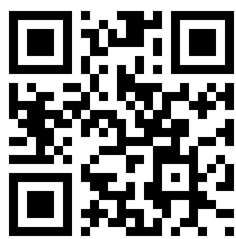


# *International Journal of Scientific Study*

*Exclusive Interview by*  
Dr. Stephen Cohen

*Forward Letters by*  
Dr. Mahesh Verma  
(Vice President - Dental Council of India)

Dr. Jayesh Shah  
(President - AAPI)



Volume 1 | Issue 2

An Official Journal of Medical Student Association of India

## **About the Journal**

IJSS is an Open-access, freely accessible online journal publishing research articles after full peer review. Each article submitted to us will be reviewed by 2-3 reviewers. We would be undergoing review in three stages

- Initial Review
- Peer Review
- Final Review

## **Aim and Scope of Journal**

The International Journal of Scientific Study (IJSS) is the official journal of Medical Students Association of India (MSAI). The journal was started with the aim to support and offer a publishing platform for the students and young academicians involved in various research projects. The objective of the Journal is to promote worldwide the medical and dental professionals research work and to encourage them to do research in various fields of medical and dental specialty.

## **About Medical Student Association of India**

Medical Students' Association of India (MSAI) is the largest medical student organization for the Indian subcontinent, involving more than 7000 students from over 100 different medical colleges. MSAI was adopted officially as the 100th Nation Member Organization representing the Republic of India in IFMSA on March 6th 2012 in Accra, Ghana during IFMSA's 61 General Assembly March Meeting.

## **The Mission of MSA-India**

"An organization of, for and by medical students, endeavors to improve medical education, encourage public health awareness"

## **The Objectives of MSA-India**

- To educate medical students about issues of importance pertaining to Medical Education & Public Health.
- To facilitate medical training, research opportunities and exchange programs.
- Providing a forum for medical students to discuss issues related to public health and formulate policies.
- To be an association for communication and representation of Indian Medical Students.
- To provide a link between members, and international organizations.
- To organize and promote urban as well as rural social health programs.
- To be open to communication and interaction with external organization.

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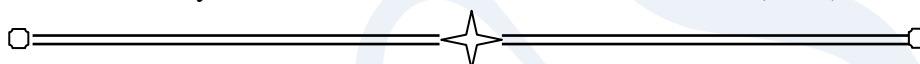
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**Dated : 01<sup>st</sup> August 2013**

### Foreword

There is clearly an upsurge of interest in science and research in our professional field. The need for scientific evidence should be the basis of clinical practice. The primary purpose of research is to produce new knowledge or find new ways of making existing knowledge available to those who need it. Research is not a separate speciality which is practiced by a few but it is a systemic approach of reasoning, documenting, analysing or reporting unusual clinical observations that we come across in everyday clinical practice.

It is said that a good research work is not really finished until you have written and published it, so it is available to other people. This is how science evolves. Result must be communicated and discussed with the rest of the scientific community to be validated or refuted. Moreover, they need to be shared with the rest of the society because science should benefit us all. However, students need a medium to publish their work and share ideas with their peers. By giving medical students an opportunity to publish their work the International Journal of Scientific Study encourages them to take the first step into their scientific carrier. Writing for an International Biomedical Journal is a challenge and getting a paper published is a true achievement. The Medical Student Association of India will provide a learning environment for students to gain experience in writing, peer reviewing and publishing biomedical research.

I am delighted to be able to write a few words of introduction to this new International Journal of Scientific Study and pleased that this is the right step of a continuing project of Medical Students Association of India to publish an ongoing IJSS research journal. Congratulations to Dr. Swapnil S Bumb, Editor in Chief for International Journal of Scientific Study who has worked for a long time to see this journal come to fruition.



**Prof. Mahesh Verma**

Director – Principal

Maulana Azad Institute of Dental Sciences, New Delhi &

Vice President,

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Dr. Swapnil S. Bumb

Editor In Chief-IJSS

President- Medical Student Association of India

Dear Dr. Bumb,

Heartiest Congratulations on the occasion of 62nd anniversary of International Federation of Medical Student's Association (IFMSA). I commend the leadership of MSAI for its dedication and selfless service nationally as well as internationally. On behalf of AAPI, I sincerely thank MSAI for its contributions for the past 62 years.

AAPI is hosting its Global Healthcare Summit in Ahmedabad during the first week of January, 2014 which has already created excitement in the medical community around the world. AAPI's Academic Affairs Committee is inviting authors to submit their research abstracts and posters for presentation at this summit. Details are available through our website [http://aapihgsindia.org/php/Research\\_Presentation.php](http://aapihgsindia.org/php/Research_Presentation.php).

The AAPI Medical Student, Resident and Fellow (MSRF) Section represents over 10,000 students across the United States. Although Asian Indians constitute less than 1 percent of the population of the United States, they constitute 10-12 percent of the student body in medical schools in the U.S. I encourage Medical Student Association of India (MSAI) to work closely with AAPI-MSRF section.

On behalf of AAPI, I express profound gratitude and wish you all the success in strengthening the academic medical environment by providing an avenue for students to publish their work through the International Journal of Scientific Study (IJSS).

With kind regards,



Jayesh Shah, MD

President, AAPI

From The Desk of .....

Editor in Chief

Medical education, both for undergraduate and postgraduate students and for those training in their chosen specialty, is currently undergoing great change. Today achieving goals for healthy living and a quality health system articulated by the World Health Organization, a sustainable and sufficient health human resource base is critical. Though India has number of medical and dental colleges and number of professionals passing out every year, there are insufficient numbers of physicians, nurses, midwives, pharmacists, physical therapists, occupational therapists, audiologists, and others.

Becoming doctor in India is that not easy even if you are brilliant and hard working. Limited government seats and high costs packages of private medical college seats are forcing medical students to head abroad. Cheap and affordable medical education by other countries like China, Russia, Ukraine, Philippines and Nepal have forced Indian students to pursue their education in these nations.

Last year of around 4000 students entered the Indian Health System after clearing the screening test for foreign medical graduates (FMG's). This problem is because difference in the cost of medical education in private colleges in India and in these countries is huge. In China, your entire medical education could be completed in Rs 15-25lakh, less than half what it would cost to even buy a seat in a private medical college, excluding the additional expense of tuition fees, food and boarding costs. China is amongst the cheapest destinations for a medical degree and has a large number of seats.

I think all the governing councils like Medical Council of India & Dental Council of India should give a thought over it and take the necessary actions. Number of government medical and dental colleges should be opened or there should be increase in number of seats in existing colleges, so that student can have affordable medical education and they would stop thinking about pursuing medical education in other countries.

I hope this problem should be highlighted and necessary actions should be taken. Along with different governing

councils, Ministry of Health, Ministry of Education, Various Medical and Dental organizations equally hold responsible for this situations. With the combined efforts of all, we work on this issue and combat to tackle the problem, so that the future of medical education in India remains stable and affordable where even a middle and lower class family students can dream of pursuing medical education in India.

### About this Issue – Volume 1, Issue 2

Colin Powell rightly said that “A dream doesn't become reality through magic; it takes sweat, determination and hard work”

With all the hard work been put by my entire team of IJSS, I would like to present all our readers the Volume 1, Issue 2 which comprises of some of the best articles from different parts of globe. Looking at the response from all part of globe, this issue would comprise of articles from like India, Australia, Ghana, Nigeria, Brazil and Bahrain. This issue will be launched at India International Medical Conclave – 2013 which is to be held on September 8-9<sup>th</sup> 2013 in the presence of several healthcare leaders, Bollywood stars and delegates from different countries.

With the release of our first issue (Volume 1, Issue 1) our journal got indexed in 6 databases. The journal was highly appreciated in many parts of globe. This issue includes interview from the World Renowned Legendary Endodontist Dr. Stephen Cohen and a Forward Letter by Vice President of Dental Council of India-Dr. Mahesh Verma.

I would like to thanks you all & hope with constant support from all of you, our journal can contribute quality research articles to existing literature.

Thanking You,  
**Dr. Swapnil S. Bumb**

Editor-In-Chief  
International Journal of Scientific Study



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# Interview by World Renowned Legendary Endodontist **Dr. Stephen Cohen**

M.A., D.D.S., F.I.C.D., F.A.C.D.

Diplomate, American Board of Endodontic

(Interviewed by Dr. Swapnil S. Bumb)  
(Editor in chief IJSS)



## 1. Tell us about yourself

When I was a child, my neighbours always called me “the little professor”. In other words, I believe my “calling” has always been to teach and that was seen by many, even when I was a child. My career has been very gratifying and I feel blessed by God.

## 2. Did you always wanted to be a dentist?

No, My Master’s degree was in micropaleontology (needed for dating rocks to discover oil/gas or aquifers), but while assisting Dr. Joe Mueller (I did the x-ray diffraction on the stannous fluoride crystals), the man who discovered Crest Toothpaste, he inspired me to change towards dentistry.

## 3. So after you got into dental school, how did the things went on?

In my first year, when we had to do pre-clinical endodontic treatment on extracted teeth, I knew right at that time that I was fascinated by the complexities of the root canal systems. Ever since, I have devoted myself to saving teeth and relieving patients from dental pain and suffering.

## 4. Your achievements in Field of Dentistry?

I do not like to brag, so for those who wish to know all my achievements, please go to my website. That said, my greatest achievement in dentistry is having the privilege to be the Senior Editor of the first nine editions of “*Pathways of the Pulp*” and then becoming eponymous with the renaming of the book to “*Cohen’s Pathways of the Pulp*” for the 10<sup>th</sup> edition with Dr. Ken Hargreaves as the new Senior Editor.

## 5. Brief about your research activities and publications?

I have had many publications and they are all detailed on my website ([www.cohenendodontics.com](http://www.cohenendodontics.com)). Some of my most challenging research that was published in 1970, was when I discovered that the traditional premise—that enamel was impermeable—was false. That was when I was able to demonstrate that children afflicted with deeply discolored crowns resulting from tetracycline administration could have their crowns returned to a normal shade by external bleaching with 35% H<sub>2</sub>O<sub>2</sub>. This discovery led to all the derivatives that have followed since then.

**6. Do you think that research activities should be promoted in every dental school?**

Absolutely!

**7. Importance of research in field of dentistry according to you?**

Regeneration of natural tissues, including the dental pulp, is clearly a part of our exciting future. Additionally I believe we will be able to routinely prescribe medications for dental patients, based on their DNA. I also believe we will be able to provide more dental therapies with less invasive approaches that are currently in vogue.

**8. What one Change/Improvement you would like to bring in field of dentistry?**

To have every dentist relicensed every 5 years to confirm that the dentist is remaining current with our rapidly changing clinical world. Presently too many dentists are practicing with what they learned in dental school decades earlier.

**9. Your view about “International Journal of Scientific Study”**

An exciting new scientific publication that reflects how the world is changing as it disseminates new concepts and thought-provoking ideas.



# Styloid Process Elongation – A Cross Sectional Study in North Western Part of India

Smita R Priyadarshini<sup>1</sup>, Vela D Desai<sup>2</sup>, Rajeev Sharma<sup>3</sup>, Isha Gaurav<sup>4</sup>

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## Abstract

**Introduction:** Elongated styloid process (ESP) is being more often seen in panoramic radiographs which are commonly used in dental practice. The panoramic radiograph shows less limitation when used to make measurements of ESP, such as the superimposition of other skeletal structures as a clear image of the basal part of the stylohyoid complex is obscured in other extra oral structures.

**Aims and Objectives:** To evaluate the magnitude of occurrence of elongated styloid process of the patients who were attending the dental OPD of Oral Medicine and Radiology Department of Jaipur Dental College.

**Materials & methods:** It is a cross sectional study based on the panoramic radiographs of patients who reported to the department during the months of January to November 2012. Type and Pattern of Calcification of both the left and right side were analyzed independently and the length was measured using the Kodak imaging soft ware. Styloid process measuring more than 30mm were considered as elongated. All data collected was analyzed using statistical analysis software (SPSS version 17, Chicago, USA). The chi-square test, unpaired t test, and one-way ANOVA were used for analysis with significance level  $< .05$

**Results:** 52.43% subjects had elongation in the styloid process with an increase in the length of the styloid process as age increased and was most commonly seen in the age group between 61-70 yrs.

**Conclusion:** Since the prevalence of an elongated styloid process was found to be higher in this study, awareness could be spread among people, who are prone to styloid process elongation, especially rural populations where individuals have a fibrous diet & chewing habits which leads to clenching of the jaw muscles and increases the weight loading of the styloid bilaterally and promotes ossification.

**Keywords:** Elongated styloid process, Panoramic radiographs, Prevalence

## Introduction:

The styloid process is derived from Greek word stylos that means "pillar" which usually serves as point of attachment for muscles and refers to the slender, pointed process (protrusion) of temporal bone of the skull. The length of the styloid process has been reported to vary according to different authors with variation in the size on either side.<sup>1</sup> The length varies from approximately 25 mm long with

its tip located between the external and internal carotid arteries, lateral to the pharyngeal wall and the tonsillar fossa. The close proximity of the styloid process to many of the vital neurovascular structures in the neck makes it clinically significant.<sup>2</sup>

The styloid process is asymptomatic; there could be increase in the length of the styloid process due to ossification of the stylohyoid and stylomandibular ligament causing clinical symptoms. These clinical

symptoms could be manifested as pain in the parapharyngeal, retromandibular or cervical region. Apart from unilateral sore throat, dysphagia, tinnitus, unilateral facial and neck pain, and otalgia, foreign object lodged in the throat and difficulty in swallowing, pain remains the dominant symptom.

Elongated styloid process (ESP) is being more often seen in panoramic radiographs which are commonly used in dental practice. The panoramic radiograph shows less limitation when used to make measurements of ESP, such as the superimposition of other skeletal structures as a clear image of the basal part of the stylohyoid complex is obscured in other extra oral structures. When the literature was reviewed very few studies have been conducted to estimate the prevalence of ESP in India with no such study in this part of the country. So the present study was designed to determine radiographically the presence of ESP.<sup>2</sup>

#### **Aims and Objectives:**

1. To evaluate the magnitude of occurrence of elongated styloid process of the patients who were attending the dental OPD of Oral Medicine and Radiology Department of Jaipur Dental College.
2. To assess the gender and age predilection of elongated styloid process.
3. To identify the radiographic types and patterns of calcifications
4. To assess the variation in the length of styloid process according to age.

#### **Materials and Methods:**

This study was undertaken in the Department of oral medicine and radiology, Jaipur dental college to evaluate the prevalence of elongated styloid process. It is a cross sectional study based on the panoramic radiographs of patients who reported to the department for regular dental problems and as these radiographs being a part of the regular investigatory procedure. All the panoramic radiographs were screened during the months of January to November 2012

**Inclusion criteria:** Patients who were advised panoramic radiographs as a part of their dental investigatory procedure.

**Exclusion Criteria:** Pregnant patients & Infants, Subjects who were uncooperative or not willing to be a part of the study, undiagnostic radiographs.

Panoramic radiograph is the most commonly used investigatory procedure in dentistry which is used as a part of regular radiographic procedure to visualize the styloid process. The Kodak 8000 Digital Panoramic system was used which complies with the directive 93/42/CEE relating to medical equipment. The magnification factor used for the machine was 1.5 Radiographs with adequate contrast and with minimum faults were included. The integrity of all the structures was checked. The styloid process on the panoramic radiograph is the anatomical basis of the styloid process.

The real origin of the styloid process is from the lower part of the temporal bone which is hidden by the shadows of the base of the skull. In this study the basis of the styloid process is defined on the basis of the anatomic landmarks. Here the measurements are on the frontal side of the styloid process where it leaves the tympanic plate of the temporal bone. In this area on panoramic radiograph a thin transparent line is generally visualized between the shadows of the styloid process and the tympanic plate of the temporal bone.

The tip of the styloid process is the bony end, which includes the mineralized part of the ligaments. If the styloid hyoid or stylomandibular ligaments were ossified they were measured along the styloid process as a part of styloid process, which was classified as calcified stylohyoid segment.

Type and Pattern of Calcification of both the left and right side were analyzed independently and the length was measured using the Kodak imaging software. Styloid process measuring more than 30mm were considered as elongated.

Langlias et al 1986 have classified the radiographic appearance of elongated and mineralized stylohyoid ligaments based on the types of styloid process and pattern of calcifications as mentioned.<sup>3</sup>



### Type of calcifications[Figure 1 A, B,C, D] Pattern of calcification[Figure-2 A,B,C, D]

In order to minimize bias all the panoramic radiographs were made and evaluated in the same fashion and read twice by the same observer in two different occasions independently.. In case of any doubt other extra oral views like the anterior posterior and the lateral skull views were advised.

There after the patient were referred for their complaints for the necessary treatment. All the data collected data was entered in a spreadsheet (Excel 2007, Microsoft, Richmond, USA) and was analyzed using statistical analysis software (SPSS version 17, Chicago, USA). The chi-square test, unpaired *t* test, and one-way ANOVA were used for analysis with significance level  $<.05$ .all

**Figure 1: –Types of Calcification of Styloid Process**

A: Elongated,



B Psedo articulated



C. Segmented



**Figure 2:- The Pattern of Calcification of the Styloid Process**

A - Calcified outline



B - Partially Calcified



C- Nodular



D - Completely Calcified



Statistical analysis were performed using a statistical software –statistical package for the social sciences version 14.0(Spss Inc, Chicago,III)

## Results:

A total of 941 panoramic radiographs were evaluated. Of which 421 radiographs showed elongation in the styloid process i.e 52.43 % . 21.3% subjects had bilateral elongation of the styloid process, 17.56% right side elongation & 13.57% had left side elongation in styloid process. [Table – 1]

When the length of the styloid process was compared on the right and left side the mean length on the right side was 28.11 for males and 26.98 for females similarly 27.18 in males and 26.25 for females on the left side. [Table – 2]

Type 1 calcification is most commonly seen in 20.64% of subjects where as Type 3 was least commonly seen in 11.62 % subjects. On the right side type of calcification in the left styloid process was type 1 and least being type 3 seen in 22.51 % & 8.71% respectively. [Table- 3]

When the right and left sided were compared there wasn't any significant difference in the Type of Calcification with a  $p > 0.05$

The pattern of calcification most commonly seen on right side was Type A seen in 19.40 % and the least common being Type D found in 1.14% subjects. Similarly on Left side Type A pattern was seen in 20.02% subjects where at least common pattern was Type D seen in 1.56% subjects. With significant difference in the patterns of calcifications in left side with a  $p < 0.05$  [Table – 4]

## Discussion:

Anatomical variation in the length of the styloid process and its stylohyoid chain is said to have profound anatomical, anthropological as well as of clinical importance. Knowledge of the clinical appearance and radiographic characteristics of

styloid process would enable differential diagnosis of different pathological changes in the orofacial and perioral area.

The elongation of styloid process is considered an anomaly which can be accompanied by calcification of the stylohyoid and stylomandibular ligaments, which can trigger a series of symptoms such as dysphagia, odynophagia, facial pain, ear pain, headache, tinnitus and trismus.<sup>4</sup>

Therefore this study was conducted to evaluate the occurrence and variation in the styloid process in Jaipur region of Northern western India.

The occurrence of elongated styloid process was 52.43% amongst the total subjects who were evaluated. This was similar to the study carried out in Mathura where the prevalence found was to be 52.1%. But studies done in other regions showed lesser incidence as in Davangere in Southern India where mineralization of the styloid process was found in 24.8%. Also in another study conducted by More C et al found that elongation in the styloid process in 19.4% of its subjects. Such higher prevalence rate of elongated styloid in this region could be attributed to the combination of factors such as race, lifestyle, and dietary habits. The subjects reporting to the department mostly comprised of a rural population where most people perform strenuous work like carrying heavy weight on their heads, which in turn could promote ossification in the ligament. They also chew hard fibrous foods which in turn could increase the masticatory load on the ligament leading to ossification of the ligament.<sup>5, 6, 7</sup>

In this study, we observed that there was an increase in the length of the styloid process as age increased which was in consistent with the studies done by various researchers. Okabe et al found a significant correlation between serum calcium concentration and the length of styloid process

**Table 1: Occurrence of Elongated Styloid Process**

	Male		Female		Total	
	No.	%	No.	%	No.	%
Styloid Process Not Elongated	239	45.79	143	50.89	382	47.57
Styloid Process Elongated	283	54.21	138	49.11	421	52.43
Right Styloid Process Elongated	93	17.82	48	17.08	141	17.56
Left Styloid Process Elongated	73	13.98	36	12.81	109	13.57
Styloid Process Bilaterally Elongated	117	22.41	54	19.22	171	21.30
<b>Total</b>	522	100.00	281	100.00	803	100.00

**Table 2: Comparison of Styloid Process Length w.r.t. Sex**

	Sex	N	Mean	Std. Deviation	'P' Value*
<b>Right</b>	<b>Male</b>	545	28.1128	9.04019	.099
	<b>Female</b>	237	26.9819	8.19764	
<b>Left</b>	<b>Male</b>	520	27.1895	8.73271	.171
	<b>Female</b>	232	26.2565	8.34888	

**Table 3: Distribution Type of Calcification of Right Elongated Styloid Process**

Type Of Calcification	Male		Female		Total	
	No.	%	No.	%	No.	%
<b>Type 1</b>	134	20.87	65	20.19	199	20.64
<b>Type 2</b>	77	11.99	44	13.66	121	12.55
<b>Type 3</b>	78	12.15	34	10.56	112	11.62
<b>Total</b>	642	100.00	322	100.00	964	100.00

Chi-Square = 0.980 With 2 Degrees Of Freedom; P = 0.613

**Table 4: Distribution of Pattern of Calcification if Left Styloid Process**

Pattern Of Calcification	Male		Female		Total	
	No.	%	No.	%	No.	%
<b>A</b>	144	22.43	49	15.22	193	20.02
<b>B</b>	106	16.51	70	21.74	176	18.26
<b>C</b>	33	5.14	22	6.83	55	5.71
<b>D</b>	10	1.56	6	1.86	15	1.56
<b>Total</b>	642	100.00	322	100.00	964	100.00

Chi-Square = 9.979 with 3 Degrees of Freedom; P = 0.02



among 80 years old subjects. They noticed that longer the styloid process, higher was the serum calcium concentration. This could be a possible reason for increase in the length of styloid process with age. However, these findings differed from Correlly RW et al who suggested that age may not have a role in elongation. There could be difference in these results as the serum calcium level of the subjects was not measured so a possible co relation could be made.<sup>8,9</sup>

Studies conducted by Bagga M B et al found 79.5% of cases had bilateral elongation in the styloid process and 20.5% of cases had unilateral whereas More C et al found bilateral elongation in 75% and a unilateral elongation in 25% of cases. In the present study bilateral elongation was found in 21.30 % subjects but unilateral elongation was found in 31.13% subjects (Table II & Graph II). Unlike those studies where bilateral elongation was a common finding we had subjects where unilateral elongation was prevalent, this could be due to improper chewing habits or racial variation amongst subjects included in our study.<sup>5,7</sup>

The prevalence of Type I type of calcification was most commonly seen in 20.64% on right side and 19.40% on left. This was in agreement with the studies done in Mathura & Ahmadabad where type I calcification followed type II & III. This similarity could be attributed to the fact that all these places were in the Northern part of the nation unlike those carried in Bangalore where Type II is the most common pattern followed by I & II.<sup>10</sup>

Pattern A (Completely calcified) type was the most common pattern of calcification which was seen in 19.4% on right side & 20.02% on left side in subjects considered in the present study. There was a significant difference in the patterns of calcifications in the age wise distribution in the left side with a  $P < 0.05$  Unlike studies done by Bagga M et al and More C et al pattern B (partially calcified) was the most common pattern. This variation in the result could be due to the wide variation in the sample size. The elongated styloid process on the right side was significantly more when compared to the left side which was in accordance with the study conducted

by More B et al. Unlike the study done by G Roopashri et al revealed that left side elongation was more when compared to right. This difference in the result could be due to regional variation in Jaipur & Ahmadabad situated in western part of India when compared to Bangalore being in southern part of the country.

