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CONTENTS

REVIEW ARTICLE

Lasers in dentistry
R.Mithra Rajan, C.A. Mathew, N. Vidya Sankari, Arul Kumar ........01

ORIGINAL ARTICLE

To determine the antimicrobial property of MTA when mixed with triple antibiotic paste and chlorhexidine gluconate: An invitro study
S. Naveen, A. Cicilia Subbulakshmi, Immanuel sathish solomon, Vineeta Gupta ........09

Pulmonary function test in chronic kidney disease patients : A study from tertiary care hospital
P. Gupta, Mukund G. ........14

Oral lichen planus : A diagnostic marker of chronic liver disease
Vaibhav Kumar Garg, Mayuri Garg ........20

A comparative evaluation of inter articulator reproducibility of protrusive condylar guidance registration in four different semi adjustable articulators using two different recording materials
C.Dhinesh Kumar, Jayashree Mohan, N.Vidyasankari, Deepesh K. Gupta, S.Senthil kumar, Indumati ........29

Evaluation of tensile bond strength between tray adhesive and poly vinyl siloxane manipulated with and without petroleum gel : An invitro study
Adarsh Shetty, Jagadish Konchada, Balasubramaniyan R, Shailendra Sahu, Anurag Dani, Manikandan R. ........37

Dermatoglyphics in oral clefts
Chinar Fating, Rolly Gupta, Anil Agrawal, Rana K. Varghese, Gopkumar Nair, Preeti Thakur ........42

Carcinoma cervix and renal failure : A study from central India
Sanjay Verma, Punit Gupta, Prakash Khunte ........47

CASE REPORT

Immediate denture as an immediate solution
N.Vidyasankari, S.Senthil kumar, Deepesh K. Gupta, Maheshwaren ........51

Unrecognized swallowing of a partial denture and surgical retrieval by cervical oesophagotomy: A case report
C. Sunil Kumar, B. M. M. Reddy, A. Samantaray, D. S. R. Reddy ........55
“Great discoveries and achievement invariably involve co-operation of many minds”

The journal is very important mouth piece and advertisement for any society. It reflects a knowledge and research of our colleagues. What lies before us and what lies behind us is nothing compare to what lies within us. So this journal is giving an opportunity to the people of our faculty for their skills and achievement as it is said ‘when you are curious you find lots of interesting thing to do’.

It gives me immense pleasure to bring out the current issue of this year, “Chhattisgarh Journal Of Health Sciences”. This journal represents the brain of faculties of our university.

Our constant search of excellence in medicine remains the challenge. We are committed continuously to report new discoveries and research, finding and exploring new ideas, methods and advancement technology along with various dimension of learning. Besides the content we pirates around the numerous material, technique and technologies to enable our professionals to put the knowledge into immediate clinical use.

I will try to deliver my best in every issue of the journal. Your suggestions for the improvement of the journal will be accepted. The timely advice of the editorial board, advisors and review board has catalyzed the publication of this journal. The moral boost and the continuing support of all our colleagues help us to take out the journal in time.

I request all the authors to submit research and original articles which will be great help to us for indexing at higher level.

Anil G Ghom
(Editor-in-Chief)
e-mail: sanvil@rediffmail.com
dranil.ghom@gmail.com
ABSTRACT
The word “laser” invokes many significant qualities like precision, efficiency, and innovation in the mind’s eye. The successful use of laser light has been proved in diverse branches of medicine and dentistry. The scope of laser in dental procedure and number of dental professionals using them is steadily increasing. Based on recent advancements and the minimum intervention principles, lasers has revolutionized various surgical, non surgical and laboratory procedures of dentistry. Low level laser therapy (LLLT) can offer tremendous therapeutic benefits to patients, such as painless as well as bloodless procedures, with more efficacy and accelerated healing. The purpose of this article is to explain the basic principles of lasers and to explore the uses of lasers in general dental practice. 

Keywords: Hard tissue lasers, Soft tissue lasers, Nd YAG laser, CO2 laser

INTRODUCTION
The field of dentistry have come a long way from just drilling, filling or replacing teeth by simple mechanics to the boundless era of modern technology. Over the past several years, tremendous advances in the field of laser have enormous impact in every disciplines of dentistry. The word laser started as an acronym for “light amplification by stimulated emission of radiation”. A laser is a device that emits light (electromagnetic radiation) through a process of optical amplification based on the stimulated emission of photons. Although Maiman first investigated the potential uses of the ruby laser in dentistry in 1960, laser gained popularity among the clinicians only after 1990s when numerous studies were published on laser applications in dentistry. The purpose of this article is to review the literature on fundamentals of lasers and their applications in various fields of dentistry.

Components of a typical laser:  

1. Active medium
This may be consists of a solid, liquid or gas that emits laser light when stimulated. This is positioned within the laser cavity, an internally-polished tube, with mirrors co-axially positioned at each end and surrounded by the external energising input, or pumping mechanism. The 'active medium' (CO2 or Nd:YAG) defines the type of laser and the emission wavelength of the laser (10,600 nm and 1,064 nm respectively). Other lasers of significance in dentistry use rare earth and other metal ions within a 'doped' YAG crystal lattice, eg. erbium (Er: YAG) and holmium (Ho:YAG), together with another erbium and chromium-doped garnet of yttrium, scandium and gallium (Er,Cr: YSGG).

