being the lingual aspect of the body, the angle and the inferior border of the mandible. In this paper we present anosteoma located in the lingual surface of the right mandible in a 44 year old woman and which was surgically excised.

Key words: Peripheral osteoma, Hard swelling, Mandible.

Authors:

Sanju L[1]
Shilpa C[2]
Eldhose K George[3]

[1]Reader,
Dept of OMFS
Annoor Dental College, Muvatupuzha

[2]Senior Lecturer,
Dept. of OMFS
Annoor Dental College

[3]Professor & HOD
Dept. of OMFS
Annoor Dental College, Muvattupuzha

Address for Correspondence

Dr. Shilpa
Dept. of OMFS
Annoor Dental College, Muvattupuzha
Email: drshilparaghu@gmail.com

J Odontol Res 2018;6(1)18-21.

Introduction

Osteoma was described as a distinct clinical entity by Jaffe in 1935. Jaffe defined osteoid osteoma as 'sui genris'denoting small, self-limiting tumor. Lichtenstein defined osteoid osteoma as a small, oval or roundish tumor like nidus which is composed of osteoid & trabeculae of newly formed bone deposited within a substratum of highly vascularised osteogenic connective tissue.[1,2]

Green et al reviewed the literature and reported the total number of cases of osteoid osteoma of the Jaw to be seven, of these four have occurred in the mandible & three in maxilla.[1]

The pathogenesis of osteoma is not completely known. They are referred to as developmental anomalies, true neoplasms, or reactive lesions triggered by trauma, muscle traction, or infection.[3-6] It has been reported that osteomas can occur at any age and has equal gender distribution.[4,7]Children are almost never affected unless they have Gardner's syndrome(GS). This syndrome is an autosomal dominant disease characterized by gastrointestinal polyps, multiple osteomas, skin and soft tissue tumors, and multiple impacted or supernumerary teeth. Intestinal polyps are predominantly adenomas and may progress to malignancy in almost 100% of patients.[8,9] Since, osteomas may be seen in the earlier stage of GS, the dentists may play an important role in the diagnosis of colonic polyposis.[8,9]

Case report

A 44 year old female patient reported to the department of Oral and Maxillofacial Surgery at ESI Hospital, Ernakulum, Kerala, India, with a complaint of bony hard swelling in lingual aspect of right mandibular body region. Over the previous 5 years, the lesion had progressed gradually from a pea nut size to a 2x2cms hard, globular, well-circumscribed swelling. She gave no history of facial trauma. Her medical, family and social history were unremarkable. Clinical examination revealed no facial asymmetry. The regional lymphnodes were not palpable. An Intra oral examination revealed a sessile well defined bony hard non tender mass in lingual aspect of right body of mandible extending from canine to first molar measuring 2x2 cms. The overlying mucosa was normal in color and texture. (Image 1) No similar bony hard swellings were found anywhere else in the body. All the biochemical and haematological investigations were with in normal limits.

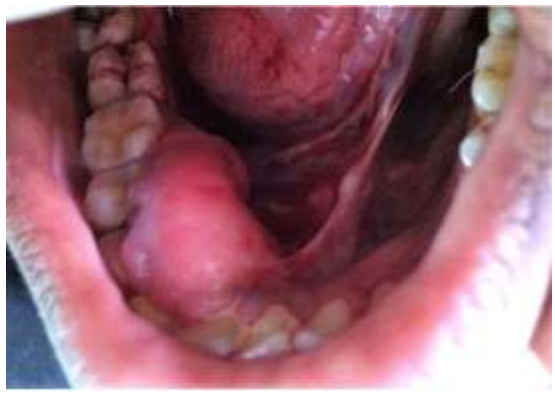


IMAGE 1

The lesion was surgically excised under local anaesthesia. Mucoperiosteal flap was reflected following a crevicular incision, exposing the mass attached to the mandibular body (Image 2). The bony mass was completely removed using bone cutting burs, chisel and mallet followed by curettage of the cavity (Im-