In the present study no statistically significant difference was observed between genders in the unilateral or bilateral elongation of the styloid process. This was in agreement with the reports of previous studies done by Ferrario VF et al, Ilgüy M et al and Omnell KA et al. But studies done by G Roopashri et al found that elongated styloid was more common in females than males. Although these findings were not statically significant, these findings were similar to studies conducted by Ferrario et al. This variation could be due to difference in the sample size and life style among people.<sup>11,12,13,14</sup>

## Conclusion:

Since the prevalence of an elongated styloid process was found to be higher in this study, awareness could be spread among people who are prone to styloid process elongation, especially rural populations where individuals have a fibrous diet & chewing habits which leads to clenching of the jaw muscles and increases the weight loading of the styloid bilaterally and promotes ossification.

Panoramic radiography is useful for detection of an elongated styloid process and/or ossification of stylohyoid ligaments in patients with or without symptoms and can thus help avoid misinterpretation of the symptoms and hence panoramic radiography is an economical and best imaging modality to view the elongation of styloid process. It also helps to avoid misinterpretation of the symptoms as tonsillar pain or pain of dental, pharyngeal, or muscular origin. Due to the medial angulations of the styloid process and superimposition of other skeletal structures, some errors may occur when measuring the length of the styloid so proper care should be taken while measuring the styloid process. Dentists should keep a proper knowledge of these symptoms

and other diseases associated with such symptom, to include styloid process elongation in the differential diagnosis associated with atypical pain in the face or oral cavity in order to facilitate best treatment for these cases.

Therefore long term follow up study could be carried out to check if masticatory habits and change in the serum calcium levels could be directly correlated to the elongation of the styloid process in this region.

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# Campylobacter Infection Antimicrobial Resistance Trends

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## Abstract

**Aim:** To determine the trends of campylobacter sensitivity and resistance to antibiotics, at the Bahrain Defence Force Hospital (BDF), in 13 months period.

**Methodology:** Resistance of campylobacter to erythromycin, clindamycin, ciprofloxacin, tetracycline and levofloxacin on human isolates of campylobacter taken within a period from October 2009 – October 2010 was assessed. Statistical analysis was done by entering the data Microsoft excel and analyzing using the SPSS version 12 statistical package.

**Results:** Ciprofloxacin and levofloxacin antibiotics were resistant in most of the cases, whereas clindamycin and erythromycin antibiotics were never resistant; this implies that the former two are safer to use with their high sensitivity rates.

**Conclusion:** The principal purpose of monitoring antimicrobial resistance trends is to provide clinicians with data that can be used to select appropriate treatment regimens.

**Keywords:** Campylobacter sensitivity, Campylobacter testing, Campylobacteriosis

## Introduction:

Campylobacter is one of the most commonly reported bacterial causes of human food borne infections, and increasing proportions of these pathogens become resistant to medically important antimicrobial agents, imposing a burden on public health<sup>1</sup>. Both Campylobacter and Salmonella are primarily intestinal organisms in a wide range of animals and are commonly present in the environment of food-producing animals<sup>2-3</sup>

Campylobacter is a bacteria, that is a major cause of diarrheal illness in humans and generally considered the most common bacterial cause of gastroenteritis worldwide. In developed and developing countries, they cause more cases of diarrhea than food borne Salmonella bacteria. Campylobacter infections in children under the age of two years are frequent and can result in death.<sup>3</sup>

Campylobacter is mainly spiral-shaped, S-shaped or curved rod-shaped bacteria. There are 16 species and six subspecies assigned to the genus Campylobacter, of which the most frequently reported in human

disease are *C. jejuni*, *C. coli*, *C. lari* and *C. upsaliensis* which are considered as primary pathogens, but are generally reported far less frequent in cases of human disease. Most species prefer a micro-aerobic (containing 3-10% oxygen) atmosphere for growth.<sup>3</sup>

Campylobacter is widely distributed and occur in most warm-blooded domestic and wild animals. They are prevalent in food animals such as poultry, cattle, pigs, sheep, ostriches and shellfish; and in pets, including cats and dogs<sup>4</sup>. The source of infection can be from GIT of poultry, farm animals (cattle swine), household pets (puppies and kittens), contaminated food (undercooked or poorly handled poultry), birds pecking the tops of doorstep milk, wombats and Kangaroo feces (bushwalker's diarrhea), unpasteurized milk and public water supplies associated with some defect in purification.<sup>3</sup> Campylobacteriosis is the disease caused by the presence of campylobacter. The incubation period is usually three to four days, but can range from eight to nine days. Typically there is a 24 hours prodromal

illness – fever, headache, followed by onset of the clinical symptoms. The most common clinical symptoms include diarrhea associated frequently with blood in the stool, abdominal pain, fever, headache, nausea, and/or vomiting, which last five to seven days. A fatal outcome is rare and is usually confined to immunocompromised patients, very young or elderly patients. Complications such as bacteremia, hepatitis, pancreatitis, toxic mega colon and abortion have all been reported with various degrees of frequency. Post-infection complications may include reactive arthritis and Guillain-Barré syndrome (<than 1 in 1000 cases).<sup>4</sup>

The main route of transmission is generally believed to be food borne, via undercooked meats and meat products, as well as raw or contaminated milk. The ingestion of contaminated water or ice is also a recognized source of infection. Campylobacteriosis is considered to be a zoonotic disease transmitted to humans from animals or animal products. In animals, campylobacter seldom cause disease<sup>4</sup>. 500 organisms are needed for infection to occur. They Adhere to jejunum and ileum, where there is mucosal invasion leading to cytotoxin release that causes local damage associated with enlarged mesenteric lymph nodes, occasionally severe hemorrhagic necrosis of the small intestine, or large bowel involvement with crypt abscess formation in severe cases (DDX Ulcerative colitis). Occasionally bacteremia may occur with focal manifestations and organism may be invasive. Enterotoxin may also play a role.<sup>5</sup>

Diagnosis of campylobacter is mainly through history and clinical diagnosis, Stool stained with methylene blue (reveals PMNs and RBCs), Culture (Feces, blood), Curved Gram Negative bacteria (flagella). Grown on especially selected agar plates with microaerophilic atmosphere and 42°C, it illustrates oxidase positive.

Incidence of Campylobacter food poisoning is 2.5 million cases per year in USA as estimated by the Centers for Disease Control and Prevention (CDC) and the National Institute of Allergy and Infectious Diseases Fact sheet (NIAID)<sup>6</sup>; 2 million cases to 8 million cases a year. Incidence Rate of

Campylobacter food poisoning is approximately 1 in 108 or 0.92%. Incidence of Campylobacter food poisoning is 40.12 per 100,000 in Canada 2000<sup>7</sup>. Also, 112.2 new cases of campylobacteriosis per 100,000 populations were notified in Australia in 2002.<sup>6</sup> Incidence usually peaks in summer. The incidence of human campylobacter infections has been steadily increasing for several years. The reason for this is unknown.

Prevalence of Campylobacter food poisoning is over 10,000 cases reported to the CDC each year, equaling approximately six cases per 100,000 population. Many more cases went undiagnosed or unreported, and campylobacteriosis is estimated to affect over 2 million persons every year, or 1% of the population. Incidence is about 20 cases per 100,000 population diagnosed in the United States. An estimated 2.4 million persons are affected each year.<sup>7</sup> Campylobacter organisms cause between 5 and 14 percent of all diarrhea illnesses worldwide. In industrialized countries, illness is more common in children younger than 2 years of age. In developing countries, older children and young adults have the highest incidence of infection. Most frequently, cattle and poultry are the sources of human infection, but puppies, kittens, pigs, sheep, rodents, and birds may also serve as reservoirs<sup>8</sup>.

Although Campylobacter doesn't commonly cause death, the death rate extrapolation for USA has been estimated to be 500 per year. This extrapolation calculation uses the deaths statistic estimated 500 deaths annually by the Division of Bacterial and Mycotic Diseases (DBMD). An estimated 124 fatal cases each year can cause life-threatening sepsis in persons with compromised immune systems<sup>9</sup>.

The objective of this study is to determine the trends in Campylobacter antibiotic resistance occurring in Bahrain Defence Force hospital (BDF) and assessing the differences in the isolates. Since antimicrobial resistance of campylobacter species to erythromycin is already being done since years in BDF microbiology laboratory, we are going to assess the resistance of campylobacter to ciprofloxacin, tetracycline and quinolones on human isolates of



campylobacter taken within a period from October 2009 – October 2010.

### Materials and Methods:

Stool samples are generally processed at the microbiology laboratory at BDF according to guidelines set out in the Bahrain National Quality Control Manual. (20) Since antimicrobial resistance of campylobacter species to erythromycin and clindamycin is already being done since years in BDF microbiology laboratory, we are going to assess the resistance of campylobacter to erythromycin, clindamycin, ciprofloxacin, tetracycline and levofloxacin on human sample isolates of campylobacter taken within a period from October 2009 – October 2010 was assessed. Campylobacter cultures were carried out using blood-free selective agar containing modified charcoal cefoperazone deoxycholate selective supplement (Oxoid). Plates called Campylo plates were incubated at 42°C for 48h under microaerobic condition (CampyGen; Oxoid). Suspected colonies were subcultured on chocolate agar plates and incubated microaerobically at 37°C for 24 h (CampyGen; Oxoid). Negative cultures were reincubated for an additional 24 h. Campylobacter isolates were identified to species level using routine biochemical tests (production of catalase, hippurate and indoxyl acetate). Statistical analysis of the data gathered was done by entering the data Microsoft Excel and analyzing using the SPSS version 12 statistical package. Statistical significance was calculated using chi square test.

### Results and Discussion:

Over 10,000 cases of campylobacter is reported to the Centers for Disease Control and Prevention (CDC) each year, equaling approximately six cases per 100,000 population. The rapid emergence of antibiotic resistance for Campylobacter species were noted in Europe in 1980's, from 0% in 1982 to 11% in 1989, in the United States it rose from 0% in 1989 to 19% in 2001. Campylobacteriosis is a disease caused by the presence of campylobacter. Treatment is not generally indicated unless symptomatic, except

electrolyte replacement and rehydration. Antimicrobial treatment with erythromycin, Ciprofloxacin, tetracycline or quinolones is indicated in invasive cases or to eliminate the carrier states. In Bahrain Defense Force Hospital, only erythromycin resistance is done as a routine test when campylobacter is found. In this analysis results showed that Ciprofloxacin and levofloxacin antibiotics were resistant in most of the cases, whereas clindamycin and erythromycin antibiotics were never resistant; this implies that the former two are safer to use with their high sensitivity rates. (Figure 1 and 2)

The prevention of infection requires control measures at all stages of the food chain, from agricultural production on the farm, to processing, manufacturing and preparation of food in both commercial establishments and the domestic environment. Education in hygienic handling of food for abattoir workers and those involved in the production of raw meat is essential to keep microbiological contamination to a minimum. The only effective method of eliminating campylobacter from contaminated foods is to introduce a bactericidal treatment, such as heating (cooking or pasteurization) or irradiation. Preventive measures for campylobacter infection in the household kitchen are similar to those used against other food borne bacterial diseases<sup>10</sup>.

Distinguishing infections caused by different enteric pathogens is seldom possible, antimicrobial drug use in the clinical setting is not confined to the treatment of Campylobacter species but rather to empiric treatment of community-acquired diarrhoea in general. Systematic surveillance data and timely reporting of antibiotic resistance patterns in pathogens from different regions should become a high priority since the principal purpose of monitoring antimicrobial resistance trends is to provide clinicians with data that can be used to select appropriate treatment regimens, it can be of great help in drawing the attention to the most effective antibiotics that could be used worldwide in addition to the fact that it will give physicians an idea about the trend of resistant percentages for each antibiotic,

by emphasizing the antibiotics that are being used routinely to treat diarrhoea, as well as any alternatives, such as fluoroquinolones, macrolides, and gentamicin.<sup>11</sup>

A meta-analysis demonstrated that antibiotic treatment was beneficial when begun early, decreasing diarrhea duration by a mean of 1.32 days as well as shortening the microbiologic carriage duration.<sup>12</sup>

In our study, we studied the range of antibiotic sensitivity that could be used in the treatment of campylobacter. Ciprofloxacin and levofloxacin were resistant in most of the times, whereas clindamycin and erythromycin were never resistant; this implies that the former two are safer to use with their high sensitivity rates. (Figure 3) Resistance in *Campylobacter* species is of paramount importance when antibiotics are used to treat human infections. Erythromycin has been the cornerstone of therapy,

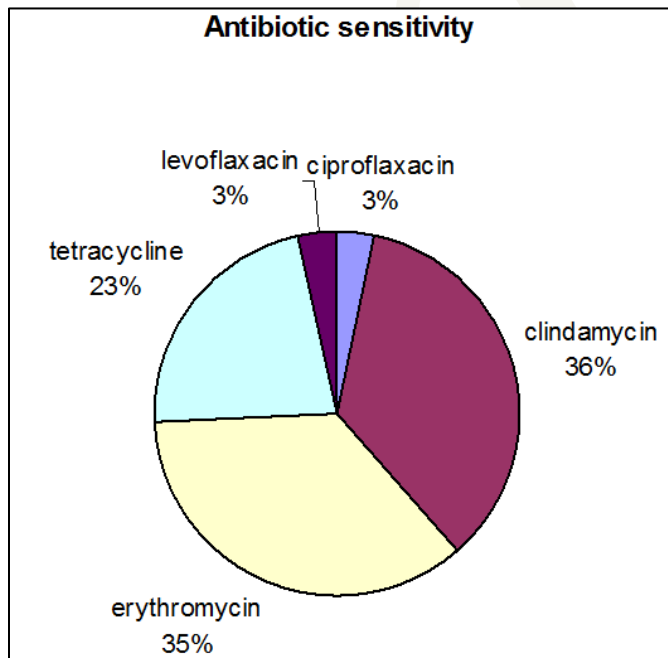
demonstrating consistent bacteriologic cure of sensitive strains when compared with placebo but with an inconsistent benefit for clinical cure.<sup>13-14</sup>

With the introduction of fluoroquinolones, ciprofloxacin became the mainstay of empiric treatment for acute community acquired bacterial diarrhea and even for traveler's diarrhea.<sup>15-16</sup>

However rapid emergence of resistant strains were noted in Europe in 1980's from 0% in 1982 to 11% in 1989, in the United States it rose from 0% in 1989 to 19% in 2001.<sup>17,18</sup>

Additional resistance to other relevant therapeutic agents poses a risk when there is no effective antimicrobial regimen for *Campylobacter* infections. Recently, Hoge et al. found 100% co-resistance between Thai isolates resistant to azithromycin and ciprofloxacin in the last 2 years of surveillance.<sup>19</sup>

**Figure 1:**



**Figure 2:**

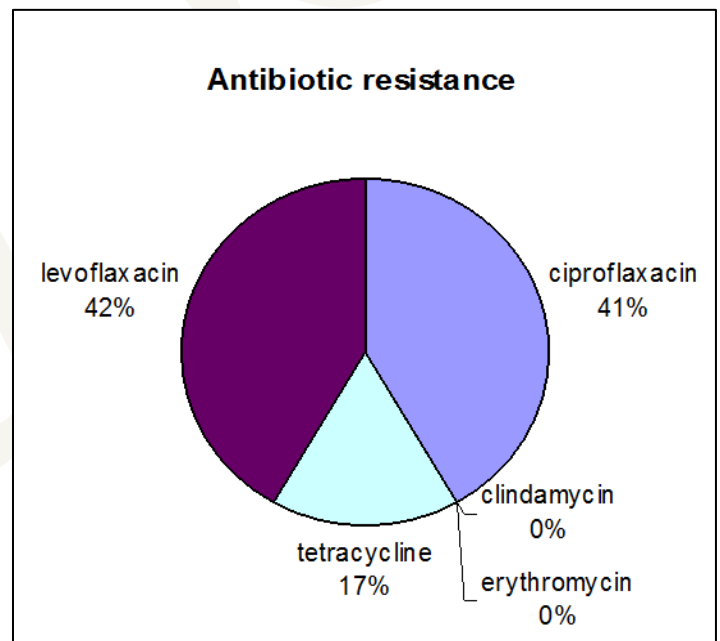
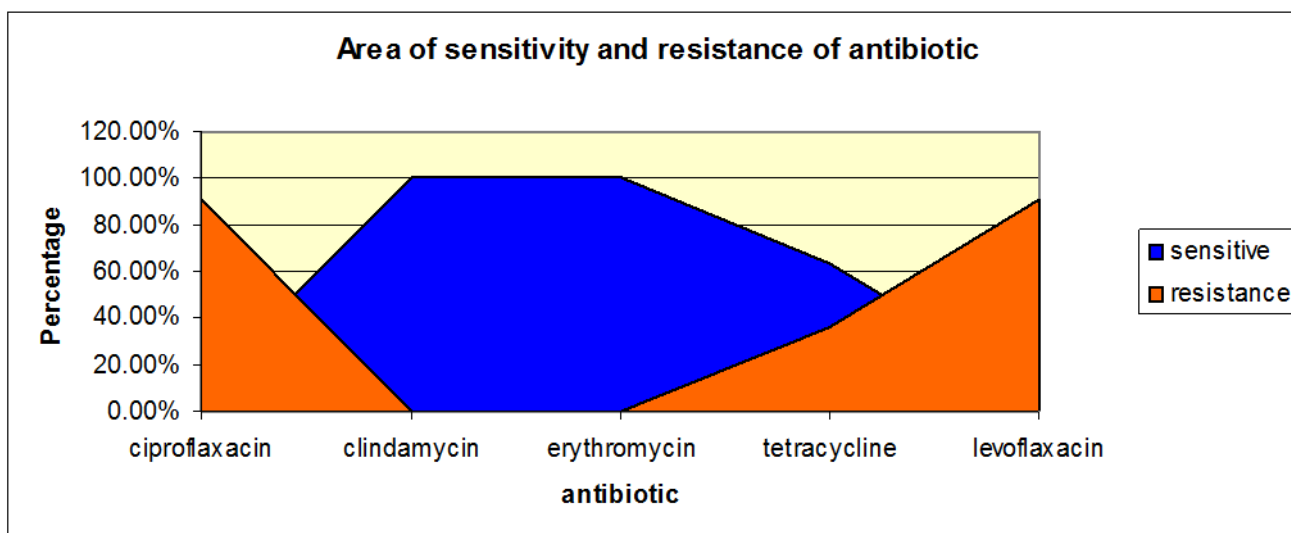


Figure 3:



### Conclusion:

Campylobacteriosis is a common cause of diarrhoea and enterocolitis worldwide. Although commonly self limiting, infections can be associated with systemic and recurrent disease in immunocompromised, and severe complications (reactive arthritis, Guillain-Barré syndrome) in healthy individuals, hence treatment options have to be clearly demarcated and sensitivity to the pathogen performed. The rapid emergence of antibiotic resistance has limited the antibiotic options but more antibiotics are emerging and continuous sensitivity testing is going to provide a range of the most effective drugs to consider in the treatment options.

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# Genetic Variation of Blood Group Polymorphism among an Endogamous Human Population from Andhra Pradesh, India

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## Abstract

Genetic polymorphic traits like blood groups are widely used genetic markers in human population genetics. The present paper reports the genetic variation in phenotype and allele frequencies of ABO and Rh (D) blood groups among Kshatriyas, an endogamous population from Visakhapatnam district, Andhra Pradesh, India. Blood samples of 100 unrelated Kshatriyas, individuals were screened for ABO and Rh (D) blood groups. The order of occurrence of ABO phenotypes is  $O > B > A > AB$ . The corresponding allele frequencies of O, A and B are 0.420, 0.155 and 0.415, respectively. The allele frequency of D (0.990) is more than  $d$  (0.010). The present results were compared with the other populations to understand the population variations.

**Keywords:** Genetic polymorphism, Genetic variation, Blood groups

## Introduction:

ABO and Rhesus (Rh) blood group systems are hereditary characters and are used widely in human population genetic studies. The knowledge of the distribution of ABO and Rh blood groups at local and regional levels are helpful in the effective management of blood banks and in blood transfusion services. The use of blood group systems are conventionally referred, to as inherited antigens detected on the red cell surface by specific antibodies. Because of this individuality and because of the rigid manner of their inheritance in different populations, blood groups can be applied to various issues such as identifying disputed parentage and paternity.<sup>1</sup> Further, blood group systems are useful to determine the genetic variation within and between the populations. In human species, the best-known example of multiple allelism is the blood groups. The availability of very sensitive immunological tests has led to recognizing numerous alleles at a

particular locus. In some groups of multiple alleles, certain heterozygotes show dominance or intermediary and other heterozygotes with alleles and with qualitatively different effects show both effects, simultaneously. Thus in blood groups, the combination of dominance and codominance are found.<sup>2</sup> The latest literature about the blood group markers revealed that the blood groups systems are inherently polymorphic and show variability across the populations.<sup>3-7</sup> During the last four decades, numerous studies have been carried out on the genetic composition of various endogamous population groups in India.<sup>8,9</sup> However, genetic studies among Kshatriyas are very limited. Hence, in the present study, the distribution of ABO and Rh blood groups has been reported among the Kshatriyas, a forward caste of Visakhapatnam district, Andhra Pradesh, India.

Kshatriyas is one of the most predominant and largest Telugu speaking castes in Andhra Pradesh.

Traditionally, it is a worrier community in Hindu society, and hierarchically, they are superior to many other castes, except Brahmins in Andhra Pradesh. They are treated as higher caste group in coastal Andhra Pradesh. Kshatriyas are forward caste in line of social caste ranking. Rajulu, suryavamsa rajulu and chandravamsa rajulu are the main synonymous to Kshatriyas. Kshatriyas selected for the present study is found to be distributed mainly in the Visakhapatnam district of Coastal Andhra Pradesh. At present Kshatriyas are accustomed to agriculture, businesses, and also switched over to government jobs and also settled in trade and industry is their main stay of economy. Monogamy is the general pattern of marriage. Literacy rate is low compared to the neighboring caste populations. Joint families are more common. They speak Telugu, a Dravidian language. The ethnographic profile of Kshatriyas is available elsewhere.<sup>10</sup>

## Materials and Methods:

The blood samples were drawn from randomly sampled 100 healthy unrelated men and women of Kshatriyas, population of Visakhapatnam district in Coastal Andhra Pradesh. The blood samples were collected according to the methods of Race and Sanger.<sup>1</sup> The 2 to 3 drops of direct blood from the finger tip were taken into the sterile test tubes containing 0.9% saline solution. RBCs are washed with normal saline solution and 5% red cell suspension was prepared. Following the standard techniques with adequate controls, the RBCs were grouped for ABO blood groups and Rh types, through agglutination method [11]. The antiserum used were anti-A, anti-B and anti-D antisera supplied by Ethnor Limited, Bombay, India.