2. Pumping mechanism
This is a source of primary energy that excites the active medium. This is usually a light source, either a flashlight or arc-light, but can be a diode laser unit or an electromagnetic coil. Energy from this primary source is absorbed by the active medium, resulting in the production of laser light.

### 3. Optical resonator

Laser light produced by the stimulated active medium is bounced back and forth through the axis of the laser cavity, using two mirrors placed at either end, thus amplifying the power. The distal mirror is totally reflective and the proximal mirror is partly transmissive, allowing light of sufficient energy to exit the optical cavity. The parallelism of the mirrors insures that the light is collimated.

### 4. Delivery system

Currently, two delivery systems are used (for surgical lasers):

- a) A flexible hollow waveguide/tube attached to a handpiece (non-contact mode) or an accesory tip of saphire or hollow metal (contact mode) connected to the end of the wave guide.

- b) A glass fiberoptic cable attached to a handpiece (non contact mode) or a saphire or quartz tip (contact mode). Most of the times it is used in contact mode.

### 5. Cooling system

Heat production is a by-product of laser light propagation. It increases with the power output of the laser and hence, with heavy-duty tissue cutting lasers, the cooling system represents the bulkiest component. Co-axial coolant systems may be air- or water-assisted.

### 6. Control panel

This allows variation in power output with time, above that defined by the pumping mechanism frequency. Other facilities may allow wavelength change (multi-laser instruments) and print-out of delivered laser energy during clinical use.

### Characteristics of laser:

With respect to the monochromatic nature of laser light, a number of emission wavelengths have been developed for the purposes of current clinical dentistry. The wavelengths of commonly used lasers range from the visible to the far infrared portions of the electromagnetic spectrum (approximately 400 - 10,600 nm). Unlike visible light, laser is monochromatic and coherent (all the waves are in the same phase & have identical wave shapes). Collimation is another prime property of laser light in that its acceptance is based upon transmission through a vacuum.

### Photobiologic Effects of Laser

#### Photothermal effect

The principle effect of laser energy is photothermal, i.e. the conversion of light energy into heat. The rate of temperature rise plays an important role in this effect and is dependent on several factors such as

- Cooling of the surgical site
- Ability of the surrounding tissues to dissipate heat
- Various laser parameters such as emission mode, power density and the time of exposure.

### Photochemical Effect

The laser light can stimulate chemical reactions (e.g. curing of composite resin) and breaking of chemical bonds (e.g. using photosensitized drugs exposed to
laser light to destroy tumor cells, a process called photodynamic therapy).

**Photoacoustic effect**

The pulse of laser energy on a crystalline structure (e.g. dental hard tissues) can produce an audible shock wave, which could explode or pulverize the tissue with mechanical energy creating an abraded crater. This phenomenon is called the photoacoustic effect of laser light.

![Fig 2. Fotona laser (Slovenia, EU)](image)

**Commonly used lasers and their wavelength:**

*Ultraviolet (0.180 μm – 0.400 μm)*

<table>
<thead>
<tr>
<th>Laser Type</th>
<th>Wavelength (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argon</td>
<td>0.275, 0.351, 0.363</td>
</tr>
<tr>
<td>Xenon Chloride</td>
<td>0.308</td>
</tr>
<tr>
<td>Xenon Fluoride</td>
<td>0.351</td>
</tr>
<tr>
<td>Neodymium:YAG (3rd harmonic)</td>
<td>0.355</td>
</tr>
</tbody>
</table>

*Visible (0.400 μm – 0.700 μm)*

<table>
<thead>
<tr>
<th>Laser Type</th>
<th>Wavelength (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhodamine 6G</td>
<td>0.450, 0.650</td>
</tr>
<tr>
<td>Argon</td>
<td>0.457, 0.476, 0.488, 0.514</td>
</tr>
<tr>
<td>Krypton</td>
<td>0.530</td>
</tr>
<tr>
<td>Neodymium:YAG (2nd harmonic)</td>
<td>0.532</td>
</tr>
<tr>
<td>Helium Neon</td>
<td>0.543, 0.632</td>
</tr>
<tr>
<td>Indium Gallium Aluminum Phosphide</td>
<td>0.670</td>
</tr>
<tr>
<td>Ruby</td>
<td>0.694</td>
</tr>
</tbody>
</table>
Lasers in Dentistry

Near-infrared (0.700 μm – 1.400 μm)

<table>
<thead>
<tr>
<th>Laser Type</th>
<th>Wavelength (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ti-Sapphire</td>
<td>0.700 – 1.000</td>
</tr>
<tr>
<td>Gallium Aluminum Arsenide</td>
<td>0.780, 0.850</td>
</tr>
<tr>
<td>Gallium Arsenide</td>
<td>0.905</td>
</tr>
<tr>
<td>Neodymium:YAG</td>
<td>1.064</td>
</tr>
<tr>
<td>Helium Neon</td>
<td>1.180, 1.152</td>
</tr>
</tbody>
</table>

Mid-infrared (1.400 μm – 3.000 μm)