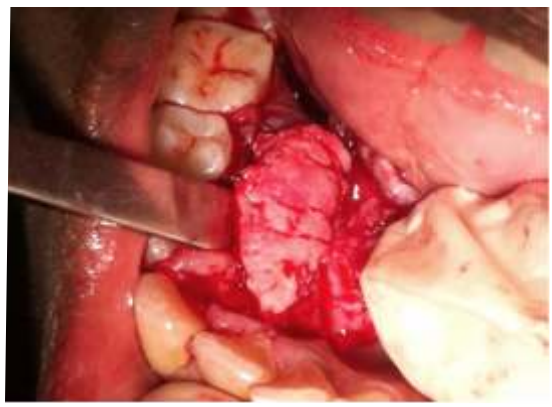


IMAGE 2

IMAGE 3

age 3). The cortical plate of the body of the mandible was smoothened with a vulcanite bur under copious saline irrigation and wound was closed. (Image 4). The surgical specimen was submitted for histopathological examination. Postoperatively, the patient received systemic antibiotics, analgesics, and mouthwash for 7 days. There were no postoperative complications. On followup healing of the wound was satisfactory.

Histopathological examination revealed well circumscribed unencapsulated, normal appearing cortical as well as prominent cancellous bone interspersed with collagen fibers, fibroblasts and few inflammatory cells suggestive of Osteoma.

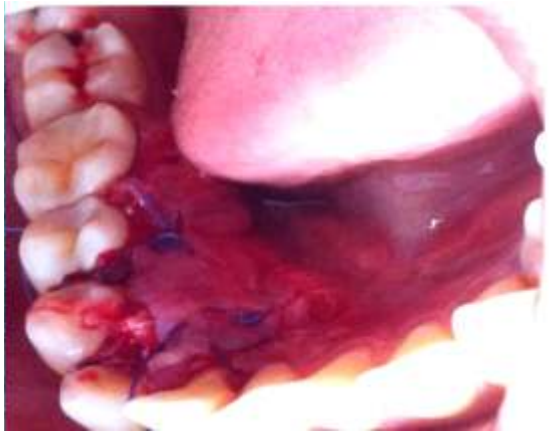


IMAGE 4

Discussion

Osteomas are benign, osteogenic lesions that may arise from proliferation of cancellous (trabeculae), compact bone (dense lamellae) or can be composed by a combination of both.[1] There are three different types of osteomas: central, peripheral and extra-skeletal. The central osteoma arises from the endosteum, the peripheral osteoma from the periosteum and the extra-skeletal soft tissue osteoma usually develops within the muscle.[1] In the facial bones, both central and peripheral osteomas have been described. Peripheral type of osteoma is most common in the lower Jaw, which occurs at the surface of the cortical bone and is sessile or pedicled.[1] Most of the osteomas occurring in the mandible are dense osteomas and the cancellous osteoma is comparatively rare.[1]

The exact etiology and pathogenesis of peripheral osteoma is unknown. Neoplastic and reactive causes have been suggested as possible etiologic factors. Kaplan et al.[4,5] and Woldenberg et al.[10] suggested that some peripheral osteomas may be reactive rather than neoplasms. Histologically osteoma consists of mature, lamellar bone or cancellous bone with abundant fibrofatty marrow between bony trabeculae. Histologically there is no evidence of differentiation between osteoma, osteochandroma, and tori it can only be differentiated clinically.

Panoramic radiography or computed tomography are used for imaging of osteomas of jaw; however, CT is the best imaging modality for determining the location and real extension of the lesion.[7,10] Peripheral osteomas, in most cases, are easy to recognize because of their classic radiographic findings. On radiological imaging, a peripheral osteoma of the mandible is a classically well-circumscribed, round or oval, mushroom-like radiopaque mass with distinct borders.[6,7] The lesion may be sessile and attached to the cortical plates with a broad base. If a peripheral osteoma is pedunculated, a narrow contact area can be seen between the lesion and the compact bone.

Removal of an asymptomatic peripheral osteoma is not generally necessary. Surgical intervention is indicated only if it becomes large enough to cause facial

asymmetry and functional impairment.[3,7,10] Surgical excision is usually simple in pedinculated peripheral osteomas. In the case of mandibular peripheral osteomas, an intraoral approach is preferable over an extraoral approach mainly for cosmetic reasons, as in our case.

Conclusion

We have presented a case of solitary peripheral osteoma on the lingual surface of the mandibular body which was surgically excised and histologically examined. Recurrence of peripheral osteoma after surgical excision is extremely rare. However, it is appropriate to provide both periodic clinical and radiographic followup after surgical excision of aosteoma.