Gene (allele) frequencies are calculated by following Bernstein's formula,<sup>12</sup> explained along with corrections by Mourant et al.<sup>11</sup> All these statistics were done as illustrated by Balakrishnan,<sup>13</sup> and these statistics are presented briefly hereunder. Phenotype frequencies of blood group systems are presented as simple percentages. The gene frequencies of ABO blood groups were calculated as:

$$p = 1 - \sqrt{0 + B}; q = 1 - \sqrt{0 + A} \text{ and } r = \sqrt{0}$$

A, B and O denote the proportion of the population in various groups; p is the frequency of gene A, q is the frequency of gene B and r is the frequency of the gene O. If the total of p + q + r are not adding up to one, the deviation from one is noted as D, an improved estimate of the gene frequencies given by Bernstein is

$$\begin{aligned} p' &= p (1 + \frac{1}{2} D) \\ q' &= q (1 + \frac{1}{2} D) \\ r' &= (r + \frac{1}{2} D) (1 + \frac{1}{2} D) \end{aligned}$$

The allele frequencies of Rh blood group were estimated as following:

Gene frequency of d =  $\sqrt{d}$ , where d = proportion of the population in Rh d group; gene frequency of D = 1 - d.

## Results and Discussion:

ABO and Rh genes and phenotypes vary widely across races and geographical boundaries despite the fact that the antigens involved are stable throughout life. The resultant polymorphism remains important in population genetic studies, estimating the availability of compatible blood. The present study is, therefore, useful in providing information on the status of ABO and Rh blood group distribution among the Kshatriyas. The distribution of ABO blood groups is presented in Table 1. The group 'O' (42%) is the most frequently encountered phenotype in the population under the study. This observation is in accordance with the previous reports from other parts of Andhra Pradesh. With regard to the other phenotypes of ABO blood groups, the frequency of group 'B' is 40 %, and group 'A' is 13%, while 'AB' group was the least occurred phenotype with a frequency of 5%. The order of ABO percentage frequencies is O > B > A > AB. With regard to distribution of allele frequencies among Kshatriyas, allele O is observed with the highest frequency (0.420) than B (0.415) and A (0.155). Reviewing the ABO phenotype frequencies of other caste populations of Andhra Pradesh, it can be observed that a majority of populations recorded higher frequencies of blood group O than either B or A,

while a few reported higher frequencies of B.<sup>14</sup> Table 2 shows the frequency of Rh (D) phenotypes among the study population. In the present study, the frequency of Rh-D positive phenotype is 99% and 1% were Rh negative and the allele frequencies of *D* and *d* are 0.99 and 0.01, respectively. This is in general with other Andhra caste populations who reported low frequency of Rh (D) negative gene,<sup>15</sup> and several populations of Andhra Pradesh reported the absence of this gene.<sup>16</sup>

**Table 1: Distribution of the ABO blood group and their allele frequencies among Kshatriya caste, Andhra Pradesh, India:**

<i>Phenotype</i>	<i>Phenotypic frequency</i>	<i>Allele Frequency</i>
O	42.0	0.420
A	13.0	0.155
B	40.0	0.415
AB	5.0	

**Table 2: Distribution of the Rh (D) blood group and their allele frequencies among Kshatriya caste, Andhra Pradesh, India**

<i>Phenotype</i>	<i>Phenotypic frequency</i>	<i>Allele Frequency</i>
Rh (D) + ve	99.0	0.990
Rh (D) – ve	1.0	0.010

In the present study, the frequency of O blood group is more than other groups. The O blood type (due to absence of both A and B alleles) is common among many populations of the world. It is particularly high in frequency among the indigenous populations of Central and South America, where it very nearer to 100%. It also is relatively high among Australian Aborigines and in Western European population of Celtic origin. Some anthropologists postulated that the allele A evolved earliest, followed by allele O, by the deletion of a single nucleotide, and then B. This chronology resulted the presence of people

worldwide with each blood type. It is consistent with the accepted patterns of early population movements and varying prevalent blood types in different parts of the world: for instance, B is very common in populations of Asian descent, but rare in populations of Western European descent. Another theory states that there are four main lineages of the ABO gene and that mutations creating type O have occurred at least three times in humans.<sup>17</sup> The continued presence of the O alleles is hypothesized to be the result of balancing selection.<sup>17</sup>

## Conclusion:

An earlier study on genetic distance analysis of Andhra castes based on ABO and Rh blood group genotypes revealed a pattern, discernable in clustering of castes of same hierarchy like forward castes forming close clusters with other forward castes, and backward castes again forming close clusters with other backward castes.<sup>14,18</sup> It is to be mentioned that each caste population is endogamous from times immemorial which automatically rules out genetic admixture with other populations with a few possible exceptions. The initial differentiation of these communities is primarily based on occupations. So to start with, many of the present day caste populations might have originated from a set of common ancestors, but this differentiation might have taken place long ago, after which, there was no significant genetic admixture.

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# Gingival Crevicular Blood: A Fast, Safe, Noninvasive and Chairside Method of Diabetic Screening

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## Abstract

**Objective:** This paper is aimed towards evaluating, whether the blood oozing during routine periodontal examination can be used for evaluating blood glucose levels.

**Methods:** A total of 60 patients, 30 diabetic and 30 non-diabetic (40 male and 20 female age 28-68 years) with moderate to severe periodontitis were included in the study. Periodontal pocket probing was performed, Blood oozing from gingival tissues of anterior teeth following periodontal pocket probing was collected with the strip of a glucose self-monitoring device (Sugarchek by Wockhardt Limited, India). As control, capillary blood was taken. Statistical analysis was performed by Pearson's correlation coefficient.

**Results:** The comparison between gingival crevicular blood and capillary blood showed a very strong correlation with an  $r$  value of 0.984 ( $P < 0.001$ ).

**Conclusions:** As a positive correlation was found between the gingival crevicular blood glucose levels (CrBGL) and capillary blood glucose (CBGL), the results suggest that blood oozing during routine periodontal examination may be used for diabetic screening in dental office settings.

**Keywords:** Diabetes mellitus, Periodontitis, Gingival crevicular blood.

## Introduction:

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both.<sup>1,2</sup> Incidence of diabetes in India is estimated to be 20.2 per 1000 persons and prevalence rate is 12.1 % in adults.<sup>3,4</sup>

Diabetes mellitus is associated with a wide range of complications, such as retinopathy, nephropathy, neuropathy, micro- and macrovascular disease, altered wound healing, and periodontitis.<sup>5</sup> Periodontal disease is considered to be the sixth complication of diabetes.<sup>6</sup> The interrelationship between diabetes mellitus and periodontitis has been studied for many years.<sup>7</sup> However, occurrence of complications, mode of therapy, duration of diabetes, age of patient and degree of control of diabetes have

been used as indicators of the disease in these studies.<sup>8</sup>

Over the past several years, several methods have been developed to measure glucose level in biological fluids, but the search for more specific, sensitive and simple method is still going on. Since centuries, the clinicians are sending venous blood, or urine samples for determining glucose levels to clinical biochemistry laboratories. But these days portable glucose monitors are in use both as a bed side testing of glucose in hospitals and for home testing conducted by patients under living conditions. These portable glucose monitors can be used for the estimation of blood glucose in dental set up also.<sup>9</sup>

The early diagnosis of diabetes, however, might help to prevent its long-term complications that are

responsible for the high morbidity and mortality of diabetes patients. Routine probing during a periodontal examination is more familiar to the dental practitioner and less traumatic than a finger-puncture with sharp lancet. It is possible that gingival crevicular blood from probing may be an excellent source of blood glucometric analysis using the technology of portable glucose monitors.

Therefore the aim of the present study was to compare blood glucose level from patient's gingival crevicular blood and finger puncture method using a self-monitor so as to determine whether gingival crevicular blood during routine periodontal examination can be used for determining glucose levels.

## Materials and Methods:

A total of 60 patients (40 male and 20 female; age range 28 to 69 years) were selecting from patients visiting the outpatient department of dental college. Patients with moderate to severe periodontitis were screened and included in the study. Patients were examined and periodontal status was recorded with William's graduated probe. Patients were classified according to AAP (American Academy of Periodontology) as moderate periodontitis with pocket depth of 3-5 mm and severe periodontitis with pocket depth of > 6mm.). After taking patients personal history and medical history, 60 patients were selected. Patients were divided in in to 2 groups:

1. Test group – 30 known diabetic patients.
2. Control group – 30 non-diabetic patients.

Patients with any of the following conditions were excluded from the study: requirement for antibiotic premedication; any disorder that is accompanied by an abnormally low or high hematocrit, e.g. polycythemia vera, anemia, dialysis; intake of substances that interfere with the coagulation system, e.g., coumarin derivatives, nonsteroidal antiinflammatory drugs, heparin; actual severe cardiovascular, hepatic, immunologic, renal,

hematological, or other organ disorders. After obtaining institutional ethical committee clearance a written and informed consent was obtained from all the participants of the study. Prior to probing, all the subjects were asked to rinse oral cavity with 0.2% chlorhexidine in order to minimize microbial load in the oral cavity. Glucose self-monitoring device (Sugarchek by Wockhardt Limited, Mumbai, India) was used according to the manufacturer's recommendations. [Figure 1] Maxillary anterior teeth were selected for taking samples and the sites were air dried to prevent contamination with saliva and with GCF. After the periodontal examination gingiva was probed with the William's graduated probe and Bleeding gingival sites were selected. [Figure 2] Site with more profuse bleeding was chosen for gingival crevicular blood. The blood oozing from gingival tissues was collected with the strip of a glucometer and then reading was taken [Figure 3] Sites with suppuration were excluded from the study. After recording blood glucose level from gingival crevicular blood another blood sample was obtained from one of the patient's finger. The soft surface of the fingertip was wiped with alcohol and the alcohol was allowed to evaporate. Sampling was carried out using an auto-lancet device to puncture the skin, and the blood drop was then collected by the strip of glucometer device for analysis and again the reading was taken.

The data obtained were tabulated and analysed using Statistical Package for Social Sciences, version 16.0 (SPSS). Means and standard deviations were calculated for gingival blood glucose levels and capillary blood glucose levels in study and control groups.

To compare the mean values of gingival blood glucose levels and capillary blood glucose levels between the study subjects and control group, Independent sample 't' test was used. For all the comparisons P-value of 0.05 or less was used for statistical significance.

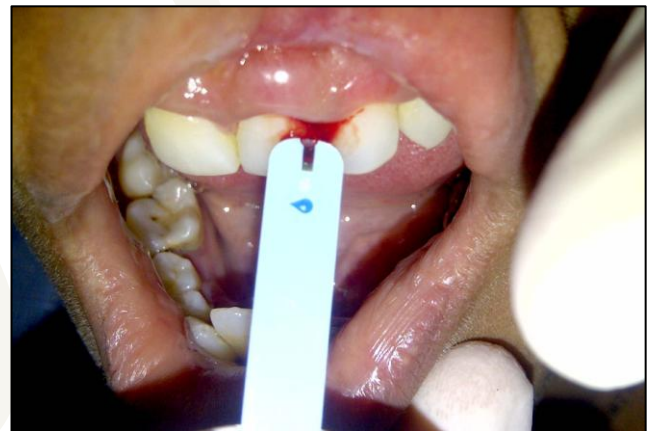
**Figure 1:** Glucose Self-Monitoring Device (Sugarchek by Wockhardt Limited, Mumbai, India)



**Figure 2:** Bleeding on Probing During Routine Clinical Examination.



**Figure 3:** Gingival Crevicular Blood Sampling for Direct Glucose Measurement with the Glucose Self-Monitoring Device.



## Results:

Sixty patients (40-males and 20-females) took part in this study with the mean age of 46.2 years (males 45.5 years and females 47.7 years). The capillary blood glucose (CBGL) levels showed significant difference between test and control groups ( $P < 0.05$ ) [Table 1] and similarly significant difference was found between test and control

groups in gingival crevicular blood glucose levels (CrBGL) ( $p < 0.05$ ). [Table 2] There is no statistically significant difference observed between the CrBGL value and the CBGL values in the diabetic group and non-diabetic group – suggestive of that gingival crevicular blood can be used as an alternative for estimation of blood glucose level in diabetic as well as in non-diabetic patients. [Table 3][Figure 4]

Correlation between CBGL and CrBGL in the total sample were analyzed with "Pearson correlation coefficient" using the SPSS version 16 (statistical and data analysis). Highly significant correlation ( $r =$

0.984) was found between CBGL and CrBGL in both test and control samples as  $r = 0.908$  and  $r = 0.969$  respectively at  $p < 0.05$  [Table 4].

**Table 1: Comparison of CBGL among test and control groups.**

Group	N	Mean (mg/dl)	SD	t- value	P value
Test	30	152.83	13.62	14.55	0.0001*
Control	30	108.77	9.46		

\*= significant at  $P < 0.001$

CBGL - Capillary blood glucose level.

**Table 2: Comparison of CrBGL among test and control groups.**

Group	N	Mean (mg/dl)	SD	t- value	P value
Test	30	150.13	14.85	14.35	0.0001*
Control	30	104.53	9.07		

\*= Significant at  $P < 0.001$

CrBGL - Crevicular blood glucose level

**Table 3: Mean, standard deviation and P value of CrBGL and CBGL in diabetic and non-diabetic group.**

Group	Diabetic Group		Non Diabetic Group	
	CrBGL (mg/dl)	CBGL (mg/dl)	CrBGL (mg/dl)	CBGL (mg/dl)
Mean	150.13	152.83	104.53	108.77
SD	14.85	13.62	9.07	9.46
P value	0.4*		0.08†	

\*= Non Significant

† = Non-Significant.



**Table 4: Relationship between CBGL and CrBGL.**

Group	Number	r-value	P value
Test	30	0.908	0.0001*
Control	30	0.969	
Combined	60	0.984	

\*=significant

### Discussion:

In India, DM is one of the major diseases of concern as the incidence rate of DM is increasing at an alarming rate but there are very few studies done for screening Diabetes mellitus using gingival crevicular blood in India.<sup>10,11</sup> Hence dentist can play an important role in identifying undiagnosed diabetes by the routine screening of patient especially those with pronounced gingival inflammation.<sup>12</sup>

Blood glucose testing with the self-monitoring devices is sensitive method, since it can give results with small amount of blood and is very less time consuming. CrBGL collected during periodontal examination is an excellent source of blood, safe, easy to perform and comfortable to the patient. Moreover, the technique described is more familiar and less traumatic to the patient than a finger-puncture.<sup>13</sup> Studies in the past have also found significant correlations between CrBGL and CBGL.<sup>14-16</sup>

The use of gingival crevicular blood to measure blood glucose is likely to be more acceptable to the dental professional and the patient because provider and patients anticipate oral intervention in the dental office. Persons can reliably be screened for diabetes by measuring glucose in gingival crevicular blood sample, since probing and gingival crevicular blood collection is less time consuming and did not increase the patient's discomfort.<sup>14</sup>

The strong correlation obtained in the present study on comparison between the various blood glucose measurements indicates the feasibility of using gingival crevicular blood as an alternative to

the Finger prick blood in accordance to the previous studies. On analysis of our study, finger prick capillary blood glucose showed a slightly higher mean value than gingival crevicular blood glucose mean value, this may be due to contamination of gingival crevicular fluid which dilutes the glucose concentration producing lower measurements in gingival crevicular blood.<sup>17</sup>

According to Muller The difference between glucose level in CrBGL and CBGL samples was unacceptable for clinical purposes.<sup>18</sup> Though capillary/venous blood samples used for diabetes mellitus screening is gold standard, but the gingival crevicular blood may prove to be promising approach for routine dental office screening for diabetes mellitus in periodontal patients.

### Conclusions:

Within the limitations of this study, the following conclusion can be made that gingival crevicular blood collected during diagnostic periodontal examination may be an excellent source of blood for glucometric analysis. Though capillary/venous blood samples used for diabetes mellitus screening is gold standard, the gingival crevicular blood may prove to be promising approach for routine dental office screening for diabetes mellitus in periodontal patients. The technique is safe, easy to perform, and comfortable for the patient and therefore, helps to increase the frequency of diagnosing diabetes during routine periodontal therapy. Thus, the dentist may increase his importance as a member of the health

team by participating in the search for undiagnosed asymptomatic DM.

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# Alport's Syndrome: A Study of Systemic Manifestations

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## Abstract

**Aim:** Alport's Syndrome is a rare hereditary, progressive renal disease leading to end stage renal disease associated with hearing defects and ocular anomalies. We studied the clinical profile of patients with Alport's syndrome from unrelated families and highlighted the classical symptoms, signs and laboratory findings, which can alter the prognosis of the disease.

**Methods:** A case record based observational retrospective study was done on 18 patients with Alport syndrome from unrelated families admitted to Kasturba Hospital from Jan. 2000 to May 2011. Clinical and laboratory features were recorded.

**Results:** 7 patients had a positive family history. The mean of diagnoses was 19 years. 13 patients had positive ocular manifestations and all patients had progressive high frequency sensorineural hearing loss. 5 had history of hypertension. Echocardiogram revealed left ventricular hypertrophy in 6 patients. Proteinuria was present in all with a mean 24 hour proteinuria of 2 grams. Renal failure was seen in 6 patients and 8 patients ultrasound abdomen revealed bilateral grade 2-3 parenchymal changes at the time of diagnosis. Mean stage of chronic kidney disease was stage 3.

**Conclusion:** In this cohort of Alport's syndrome males presented predominantly. Microscopic hematuria, proteinuria, hypertension, ocular signs and deafness were major presenting signs and symptoms. This descriptive study enumerates the classical symptoms, signs and laboratory features of the rare disorder Alport's syndrome in a large cohort.

**Keywords:** Alport's syndrome, Hematuria, Hypertension, Lenticonus, Retinitis pigmentosa, Sensorineural hearing loss

## Introduction:

Alport's syndrome is a rare, hereditary disease. It is a severe, progressive, non-immune form of nephritis<sup>1</sup> and it is characterised by progressive kidney dysfunction, sensorineural hearing loss and ocular manifestations.<sup>2,3</sup> The prevalence of this disease is 1 in 50,000 and its incidence rate is higher among males than females.<sup>4</sup> The prognosis is worse in males as compared to females and most males die due to progressive renal damage during the third decade of their life.<sup>5</sup> Defect in the collage type IV

chains of the basement membrane causes the disease. Most of the cases are X-linked (80%-85%) resulting from mutations in the gene coding for the alpha-5 chain of collagen type IV (gene COLA45) whereas autosomal recessive (10%-15%) cases result from mutations of genes coding for alpha-3 or alpha-4 chain of collagen type IV (genes COL4A3 or COL4A4) and autosomal dominant (5%) from mutation of alpha-3 or alpha-4 chain of collagen type IV (genes COL4A3 or COL4A4).<sup>6</sup>

## Materials and Methods:

The ethical committee of the institution at which the study was carried out approved the study. A retrospective review of case records of patients diagnosed to have Alport's syndrome who came at Kasturba hospital, Manipal in between the time period of January 2000 to December 2010 was done to look at the clinical profile of family history. The diagnosis of Alport's syndrome was made according to criteria proposed by Gubler and colleagues<sup>7</sup> – which include hematuria with or without proteinuria, hypertension and chronic kidney disease with the following characteristics: established kidney disease which progresses to kidney failure in at least one relative, visual impairment and sensorineural hearing loss in the patients or their kinsmen. All underwent ophthalmologic and otologic evaluations including audiometry and relevant laboratory investigations such as urine analysis for proteins, urine microscopy, blood urea, serum creatinine and ultrasound of the abdomen. Chronic kidney disease staging was done as per standard criteria.

## Results:

There were 18 patients with Alport's syndrome of which 14 were males and 4 were females. The male to female ratio was 3.5:1. The mean age of the patient at the time of diagnosis was 19 years. Seven patients (38.8%) had positive family history of kidney disease.

### Presenting complaints [Table 1]

Seven patients (38.8%) presented with deafness, seven patients (38.8%) with abnormal vision and four patients (22.2%) with gross hematuria. Two patients (11.1%) presented with facial puffiness, two patients abdominal pain and pedal oedema. Five patients (27.7%) gave a positive history of progressive dyspnoea and fatigue were present in four (22.2%).

### Ophthalmologic findings [Table 2]

Thirteen (72.2%) patients had ocular signs. Four patients (22.2%) had anterior lenticonus, three (16.6%) patients had posterior lenticonus, two patients (11.1%) presented with both anterior and posterior lenticonus, two (11.1%) patients presented with Retinitis pigmentosa and two patients (11.1%) with idiopathic vision defect.

### Otologic Evaluation:

All cases presented with sensorineural hearing loss which was bilateral and progressive in nature.

### Other investigations:

All cases had microscopic hematuria at presentation with four (22.2%) patients also giving a history of gross hematuria. Sixteen patients (88.8%) were anemic(1) with mean Hemoglobin of 6 gm/dl. Proteinuria was present in all the patients which was progressive with a mean value of 2000 mg per 24 hour urine sample [Table 3].

Five patients (27.7%) presented with a history of hypertension. Echocardiogram of six (33.3%) patients revealed left ventricular hypertrophy. Ultrasonography revealed grade 2-3 parenchymal changes of kidneys in eight (44.4%), eight (44.4%) patients with grade 1 parenchymal changes and two (11.1%) showed normal kidneys at the time of diagnosis. Renal failure was seen in six (33.3%) and mean stage of chronic kidney disease was stage 3.

## Discussion:

The study describes a cohort of 18 patients of Alport's syndrome with male predominance. Microscopic hematuria, proteinuria, hypertension, ocular signs and deafness were major presenting signs and symptoms. Ocular signs included anterior lenticonus, posterior lenticonus and Retinitis Pigmentosa.



**Table 1: Presenting complaints**

<b>Presenting Complaint</b>	<b>No. Of patients</b>	<b>Percentage</b>
Gross haematuria	4	22.2%
Facial puffiness	2	11.1%
Dyspnoea	5	27.7%
Deafness	7	38.8%
Abnormal vision	7	38.8%
Abdominal pain	2	11.1%
Fatigue	4	22.2%
Pedal edema	2	11.1%

**Table 2: Ophthalmologic findings**

<b>Clinical findings</b>	<b>No. Of patients</b>	<b>Percentage</b>
Retinitis Pigmentosa	2	11.1%
Anterior lenticonus	4	22.2%
Posterior lenticonus	3	16.6%
Anterior and posterior lenticonus	2	11.1%
Idiopathic vision defect	2	11.1%

**Table 3: Amount of Proteinuria**

<b>Amount of proteinuria</b>	<b>No. Of patients</b>	<b>Percentage</b>
1+	6	33.3%
2+	5	27.7%
3+	2	11.1%
4+	5	27.2%

**Conclusion:**

This descriptive study enumerates the classical symptoms, signs and laboratory features of the rare disorder Alport's syndrome in a large cohort. The need for checking for ocular and otologic signs of Alport's syndrome in all children with hematuria is emphasised. This study looks at the systemic manifestations and speaks of their significance and how they can be used and developed as a diagnostic tool, or to develop a high index of suspicion in ambiguous cases, as well as to be used as an early screening tool in people who have had a family history of Alport's Syndrome, so that treatment can be started as early as required to delay the onset and prevent the progression to an overt and serious stage of the disease for as long as possible. Lack of genetic analysis and the retrospective nature of the study are limitations.