<table>
<thead>
<tr>
<th>Laser Type</th>
<th>Wavelength (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erbium:Glass</td>
<td>1.540</td>
</tr>
<tr>
<td>Homium</td>
<td>2.100</td>
</tr>
<tr>
<td>Hydrogen Fluoride</td>
<td>2.600 – 3.000</td>
</tr>
<tr>
<td>Erbium</td>
<td>2.940</td>
</tr>
</tbody>
</table>

Far-infrared (3.000 μm – 1 mm)

<table>
<thead>
<tr>
<th>Laser Type</th>
<th>Wavelength (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helium Neon</td>
<td>3.390</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>5.000 – 5.500</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>10.6</td>
</tr>
</tbody>
</table>

The shorter wavelengths (500–1,000 nm) are readily absorbed in pigmented tissue and blood elements. Argon is highly attenuated by hemoglobin. Diode and Nd:YAG have a high affinity for melanin and less interaction with hemoglobin.

The longer wavelengths (2,000–10,600 nm) are more interactive with water and hydroxyapatite. The largest absorption peak for water is at the Er:YAG wavelength (just below 3,000 nm). Erbium is also well absorbed by hydroxyapatite. CO₂ (at 10,600 nm) is well absorbed by water and has the greatest affinity for tooth structure.

**Analgesic Effects of Laser**:

Low-power lasers inhibit the release of mediators from injured tissues. In other words, they decrease concentration of chemical agents such as histamine, acetylcholine, serotonin, H+ and K+, all of which are pain mediators. Low-power lasers inhibit concentration of acetylcholine, a pain mediator, through increased acetylcholine esterase activity. They cause vasodilatation and increase blood flow to tissues, accelerating excretion of secreted factors. Lasers decrease tissue edema by increasing lymph drainage. They also remove the pressure on nerve endings, resulting in stimulation decrease. These lasers decrease sensitivity of pain receptors as well as transmission of impulses. They decrease cell membrane permeability for Na⁺ and K⁺ and cause neuronal hyperpolarization, resulting in increased pain threshold. Injured tissue metabolism is increased by electromagnetic energy of laser. This is induced by ATP production and cell membrane repolarization. Low-power lasers increase descending analgesic impulses at dorsal spinal horn and inhibit pain feeling at cortex level. They balance the
activity of adrenalin and noradrenalin system (autonomous system) as a response to pain. Low-power lasers increase the urinary excretion of serotonin and glucocorticoids, increasing the production of β-endorphin.¹

**Diagnostic applications of laser:**⁵

- Laser fluorescence is commonly used for
  - Detection of dental caries (DIAGNOdent)
  - Detection of subgingival calculus
  - Detection of crown/root fractures
  - Assessment pulpal blood flow (Laser doppler flowmetry)
  - Scanning of phosphor plate digital radiographs / conventional radiographs for teleradiology.

**Laser as an in-vitro research tool:**⁶

Nd:YAG (1064nm) is utilized for Raman spectroscopic analysis of tooth structure and Terahertz imaging of internal tooth structure. Er:YAG (2940nm) can be used for breakdown spectroscopic analysis of tooth structure. Argon (488 and 515nm) is useful in confocal microscopic imaging of soft and hard tissues, flow cytometric analysis of cells and cell sorting. Helium-neon (633nm) and other diode lasers are proved to be successful in profiling of tooth surfaces and dental restorations.

**LASERS IN ORAL MEDICINE**

Laser vaporization offers a precise means of treating oral lesions that reduces the potential for pain and scarring. Oral lesions treated with laser surgery include aphthous ulcers, lymphangiomas, hemangiomamas and verrucous carcinomas. Laser irradiation acts in the final stage of HSV-1 replication by limiting viral spread from cell to cell and that laser therapy acts also on the host immune response unblocking the suppression of proinflammatory mediators induced by accumulation of progeny virus in infected epithelial cells.⁷

A more powerful laser-initiated photochemical reaction is photodynamic therapy (PDT), which has been employed in the treatment of malignancies of the oral mucosa, particularly multi-focal squamous cell carcinoma.⁸ Laser-activation of a sensitizing dye in PDT generates reactive oxygen species. These in-turn directly damage cells and the associated blood vascular network, triggering both necrosis and apoptosis. There is accumulating evidence that PDT activates the host immune response, and promotes anti-tumour immunity through the activation of macrophages and T lymphocytes.

CO₂ laser and diode laser has been found useful for the treatment of vascular anomalies of the oral cavity and concluded that laser is a suitable tool for the treatment of these lesions and sometimes the laser cannot remove the entire tumour in one treatment, so more treatments may be needed. Infrared laser photodynamic therapy over the projection of the sinuses will lower the sensation of pressure and tenderness. Irradiation into the nostrils will reduce the mucosal swelling and open the nasal obstruction.⁹

**LASERS IN PERIODONTICS:**

The application of laser in periodontics was first documented in 1985 when CO₂ laser was used for the removal of phenytoin hyperplasia. Early efforts were limited to those soft tissue procedures like gingivoplasty, operculectomy, gingival troughing, crown lengthening, Sulcular debridement (removal of inflamed soft tissue in the periodontal pocket), flap surgery and for guided tissue regeneration.¹⁰

Erbium lasers show potential for effective root debridement. The Er:YAG laser has been shown, in vitro, to remove calculus and to negate endotoxin.¹¹ Clinical data also exist that suggest the Er:YAG laser can result in a superior calculated clinical attachment gain compared with mechanical scaling and root planning.