References

1. Gayathri G, Ravi Kumar R, Manjunath G A, Jyothi M. Osteoma of the Mandible. Journal of Dental Sciences and Research.2011;2(1).
2. Cherry W, Parvati D, Thimmarasa VB, Jayadev S. Osteoid osteoma of mandible: a rare entity. Journal of Indian Academy of Oral Medicine and Radiology. 2010;22(3):162-4.
3. Larrea-Oyarbide N , Valmaseda-Castell E, Berini-Ayt´es L, Gay-Escoda C. Osteomas of the craniofacial region. Review of 106 cases. Journal of Oral Pathology and Medicine.2008; 37(1):38-42.
4. Kaplan I, Nicolaou Z, Hatuel D, Calderon S. Solitary central osteoma of the jaws: a diagnostic dilemma. OralSurgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontology. 2008;106(3):e22-e29.
5. Kaplan I, Calderon S, Buchner A. Peripheral osteoma of the mandible: a study of 10 new cases and analysis of the literature," Journal of Oral and Maxillofacial Surgery. 1994;52(5):467-70.
6. Ogbureke K, Nashed M, Ashraf A. Huge peripheral osteoma of the mandible: a case report and review of the literature. Pathology Research and Practice. 2007;203(3):185-8.
7. Chaurasia A, Balan A. Peripheral osteomas of jaws-astudy of six cases. Kerala Dental Journal. 2009;32(1):23-6.
8. Bilkay U, Erdem O, Ozek C. Benign osteoma with Gardner syndrome: review of the literature and report of a case. The Journal of Craniofacial Surgery.2004;15(3):506-9.
9. Lee BD, Lee W, Oh SH, Min SK, Kim EC. A case report of Gardner syndrome with hereditary widespread osteomatous jaw lesions, Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontology. 2009;107(3):e68-e72.
10. Woldenberg Y, Nash M, Bodner L. Peripheral osteoma of the maxillofacial region. Diagnosis and management: a study of 14 cases. Medicina Oral, Patolog´ıa Oral y Cirug´ıaBucal. 2005;10(2):e139-e142.

OSTEOMYELITIS AS A RARE COMPLICATION OF HERPES ZOSTER INFECTION ASSOCIATED WITH NEURALGIA

A CASE REPORT & REVIEW OF LITERATURE

ABSTRACT

Herpes zoster is caused by reactivation of latent varicella zoster virus in cranial-nerve or dorsal-root ganglia, with spread of the virus along the sensory nerve to the dermatome. Osteomyelitis of the jaws as a complication of herpes zoster infection is a rare finding. The aim of this paper is to review the literature regarding osteomyelitis as an unusual complication secondary to herpes zoster and to present a case report of this complication in an immunocompetent patient.

CASE REPORT

A 52 year-old male patient presented with herpetic neuralgia of mandibular & maxillary divisions of trigeminal nerve with associated osteomyelitis of left side of mandible.Patient was treated with antivirals, antibiotics, carbamazepine with curettage and debridement.

CONCLUSION

Osteomyelitis of the jaws as a complication of herpes zoster infection is a rare finding. The etiopathogenesis of herpes induced osteomyelitis is controversial and research in this aspect is hindered by limited sample size. Through this case report we try to present a rare case of osteomyelitis as a complication of herpes zoster infection. Further research with randomized control trials is warranted for better management of this condition.

Keywords: Osteomyelitis, Neuralgia, Hepres zoster, Mandible, Trigeminal nerve.

J Odontol Res 2018;6(1)22-5.

Authors:

Ajish George Oommen[1]
Fiaz Shamsudheen[2]
Joju George[3]

[1]Senior lecturer
Department of OMFS,
Indira Gandhi Institute of Dental Sciences
Nellikuzhy, Kothamangalam.