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# Effect of Non-Surgical Therapy on W.B.C. Count in Generalised Chronic Periodontitis Patients

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## Abstract

**Background:** Periodontitis is one of the most common diseases in humans. Since the local inflammatory and infectious nature of periodontitis is well known, many studies have focused on the interaction between the pathogenic bacteria and the host response. Even the importance of leukocytes in leukocyte formula point to the presence of infection and inflammation, which can be the risk factors for systemic conditions and diseases. The importance of leukocytes and their count in different levels of periodontitis severity have not yet been investigated. Thus, the aim of the present study is to investigate and compare the W.B.C. count in patients of generalised chronic periodontitis pre and post non surgical treatment.

**Method:** 20 patients were selected for the study with generalised chronic periodontitis, all with no systemic diseases and had not undergone any periodontal therapy 6 months prior to study. Pre and post nonsurgical periodontal therapy W.B.C. count estimation was done.

**Results:** In all 20 patients, W.B.C. count decreased after treatment. Pre therapy mean of W.B.C. count was 8889 cells/mm<sup>3</sup> and post therapy mean was 6765 cells/mm<sup>3</sup>. P-value was 8.86 whereas table value was  $p > 2.09$ .

**Keywords:** Chronic periodontitis, Inflammation, Leukocytes, Non surgical therapy, W.B.C. count.

## Introduction:

Periodontitis is one of the most common disease in humans.<sup>1</sup> It is a chronic infectious condition of the supporting tissues of teeth.<sup>2</sup> Bacteria with varying pathogenicity have been identified and correlated with various forms of periodontitis.<sup>3</sup> It has been shown that periodontal bacteria or their products can directly invade the periodontal tissues, through the ulcerated pocket epithelium around the teeth and gain access to the systemic circulation.<sup>4</sup> Since the local inflammatory and infectious nature of periodontitis is well known, many studies have focused on the interaction between the pathogenic bacteria and the host response.<sup>3</sup> For thousands of years, blood has been regarded as an ultimate body fluid that could indicate disease process. In the past

decade, there has been a renewed interest in the ways in which periodontitis may affect changes in cellular and molecular components of peripheral blood.<sup>5</sup> It is currently unknown whether periodontal disease affects haematological variables.<sup>3</sup>

Few studies have analysed haematological variables in periodontitis patients and the results were contradictory.<sup>3</sup> Even the importance of W.B.C. in leukocyte formula (Differential white blood cell count) points towards the presence of infection and inflammation, which can be the risk factors for systemic conditions and diseases. The importance of W.B.C. and their count in different levels of periodontitis severity have not been investigated yet.<sup>6</sup> W.B.C. has also been associated with atherosclerosis in a number of epidemiological

studies and is considered to be a risk factor for the disease<sup>7</sup> and none of the studies dealt with the post therapy effect of W.B.C. count after non-surgical therapy in patients of generalised chronic periodontitis.

Thus, the aim of the present study is to investigate and compare the W.B.C. count in patients of generalised chronic periodontitis before and after non surgical treatment.

## Materials and Methods:

### Source of Data:

All patients visiting the outpatient department of Department of Periodontics & Implantology, Rama Dental College, Hospital & Research Center, Lakhanpur, Kanpur, Uttar Pradesh, India were screened and 20 patients were selected for the study.

### Inclusion criteria:

- Age 30-55 years.<sup>8</sup>
- Both males and females.<sup>2</sup>
- Pocket depth more than or equal to 4 mm in atleast 30% of sites.<sup>8</sup>
- No periodontal therapy for the last 6 months prior to study.<sup>8</sup>

### Exclusion criteria:

- Patient with systemic disease.<sup>1, 2, 3, 6</sup>
- Pregnancy and lactation.<sup>2, 3, 1.</sup>
- Smokers.<sup>2</sup>
- Recent extraction and tooth trauma.<sup>1</sup>
- Immunological disorders.<sup>2</sup>

### Clinical parameters:

The following indices were recorded using UNC-15 probe.<sup>2</sup>

- Gingival index (Loe and Sillness, 1963).
- Plaque Index (Sillness & Loe, 1964).
- Bleeding on probing.
- Probing pocket depth.
- Clinical attachment level.

### Study Design:

The clinical study protocol consisted of full mouth supra and sub-gingival scaling and root planing, if required. Oral hygiene instructions were also given. After taking informed consent from the patient, blood sample was taken and sent for W.B.C.

count estimation. Estimation was done using semi-automatic analyzer (NEXZEN, Span diagnostics). Scaling of patient was done using ultrasonic scaler (EMS, mini piezon) and root planing was done using Gracey curettes (Hu-friedy, China). Patient was recalled after 14 days. W.B.C. count estimation was again done and compared with pre therapy counts.

### Blood sampling:

Venous blood samples were drawn from antecubital vein by venipuncture using a standard 2-ml syringe from each subject and sent for haematological analysis. The blood samples were taken at baseline and then again 14 days after treatment. The blood samples were analysed using semi-automatic analyzer.

### Statistical Analysis:



Comparison between baseline and post therapy W.B.C counts was made on individual subjects and then computed across the subjects. Parametric method was utilized for statistical analysis

.W.B.C. counts were compared using Paired 't' test.

### Results:

Results show that in all 20 patients W.B.C. count decreased after treatment. Level of significance was found to be 5% i.e.; out of 20 patients 95% shows statistically significant decrease in W.B.C. count post therapy while in rest 5% there was no significant decrease in W.B.C. count after therapy. Pre therapy mean of WBC count was 8889 cells/mm<sup>3</sup> and post therapy mean was 6765 cells/mm<sup>3</sup>. P-value was 8.86 whereas table value was  $p > 2.09$ . Mean values of gingival and plaque score pre and post therapy are shown in table below.



Mean values	Pre therapy	Post therapy
Gingival index score	2.3	0.4
Plaque index score	1.5	0.38
W.B.C. count	8889 cells/cm <sup>3</sup>	6765 cells/mm <sup>3</sup>

## Discussion:

Epidemiological studies suggest that periodontitis is associated with an increased risk of systemic diseases like cardiovascular diseases, cerebrovascular ischemia, and atherosclerosis. Pre-term low birth weight of infants has also been associated with destructive periodontal diseases.<sup>9</sup> These associations indicate that periodontitis has systemic effects and most likely signs of systemic inflammation may be present.<sup>1</sup>

Any infection in the body leads to increase in W.B.C. count.<sup>10</sup> In this study, infections related to systemic disease were excluded. Even among oral infections all other infections, were excluded except generalised chronic periodontitis. Patients were subjected to scaling and root planing, if required. W.B.C. count were evaluated after 14 days of the non surgical therapy and compared with the W.B.C. count at baseline as the average life span of leukocytes is 14 days.

Also, gingival index and plaque indices were repeated post therapy which shows reduction in plaque scores and gingival scores as the patient started maintaining oral hygiene after oral hygiene instructions and inflammation got subsided after non surgical therapy.

Result showed that there is marked decrease in W.B.C. count after non surgical therapy. Patients with raised W.B.C. count came within normal range after treatment. The patients with W.B.C. count with higher level of normal range came to lower level of normal range of W.B.C. count.

Activation of the immune system and inflammation may be detected by an increase in a number of markers, including white blood cell count and to date, there is some evidence from prospective studies in Pima Indians and other populations to support the hypothesis that altered markers of inflammation, such as a high W.B.C., plasma fibrinogen, PAI-1, gamma globulin, and lower albumin concentrations are associated with the later development of type 2 diabetes.<sup>11</sup>

In an inflamed periodontal tissue, the cellular and molecular mechanism are interconnected, so that such interactions and consequences are not restricted to periodontal tissue only, they also cause systemic effects.<sup>12</sup> Thus increase in W.B.C. count could be cause for cardiac problem, Type 2 diabetes and atherosclerosis. By reducing the W.B.C. count, the risk for these diseases can be reduced.

In his review paper Loos (2005) presents current knowledge on the levels of selected markers of inflammation in periodontitis. The changes in blood parameters in periodontitis are modest and often do not exceed the normal reference values. However, analogous to other infectious inflammatory diseases, it is conceivable that the chronically, slightly elevated, or depressed systemic markers (e.g., haemoglobin) in blood exacerbate other ongoing inflammatory processes in other organ systems and this way perhaps increase the risk for atherosclerosis, leading to cardiovascular and cerebro-vascular events.<sup>5</sup>

Thus, the hypothesis was drawn that the periodontal infection could be the cause of increase in W.B.C. count in systemically healthy patients. After alleviating the periodontal infection, decrease in W.B.C. count is seen. So, the patients chosen were systemically healthy with no other foci of infection other than generalised chronic periodontal disease. After alleviating the periodontal infection, decrease in W.B.C. count is seen.

## Conclusion:

In conclusion, the present study shows a positive correlation of severity of periodontitis along with increase in the W.B.C. count. The W.B.C. count decreased after non surgical treatment of generalised chronic periodontitis. As increase in W.B.C. count can act as risk factor for many systemic diseases, so to avoid the risk of systemic disease, non surgical therapy should be advocated.

## Acknowledgement:

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# A Review of Current Practices for Management of Rotavirus Infection in Children Under - 5 Years in Ghana

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## Abstract

Rotavirus causes significant morbidity and mortality in children less than five years. Various strategies have been explored in the control and prevention of rotavirus acute gastroenteritis. The main stay of prevention is vaccination. This review seeks to compare environmental sanitation (as a single entity) with vaccination against rotavirus. Google scholar, PUBMED and Cochrane library were used to gather articles used for this review. Vaccination showed to significantly reduce mortality, morbidity and transmission rates of rotavirus. Vaccination should however be integrated into pre-existing protocols for managing diarrheal diseases in children.

**Keywords:** Vaccination, Rotavirus, Acute Diarrhea Disease

## Introduction:

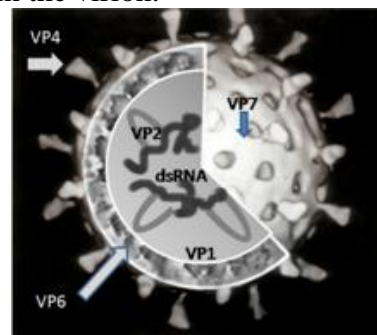
Human Rotavirus is one of the most common causes of acute gastroenteritis (AGE) among infants and children. It is a genus of double-stranded RNA virus in the family Reoviridae. It was discovered in 1973 and accounts for the death of nearly 450,000 infants and children most occurring in developing countries.<sup>1</sup> Nearly every child in the world has been infected with rotavirus at least once by age five.<sup>2</sup> The virus is transmitted through the fecal-oral route. There are seven species of this virus referred to as A,B,C,D,E,F and G with Rotavirus A being the most common specie also identified as a major cause of dehydrating gastroenteritis in infants and young children.<sup>1,2</sup>

AGE is still a major cause of morbidity and mortality in children less than 5 years in sub-Saharan African (including Ghana) and half the children presenting with AGE have shown positive cultures for rotavirus with mortalities as high as 23-43%.<sup>3,4</sup> The extended programme on immunization was initiated in Ghana in 1978 to cover six antigens. In 1992 and 2002 yellow fever and the pentavalent

vaccines were introduced respectively. Rotavirus vaccine was introduced as a result of the increasing mortality and morbidity associated with AGE (alongside the pneumococcal vaccine) in 2012<sup>4</sup>. This review seeks to address the pathophysiology and pathogenesis of rotavirus gastroenteritis and the role of vaccination in prevention of the disease.

## Structure of the Rotavirus:

The virus is made up of structural and non-structural proteins. The non-structural proteins are thought to be related to RNA synthesis and packaging in the virion.



**Fig 1.1: The structure of Rotavirus**

The structural proteins are six and are briefly described below.

Viral protein (VP) 1 is an RNA polymerase enzyme, VP2 forms the core layer of the virion and binds the RNA genome. VP3 is part of the inner core of the virion and is an enzyme called guanylyltransferase. It is important for capping and post-translational modifications in the mRNA. VP4 is on the surface of the virion that protrudes as a spike (see fig 1.1 above) and it's important for the virus's virulence. VP6 forms the bulk of the capsid. It is highly antigenic and can be used to identify rotavirus species. This protein is used in laboratory tests for rotavirus A infections. VP7 is a glycoprotein that forms the outer surface of the virion. It has structural functions and determines the G-type of the strain. It is also involved in immunity to infection (along with VP4)

### **Pathogenesis of the Infection:**

Rotaviruses replicate mainly in the gut, and infect enterocytes of the villi of the small intestine, leading to structural and functional changes of the epithelium. The triple protein coats make them resistant to the acidic pH of the stomach and the digestive enzymes in the gut.

The virus enters cells by receptor mediated endocytosis and forms a vesicle known as an endosome. Proteins in the third layer (VP7 and the VP4 spike) disrupt the membrane of the endosome, creating a difference in the calcium concentration. This causes the breakdown of VP7 trimers into single protein subunits, leaving the VP2 and VP6 protein coats around the viral dsRNA, forming a double-layered particle (DLP). The eleven dsRNA strands remain within the protection of the two protein shells and the viral RNA-dependent RNA polymerase creates mRNA transcripts of the double-stranded viral genome. By remaining in the core, the viral RNA evades innate host immune responses called RNA interference that are triggered by the presence of double-stranded RNA.

During the infection, rotavirus produces mRNA for both protein biosynthesis and gene replication.

Most of the rotavirus proteins accumulate in viroplasm, where the RNA is replicated and the DLPs are assembled. Viroplasm is formed around the cell nucleus as early as two hours after virus infection, and consists of viral factories thought to be made by two viral nonstructural proteins: NSP5 and NSP2. Inhibition of NSP5 by RNA interference results in a sharp decrease in rotavirus replication. The DLPs migrate to the endoplasmic reticulum where they obtain their third, outer layer (formed by VP7 and VP4). The progeny viruses are released from the cell by lysis.<sup>5</sup>

### **Signs and Symptoms:**

Rotavirus gastroenteritis can range from mild to severe disease. It is usually characterized by early onset vomiting, watery diarrhea for four to eight days, and low-grade fever. It has an incubation period of about two days before symptoms appear. Dehydration occurs and is characterized by sunken eyes, increased skin recoil, impaired consciousness and circulatory shock. Dehydration is more common in rotavirus infection than in most of those caused by bacterial pathogens, and is the most common cause of death related to rotavirus infection. Rotavirus A infections can occur throughout life: the first usually produces symptoms, but subsequent infections are typically mild or asymptomatic. The most severe symptoms tend to occur in children six months to two years of age, the elderly, and those with compromised or absent immune system functions.

### **Diagnosis:**

Presumptive diagnosis is made in any child less than five years with acute diarrhea especially in low resource centers. However definitive diagnosis is made on stool examination by enzyme-linked immunoassay (ELISA) for Rotavirus A. Polymerase chain reaction (RT-PCR and G and P typing PCR), polyacrylamide gel electrophoresis and electron microscopy are used for research purposes.

### **Treatment:**



Treatment is based on severity of the presenting symptoms. Oral rehydration therapy (ORS) is administered based on the WHO protocol, after estimation of severity of dehydration<sup>7</sup>.

### Prevention:

Because improved sanitation does not decrease the prevalence of rotaviral disease, and the rate of hospitalizations remains high despite the use of oral rehydrating medicines, the primary public health intervention is vaccination.<sup>10</sup> The two vaccines against Rotavirus A infection that are both safe and effective in children include Rotarix by GlaxoSmithKline and RotaTeq by Merck. Both are taken orally and contain attenuated live virus.<sup>4</sup> In 2009, the immunization programmes.<sup>5</sup> The incidence and severity of rotavirus infections has declined significantly in countries that have acted on this recommendation.<sup>12</sup>

The Rotavirus vaccine was introduced in Ghana in 2012 when the morbidity and mortality rate for AGE became really high. The mortality rate however has reduced by 30% since the usage of the vaccines.<sup>4</sup> In Ghana the oral rotavirus vaccine is given twice; at six weeks and ten weeks, along with the pentavalent vaccine.

### Methodology:

Google scholar, Cochrane library and PUBMED databases were used to search for articles relating to rotavirus infection. These were critically analyzed and their suitability for this review determined

### Results:

From the databases, two strategies for controlling rotavirus infection were evaluated. These are improved sanitation and vaccination strategies.

### Discussion:

Sanitation has been previously described as key in the control of infectious disease especially diarrhea diseases<sup>12</sup>. However, recent researchers have shown that sanitation alone has not significantly improved the control of rotavirus diarrhea disease. This has been attributed to the fact that enteric viruses are more resistant to common water treatment processes than their coliform counterparts.<sup>2,13</sup>

Mortality and hospitalization from AGE has significantly decreased since the advent of rotavirus vaccines. This is in agreement with reports by other workers<sup>2-5</sup>. It also provides some form of immunity for non-vaccinated individual by herd immunity thereby reducing the burden of the infection<sup>12</sup>.

Despite the landmark achievements of the rotavirus vaccine, it was discovered to cause intussusception in children especially in those less than one year. Rotashield was subsequently withdrawn by the center for disease control in the United States<sup>14</sup>. In Ghana, rotarix is not given to children with previous history of intussusception, uncorrected congenital gut anomalies etc. It is however generally a safe vaccine<sup>3</sup>.

**Table 1.1: Comparison between Sanitation (Only) and Vaccination in the Management of Rotavirus Age.**

Parameter	Sanitation	Vaccination
Involvement	Hand-washing, environmental sanitation, exclusive breastfeeding,	Rotarix oral live vaccines given at 6 and 10 weeks after birth
Mortality	Higher	Lower
Morbidity	Higher	Lower
Severity of symptoms	More severe	Milder
Effect on transmission of diarrhea diseases	Stops transmission of bacteria and parasitic infections but not rotavirus infection	Adequately controls rotavirus infection
Complications and contra-indications	None	Hypersensitivity to vaccine, intussusception

**Conclusion:**

Rotavirus infection and its attendant effects can be reduced by comprehensive, preventive strategies which includes vaccination alongside other modalities like breastfeeding, oral rehydration therapy, zinc treatment, environmental and water sanitation.

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# How We Got from There to Here and Back

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## Abstract

Edward H. Angle dominated orthodontic armamentarium, diagnosis and treatment planning for almost a half century until Charles Tweed successfully challenged his mentor's nonextraction mantra. The ensuing diagnostic regimen used by Tweed, however, proved to have serious limitations and clearly resulted in the extraction of too many teeth. This caused a subsequent deterioration of soft tissue appearances of patients that neither they nor their doctors liked. This article will describe and illustrate how new expansion techniques differ qualitatively from those of Angle, and how these techniques offer patients and doctors less invasive and more comfortable therapies which do not jeopardize facial appearances.

## Introduction:

For the first third of this past century, orthodontics found itself dominated by one man, Edward H. Angle, with the resultant intellectual stagnation that arises from such monomaniacal control. This recognition in no way detracts from Angle's contributions – notably his clear and simple classification system along with the edgewise bracket. Both of these inventions have endured for a century, and that is no mean achievement in any scientific discipline. Nevertheless, orthodontists' unquestioning acceptance of his limited diagnostic and treatment planning regimens hindered the advancement of this discipline more than it helped, and the last half of this past century was spent trying to overcome the stupor of the first half.

Angle's influence continued until an apostate student of his, Charles H. Tweed,<sup>1</sup> had enough courage and objectivity to challenge Angle's non-extraction scheme. It wasn't a tremendous leap of intellectual power. Tweed simply and honestly recognized that when 100% of your patients relapsed, there might be something wrong with the diagnosis and/or treatment planning.

Dr. Tweed acted appropriately in the face of this challenge - quite unlike the ancient dentist who chided a young colleague who was describing his

meticulous technique of endodontic filling to the monthly assembly of dentists. The old man explained his own technique that used a simple matchstick sharpened with a pocketknife and then jammed into the canal. When the young dentist asked if a lot of these root canal fillings didn't subsequently fail, the older man replied, "Every damn time!"

Dr. Tweed tired of those orthodontic abscesses and, unlike his peers, sought to correct the deficiencies he saw in Angle's philosophy. Some would say that he overcorrected, but that said, we must pay homage to anyone who has the skill and temerity to successfully challenge a mentor and his minions. Tweed's success brings to mind the remark of C.S. Lewis, who said, "No genius is so fortunate as he who has the skill and ability to do well that which others have been doing poorly."

Nevertheless, I don't think that Tweed would have ever been able to deliver his paper describing his extraction technique had Dr. Angle still been alive. Angles influence over the society that bore his name was too immense to permit such hubris from a young upstart. But as Samuelson, the MIT economist, once noted: "Science progresses slowly – funeral by funeral." And so it was and is in orthodontics.



## Non-extraction Philosophy

Aside from the edgewise bracket and the classification system, Angle's most enduring legacy has been his belief in non-extraction therapy. Angle had unsuccessfully experimented with premolar extractions while using his ribbon arch appliance, but he never solved the problem of paralleling the roots to prevent the extraction spaces from opening. If he couldn't do it, then, ergo, no one else could, and this resulted in a virulent opposition to any extractions and an insistence upon enlarging the arches to accommodate all of the teeth.

This dogma stayed dominant for several decades until Tweed advocated the extraction of premolars based on his diagnostic triangle, which was the first systematic treatment planning stratagem orthodontists had. Tweed received corroboration simultaneously from another former Angle protégé in Australia, Raymond Begg,<sup>2</sup> who had studied aborigines and concluded that nature intended for enamel to wear. He decided that orthodontists could mimic nature by extracting teeth prior to orthodontic therapy. The Tweed and Begg Extraction Philosophies eventually prevailed and remained uncontested for some time.

Several years past before Holdaway<sup>3,4</sup> published his articles that suggested the soft tissue as the determining feature of diagnosis. This disputed Tweed's narrow diagnostic regimen that focused on the mandibular incisor and totally neglected the soft tissue. Tweed's triangle set in motion a trend that emphasized more prudence in the extraction of teeth. Soon others added their discoveries regarding soft tissue and the maxillary incisors as main determinants of diagnosis and treatment planning.<sup>5,6</sup> From the inception of this specialty, with Dr. Angle, diagnosis never had too much importance because everyone received the same non-extraction treatment with the same expansive appliance. The marvel of it all is that the collection of orthodontic records never became important. A few months ago an orthodontist boasted that since invoking a different treatment regimen, he was treating 98% of his patient's non-extraction. One was tempted to ask if

he still took records because with diagnostic certainty such as that, records are clearly redundant. Orthodontists shouldn't waste patients' time and money taking impressions, cephalometric X-rays or doing treatment simulations if all treatment plans are essentially the same. One doesn't need orthodontic records to come to such a preconceived conclusion.