**LASERS IN CONSERVATIVE DENTISTRY AND ENDODONTICS:**

Er:YAG laser is used for caries removal, restoration removal, hard tissue surface roughening and etching, enameloplasty, excavation of pits and fissures for placement of sealants, hypersensitive dentin. Esthetics and smile has become important issues in modern society. Bleaching has become the common method for tooth whitening. Bleaching using diode lasers results in immediate shade change and less tooth sensitivity and is preferred among in office bleaching systems.¹²
Lasers in Dentistry

Lasers are also useful for access cavity preparation, pulpotomy, cleaning and shaping of the root canal. In periapical surgery, laser is used for incision of soft tissue to prepare a flap and expose the bone, cutting bone to prepare a window access to the apex (apices) of the roots, apicoectomy – amputation of the root end, root end preparation for retro filling, removal of pathological tissues (i.e., cysts, neoplasm or abscess) and hyperplastic tissues (i.e., granulation tissue) around the apex.\(^\text{13}\)

**LASER IN ORAL AND MAXILLOFACIAL SURGERY:**

A diode laser can be used for incision instead of a scalpel. Hard tissue lasers are used for osteoplasty and osseous recontouring (removal of bone to correct osseous defects and create physiologic osseous contours), ostectomy (resection of bone to restore bony architecture, resection of bone for grafting, etc.), osseous crown lengthening, vestibuloplasty, sinus lift procedure. The yttrium-scandium-gallium-garnet (YSGG) laser is the optimal choice for not cutting the sinus membrane. The YSGG laser can also be used to make the osteotomy for a ramal or symphyseal block graft.

Diode lasers are attracted to pigments. Frena are typically thicker fibrous tissue and have very little pigment to them. The lack of pigment and more fibrous nature of the tissue require higher energies to ablate this tissue. Other wavelengths such as Er:YAG lasers may ablate frena faster, and can be used in non contact mode, but the drawback compared to diode lasers is an increased risk of bleeding.\(^\text{14}\)

**LASERS IN PROSTHODONTICS:**

Fixed Prosthetics: \(^\text{15}\)

One of the essential elements of success of lasers in fixed prosthodontics is the care and accuracy of the component treatment stages and the laser often can confer minimal collateral tissue damage through proper consideration of the use of minimal laser energy of the correct wavelength. Argon laser energy has peak absorption in haemoglobin, thus lending itself to providing excellent haemostasis and efficient coagulation and vaporization of oral tissues. The removal and recontouring of gingival tissues around laminates can be easily accomplished with the argon lasers.

Most commonly used in

i. Crown lengthening
ii. Soft tissue management around abutments
iii. Osseous crown lengthening
iv. Troughing
v. Formation of ovate pontic sites
vi. Altered passive eruption management
vii. Modification of soft tissue around laminates

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*Fig 3. Nd:YAG (200 μm laser fiber at 1.5 W and 15 Hz) used for root canal disinfection.*

*Fig 4. Er:YAG Lasers for Fast and Precise caries removal and tooth preparation.*
viii. Bleaching  
ix. Veneer removal  
x. Laser etching of enamel, dentin, titanium, zirconia  

In pre-prosthetic surgery:  
i. Treatment of undercuts  
ii. Tuberosity reduction  
iii. Torus reduction  
iv. Soft tissue modification  
v. Epulis fissurata  
vi. Denture stomatitis  
vi. Residual ridge modification  

In Implant dentistry:  
i. Implant recovery  
ii. Implant uncovering  
iii. Implant site preparation  
iv. Laser assisted cementation  
v. Implant Surface Modification Using Laser Guided Coatings  
vi. Peri-implantitis  

Laser applications in the dental laboratory:  
I. Scanning of models for orthodontics.  
II. Holographic interferometry.  
III. Scanning of crown preparations for CAD-CAM  
IV. Welding of alloys (Co-Cr, Ni-Cr, gold, titanium)  
V. Sintering of ceramics  
VI. Laser pointer surveyor  
VII. CAD-sintering fabrication  
VIII. CAD-polymer fabrication of splints or surgical models Cutting of ceramics  

Laser technology in fabrication of maxilla facial prosthesis:  
i. Laser Digitizing Technology  
ii. Selective Laser Sintering (SLS) technology  

Laser Hazards and Laser Safety:  

The subject of dental laser safety is broad in scope, including not only an awareness of the potential risks and hazards related to how lasers are used, but also a recognition of existing standards of care and a thorough understanding of safety control measures.  

**Laser Hazard Class for according to ANSI and OSHA Standards:**  

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Low powered lasers that are safe to view</td>
</tr>
<tr>
<td>IIa</td>
<td>Low powered visible lasers that are hazardous only when viewed directly for longer than 1000 sec.</td>
</tr>
<tr>
<td>IIb</td>
<td>Low powered visible lasers that are hazardous when viewed for longer than 0.25 sec.</td>
</tr>
<tr>
<td>IIIa</td>
<td>Medium powered lasers or systems that are normally not hazardous if viewed for less than 0.25 sec without magnifying optics.</td>
</tr>
<tr>
<td>IIIb</td>
<td>Medium powered lasers (0.5w max) that can be hazardous if viewed directly.</td>
</tr>
<tr>
<td>IV</td>
<td>High powered lasers (&gt;0.5W) that produce ocular, skin and fire hazards.</td>
</tr>
</tbody>
</table>

The types of hazards can be grouped as follows:  

1. Ocular injury  
2. Tissue damage  
3. Respiratory hazards  
4. Fire and explosion  
5. Electrical shock  

Proper training and education should be given for all the dental personnel to follow standard operating procedures. Personal protective equipment like appropriate eye wear, clothing etc.  