[2]Reader
Department of OMFS
Indira Gandhi Institute of Dental Science,
Kothamangalam, Ernakulam Dt., Kerala

[3]Sr Lecturer
Department of OMFS
Indira Gandhi Institute of Dental Science,
Kothamangalam, Ernakulam Dt., Kerala

Address for Correspondence:
Dr. Ajish George Oommen
Senior lecturer, Department of OMFS
Indira Gandhi Institute of Dental Sciences
Nellikuzhy, Kothamangalam
Ernakulam Dt., Kerala
Phone: 9464525560
Email: ajishgeorgeoommen@yahoo.com

Introduction

Primary infection with varicella-zoster virus (VZV) results in chickenpox, characterized by viremia with a diffuse rash and seeding of multiple sensory ganglia, where the virus establishes lifelong latency[1]. Herpes zoster infection commonly known as shingles is caused by reactivation of latent VZV in cranial-nerve or dorsal-root ganglia, with spread of the virus along the sensory nerve to the dermatome[1]. Even though the skin rash regularly heals after 2-4 weeks, the nerve pain remains for months or years demonstrating a condition called post-herpetic neuralgia[2].Trigeminal nerve is the most commonly affected cranial nerve[3].Trigeminal nerve is affected unilaterally and limited to a single division, more often the first division in herpes zoster patients. Oral manifestations of herpes zoster appear when the second or third division is involved[4].

Antiviral drug therapy can reduce the severity and duration of herpes zoster if the administration of these drugs is started within 72 hours from the initial presence of the characteristic skin rash and is continued for 7-10 days.[2] In general, the incidence and burden of herpes zoster complications other than post-herpetic neuralgia are poorly studied and consequently, reliable epidemiological information is scarce[5]. Reports of dental complications are even rarer[5]. Herpes zoster-induced alveolar bone necrosis is a rare manifestation of this disease and few case reports are available in the literature[2]. This brutal manifestation of the disease is most often noted in immunocompromised and rarely in immunocompetent patients[2]. The aim of this paper is to review the literature regarding osteomyelitis as an unusual complication secondary to herpes zoster and to present a case report of this complication in an immunocompetent patient.

Case Report

A 52 year-old male patient presented to the outpatient department of oral & maxillofacial surgery with complains of pain in his lower right back tooth region since 2 months and vesicular eruptions in left side of the face since 10 days which turned into ulcerations and healed with hyper pigmentation in the left side of his face, as well as the left ear. Patient gave history of exfoliation of teeth in left mandibular region1 month back. No relevant medical history was present. Multiple areas of hyper pigmentation were seen in the left middle and lower one-third of the face along the distribution of the mandibular and maxillary division of the trigeminal nerve. Pain was severe lancinating type and was found along the course of the maxillary and mandibular division of trigeminal nerve. There was no associated lymphadenopathy.

Evidence of pus discharge from the left ear was present. No evidence of altered sensation was present. Intraoral examination revealed partially edentulous region with non-healing necrotic region in the left side alveolar region extending from 31 to 36 region. There was sloughing over the necrotic bony region. The necrotic region was tender on palpation. Panoramic radiograph showed the outlines of the sockets of the exfoliated teeth. A provisional diagnosis of osteomyelitis with associated herpetic neuralgia was made. The patient was treated with Acyclovir 800 mg five times daily, Amoxicillin 500 mg three times a day, and carbamazepine100 mg three times a day. Debridement with curettage of the necroticalveolar bone was done under local anesthesia. The patient was lost to follow up. It is rare to find osteomyelitis with herpes zoster infection in an immuno competent patient.

Discussion

Post-herpetic neuralgia or pain persisting after the rash has resolved (often defined specifically as pain persisting for 90 days or more after the onset of the rash), is a feared complication of herpes zoster. The pain may persist for many months or even years; it may be severe and interfere with sleep and activities of daily living, resulting in anorexia, weight loss, fatigue, depression, withdrawal from social activities and employment, and loss of independent

living[1].The rash of herpes zoster is dermatomal and does not cross the midline, a feature that is consistent with reactivation from a single dorsal-root orcranial-nerve ganglion[1]. The thoracic, trigeminal, lumbar, and cervical dermatomes are the most frequent sites of rash, although any area of the skin can be involved.