Obviously, this one-size-fits-all treatment planning didn't benefit patients a hundred years ago, and it doesn't in our own age. But such simplicity continues to hold enormous appeal for many orthodontists. Orthodontists pride themselves in being scientists, and without doubt they receive good training in the scientific method; but it takes very little anecdotal information to eclipse the scientific judgment of many in the profession. Albert Szent-Györgyi was probably more right than he knew when he said, "The brain is not an organ of thinking but an organ of survival like a claw and fang. It is made in such a way as to make us accept as truth that which is only advantage."

No matter how spectacularly orthodontic therapy changes, it will benefit our patients minimally if we do not have a concomitant improvement in our diagnostic and prognostic knowledge. This remains the number one imperative for those who practice orthodontics. Orthodontists should view any new therapy unaccompanied by equally sophisticated diagnostic knowledge suspiciously. Patients have already received far too much orthodontic treatment and far too little diagnosis.

## Instrumentation

The first attempts to correct malocclusions used simple large arch wires ligated to the malposed teeth. Pierre Fauchard of France developed the precursor of the modern appliance – expansion arch (Figure 1).

This arrangement gave only tipping control, in one dimension, and soon proved inadequate for controlling rotations. In 1887 Edward H. Angle introduced the E arch, i.e. expansion arch that used a labial wire supported by clamp bands on the molar teeth which ligated to the other teeth (Figure 2)

Metallurgical developments by the early 20<sup>th</sup> Century allowed clinicians to encase all of the teeth

with bands and solder attachments that could control the horizontal rotations. Angle developed a popular attachment known as the pin and tube attachment in 1911 (Figure 3), and it satisfied many of the requirements of clinicians; but this demanded unusual dexterity, patience and skill, so dental clinicians evolved to a ribbon arch bracket (Figure 4), which Angle introduced in 1916. It provided good control in two dimensions and became popular quickly. The ribbon arch attachment also marked the first time orthodontic attachments gained the name bracket.<sup>8</sup>

When Angle launched the ribbon arch bracket, he had already started work on the edgewise bracket primarily as a supplement to his ribbon arch appliance. Nevertheless, the edgewise bracket did not suddenly spring full-grown from Angle's fertile mind, but slowly evolved with several iterations (Figure 5). When Angle realized that this bracket could deliver three-dimensional control of the teeth with horizontal, one directional placement and simultaneous engagement of all the teeth, he changed the bracket several times until he achieved the #447 (Figure 6) in 1928. It received early and enthusiastic endorsement from dental clinicians throughout the United States and eventually eclipsed other useful orthodontic appliances such as the McCoy open tube appliance, the Atkinson universal appliance and the Johnson twin wire attachment.

The universal application and durability of the edgewise bracket confirmed Angle's immodest claim that it offered the "latest and best in orthodontic mechanisms".<sup>9</sup> Innovators have added minor but practical trimmings such as rotating wings, twin brackets, different dimensions, preadjusted appliances, lingual applications, etc., but the essence has remained edgewise. For any instrument, particularly in the health sciences, to remain virtually unchanged (and almost as useful for close to a century) approaches unbelievability. In the automobile industry, this would be equivalent to the Model T Ford remaining as the epitome of motoring sophistication.

Other than adding wings and doubling the bracket to make the popular twin edgewise bracket,

Angle's invention has remained basically unchanged. Holdaway<sup>10</sup> suggested angulations for brackets to help set anchorage, parallel roots and artistically position teeth, while Lee<sup>11</sup> had built some anterior brackets with the ability to torque incisors. But it was Andrews that was to develop an appliance that would apply 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> order movements to the teeth without making changes in the wire – hence the Straight Wire Appliance.<sup>12</sup>

Preadjusted orthodontic appliances have dominated the profession for the past 30 years, and the belief in them shows little sign of abating even though many have questioned the one-size-fits-all idea.<sup>13-18</sup>

## And Back Again

The publication of Frankel's<sup>19</sup> work with functional appliances illustrated significant enlargement of dental arches and reawakened an interest in nonextraction therapy. Nevertheless, Frankel mechanics required the use of removable appliances, and that didn't resonate well with many orthodontists or their patients. After a brief flurry of interest in the United States, few clinicians continued to use the Frankel appliance on a regular basis.

Nevertheless, the successful use of orthopedic appliances alerted orthodontists to the possibility of increasing arch widths and arch perimeters with minimum forces. Although mandibular canines offer significant resistance to expansion, mandibular premolars and first molars often demonstrate substantial and stable expansion. Brader<sup>20</sup> hinted at this with his work on the tri-focal ellipse arch form, but he didn't follow through about how this might give wider and more accommodating arch forms.

Low-force titanium coil expanders have shown their ability to develop arches laterally,<sup>21</sup> and recently Damon<sup>22</sup> has suggested that low arch wire forces, coupled with a passive tube and a small wire-to-lumen ratio, enable teeth and their accompanying dentoalveoli to expand in all planes of space. Damon feels that using small, low-force wires such as those of Copper Ni-Ti™ (Ormco Corporation,

Orange, CA) achieves the ideal biological forces proposed long ago by several investigators.<sup>23,24,25</sup>

Self-ligating brackets that essentially form a tube developed several decades ago with the Ormco Edgelok<sup>26</sup> being the first, closely followed by the Speed bracket.<sup>27</sup> Both of these early self-ligating systems suffered from the fact that the Straight-Wire Appliance phenomenon debuted at the approximately the same time, plus a lack of appreciation for what the newer titanium wires could achieve.

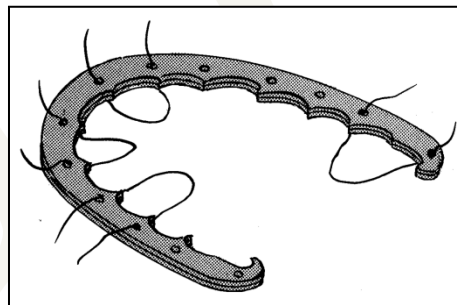
Damon has persisted since 1995 with his version of a self-ligating bracket (Figure 8) and has fundamentally changed the types of arch wires and the sequence in which clinicians use them. His experience has shown that with many patients he can often eliminate distalisation of molars, extractions (excluding those needed to reduce bimaxillary protrusions) and rapid palatal expansion. He offers compelling clinical evidence of doing this with consistency.<sup>22</sup>

The Damon bracket is essentially a tube designed with the right dimensions to foster sliding mechanics where needed and enough play in the system for torque and rotational control using the larger cross

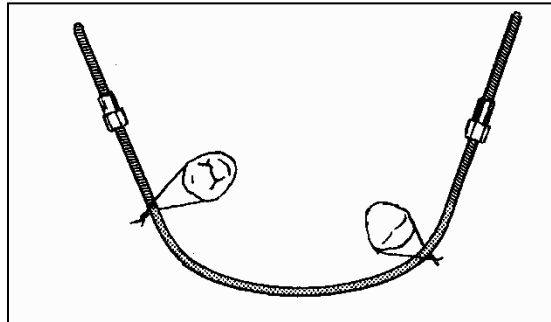
section wires. Damon starts cases with a large lumen arch wire slot and .014 or smaller diameter hi-technology arch wires. Starting cases with a large dimension passive arch wire slot and small diameter wires diminishes the divergence of the angles of the slots. This lowers the applied force and binding friction.(figure 7)

The most logical questions readers could propose would be why has Damon shown successful expansion whereas Angle did not? The quantity of expansion probably differs little, but the quality of expansion offers a quantum change. Mollenhauer<sup>28</sup> has suggested as much with his appeal for light forces. Even though Angle used a ribbon arch, (which suggests a thin, delicate wire) the actual size of the wire had the dimension of .036 x .022 inches. Ligating to this wire would overwhelm the periodontium and prevent the development of a supporting dentoalveolus. Rather than forming new bone, the supporting dentoalveolus would simply bend and upon completion of treatment quickly return. Astute clinicians often see this with molar distalization from headgear use and over treat such

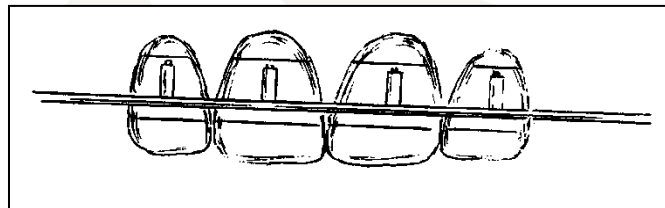
**Figure 1: Fauchard's Expansion Arch**



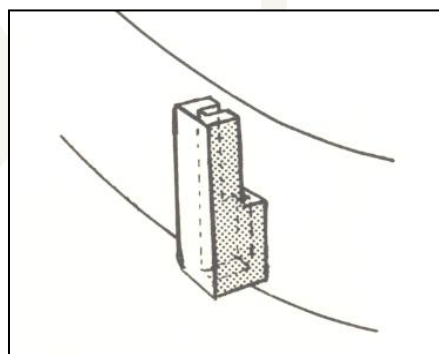
**Figure 2: Angle's E Arch**



**Figure 3: Pin and Tube Appliance**

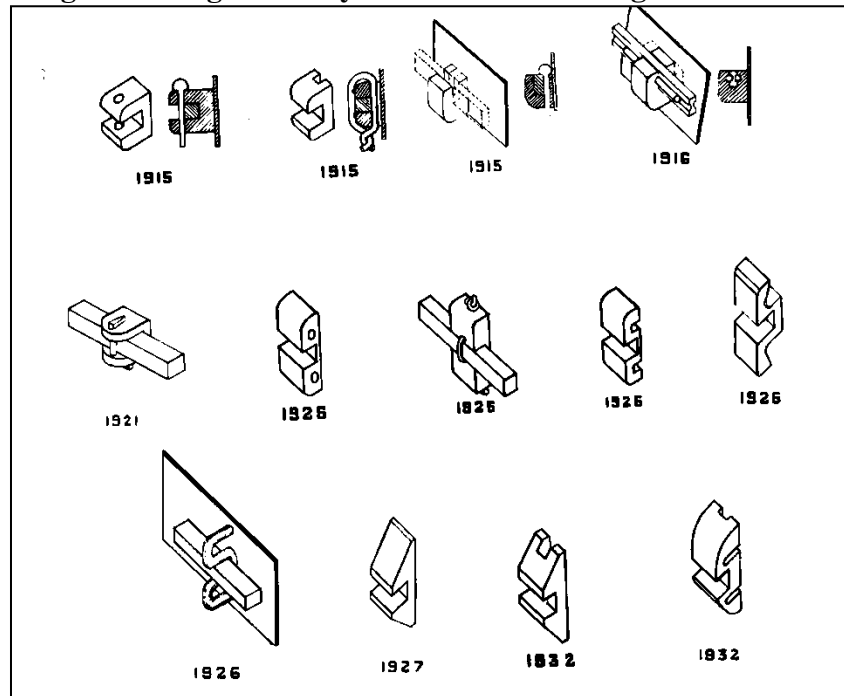


**Figure 4: Ribbon Arch**

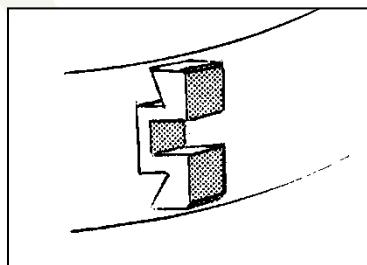




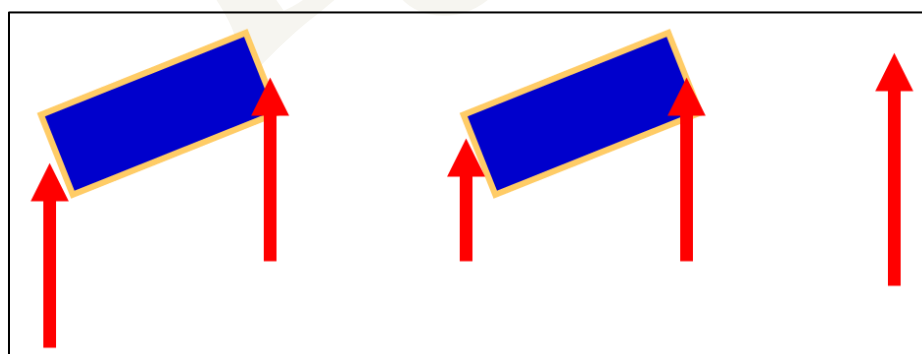
**Figure 5: Angle's Many Iterations of the Edgewise Bracket**

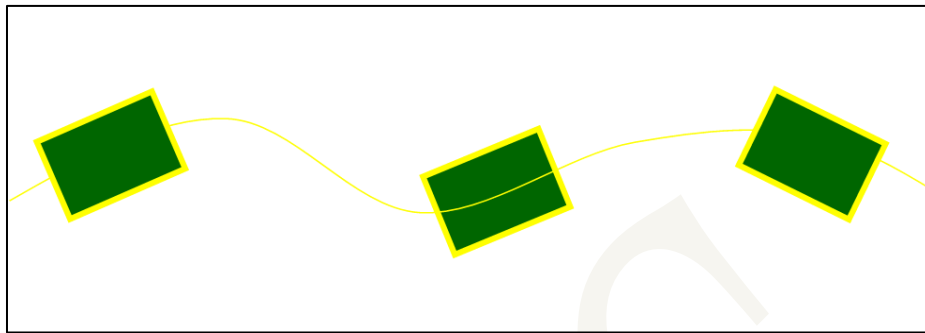
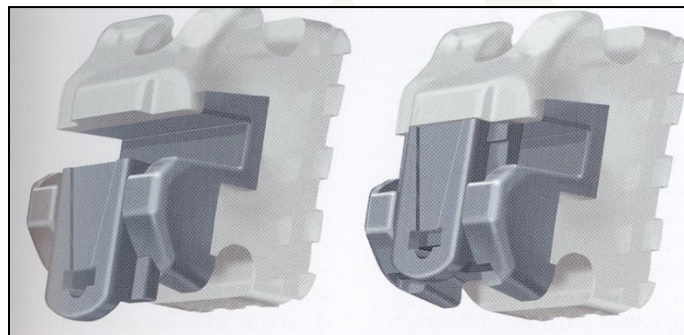


**Figure 6: Angle's 447 Edgewise Bracket, "The Latest and Best in Orthodontic Mechanisms."**



**Fig 7a: Binding**



**Fig 7b: Divergence****Figure 8: Damon 3 Bracket Opened and Closed**

movement in order to compensate for this regressive bone bending.

Schwartz<sup>25</sup> stated that it takes 20 to 26 g/cm<sup>2</sup> of force to collapse the capillaries in the Periodontal Ligament. With RPEs and headgears this force sometimes exceeds 10 pounds!

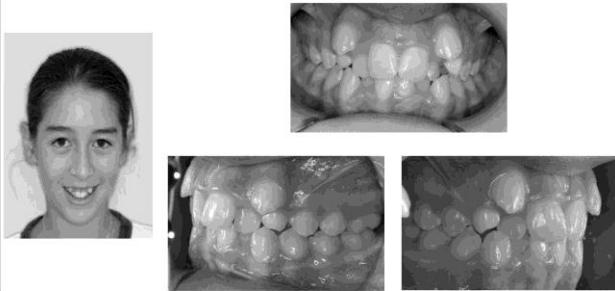
Proffit<sup>29</sup> states that that *optimal force levels* for orthodontic tooth movement should be just high enough to stimulate cellular activity without completely occluding blood vessels in the periodontal ligament.

True Biomechanics is staying in the Optimal Force Zone i.e. keeping forces below capillary blood pressure. Conventional ties (o-rings and stainless

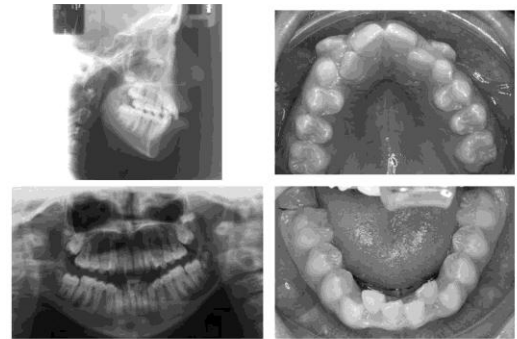
steel ligatures and spring clips) make staying in the Optimal Force Zone nearly impossible due to the increased *binding* and *friction*.

The most important caveat Damon offers clinicians is not to use their ordinary mechanics with his system, and I could not agree more. When I first began to use the Damon system, I continued to use the regular sequence of arch wires and saw little advantage to these new, more expensive brackets. Nevertheless, as I began to use the brackets according to Dr. Damon's advice, I started seeing phenomenal changes. The following patient illustrates typical responses to the biomechanics offered by the Damon System:

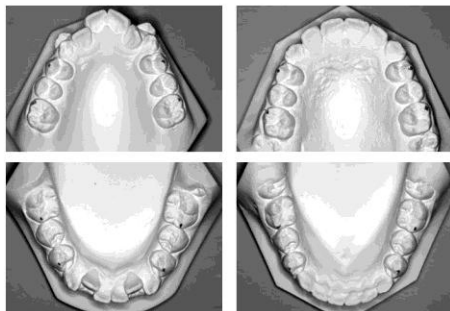
### Pre-treatment



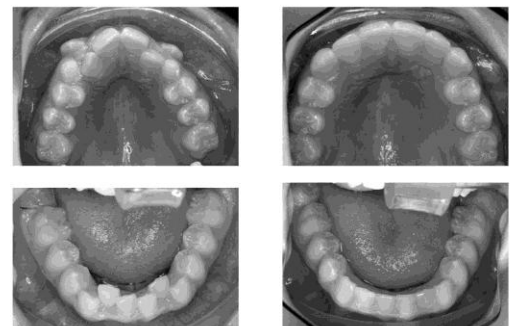
### Pre-treatment



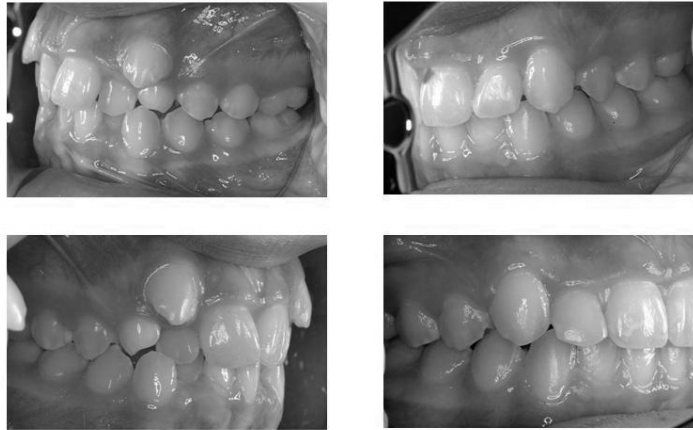
### Arch development



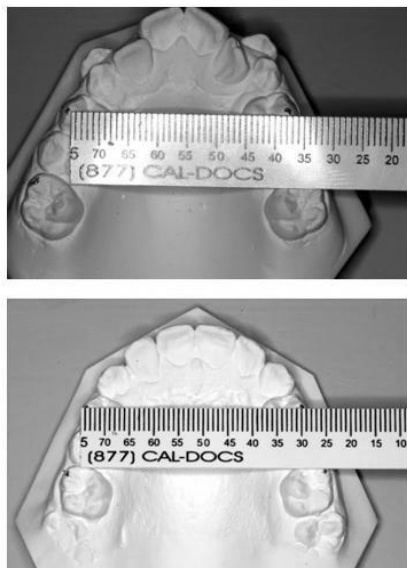
### 12 months



12 months

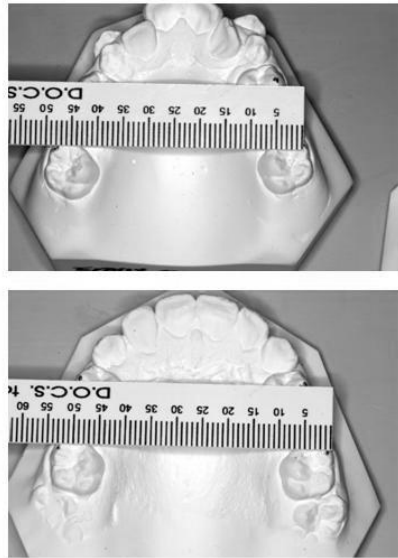


The maxillary posterior transverse arch adaptation resulted in an 8 mm change at the first premolars

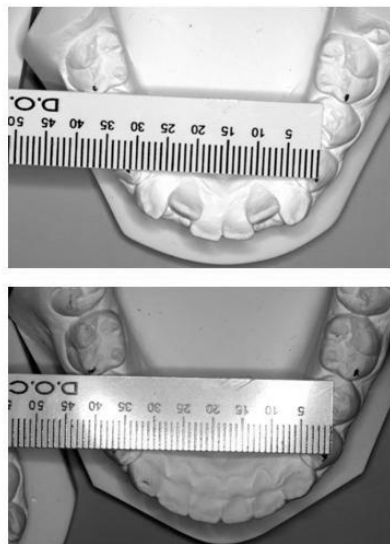




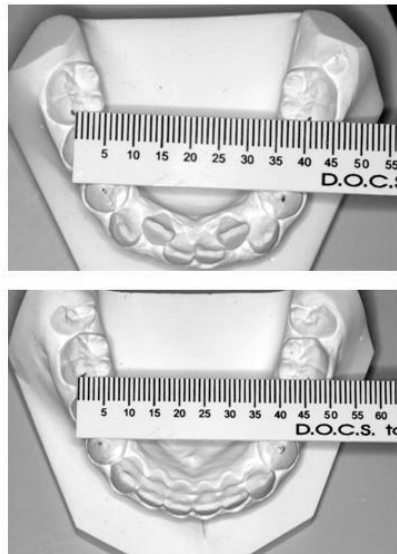
The maxillary posterior transverse arch adaptation resulted in a 7 mm change at the first molars



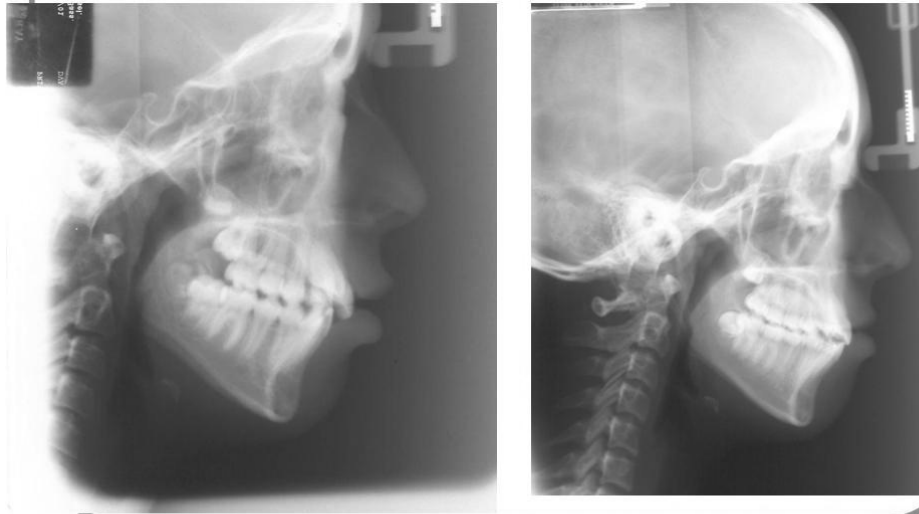
The mandibular posterior transverse arch adaptation resulted in a 6 mm change at the first premolars



The mandibular posterior transverse arch adaptation resulted in a 6 mm change at the first molars



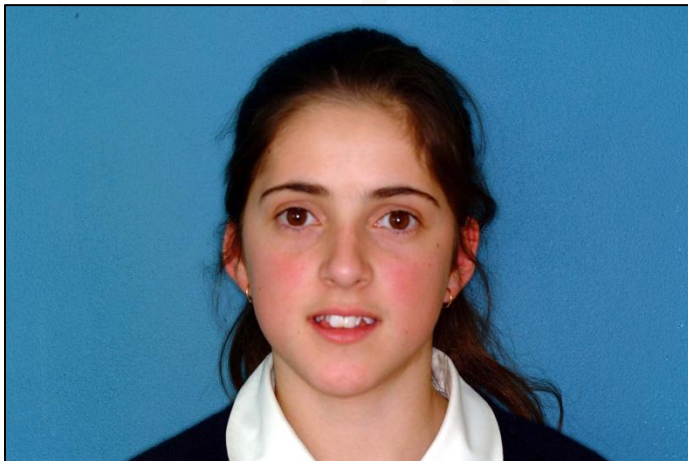
**Patient No. 1**



## CT Scans

Upper

Lower



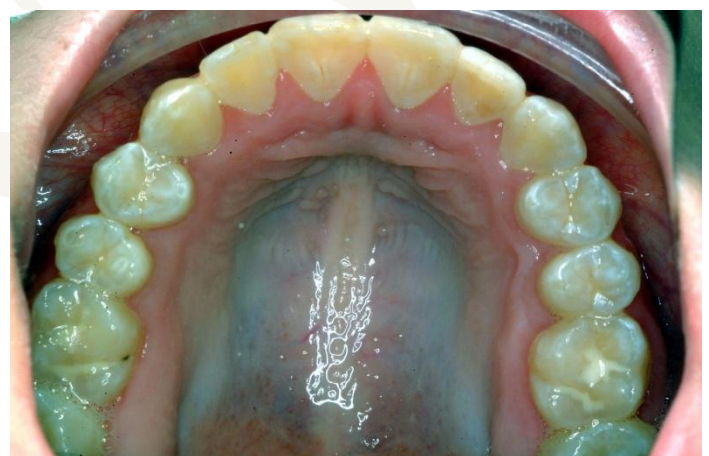
**Patient Before**



**Patient After**

**Patient No. 2**



**Patient: - Frontal Before****Patient: - Frontal After****Patient: - Upper Before****Patient: - Upper After**

## Conclusion:

The paradigm shift in our current thought processes is the belief that alveolar bone can be altered and re-shaped with low clinical forces. Using low force, low friction orthodontics, the alveolar bone allows the bodily movement of teeth in all directions.