**CONCLUSION:**  

It is most important for the dental practitioner to become very familiar with the principles of recent advances like laser and should have thorough clinical experience. Although there is some overlap of the type of tissue interaction, each wavelength has specific qualities that will accomplish a specific treatment objective. Laser energy requires some procedures to be performed much differently than with conventional instrumentation, but the indications for laser use continue to expand and further benefit patient care.
REFERENCES:

ABSTRACT

Context: Mineral trioxide aggregate [MTA] has several superior properties as a root end filling material but its antibacterial property is not lethal against E. faecalis which is the main organism for endodontic treatment failure. Hence antibacterial mixing agents was considered.

Aim: The aim of this in vitro study was to compare and determine whether the chlorhexidine gluconate[CHX] and triple antibiotic agent(ciprofloxacin/metronidazole/minocycline) when used as a mixing agent for mineral trioxide aggregate[MTA] would enhance the antimicrobial activity against E. faecalis.

Materials and methods: 30 single rooted tooth samples were endodontically treated, sterilized and divided into three groups. Group A, B and C whose root ends were filled with MTA mixed in saline, CHX and antibiotic paste respectively. The antimicrobial property was studied by placing MTA blocks in BHI (brain heart infusion broth) agar plates suspended with bacteria and incubating it, after which the inhibition zones were measured.

Statistical analysis used: Kruskal Wallis test to ascertain the statistical significance.

Results: Group C showed enhanced antimicrobial property when compared to other groups.

Key words: MTA, antimicrobial property, CHX, triple antibiotic paste.

Key message: The properties of MTA will be enhanced when mixed with triple antibiotic paste or CHX.

INTRODUCTION:

When non-surgical endodontic treatment fails periradicular surgery is advised. But the success of the periradicular surgery depends on the root end sealing material used. Ease of handling, dimensional stability, radio opacity, insolubility and moisture resistance are the properties of an ideal root end filling material[1]. MTA which has several potential clinical applications has all the above mentioned properties in addition has the ability to stimulate osteoblastic activity. The original study of Torabinejad et al found that MTA was effective against some facultative microorganisms but not...
against other bacterial strains, including Enterococcus faecalis. E. faecalis is a nonspore-forming, fermentative, facultatively anaerobic, Gram-positive coccus. It can penetrate deep into dentinal tubules and resist bactericidal substances commonly used in endodontic procedures. Chlorhexidine (CHX) which is active against Gram positive and Gram-negative bacteria, especially E. faecalis facultative anaerobes and aerobes, moulds, yeasts and viruses acts by adsorbing onto the cell wall of the microorganism and causing leakage of intracellular components and eventually leading to cell death. The triple-antibiotic paste was first tested in vitro by Sato et al. and was found to be effective in treating dentin infected with E. faecalis. Hence this study was done to compare the antimicrobial property of MTA when mixed with CHX and triple antibiotic paste.

**MATERIALS USED IN THE STUDY:**

- Extracted human lower premolars (30)
- Enterococcus faecalis strain
- Culture media (Pfizer selective Enterococcus agar)
- Culture media jar (1000 ml jar)
- Culture plates (Diameter 60mm; 25 nos)
- Distilled water
- Micropipette, micropipette tips (0.5µl)
- Incubator, Autoclave
- Glass test tubes (5ml)
- Plastic test tubes (5ml), Swab and cotton
- Bunsen burner, Spirit
- Gloves and face mask
- Permanent marker
- Centrifuge tubes (3ML)
- Test tube stand
- Diamond points (round bur 08)
- Sterilization pouches and pouch sealer
- High speed air rotor hand piece.
- K – files
  - Size 10, Sizes 15 – 40, Sizes 45 – 80
  - Sodium HypoChlorite 3%
  - 5 ML irrigating syringe
  - Mini Endo Block, PulpDent
  - 17% EDTA, Saline
  - Straight hand piece, Micro motor unit
  - Carborundum disks with mandrel
  - Lentulo spiral Ball burnisher
  - Contra angle micromotor hand piece
  - Epoxy glue
  - Nail varnish.
  - Digital Camera
  - Pro root tooth colored MTA.
  - Triple antibiotic (ciprofloxacin, metronidazole and minocycline)
  - Chlorhexidine gluconate,
  - Measuring scale

**METHODOLOGY**

**Culturing of the bacterial strain**

20 ml BHI broth was taken in a test tube and heated in a Bunsen burner for 60 seconds and allowed to cool to reach room temperature. The freeze dried vacuum sealed E. faecalis sample was opened from one end and the sample was mixed in the BHI broth by shaking followed by moving the test tube in circular motion. The test tube was then incubated for 4 hours before inoculation.