Additionally, symptoms like acutepulpitis, toothache, root resorption and periapical lesions are often observed when the maxillary and mandibular nerves are involved. Rarer still, some cases involve osteomyelitis and tooth exfoliation[4]. The treatment goal for HZV infection is to reduce acute viral infection, acute pain, and post-herpetic neuralgia. Immediate administration of an anti-viral agent and active use of pain killers for post-herpetic neuralgia are required[6]. When herpes zoster related osteomyelitis of the jaw occurs, it can be managed by proper antibiotic administration, curettage or debridement of necrotic tissue and periodic followup[7]. In this case we managed the condition with antivirals, antibiotics, carbamazepine with curettage and debridement. It is rare to find this in an immunocompetent patient and in our case patient never had any medical history.

Dechaume et al reported a case of herpes induced osteomyelitis in 1955[8]. Cooper in 1977 reported two cases of bone necrosis with herpes zoster infection[9]. Mckenzie et al reported two cases of herpes induced osteomyelitis[10]. Although the lesion has been reported but most scientific publications are limited by sample size.

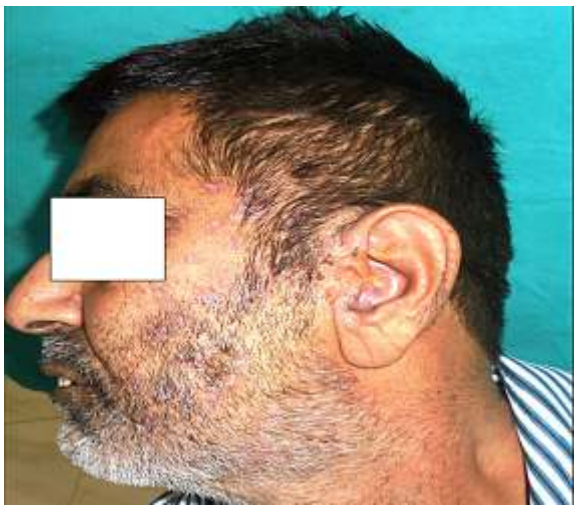


Fig. 1 Lateral profile view showing vesicular eruptions with scarring on left side of face

Conclusion

Osteomyelitis of the jaws as a complication of herpes zoster infection is a rare finding. The etiopathogenisis of herpes induced osteomyelitis is controversial and research in this aspect is hindered by limited sample size. Through this case report we try to present a rare case of osteomyelitis as a complication of herpes zoster infection. Further research with randomized control trials is warranted for better management of this condition.

Fig. 2 Intraoral view of the necrosed bone on left side

References

1. Cohen J.Herpes Zoster. New England Journal of Medicine. 2013;369(3):255-63.
2. Tabrizi R., DehghaniNazhvani A., Vahedi A., Gholami M., Zare R., EtemadiParsa R. Herpes Zoster Induced Osteomyelitis in the Immunocompromised Patients: A 10-year Multicenter Study.J Dent Shiraz Univ Med Sci., September 2014;15(3):112-6.
3. Jain MK, Manjunath KS, Jagadish SN. Unusual oral complications of herpes zoster infection: Report of a case and review of literature. OralSurg Oral Med Oral Pathol Oral RadiolEndod 2010;110:e37-41.

4. Carbone V, Leonardi A, Pavese M, Raviola E, Giordano M. Herpes zoster of the trigeminal nerve: a case report and review of the literature.Minerva Stomatol 2004;53:49-59.
5. Gupta S, Sreenivasan V, Patil P. Dental complications of herpes zoster: Two case reports and review of literature. Indian Journal of Dental Research. 2015;26(2):214.
6. Gershon AA, Gershon MD, Breuer J, Levin MJ, Oaklander AL, Griffiths PD. Advances in the understanding of the pathogenesis and epidemiology of herpes zoster. J ClinVirol 2010;48 Suppl1:S2-7.
7. Mendieta C, Miranda J, Brunet LI,Gargallo J, Berini L. Alveolar bone necrosis and tooth exfoliation following herpes zoster infection:a review of the literature and case report. J Periodontol 2005;76:148-53.
8. Dechaume M, Descrozailles C, Garlopeau F, Robert J. Localized mandibular necrosis during herpes zoster infection(in French). Rev Stomatol1955;56:516-21.
9. Cooper JC. Tooth exfoliation and osteonecrosis of thejaw following herpes zoster. Br Dent J 1977;143:297-300.
10. Mckenzie CD, Gobetti JP. Diagnosis and treatment of orofacial herpes zoster: Report of cases. J Am Dent Assoc1990;120:679-81.