The architecture of alveolar bone appears to improve over time following low force orthodontics so clinicians should be very creative on how to

maintain the appropriate biologic forces during all phases of treatment.

Orthodontists are currently witnessing an interest in qualitatively different expansive biomechanics that offer patients the possibility of obviating the use of distalizers, rapid palatal expanders and many needless extractions. The bracket systems that make this possible should command the utmost respect and clinicians should use them as recommended with light forces.

I am witnessing *shorter* treatment in most of my Damon cases with less *discomfort* to my patients.

The playing field seems to be leveled between adults and children. These changes I am seeing are more than enough reasons for me to question my previous force systems.

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# Sleep Patterns in Patients with Schizophrenia: A Review

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## Abstract

**Introduction:** Schizophrenia is a very debilitating chronic mental disorder which is characterized by positive symptoms, such as delusions and hallucinations, along with negative symptoms, established as social withdrawal and blunted affect

**Methods:** literature review using the pubmed database.

**Results:** The majority of studies showed the effect of schizophrenia on disturbing the circadian rhythm and also the sleep spindles, thus affecting the cognition of the patients.

**Conclusion:** Sleep disturbances in schizophrenia may be partially associated with the increased activity of the dopaminergic system in the brain, which leads to the possible role of using melatonin as a pharmacological treatment as it has been found to reduce to the dopamine activation in the brain.

**Keywords:** Sleep, Schizophrenia, Circadian Rhythm, Sleeps Spindles.

## Introduction:

Schizophrenia is a very debilitating chronic mental disorder which is characterized by positive symptoms, such as delusions and hallucinations, along with negative symptoms, established as social withdrawal and blunted affect. Although insomnia may be a common feature in patients with schizophrenia, it's rarely addressed as the main complaint. Many sleep studies in patients with schizophrenia have been inspired by the similarities between dream and hallucinations that were observed by clinical investigators. The first to ever look at sleep in patients with schizophrenia was a German psychiatrist "Emil Kraepelin" who studied dreams and "schizophasia", known as "word-salad" nowadays, in patients with schizophrenia.<sup>1</sup> Difficulties in initiating or maintaining sleep are commonly found in the patients, affecting 30-80% of them, depending on the degree of the psychotic symptomatology.<sup>2</sup> There has been a spat of reports in the past few years discussing the link between schizophrenia and sleep macroarchitectural abnormalities, including prolonged sleep onset, decreased total sleep time and short REM latency. Negative symptoms have been shown to decrease the delta wave counts in patients with schizophrenia. In

addition, some studies suggested that the circadian rhythm is also disrupted, either due to the clinical outcomes of the disease or the medications taken to treat the disease itself.<sup>3</sup>

Two aspects of sleep disturbances that have been focused at, with a proven effect on cognition, were reduced sleep spindles in the electroencephalogram, and disruption of the circadian rhythm which will be discussed in details below.

## Circadian rhythm<sup>3</sup>

There are many medical issues with relation to sleep pattern in schizophrenia, but the most clinically relevant and distressing problem is going to sleep while everyone else is awake. This is known as the circadian rhythm, which is more of a clock that regulates the sleep cycle in the body, and once this clock's battery burns out, the brain loses the ability to synchronize sleep with the environment. This mis-synchronization may be either attributed to the sedative effect of medications or the negative symptoms of the disease. The main influence that regulates this clock, which in turn regulates the sleep-wake cycle, is light. Patients with psychosis, including schizophrenia, may get very little light during the day as they tend to be socially withdrawn



and might keep their curtains closed since they perceive the sun light as a threat. This by itself may play a role in disrupting the sleep cycle in the brain and affect the signals that regulate the circadian rhythm.

Many studies aimed to investigate the sleep-wake cycle but failed due to the day-to day fluctuation of this event and the need for a long follow up trial to study the characteristic of such cycle. Two recent published papers in the British Journal of Psychiatry studied the sleep-wake cycle over 6 weeks, using actigraphy, which is a non-invasive method to measure the rest-activity cycles in patients with schizophrenia. In this study, there were 2 groups, the cases, who are the patients with schizophrenia, and the controls, who are healthy individuals. Both groups were asked to wear a wrist device, which measures the activity over days or weeks. Only little movement is registered during sleep, and more movement is recorded during the waking hours. The study showed that the cases had longer sleep hours than the controls during daytime, and 50% of them showed misalignment of sleep with the environmental night-time. The circadian non-synchronization was not related to the clinical state or dose of antipsychotics.

Similar findings were established in another study that looked at the frontal lobe function in the cases and controls, in which the participants who had a normal circadian rhythm performed better. This brings us to the possibility of the role of disrupted sleep in the impaired cognition of patients with schizophrenia.

These two papers, with their convincing objective evidence of abnormal circadian rhythm, and the additional finding of cognitive function being lower in people with more abnormal rhythms, may be enough to justify the use of targeted systematic chronotherapeutic treatments to aid rehabilitation following an acute episode of the illness.

### **Sleep architecture (sleep spindles) <sup>3</sup>**

Sleep architecture, sleep spindles and the electroencephalogram, have been left aside when

conducting research and haven't been studied thoroughly in schizophrenia like they have in depression. The main issue that lies here is that many of the antipsychotic medications used in the treatment of schizophrenia, often affect the neurophysiology of the brain, and in turn alters the sleep features. On the other hand, it is very difficult to conduct such studies in patients who aren't using any medications due to the distressing positive symptoms.

Sleep spindles were one of the first patterns that were identified in the human sleep, and can be easily recorded from the scalp over the whole night in light sleep, and decreased significantly in deep sleep and rapid eye movement sleep. Although the electroencephalogram of these spindles have been established since a long time, the link between them and learning and memory has only been established recently, mainly in Germany.

It has been established that the type and amount of these spindle is related to learning and the amount of learning is related to sleep, which in simple words may be transformed as the more sleep, the more learning and the more spindles appear on the EEG. There have been 3 published studies linking sleep spindles and cognition in schizophrenia in the past 3 years, which showed a decrease in the amplitude and duration of sleep spindles in 49 participants with schizophrenia on antipsychotic medications in comparison to 44 matched controls, and also 2 non-schizophrenia patients receiving antipsychotic medications. This showed fascinating results, in which a change in sleep parameters including sleep spindles and slow wave was documented with taking anti-psychotic medications even in normal participants. However the reduction in sleep spindles were only found in patients with schizophrenia and thus couldn't be explained by the use of antipsychotics.

Another study done by Keshavan et al showed that a group of 27 untreated patients, who were newly diagnosed, had decreased spindles which was associated with a lower performance on frontal cognitive tasks. It was previously reported that patients with schizophrenia, when compared to

controls, did not show the normal improvements in a motor task (a finger-tapping sequence) after a night's sleep. This showed that the lower the spindles number and density, the smaller the improvements that were found in the task. These studies revealed a dependable neurobiological marker in schizophrenia that showed an interrupted thalamocortical activity, which could be used as a treatment target in the future.

### **Melatonin.....a possible therapeutic agent in Schizophrenia?**<sup>3</sup>

Several studies have shown the beneficial effect of melatonin on the initiation and maintenance of sleep. It has been recommended by the British Association of Psychopharmacology as the evidence based treatment for insomnia, parasomnia and circadian rhythm sleep disorders.

Interesting results have been concluded from several studies which showed the effect of melatonin on alternating the dopamine receptor activation. A randomized double blinded controlled trial measuring the urinary melatonin output in patients with chronic schizophrenia, and assessing the effect of melatonin on their sleep quality showed that giving 2mg melatonin increased the efficiency of sleep and decrease the cognitive impairment. This hides interesting future era for melatonin agonist research and their potential use in schizophrenia.

### **Antipsychotic drugs and their effect on sleep architecture and circadian rhythm?**<sup>4</sup>

Antipsychotic medications have a role on the patients sleep patterns. First and second generation antipsychotics, with the exception of risperidone, are involved with an increase in total sleep time. The increase in slow waves varies among those 2 groups, with a documented increase upon the use of olanzapine and a decrease when using clozapine. Patients treated with clozapine had significantly high rest-activity cycles, whereas patients on classical antipsychotics such as haloperidol or flupentixol had minor to major circadian rhythm abnormalities.

### **Conclusion:**

In conclusion, initiation and maintenance of sleep is a major issue in patients with schizophrenia regardless of their medication or the phase of disease they're at. The majority of studies showed the effect of schizophrenia on disturbing the circadian rhythm and also the sleep spindles, thus affecting the cognition of the patients. Sleep disturbances in schizophrenia may be partially associated with the increased activity of the dopaminergic system in the brain, which leads to the possible role of using melatonin as a pharmacological treatment as it has been found to reduce to the dopamine activation in the brain.<sup>5</sup> It may be also possible that cognitive improvement in people with schizophrenia depends on improving sleep parameters.

### **Acknowledgment**

Many thanks should be given to the staff at the Psychiatry Hospital for their help and cooperation.

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# Periodontal Maintenance Program in Orthodontic Patients

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## Abstract

Periodontal problems are commonly seen during and post orthodontic treatment. A proper interdisciplinary treatment plan along with periodontal maintenance has led to successful orthodontic treatment in even periodontally compromised patients. Every patient should be educated and positively motivated not only to avoid occurrence of periodontal problems but to create awareness and help in achieving a healthy periodontium. This article presents an overview on few common maintenance aids towards promotion of oral health in orthodontically treated patients.

**Keywords:** Periodontium, Interproximal, Decalcification

## Introduction:

In today's aesthetic world patients seeking orthodontic treatment is considerably increasing. Outcome of the success of treatment largely depends on the periodontal status of patients. Fixed orthodontic appliances increase the risk of plaque accumulation posing a potential damage to teeth, gingiva and alveolar bone. Periodontal maintenance should be carried out before, during and after orthodontic treatment. This article presents an overview on proper inter-disciplinary approach and positive reinforcement with the patients aiming for maintenance of the health of the periodontium in orthodontically treated patients.

## Periodontal Tissues in Orthodontic Treatment:

Fixed orthodontic appliances would make brushing procedure difficult hence inability to completely remove plaque initiates the potential to cause gingivitis and progress to periodontitis during tipping and extrusive movements [Figure 1]. The gingival pocket deepens and results in development of pseudo pockets [Figure 2]. This pseudo pockets

provides an opportunity for colonization to subgingival bacteria leading to periodontal breakdown.<sup>1, 2</sup> This periodontal destruction overtime undergoes some degree of degeneration in PDL. Force applied on such teeth can result in more periodontal breakdown and regeneration of periodontal ligament tissues with periodontal inflammation present are defenseless to bacterial infection.<sup>3, 4</sup>

Removable appliances have however not been shown to cause such periodontal liability because of ease of cleansing with the appliances.<sup>5</sup> Trauma from occlusion, one of the major factors causing periodontal problems should be relieved to avoid any further progress of the disease. These gingival problems and periodontal breakdown once occurred may present themselves in extension or increments.

However, if effective preventive measures are taken by the operator and patients during treatment, no clinically significant damage to the periodontium will occur.<sup>6, 7</sup>

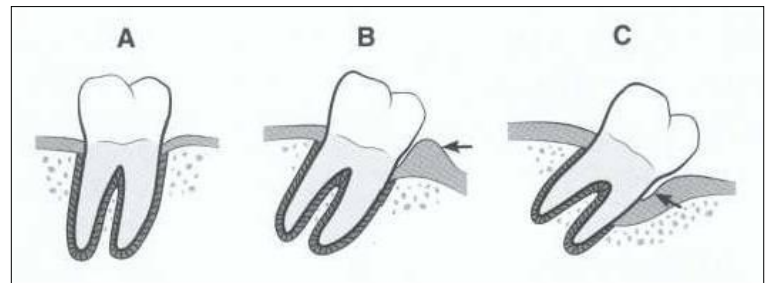




**Figure 1: Gingivitis Due to Crowding**

### Treatment Program:

Every patient should be properly screened and after initial diagnosis, referral for treatment to control active periodontal disease and caries should be done. Patients should be explained about the treatment, their responsibilities and risk during orthodontic treatment. Proper instructions and positive reinforcement about management of new oral environment and its maintenance must be emphasized. Provide the patients with initial brushing and flossing instructions with either a conventional or powered tooth brush. A fluoride tooth paste and chlorhexidine mouthwash for antigingivitis and anti plaque effect should be advised. Regular appointments scheduled increase the patient's compliance towards treatment. Additional methods to improve oral hygiene such as flossing should be introduced. Patient's routine dental appointments and periodontal status information chart will help in knowing the progress of periodontal disease and explaining the importance of its maintenance. A poor compliant patient needs more professional time explaining the ill effects of poor oral hygiene. Before start of orthodontic treatment, patients should undergo supragingival and subgingival scaling, and root planning if necessary.<sup>8</sup>



**Figure 2: Formation of pseudo pockets**

A) Upright molar in normal position.

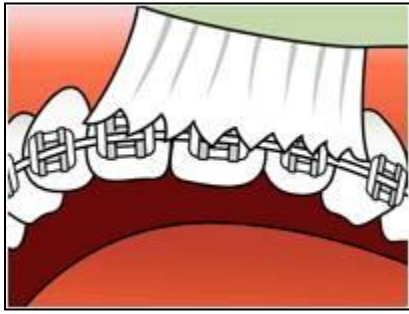
B) Soft tissue piling up on mesial surface as molar tips forming pseudo pocket.

As pseudo pocket deepens subgingival plaque accumulation occurs leading to periodontitis.

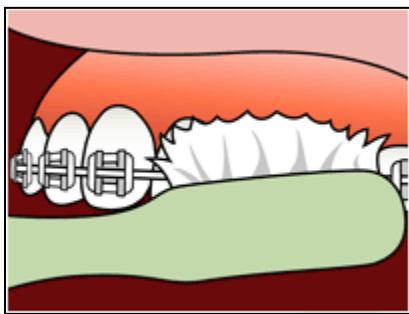
### Plaque Removal:

**Toothbrushes:** Presence of brackets, archwires and ligatures make brushing more difficult. Conventional tooth brushes having soft bristles with rounded ends to minimize gingival and tooth abrasion should be advised. Brushes with shorter middle row bristles than the outer one are specific for orthodontic treatment purpose. A clinician should properly train the patient in brushing habits [Figure 3, 4]. Brushing should be accomplished with gentle vibratory movements at one place and avoid scrubbing and cleaning behind the archwires and cleaning of inter proximal areas to be emphasized. A modified bass method with bristles at 45 degrees to sulcus would be more beneficial in patients with deepened pockets. Patients should be made to demonstrate the method of brushing and must be made aware when appliances are shiny are clean.

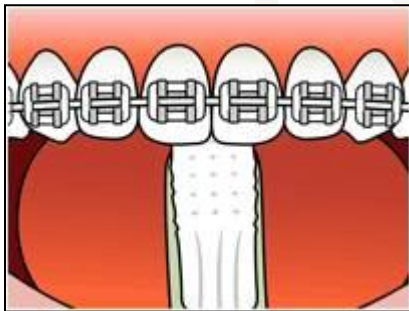
**Electric toothbrushes:** The Rotadent electric toothbrush with short pointed bristles was found to be more effective than conventional toothbrushes in orthodontic patients. It was seen to remove the interproximal plaque more effectively with least abrasion because of smaller diameter bristles.<sup>9,10</sup> However due to cost effectiveness it was often neglected by the patients [Figure 5].



**Figure 3: Brushing techniques.**  
**3- A: Placing bristles where gums and teeth meet.**



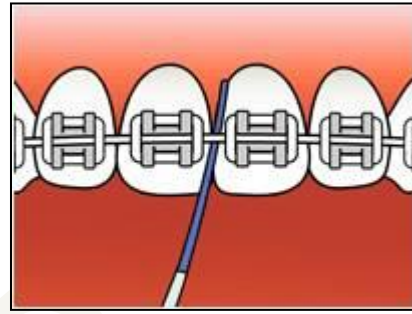
**Figure 3-B: Circular and gentle vibratory motions around gum lines on each tooth.**



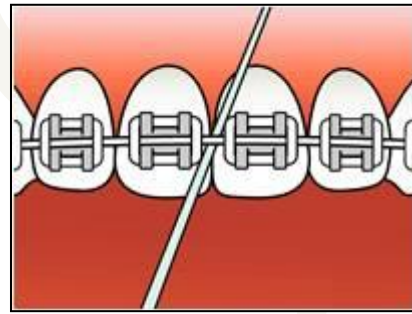
**Figure 3-C: Slow brushing on palatal/lingual surfaces of each tooth.**



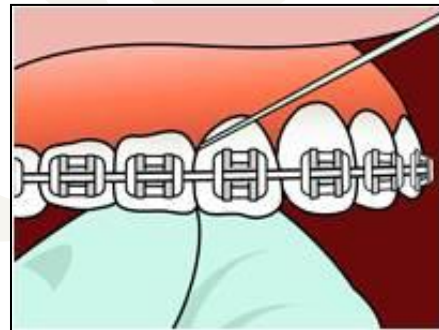
**Figure 3-D: Brush from gum line to occlusal surface.**



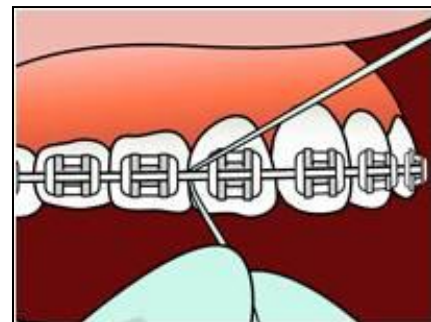
**Figure 4: Flossing technique**  
**4-A: Thread unwaxed floss between braces & wire.**



**Figure 4-B: Floss around braces.**



**Figure 4-C: Floss around gum areas.**



**Figure 4-D: Floss around each tooth.**

**Anti-Plaque Agents:** In addition to toothbrushes number of agents as Stannous fluoride, Tryclosan, Chlorhexidine and Listerine help to maintain the hygiene. Stannous fluoride gels are found to be more effective against gingivitis. It is found to be very useful to prevent decalcification in orthodontic patients by using daily, topical and in low concentration of 0.05% or 0.4% in gel form.<sup>11</sup> Continued use for 6 months after appliance removal helps to remineralize areas of decalcification that may have occurred during treatment. It was found 15-20 % patients develop mild staining with its use in 3-6 months of use, but yet its effectiveness largely depends on patient's compliance.

Listerine rinse contain 26% alcohol and should be rinsed twice daily for one minute for anti-gingivitis effect without dilution. Tryclosan toothpastes have good anti-gingivitis effect, good taste and good control against supragingival calculus. They should be the standard toothpastes for all orthodontic patients with fixed appliances.<sup>12</sup> Chlorhexidine has always been the best option in management in severe gingivitis in adolescent patients. A three month use of 0.12 % chlorhexidine approximately reduced 65% plaque, 77% gingival bleeding.<sup>13</sup> One of the main problems with its use was potential staining [Figure 6].

Few products such as baking soda toothpastes which might also contain peroxides are marketed as antiplaque agents. If fluoride content is present, they too can be used for orthodontic patients. Sanguinaria, baking soda and peroxide used as antiplaque agents are not FDA or ADA approved.<sup>14, 15</sup>

Oral irrigator with regular tap water at high pressure with a conventional irrigator tip can aid as a very effective method in periodontal maintenance. Use of chlorhexidine with specially modified irrigating tips called as '*Pik Pocket* (Teledyne Corporation)' can be used to directly to irrigate the pockets with medium pressure if gingival bleeding on probing persists [Figure 7].<sup>16</sup>

## Decalcification Treatment

Decalcification is evident in form of white or yellow stains clinically with possible roughness. Best

method to prevent is use of fluoride toothpaste without rinsing with water or by using a topical fluoride rinse or gel twice daily during orthodontic treatment. This regime helps in 50% reduction in discoloration. For stains still present after 6 month, a rotary green bur may be used to remove a thin layer of decalcified enamel. This may additionally remove 25% of the stains.

Post orthodontic treatment, moderate decalcified areas may present as larger areas of color changes in yellow-brown form with definite roughness [Figure 8]. But when a severe decalcified area is present, patient might have to have a restoration placed.