**Preparation of the teeth samples**

30 extracted human single rooted mandibular premolars[fig-1] were collected and stored in saline. The diamond points used for access cavity were autoclaved. Access opening was performed with a high speed air rotor handpiece with water coolant. The initial entry was made with a 0.08 round diamond abrasive point. The access cavity was extended with a non end cutting diamond point and the working length was estimated by visual method by deducting 1mm from the initial file visible beyond the apex. The canals were instrumented to an apical size of ISO file size #60 with step back technique with recapitulation after every instrument used. The canals were copiously irrigated...
To Determine the Antimicrobial Property of MTA

with 5ml of 3% sodium hypochloride between each instrument.

The smear layer was removed with a 2ml aqueous solution of 17% EDTA. The teeth samples were then flushed finally with saline as a final rinse. Then decoronation was done. The roots were kept on wet gauze to maintain humidity and autoclaved in sealed sterilization pouches sealed for 15 mins at 121º C.

After sterilization, 2 samples were inoculated in BHI broth and incubated anaerobically for 24 hours at 37º C to confirm sterility of the samples. After confirming the sterility of the broth, the study was performed in aseptic conditions and the 30 teeth were randomly divided into 3 groups with 10 samples in each group. Groups are

Group A – MTA mixed with sterile water
Group B – MTA mixed with chlorhexidine
Group C – MTA mixed with triple antibiotic paste.

Preparation of MTA:
Tooth colored ProRoot MTA was used in this study. 100mg of MTA was taken for each Group. In Group A MTA was mixed with sterile water according to the manufacture instructions. In this Group 100mg of MTA was mixed with 36μl of sterile water.
In Group B MTA was mixed with 36μl chlorhexidine 0.12% solution.
In group C triple antibiotic was mixed with saline and then 36μl test solution was mixed with MTA.

Placement of the root end filling material:
Root-end resections were made by removing 3 mm of the apex at a 90° angle to the long axis of the root with a cylindric carbide bur using a high-speed handpiece with coolant water spray.

The root experimental samples were randomly divided into 3 groups of 10 each (MTA with sterile water, MTA with 0.12% CHX, MTA with triple antibiotic paste). The material was mixed and placed into the root end with an amalgam carrier.

Agar diffusion test:

200 μl of bacterial suspension (approximately 5 ×10^7 colony-forming units) were spread on BHI agar plates. Freshly mixed specimens of size 5mm diameter from each test material were prepared and placed in the agar plates. After incubation at 37ºC for 24 hrs and 7 days under anaerobic conditions, the agar plates were examined for bacterial-inhibition zones. The diameter of the halo formed in the bacterial lawn was measured in millimeters. An independent observer who was blind to the study measured the zones of inhibition[fig-2].

RESULTS:
The zones of inhibition of the three groups MTA/sterile water, MTA/CHX, MTA/antibiotic paste were measured in millimetres after 7 days in anaerobic condition. The results obtained are shown in the Table-1.

The mean value of the individual groups was subjected to Kruskal Wallis test to ascertain the statistical significance.

The mean value obtained in Group A is 11.1mm. The mean value obtained in Group B was 13.6mm. The mean value obtained in Group C was 14.1mm. (Table-2).

Comparing the data obtained from the three Groups (Group A Versus Group B and Group C) shows (p<0.005) significance value. Group A was compared with Group B (p<0.011) showed significant difference. Group A was compared with Group C (p<0.002) showed significant difference. No significant difference was found when Group B was compared with Group C (p>0.529).

Coming to the sealing ability no turbidity was formed in the lower compartment of the test apparatus in any of the groups. Hence there was no significant difference in the sealing ability of the three groups.

TABLE I: Zone of inhibition of three groups (in millimeters)

<table>
<thead>
<tr>
<th>Samples</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTA/sterile water</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>10</td>
<td>11</td>
<td>13</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>MTA/CHX</td>
<td>13</td>
<td>11</td>
<td>16</td>
<td>18</td>
<td>13</td>
<td>15</td>
<td>12</td>
<td>10</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>MTA/antibiotic</td>
<td>14</td>
<td>12</td>
<td>15</td>
<td>16</td>
<td>10</td>
<td>16</td>
<td>15</td>
<td>14</td>
<td>13</td>
<td>16</td>
</tr>
</tbody>
</table>
TABLE II: Mean Zone of inhibition of three groups (in millimeters)

<table>
<thead>
<tr>
<th>Material used</th>
<th>Mean</th>
<th>K.W value</th>
<th>P value</th>
<th>Multiple K.W test</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTA/sterile water</td>
<td>11.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTA/CHX</td>
<td>13.6</td>
<td>10.620</td>
<td>0.005</td>
<td>1 Vs 2,3</td>
</tr>
<tr>
<td>MTA/antibiotic</td>
<td>14.1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DISCUSSION:**

Several different microorganisms play a key role in endodontic treatment failures of which E. faecalis is the most frequently recovered microorganism from periapical periodontitis. Treatment outcome depends on successful elimination of the associated microorganisms and infected tissues as well as the effective seal of the root-end site. The root-end filling material used should also have certain anti-microbial property to prevent future recontamination.