To prevent these problems few steps by the clinicians, as bonding of molars than banding, in periodontal compromised patients can be helpful. Use of single archwires whenever possible and removal of excess composite around brackets, especially at gingival margins can aid in additional maintenance.

## Gingival Recession

Gingival recession is found to be more in periodontally compromised patients undergoing orthodontic treatment [Figure 9]. A clinician should be aware of this fact and have an interdisciplinary treatment plan. Force applied on periodontally compromised teeth can result in more periodontal breakdown and regeneration of such periodontal ligament tissues is difficult. As a result, with loss of bone support, centre of resistance of the involved tooth moves more apically resulting in teeth being more prone to tipping movements than required bodily movements [Figure 10]. Supra gingival plaque can shift to subgingival position in a plaque infected tipped/tilted teeth inducing an apical shift of the connective tissue attachment and formation of pockets and further loss of attachment. Due to risk of having more PDL attachment loss, very light forces must be applied.<sup>17</sup>

Areas of thin gingiva are usually noted as having washboard appearance of prominent roots and a narrow width of attached gingiva. Tooth movement if in labial direction, may require soft tissue graft. If teeth having thin tissue are going to be moved





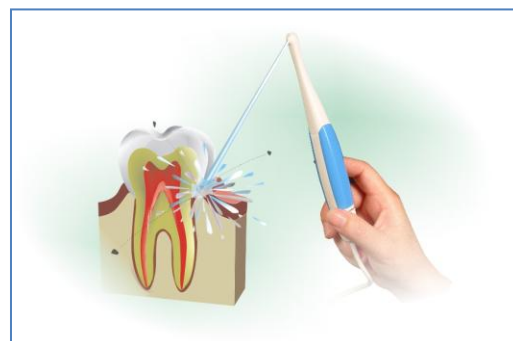
**Figure 5: Electric tooth brush- ROTADENT**



**Figure 6: Chlorhexidine stains**



**Figure 7-A: Oral irrigator.**



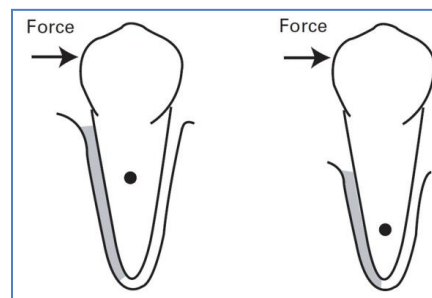
**Figure 7-B: Oral irrigation to gingival pockets.**



**Figure 8: Decalcification post orthodontic treatment.**



**Figure 9: Gingival recession during orthodontic treatment.**



**Figure 10: Apical shift of centre of resistance in bone loss**



lingually, there is potential for the tissue to move coronally and become thicker. In this case any grafting of soft tissue should be postponed until active tooth movement is completed. In cases of bony defects, teeth can be moved orthodontically provided the remaining bone and periodontium are brought to healthy states.<sup>18,19</sup>

### Retention

Post orthodontic treatment removable or fixed retainers are necessary to prevent any relapse of the treatment and allow time for reorganization of the gingival and periodontal tissues.<sup>20</sup> As instructed by the clinician, patients should be made aware of its importance and motivated for proper use of retainers to avoid any possible damage to the tissues [Figure 11].



**Figure 11-A: Permanent lingual retainer given post orthodontic treatment on mandibular anteriors.**



**Figure 11-B: Relapse following no retainer use**

### Conclusion:

Treatment of orthodontic patients should have an interdisciplinary approach, to provide the best treatment plan to the patients. Patients should be explained all the modalities of treatment procedure and their effects on the gingiva and periodontium and creating a positive reinforcement, motivate them for its maintenance and promotion of healthy oral health.

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## Unusual Cases of Epidermoid cyst: Case Series

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### Abstract

In the oro-facial region cystic lesions of different etiologies are encountered owing to the presence of the teeth in the jaw bones. A bewildering variety of developmental, odontogenic and non-odontogenic cysts are seen. Epidermoid cyst is a rare developmental cyst of the oro-facial region which results from entrapped epidermal elements without adnexal appendages. Dermoid and epidermoid cysts occur in oro-facial region with an incidence of 6.9-7% and represents less than 0.01% of all oral cavity cysts. Here we report two cases of epidermoid cysts occurring at unusual locations involving upper left maxillary region lateral to the nose and pinna of the ear.

**Keywords:** Cyst, Epidermoid Cyst, Dermoid Cyst, Pinna of the Ear, Maxillary Region

### Introduction:

Epidermoid cysts are non-odontogenic inclusion cyst lined by ectoderm.<sup>1</sup> These are rare lesions derived from germinal epithelium and are encountered throughout the body, in areas where embryonic elements fuse together.<sup>2, 3, 4, 5</sup> Most cases have been reported in ovaries and the testicles, with 7% occurring in the oro-facial area and 1.6% in the oral cavity, representing 0.01% of all oral cavity cysts.<sup>4, 5</sup>

Epidermoid cysts are indolent in nature, slow to progress and remain asymptomatic unless secondarily infected. Larger cyst can cause obstructive signs and symptoms like dyspnoea and dysphagia.<sup>3, 6, 7</sup> In the current report, we describe two cases of epidermoid cyst in the upper left maxillary region and pinna of the ear, which are unusual sites of epidermoid cysts.

### Case Reports

#### Case Report 1:

A 30 yrs old male patient presented with a swelling on the left malar region since 2 months. History revealed that the swelling was asymptomatic

and gradually increasing in size. On examination, a single well circumscribed swelling was seen in the left malar region, ovoid in shape, 1.5x1.5 cm in greatest diameter, skin over the swelling was smooth and of the normal color without any secondary changes, non-tender on palpation, soft and fluctuant in consistency. No dental abnormality was detected. Fine needle aspiration cytology (FNAC) revealed a creamy white fluid. A provisional diagnosis of Sebaceous Cyst was made and following complete excision of the swelling, the specimen submitted for histopathologic investigation. Gross examination shows a soft tissue specimen of size 2 x 2cm, oval in shape, yellowish white in color and cystic in consistency. Cystic lumen was filled with thick creamy, cheesy like material (Fig1). The entire tissue was kept for processing. Histopathological examination revealed cystic lining of keratinized stratified squamous epithelium which was 4-5 cell layers thick with numerous keratin flakes in the lumen. The surrounding connective tissue capsule was made up of collagen fibres, blood vessels, chronic inflammatory cell infiltrate and there was absence of dermal appendages (Fig 2, 3).

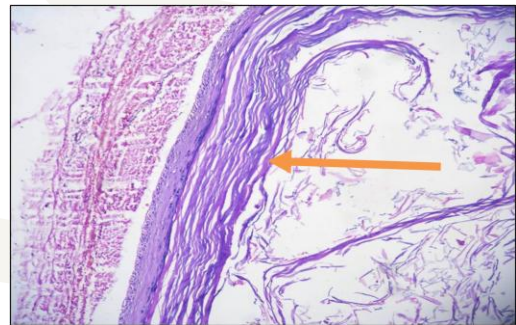
**Case report 2:**

A 27 yrs old male patient presented with swelling on the right ear lobe since 15 yrs. History revealed that the swelling has remained constant without any increase in size and is asymptomatic since the past 15 years. On examination, a single, well circumscribed swelling was seen in the right pinna, ovoid in shape, 1x1 cm in greatest diameter, skin over the swelling was smooth and of the normal color without any secondary changes, non-tender on palpation, firm in consistency. FNAC revealed no aspirate. A provisional diagnosis of benign soft

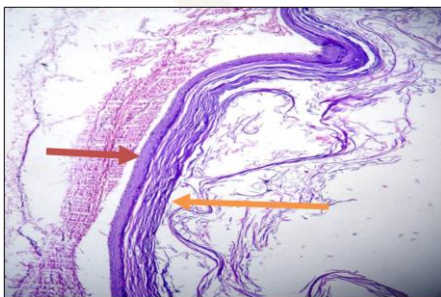
tissue neoplasm was made. The swelling surgically excised and the specimen submitted for histopathological examination. On grossing, the soft tissue specimen was approximately 1 x 2 cm in size, ovoid in shape, yellowish white to brown in color, firm in consistency (Fig 4). The entire tissue was kept for processing. Histopathological examination shows cystic lumen lined by keratinized stratified squamous epithelium and the surrounding connective tissue. Capsule lumen was filled with keratin flakes and there was no evidence of dermal appendages in the connective tissue wall (Fig 5, 6).



**Fig 1-** Gross examination shows a soft tissue specimen oval in shape, yellowish white in color and cystic in consistency.



**Fig 3-** Under low power, histopathological examination shows numerous keratin flakes in the lumen (orange arrows) - 10X.

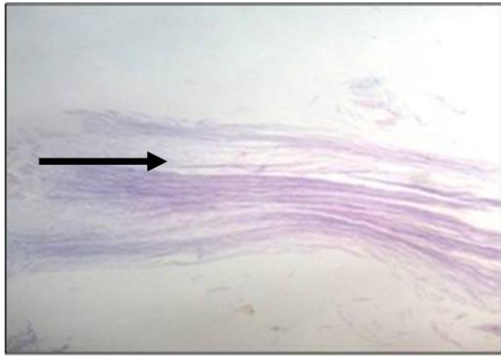


**Fig 2-** Under scanner view, section shows cystic lining of keratinized stratified squamous epithelium (red arrows) with numerous keratin flakes in the lumen (orange arrows) - 4X.

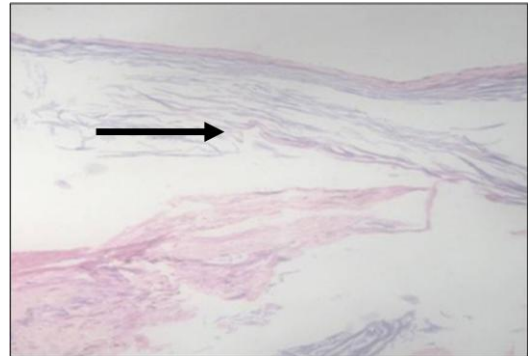


**Fig 4-** Gross examination shows a soft tissue specimen showing numerous keratin flakes.





**Fig 5-** Under low power, section shows numerous keratin flakes in the cyst lumen (10X).



**Fig 6-** Under low power, section shows absence of dermal appendages in the connective tissue wall (10X).

## Discussion:

Roser, in 1859 first described epidermoid cyst.<sup>8</sup> These are rare benign conditions in the oro-facial region derived from abnormally situated ectodermal tissue. They can develop anywhere in the body, with the incidence ranging from 1.6% to 6.9% occurring in the oro-facial area and 1.6% within the oral cavity and represent less than 0.01% of all oral cavity cysts.<sup>9</sup>

Depending on the pathogenesis, Epidermoid cyst can be divided into:

- 1) Congenital
- 2) Acquired

Congenital cysts are dysembryogenic lesions that arise from ectodermal elements entrapped during midline fusion of the first and second branchial arches between the third and fourth week of the intrauterine life. Alternatively, they may also arise from tuberculum impar of His.<sup>10, 11, 12</sup>

Acquired cyst are derived from traumatic or iatrogenic inclusion of epithelial cells or from occlusion of sebaceous gland duct, it was first recognized by Werhner in 1855 and originally referred to as "Implantation cyst" by Sutton in 1895.<sup>11, 12, 13</sup>

There are two theories for epidermoid cyst formation: Firstly, Epidermoid cyst may occur when two epidermal surfaces fuse together during early intrauterine life and an ectodermal implant is

retained deep to the surface. Secondly, due to traumatic entrapment of surface epithelium in the connective tissue; later these cells may differentiate to form cyst.<sup>13, 14, 15</sup>

In 1955, Meyer updated the concept of epidermoid cyst to describe three historical variants:

**Dermoid cyst:** Epithelium lined cystic cavity encloses skin appendages such as hair, hair follicles, sebaceous and sweats glands.

**Epidermoid cyst:** Epithelium lined cystic cavity without skin appendages.

**Teratoid:** The cyst cavity encloses mesodermal derivatives such as bone, muscle along with skin appendages.<sup>4, 5, 16, 17</sup>

Epidermoid cyst is mainly reported from face, trunk, neck, extremities and scalp. In the oral cavity, floor of the mouth is the most common location, and occasional occurrence have been reported involving buccal mucosa, tongue, lips, uvula and intraosseous location within the mandible and maxilla.<sup>3, 6, 7</sup> This is consistent with our case that occurred at unusual location involving upper left maxillary region lateral to the nose and pinna of the ear.

Epidermoid cysts are generally diagnosed in young adults in the second and third decades of life. It is twice as common in men as in women with a male to female ratio of 3:1.<sup>3, 6, 7</sup> The clinical findings in our case were consistent with previous cases except for site of occurrence.

The epidermoid cyst rarely discloses malignancy.<sup>5</sup> The occurrence of Basal cell carcinoma, Bowen disease, and Squamous cell carcinoma has been reported in the literature that had evolved from epidermoid cyst.<sup>7</sup> Dini et al<sup>18</sup> described a patient with basal cell carcinoma arising in the wall of an epidermoid cyst. Ikeda et al<sup>18</sup> presented a case stating that basal cell carcinoma originates from an epidermoid cyst in which nests of basal cell carcinoma connected with the epidermoid cyst and partially replaced the cyst wall. Lopez-Rios et al<sup>19</sup> described a case in which squamous cell carcinoma had evolved in the wall of conventional epidermoid cyst. An incorrect diagnosis could result in inappropriate therapy and if the lesion is completely excised, the treatment is definitive.<sup>5</sup>

### Conclusion:

The cases presented show no variation from the normal histopathology, but, they prove to be significant, because of the variation in their anatomical presentation. Epidermoid cysts of an oral cavity are an uncommon entity. Ample understanding and vigilance about this slow growing mass is essential not only because of the symptoms it produces but also due to the malignant potential.

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# Maxillary Central Incisor with two Root Canals and two Separated Roots: A Case Report

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## Abstract

Maxillary central incisors have been reported as presenting with only 1 root canal and a single root in 100% of cases. Variations in the number of roots or canals in the upper central incisors are rare. Therefore, to achieve a technically satisfactory endodontic outcome, the clinician must have adequate knowledge of the internal canal morphology and be aware of the possible variations. The purpose of this study was to report a clinical case with a varying number of roots in a right maxillary central incisor. After the appropriate cleaning and shaping of the missed root canal, it was filled using the Tagger's technique. Cone beam computed tomography follow up showed complete healing of the lesion after 36 months.

**Keywords:** Cone Beam Computed Tomography, Dental Operating Microscope, Internal Anatomy, Maxillary Central Incisor, Root Canal Treatment

## Introduction:

The success of root canal treatment is highly dependent on the cleanliness and shaping of the root canal system. The aim is the removal of pulp tissue and bacteria and their by-products, while the canal is shaped in preparation to receive the filling material.<sup>1</sup>

To achieve cleanliness and decontamination of the canal, adequate knowledge of the internal anatomy of the teeth and possible variations is essential. The use of a dental operating microscope with adequate instruments that permit visualization and negotiation of the root canal system is also important.<sup>2</sup>

Since the first report by Hess<sup>3</sup> in 1925, the maxillary central incisor has been reported as presenting with 1 root canal and a single root in 100% of cases. In 1975, De Deus<sup>4</sup> studied the internal dental anatomy of 1137 teeth. Among them were 37 maxillary central incisors and all of them had 1 root canal in a single root. Further studies such

as Vertucci<sup>5</sup> in 1984 have also evaluated the internal anatomy of the teeth and reported the same findings.

Despite these findings of 1 root canal in a single root being presented in the vast majority of cases, some variations have been reported. Reid<sup>6</sup> *et al.* reported 2 cases of maxillary permanent incisors with 2 root canals in a single root. In 2003, Genovese<sup>7</sup> reported a maxillary central incisor with 2 separated roots. In addition, Sponchiado<sup>8</sup> *et al.* reported a case with this variation to the anatomy in a tooth with coronal macrodontia. In 2009, Gondin<sup>9</sup> reported an upper incisor presenting 3 root canals.

## Case Report:

A 42-year-old Caucasian woman was referred for endodontic treatment of the maxillary right central incisor due to apical radiolucency and prosthetic indications. The tooth was asymptomatic, with an absence of sinus tract or swelling. A provisional acrylic crown was in position. The tooth had been previously treated by an endodontic specialist, but



without the use of a microscope or any other kind of magnification.

Radiographic examination (fig. 1) revealed that the tooth had 2 separated roots. The buccal root exhibited radiopaque material, and the palatal root showed a narrow canal and an apical radiolucent area.

After local anesthetization with 3% prilocaine and 0.03 IU/mL felipressine (DFL, Rio de Janeiro, Brasil), the tooth was isolated with a rubber dam, all the provisional cement was removed and the pulp chamber was irrigated with 2.5% sodium hypochlorite (Biodinâmica, São Paulo, Brazil). Using an 8× magnification on a dental operating microscope (DFVasconcellos, Rio de Janeiro, Brazil), the gutapercha present in the buccal canal was assessed. The entrance of the palatal root was obliterated. Using TRA 01 and TRA 24D ultrasonic tips (Dental Trink, São Paulo, Brazil) and with the illumination and magnification provided by the microscope, the palatal root was located and negotiated. The working length was established with an apex locator (Sybron Endo, California, USA) and a radiograph was taken to confirm the patency of the canal. No treatment was performed on the buccal canal.

Chemical and mechanical instrumentation was performed with Gates Glidden burs (DentsplyMaillefer, Ballaigues, Switzerland), manual files (Flexofile, DentsplyMaillefer, Ballaigues, Switzerland), and rotary Ni-Ti files (MTwo, VDW, Munich, Germany). At every change of instrument, the canal was thoroughly irrigated with sodium hypochlorite; after preparation, it was flooded with 17% EDTA (Biodinâmica, São Paulo, Brazil) for 3 min. Passive ultrasonic irrigation (PUI)

was used for 20 sec to activate the hypochlorite; this procedure was repeated 2 more times. After final hypochlorite irrigation, the root canal was dried with paper points. A dressing of calcium hydroxide with saline solution was left inside the canal for 14 days.

At the following appointment, the patient was asymptomatic with the provisional crown not showing any clinical sign of leakage. After anesthesia and placement of the rubber dam, the root canal was again accessed. The calcium hydroxide dressing was removed, the canal was irrigated with sodium hypochlorite then EDTA, and passive ultrasonic irrigation was performed using the same protocol as for the first visit, and finally the root canal was dried with paper points. Filling was performed with standard #60 gutta percha points and accessory M, FM, and F (Dentsply, Petropolis, Brasil). Endofill (Dentsply, Petropolis, Brasil) cement and Tagger's technique were used to complete the root canal filling.

Final radiographs were taken from the orto, mesial, and distal aspects. A prosthesis was cemented and the patient was referred for general dentistry. Due to the initial attempt at canal location, a deviation was observed in the palatal root. (fig. 2)

Thirty-six months after treatment, the patient was asymptomatic; the probing test was normal and a permanent crown was complete. Radiographic examination (fig. 3) revealed that the radiolucent area had become normal with characteristics of a healing area. With the aid of cone beam computed tomography the independent roots could be visualized (fig 4,5). The original lesion was completely healed, and there was no perforation at the palatal root.



Figure No. 1



Figure No. 2



Figure No. 3



Figure No. 4



Figure No. 5

## Discussion:

Conventional endodontic treatment, particularly in cases of anatomic variation, must be performed efficiently to ensure functionality of the tooth. Substantial coronal destruction may jeopardize prosthetic rehabilitation and encourage patients to reconsider prosthesis on implant. Teeth with a small coronal remnant and apical radiolucency may have a favorable outcome in cases where the root canal system is properly negotiated and filled. Root canal retreatment is usually more cost-effective than an implant-supported restoration.<sup>10</sup> Considering that the palatal root had no canal obturation, performing apical surgery in this case would have been unlikely to be successful.<sup>11</sup>

Variations in the anatomy of the root canal may be associated with coronal aberrations such as dens invaginatus,<sup>12,13</sup> talon cusp fusion,<sup>14</sup> or germination, even with a clinically normal crown.<sup>15</sup> In this case, the patient had no natural crown, precluding the assessment of the original morphology. The case reported herein exhibited a rare situation of a maxillary central incisor with 2 independent root canals, classified as a class IV as described by Vertucci.<sup>5</sup>

The success in this case was largely dependent on the localization, negotiation, and proper treatment of the palatal root. In spite of having had previous appointments with an endodontic specialist, the complete domain of the internal anatomy was not achieved. It is believed that the use of magnification and illumination may increase the success of accessing “calcified” canals or those with an uncommon morphology.<sup>16,17</sup>

It is important to use ultrasonic tips with different shapes when removing calcifications, pulp nodules, or materials that obliterate the canal entrance. The utilization of microsonics<sup>18</sup> is a safe way to deal with difficult anatomies by minimizing the risk of perforation or other adverse events. Modern endodontic practice must involve not only knowledge of the internal anatomy, but also the technology necessary to adequately negotiate the entire root canal system.

## Conclusion:

The use of dental operating microscope and the appropriate ultrasonic tips can be considered an important armamentarium to locate root canals. The root canal treatment of the tooth reported in this study was effective, less invasive and cost effective in comparison with an implant-supported single crown.

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# Herpes Associated Erythema Multiforme-A Diagnostic Dilemma

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## Abstract

Erythema multiforme is an acute mucocutaneous disorder, characterized by varying degrees of blistering and ulceration. It comprises variants ranging from a self limited, mild, exanthematous, cutaneous variant with minimal oral involvement. It presents a diagnostic and therapeutic challenge to the clinician. Association between HSV infection and EM has been designated HAEM (Herpes associated erythema multiforme). The incidence of EM has been estimated to be between 0.01 and 1%. It is estimated that 20-40% of cases of erythema multiforme are secondary to herpes simplex virus infection. Both HSV 1 and HSV 2 trigger the erythema multiforme lesions. Prevalence of oral EM varies from 35% to 65% among patients with skin lesions. However, in patients where EM was diagnosed by oral lesions, prevalence of skin lesions ranged only from 25% to 33%. We report a case of recurrent herpes-associated erythema multiforme in a 57 year old female patient managed with prophylactic acyclovir. The patient responded well to this treatment regimen and has been in remission to date.

**Keywords:** Erythema Multiforme, Herpes Simplex Virus, Acyclovir

## Introduction:

Erythema multiforme (EM) is an acute mucocutaneous disorder which appears mostly as symmetrical papules, later developing into “target” or “iris” lesions with an erythematous periphery and a central zone of necrosis.<sup>1</sup> It comprises variants ranging from a self limited, mild, exanthematous, cutaneous variant with minimal oral involvement (EM minor) to a progressive, fulminating, severe variant with extensive mucocutaneous epithelial necrosis (Stevens-Johnson syndrome: SJS; and toxic epidermal necrolysis: TEN), hence the name “multiforme”.<sup>2</sup> Originally in 1866 Ferdinand Von Hebra described “erythema multiforme exudativum” as a self limiting cutaneous eruption lasting for several weeks with symmetrically distributed, round,

erythematous skin lesions, some of which evolved with concentric colour changes producing iris or target lesions or blisters.<sup>3</sup>

The peak age at presentation is between 20 and 40 years although 20% of cases occur in children.<sup>4</sup> Drugs, mycoplasma, and herpes simplex virus (HSV) infections were described as the most frequent causes,<sup>4-6</sup> although other causes such as allergy to foodstuffs were also suggested.<sup>5</sup> It is estimated that 15-63% of cases of erythema multiforme are secondary to infection herpes simplex virus.<sup>6</sup>

Before any therapy is prescribed, possible underlying causes, such as medications, diet, infections or systemic diseases should be determined and eliminated. The prophylactic and therapeutic use of acyclovir, in cases of HAEM is a common practice.<sup>7</sup>

**Case Report:**

A 57 year old female patient reported to the Department of Oral Medicine and Radiology, Institute of Dental Sciences, Bareilly(U.P.) with the chief complaint of painful ulcers and hemorrhagic crusts on the lower lip since 1 month. History of present illness revealed that this type of ulcers occurred for the first time. The ulcers were painful and hemorrhagic. Patient reported that initially there were blisters on the lips which ruptured to form ulcers and erosions. Patient also complained of swelling and erythema and gave history of mild fever of 1 week duration about 15 days back. On general physical examination patient was of thin built, pale, and was anemic. On extra oral examination there was localized swelling and redness on the lower lip with fragile hemorrhagic crustations (Figure 1). No such history of ulcers elsewhere in the body.

On inspection ulcers were present on the vermillion border of lower lip, roughly measuring around 1x1.5 cm in dimension with diffuse borders and with hemorrhagic overlying crustations. On

palpation all inspectory findings were confirmed and the ulcer was tender, fragile and haemorrhagic on mild palpation.

On Intraoral examination revealed multiple ulcers on the left buccal mucosa, on the gingiva and lateral border of tongue measuring around 0.5x 1.0 mm in dimension with necrotic centre and erythematous halo(Figure 2). On the basis of history and clinical examination a provisional diagnosis of erythema multiforme minor was given with a differential diagnosis of recurrent herpes labialis and paraneoplastic pemphigus was given. Immunohistochemistry was carried out in a private lab which was found to be positive both for HSV1 IgG and HSV2 IgM antibody. Final diagnosis of herpes associated erythema multiforme was given. A one week course of acyclovir 400mg was given five times daily. For symptomatic relief, hexigel and tantum mouthwash was given. After 1 week patient returned with healed ulcers(Figure 3). Patient was recommended to continue the medication for next 6 months.



Figure no. 1: Haemorrhagic crustations on lower lip



Figure no. 2: Ulcers on left buccal mucosa



Figure no. 3: Post operative view

## Discussion:

The term erythema multiforme (EM) is a clinical condition which reflects the broad morphological spectrum of the lesions.<sup>8</sup> A range of usually exogenous factors trigger what appears to be an immunologically related reaction with sub- and intra-epithelial vesiculation.<sup>2</sup> Erythema multiforme has been reported to be triggered by numerous agents, particularly viruses, especially herpes simplex virus (HSV) but other herpesviruses (varicella-zoster virus, cytomegalovirus, Epstein-Barrvirus), adenoviruses, enteroviruses (Coxsackie virus B5, echoviruses), hepatitis viruses (A, B and C), influenza, paravaccinia, parvovirus B19, poliomyelitis, vaccinia and variola have all been implicated.<sup>9</sup> Drugs such as sulphonamides (e.g. co-trimoxazole), cephalosporins, aminopenicillins, quinolones, chlormezanone, barbiturates, oxicam non-steroidal anti-inflammatory drugs, anticonvulsants, protease inhibitors, allopurinol or even corticosteroids may be implicated. Food additives or chemicals such as benzoates, nitrobenzene, perfumes or terpenes have also been reported as aetiological agents.<sup>10</sup>

Autoreactive T-cells triggered by virus infection play an important role in herpes associated erythema multiforme (HAEM) pathogenesis.<sup>11</sup> Both HSV 1 and HSV 2 trigger the Erythema multiforme lesions. A study revealed that the cutaneous lesions of patients with HAEM were infected with HSV-1 in 66.7% of cases, HSV-2 in 27.8% of cases and with both HSV types in 5.6% of cases.<sup>12</sup> The HAEM is a recurrent disease that can be precipitated by sun exposure and does not progress to Stevens-Johnson syndrome. Even in the absence of a clear clinical history of HSV infection, subclinical HSV is likely the precipitating factor, as evidenced by the polymerase chain reaction (PCR) analysis of HSV.<sup>13</sup> Typically, an erythema multiforme (minor or major) lesion begins 10–14 days following the clinical manifestations of an HSV infection. In the HAEM, HSV lesions can precede the appearance of target lesions by 2–17 days.<sup>14</sup> The condition can begin with nonspecific prodromal symptoms such as headache, malaise and fever. Lesions of the EM minor

can be persistent (continuous), cyclical (acute and self limiting) or recurrent, the cyclical and recurrent occur mainly in the HAEM.<sup>15</sup> The EM minor skin lesions usually caused by herpes simplex are predominantly raised and distributed on the extremities and/or the face, with mucosal erosions involving one or several sites.<sup>16</sup>

Typical targets<sup>7</sup> are defined as individual lesions less than 3 cm diameter with a regular round shape, a well-defined border, and two concentric palpable, oedematous rings, paler than the centre disc. The lip is the most common site of preceding HSV infection in cases of HAEM. The oral lesions have predilection for the vermillion border of the lips and the buccal mucosa, generally sparing the gingival.<sup>7</sup> Hemorrhagic crusting of the lips and ulceration mainly of the non-keratinized mucosa characterize oral lesions. When it affects the lips, it results in erosions or serum-hemorrhagic crusts, with pathognomonic blood-stained crusting of erosions on swollen lips, hindering the phonation, the feeding and limiting the oral movement.<sup>17</sup> Other mucous membranes that can be affected, mainly in the HAEM cases, are the eyes, nose, genitalia, esophagus and respiratory tract.<sup>18</sup>

Recurrences are seen in approximately 20%–25% of erythema multiforme cases. Although the disease resolves spontaneously in 10–20 days, patients may experience 2–24 episodes a year. The mean duration of the disease is 10 years (range 2–36 years).<sup>19</sup>

The diagnosis of HAEM is clinical and is easier when the patient develops target lesions with a preceding or coexisting HSV infection. The finding of typical skin or oral lesions (or both) in a patient with suspected HAEM supports the clinical diagnosis.<sup>12</sup> Serology to identify HSV-1 and HSV-2 and to detect specific IgM and IgG antibodies may confirm a suspected history of HSV infection.<sup>20</sup> HSV-DNA has been detected in between 36% and 81% of patients with the HSV-EM using polymerase chain reaction amplification.<sup>21</sup>

The characteristic histopathological change of EM minor is epidermal cell death, which is termed “satellite cell necrosis”, mimicking apoptotic cell

death. Among some apoptosis inducers, the perforin, a pore-making granule from natural killer cells has been suggested.<sup>22</sup> Another apoptotic mechanism that can also be related is the altered expression of apoptotic regulatory proteins. The intense expression of Bcl-2 protein by the inflammatory cells in EM minor support a role for this protein in the maintenance or persistence of the infiltrate in submucosa. An altered or increased expression of Fas antigen throughout the epithelium in correlation with the inflammatory cell infiltrates has been reported in many skin diseases including EM minor.<sup>23</sup>

The EM minor can be distinguished from SJS by the presence of true target lesions and no mucosal lesions or lesions involving 1 (oral) mucosa site rather than 2 or more mucosal sites, as seen in SJS. The EM minor also resolves without sequels within 2 weeks, whereas SJS often lasts longer than 2 weeks, leaving scars, could also have visceral involvement, with signs and systemic symptoms.<sup>13</sup> The HSV is associated with many cases of EM minor, while SSJ and TEN are caused in 80% of the cases by systemic drugs.<sup>4</sup>

Erythema multiforme major is characterised by involvement of multiple mucous membranes. Generally EM major is a more severe form of the disease than EM minor and, in addition to the oral cavity, the genital, ocular, laryngeal and oesophageal mucosae may be affected. Toxic epidermal necrolysis is a rare clinicopathologic entity, with a high mortality, characterised by extensive detachment of full thickness epithelium usually induced by drugs.<sup>2</sup> No specific treatment is available but supportive care is important; a liquid diet and intravenous fluid therapy may be necessary.<sup>2</sup> HAEM is often effectively managed with acyclovir (200 mg, 5 times a day for 5 days), but only if the therapeutic scheme is started in the first few days. If erythema multiforme keeps recurring, a continuous low dose of oral acyclovir is necessary.<sup>19</sup> Oral acyclovir has been shown to be effective at preventing recurrent HAEM and the protocols may include 200–800 mg/day for 26 weeks.<sup>24</sup> If acyclovir treatment fails, valacyclovir can also be prescribed (500 mg twice a

day). The latter has greater oral bioavailability and is more effective at suppressing recurrent HAEM.<sup>12</sup> In patients who have recurrent EM associated with HSV, suppressive treatment using acyclovir (400 mg twice a day for 6 months) has also been effective in preventing recurrence. Newer generation anti-herpes drugs such as valacyclovir hydrochloride and famciclovir are also useful in both intermittent and suppressive therapy.<sup>4</sup>

### Conclusion:

An important step in the management of erythema multiforme is recognition and withdrawal or prevention of contact with the causative agent. Although its etiology is not yet well defined, the relationship between erythema multiforme and herpetic infection seems certain. In the case reported here, erythema multiforme triggered by HSV infection was diagnosed, and the disease was controlled with continuous oral acyclovir therapy to prevent recurrences. Patients should be informed about the condition and the importance of preventing recurrences. As there remains no specific diagnostic test, early clinical recognition of disease remains essential to promptly initiate appropriate treatment.

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# Klippel-Trenaunay Syndrome- A Rare Presentation

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## Abstract

Klippel-Trenaunay Syndrome(KTS) is a sporadic but has been associated with translocation t(8;14)(q22.3;q13). Clinically patients have congenital malformation of blood vessels and lymphatics and usually present with Nevus Flammeus(port wine stain), soft tissue and bony hypertrophy of the limbs, varicose veins and lymphatic malformations. The disease has a wide spectrum of presentation. The patients can have a mild morbid illness to severe life threatening complications like gastrointestinal bleeding, stroke and pulmonary embolism. Here is presented case of Klippel-Trenaunay Syndrome (KTS) with complaints of varicose veins, hypertrophy of both the legs and ecrodactyly with past history of self-limiting rectal bleed and hematuria.

**Keywords:** Klippel-Trenaunay Syndrome, Lymphatic malformations, Nevus Flammeus, Soft tissue

## Introduction:

Klippel-Trenaunay-Weber syndrome often simply known as Klippel Trenaunay syndrome (KTS) and sometimes called as angio-osteo-hypertrophy syndrome and hemangiectatic hypertrophy.<sup>1</sup> Maurice Klippel and Paul Trenaunay, two French physicians were the first to describe this disease in 1900.<sup>2</sup> The etiology is unknown but there has been evidence that the disease is associated with translocation t(8;14)(q22.3;q13).<sup>3</sup> The three main features are nevus flammeus (port-wine stain), venous and lymphatic malformations, and soft-tissue hypertrophy of the affected limb.<sup>1</sup>

This syndrome is rare and not well recognized among the physicians so well which has resulted in inappropriate management and delayed referral. The lesions are typically limited to a single extremity, but multiple extremities may be involved. Legs are more often affected than arms.<sup>4,5</sup> Small angiokeratomas and lesions resembling granuloma telangiectaticum may occur. These patients may be prone for prolonged bleeding from telangiectatic areas of the skin following trauma.<sup>6</sup> Associated developmental defects are polydactyly<sup>7</sup>, gastrointestinal haemorrhage<sup>8</sup>, pulmonary embolism<sup>9</sup>, deep veins anomalies such as aneurysmal dilation, hypoplasia,

aplasia, absent or incompetent valves and visceral venous malformations.<sup>4</sup>

In Klippel Trenaunay syndrome there is always an increased risk of acute ischemic stroke because of associated coagulopathy and haemorrhagic stroke if associated A-V malformations present which is very rare. It is one of the common causes of severe morbidity in patients diagnosed to have Klippel-trenaunay syndrome.<sup>10</sup> Hemangiomas are usually present and it can occur at various sites like gastrointestinal tract, liver, kidney and bladder. Bleeding from these areas can be a serious complication. Involvement of cerebrum, cerebellum and spinal cord can be there and patient may present with associated neurological symptoms.<sup>8</sup> Deep and perforator venous system rarely coexist and there is increased predisposition to thrombo embolism. But, Pulmonary embolism is infrequently encountered in the setting of this syndrome.<sup>9</sup>

## Case Description:

The patient is a 45 year old male who came with complaints of dull aching pain in both the lower limbs since ten years with two previous episodes of rectal bleeding and hematuria six months back which was self-limiting. There are no respiratory

complaints. There is no previous history of stroke. There is no family history of similar complaints in the past.

On general examination the patient was conscious, cooperative and well oriented to time, place and person. The patient's vitals were stable. The patient had pallor and non-pitting edema in both the lower limbs. On examination of lower limbs the patient had varicose veins in both the lower limbs as seen in Figure-1. There was pigmentation and mild hypertrophy of both the lower limbs. The right foot is deformed with overlapping of 3<sup>rd</sup> and 4<sup>th</sup> toe (ectrodactyly) as seen in Figure-2. Trendelenburg test showed incompetence of saphenous junction and

tourniquet test showed incompetence of all the perforators. Homan's sign was negative suggestive of patency of deep veins. The upper limb is normal. Higher mental functions were normal and there were no neurological deficits. Systemic examination was normal. There were no dermatological signs like nevus flammeus, telengectasias or signs of thrombophlebitis.

Routine hematological investigations were normal except Hb which was 7.8%. Chest X-ray was normal. CT-Scan was normal. X-ray of lower limbs showed soft tissue shadow without any evidence of calcification. Doppler studies showed low flow through the vein and a patent deep venous system.

**Figure No. 1**



**Figure No. 2**



### **Discussion:**

Klippel Trenaunay syndrome is a rare disease usually presents with nevus flammeus, varicose veins, hypertrophy of limbs. The etiology is unknown but there has been evidence that the

disease is associated with translocation t(8;14)(q22.3;q13). Usually one limb is involved and lower limb involvement is more common than upper limb.

Because of low pressure flow in the limbs there is development of varicose veins at a much earlier

age than expected. So a young patient with varicose veins should always be suspected of klippel trenaunay syndrome and other signs of disease should always be looked for. In our patient the diagnoses was difficult because of the unusual presentation as the patient presented quite late and there were no neavus flammeus. Bilateral varicose veins and hypertrophy of the limbs makes it a very rare presentation. Advancement in new radiological investigations like Doppler has resulted in differentiating it from other diseases with similar presentations. Here, Doppler study showed low flow which distinguishes it from Parks-Weber syndrome (arterio-venous malformations).

### Conclusion:

Although the disease is rare, early diagnoses and treatment can alter the course of the disease. Making an early diagnosis of this sporadic congenital disease with unknown aetiology is important in order to be able to provide early prophylactic and therapeutic measures. Rarely, it may present with bleeding from telangiectatic areas, acute ischemic stroke and pulmonary embolism. Pulmonary embolism and acute ischemic stroke are life threatening complications and that is why in patients with Klippel Trenaunay syndrome regular (clinical and radiological) monitoring of limb girth and length is mandatory and Complications like thrombophlebitis, stasis dermatitis, cutaneous ulcers, bleeding, coagulopathy, repeated attacks of stroke should always be kept in mind.

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## Blindness after Maxillofacial Trauma

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**Dear Sir,**

Blindness following maxillofacial trauma is very rare complication representing around 0.67 to 3 %<sup>1</sup>. It is most commonly seen in posterior orbital fractures, retrobulbar hemorrhage causing increase in intraorbital pressure, direct injury to optic nerve (rare) or any indirect injury to the nerve (common), lacerations of the optic nerve sheath, fracture of zygoma body which constitutes the lateral wall of the orbit, retinal arteriolar occlusion.<sup>2,3</sup>

A 35 year old male reported to department of emergency following road traffic accident. His Glasgow Coma Scale was 14/15. Clinical examination revealed circumorbital ecchymosis and oedema, Proptosis, of left eye with mild subconjunctival hemorrhage with left zygomatic body and arch fracture. He had a laceration of 3x2 cm on left cheek. His Vision of left eye was blurred and had deteriorated from the time of trauma while right eye was normal. Left ocular movements were restricted. Pupil was dilated for 2mm. Computed tomography (CT) PNS view of skull revealed fracture of zygomatic body on left side and retrobulbar hemorrhage of left eye with comminuted posterior orbital floor fracture.

Patient was started on intravenous Dexamethasone, acetazolamide and mannitol (Anderson mega dose). He was planned for drainage of retrobulbar hemorrhage by lateral canthotomy of left eye. Patient was operated for zygomatic body and arch fractures which were fixed with 2mmx2 holed titanium plates with 2mm x 6mm screws. Patient was monitored for his improvement of vision postoperatively. Ocular movements were present and were improving. Complete normal visions with all ocular movements were seen on 21th postoperative day.

This letter highlights the return of vision following the management of maxillofacial fractures.

However there are certain reports in literature which have been reported for blindness after maxillofacial trauma treatment which is around 0.24% occurring after sever maxillofacial injuries around the eye. Any changes occurring around the optic nerve canal cause ischemic optic nerve injury due to increase in intraorbital pressure and causes blindness which may be temporary or permanent. Ashar et al<sup>4</sup> noted 22% of midfacial fractures involving the orbit resulted in permanent blindness. MacKinnon et al<sup>5</sup> reported that the lateral orbital wall of zygomatic body were the most commonly fractured areas in the patients with significant ocular sequelae. So blindness can be seen either after a severe maxillofacial trauma or can be manifested as rare complication after treatment of maxillofacial fractures. Management is usually by relieving pressure on optic nerve by lateral canthotomy and administration of Anderson's mega dose<sup>6</sup>.

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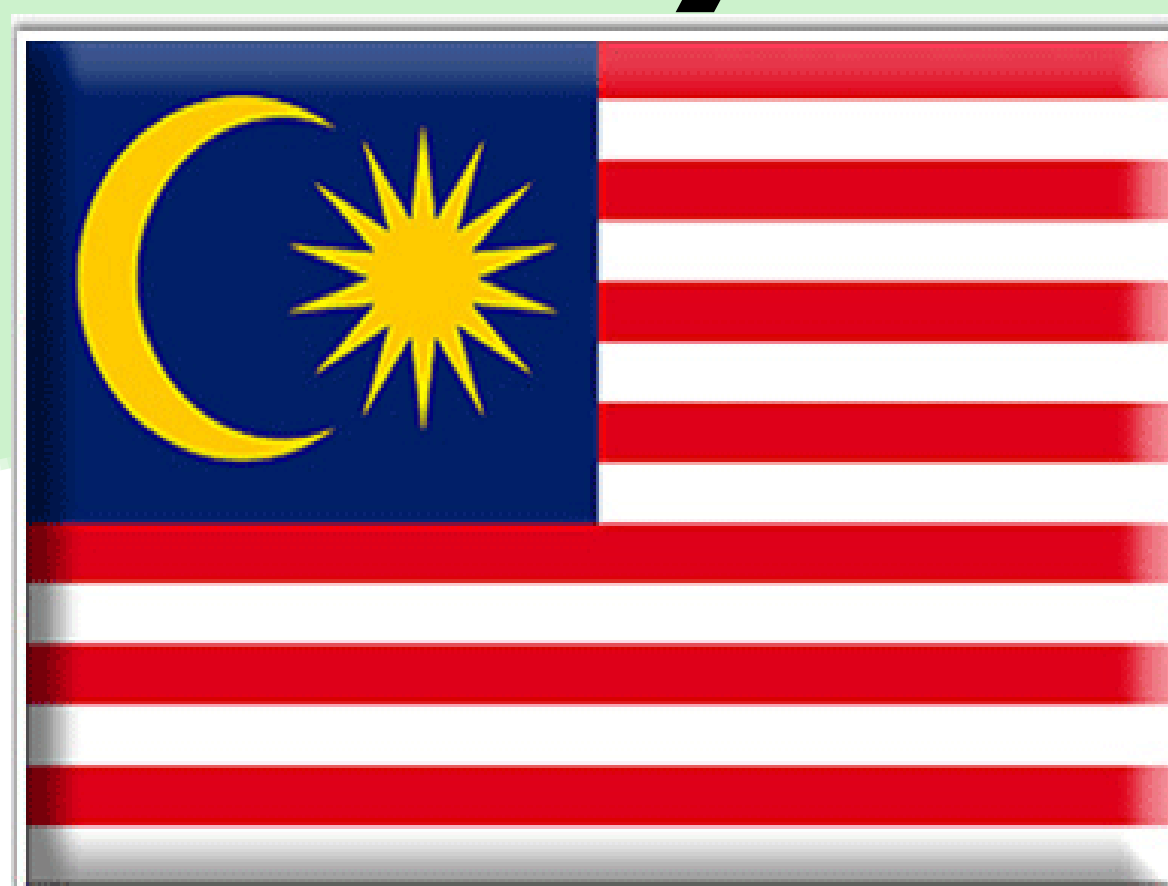
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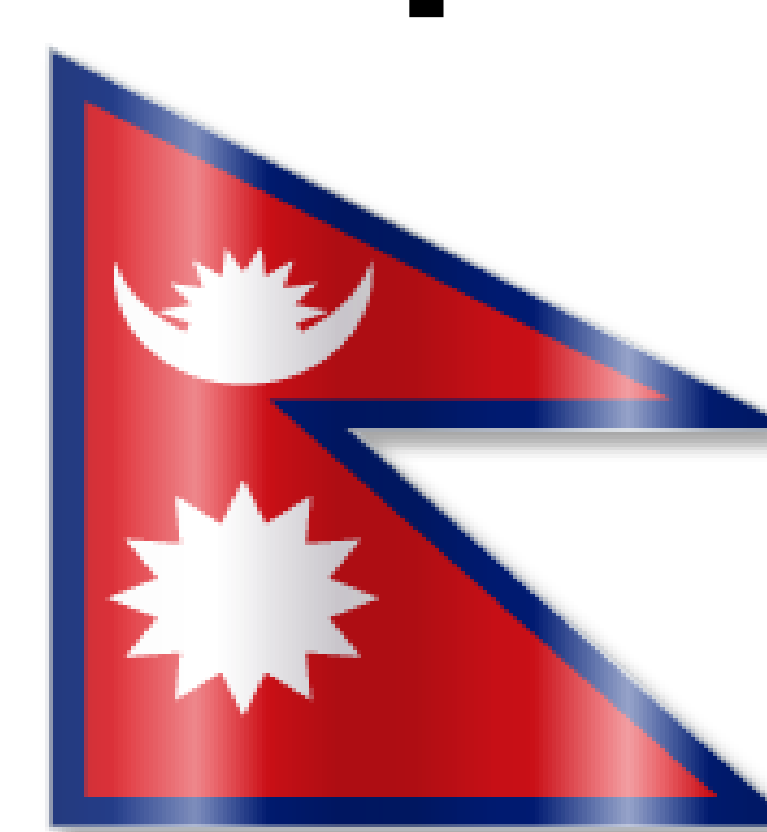
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