Cabiscol et al demonstrated that MTA in an aerobic atmosphere can generate ROS (reactive oxygen species), which have antimicrobial activity. The apical third of the infected root canal is an anaerobic atmosphere, hence the use of MTA does not favour the formation of ROS. E. faecalis has high alkali tolerance which might result in resistance to certain intracanal medicaments and ability to survive conventional root canal therapy.

The original study of Torabinejad et al found that MTA was not effective against E. faecalis. Hence this study was done to compare the antimicrobial property of MTA when mixed with CHX and triple antibiotic paste.

MTA itself has some antimicrobial property due to its high PH of 11 to 12 which it can maintain for 78 days. E. faecalis can survive in extra alkaline environment. Perhaps the inherent, persistent high alkali of MTA is just enough to overwhelm the E. faecalis, which could have contributed to the zone of inhibition observed in the Group I MTA/sterile water.

It has been proved that CHX has better antimicrobial property, but Pucher states that CHX was shown to be highly cytotoxic to human fibroblasts in vitro.

Gabler et al concluded that serum present during the initial healing period seems to provide significant protection against these cytotoxic effects. Stowe et al have demonstrated that MTA has better antibacterial properties when mixed with 0.12% CHX instead of water.

Luiz et al stated that When combined with calcium hydroxide, production of ROS is increased. It is proved that MTA on hydration produces calcium hydroxide. we assume that this hydration of calcium hydroxide combined with CHX increases the production of ROS and has better antibacterial property than MTA mixed with sterile water in this study.

The first reported local use of an antibiotic in endodontics was in 1951, when Grossman used a polyantibiotic paste known as PBSC (a mixture of penicillin, bacitracin and streptomycin and caprylate sodium). In this study the antibiotics used are ciprofloxacin, metronidazole and minocycline pastes.

Metronidazole is a nitroimidazole compound that exhibits a broad spectrum of activity against anaerobes but it had no activity against aerobes. Tetracyclines, are a group of bacteriostatic antimicrobials having broad spectrum of activity against both gram-positive and gram-negative microorganisms. In endodontics, tetracyclines have been used to remove the smear layer from instrumented root canal walls for irrigation of apical root-end cavities during periapical surgical procedures.

Ciprofloxacin is a synthetic Floroquinolone. Ciprofloxacin has very potent activity against gram-negative pathogens but very limited activity against gram-positive bacteria. Most anaerobic bacteria are resistant to ciprofloxacin hence it is often combined with metronidazole in the treatment of mixed infections.

In the present study the zone of inhibition was more for...
MTA/antibiotic mixture than MTA/CHX and MTA/water. Here the interaction between MTA and triple antibiotic paste was not known. In this study E. faecalis was used, which was a facultative anaerobe. The action of metronidazole is more predominant for anaerobic bacteria. The use of a combination of drugs was also another reason for more antibacterial activity. Another advantage of using a combination of drug is that, it will decrease the likelihood of the development of resistant bacterial strains. Sato et al. evaluated the potential of this mixture to kill bacteria in the deep layers of root canal dentin in situ.

In present study it is noted that MTA/CHX mixture sets more rapidly than MTA/water. This was concluded in the study by Stowe et al., that MTA/CHX mixture seemed to set more rapidly (1–2 min) than the MTA/water mixture (5–6 min) and take on a more crumbly texture at placement.

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Pulmonary function test in chronic kidney disease patients: A study from tertiary care hospital

P. Gupta¹, Mukund G²

1. Associate Professor, Nephrology Unit, Department of Medicine, Pt. J.N.M. Medical college, Raipur(C.G)
2. MD Medicine, Private Practitioner, Raipur

Corresponding author:
Dr. Punit Gupta
Associate Professor, Nephrology Unit, Department of Medicine, Pt. J.N.M. Medical college, Raipur(C.G)
Email: punit282004@yahoo.co.in Mobile no- 0900920000

ABSTRACT
Context: Malnutrition and inflammation are associated with impaired pulmonary function in pre-dialysis patients.
Aims: To study variation in Spirometry due to malnutrition and inflammation.
Methods and Material: Fifty Chronic Kidney Disease patients admitted in Pt.J.N.M medical college & GBG kidney care hospital, Raipur were studied. Pulmonary function test was performed as per "ATS/ERS TASK FORCE Guidelines." Malnutrition and inflammation were assessed by Subjective Global Assessment scores (SGA) and CRP respectively.
Statistical analysis used: Chi-square test, Student's t-test and Spearman’s rank correlation.
Results: Males were 70% and females were 30%. Restrictive pattern on pulmonary function test was present in 84%. Pulmonary restriction was severe in 43% males, and 8.3% females. Subjective global assessment score was B or C in 94% of which 20% were SGA C. Mean predicted Forced Vital Capacity was 37 ± 11% in SGA C and 82 ± 5% in SGA A. Mean predicted Forced Expiratory Volume in 1st second (FEV1) was 41 ± 13% in SGA C and 86 ± 3% in SGA A. Mean Peak Expiratory Flow Rate (PEFR) was 27 ± 9% in SGA C and 65 ± 23% in SGA A. Spearman’s rank correlation (Rho) of CRP with percent predicted FVC, FEV1 and PEFR were Rho= -0.84, -0.60 and-0.35 respectively.
Conclusions: Restrictive pattern was the most common pulmonary function anomaly. (P< 0.001). Severe restriction was significantly more common in males than in females (P< 0.01). Percent predicted FVC, FEV1 and PEFR were significantly lower in severely malnourished than in well nourished. (P< 0.05). Severity of restriction on pulmonary function test increased in co-relation with increase in the level of CRP.

Key-words: Malnutrition, Inflammation, Chronic Kidney Disease, pulmonary function, Subjective Global Assessment scores (SGA), CRP

INTRODUCTION
Chronic kidney disease (CKD) is a devastating medical, social, and economic problem for patients and their families.¹ Prevalence CKD patients will continue to rise, reflecting the growing elderly population and increasing numbers of patients with diabetes and hypertension.²⁵ Inflammation and malnutrition are common findings in patients of chronic kidney disease (CKD). Approximately 30-50% of patients with CKD have elevated serum levels of C-reactive protein (CRP). In CKD patients the acute phase response may be influenced by a number of factors such as age, race, residual renal function and gender.² Since malnutrition also occurs in pre-dialysis patients, it is evident that dialysis-unrelated factors, e.g. infectious and inflammatory complications, as evidenced by increased levels of pro-inflammatory cytokines and CRP, is common in CKD patients and may cause malnutrition and progressive atherosclerotic cardiovascular disease.³⁶,⁷,⁸ SGA is a clinically useful measure of protein-energy nutritional status and is helpful in identifying patients with increased risk of morbidity and mortality in the setting of CKD.⁹,¹⁰ There is controversy over the degree to
which albumin and nutrition are interrelated.\textsuperscript{11} Physiologically, the lungs and kidneys are intricately related,\textsuperscript{12} Impairment of spirometric function in patients with renal insufficiency is continual, with reduction of GFR, and thus small airways dysfunction may be expected not only in patients with end-stage renal failure, but also in those with moderate GFR reduction.\textsuperscript{13} This pulmonary dysfunction may be a direct result of the circulation of toxins or, indirectly, from the excess volume due to the increased quantities of circulating body fluids, anemia, immunological suppression, drugs and deficient nutrition.\textsuperscript{14} A low lung function has been associated with increased levels of fibrinogen, C-reactive protein and white blood cells.\textsuperscript{15} Several papers reported that inflammation markers fibrinogen and C-reactive protein (CRP) were inversely associated with lung function in cross-sectional analyses.\textsuperscript{16} FVC is significantly and inversely associated with plasma levels of inflammation sensitive plasma proteins. Impaired pulmonary function was associated with malnutrition and inflammation.\textsuperscript{17} To best of our knowledge there is no Indian study regarding the association of CRP and SGA with impaired pulmonary function in pre-dialysis patients of CKD. Hence we have done this study to establish the relation between SGA, a marker of protein energy wasting and CRP, a marker of inflammation with lung function in CKD patients.

AIMS AND OBJECTIVES
Study of was conducted in the department of medicine, Dr.B.R.A.M hospital, Raipur (C.G) with the aims and objectives of:

1. To study Statistical correlation between various stages of CKD and pulmonary function anomalies (FVC, FEV1, FVC/FEV1, and PEFR)
2. To study Statistical correlation between Subjective global assessment score and pulmonary function anomalies (FVC, FEV1, FVC/FEV1, and PEFR)
3. To study Statistical correlation between Serum CRP with Pulmonary function anomalies (FVC, FEV1, FVC/FEV1, and PEFR)
4. To assess the Statistical correlation between Subjective global assessment score and serum CRP with pulmonary function anomalies (FVC, FEV1, FEV1/FVC and PEFR)

SUBJECTS AND METHODS

The study was conducted in the department of medicine, Pt. J.N.M. medical College and Dr. B.R.A.M. hospital, Raipur. In this study 50 chronic kidney disease patients, as per National Kidney Foundation, 2002 Kidney Disease outcome Quality Initiative (K/DOQI) guidelines, admitted in the wards of Medicine Department were selected as cases.

Inclusion criteria for study group
1. Patients with CKD according to the NFK-DOQI definition.
2. Stage 0, I, II, III, IV and V CKD.
3. Diabetics and non diabetics with CKD.
4. Chest X ray showing absence of any active or old lung pathology.
5. If Smoker then with <1 Cigarette pack per year.
6. If Tobacco chewer then included in the study.
7. Age >15 years to ≤ 70 years.

Patients were assessed by:

a. History and physical examination
Detailed clinical history was recorded regarding age, sex, presenting complaints and duration of symptoms and significant past history of each patient. All patients underwent complete clinical examination including pulse, blood pressure, general examination and systemic examination. Height and weight were expressed in centimetres and kilograms respectively.

b. Investigations: All routine investigation was done in all the cases.

c. Assessment of Malnutrition, inflammation and pulmonary function abnormalities.

i) Malnutrition: Malnutrition was assessed by Subjective global assessment, body mass index and serum albumin. Every patient was assessed and different SGA scores were given as per Detsky et al.\textsuperscript{22} ii) Inflammation: Inflammation was assessed by measuring CRP (C reactive protein). The plasma concentrations of CRP were measured by CRP Latex agglutination method.

iii) Pulmonary Function Test: Pulmonary function test was performed three times and best of the three efforts were considered as appropriate. PFT was performed as per "ATS/ERS TASK FORCE: STANDARDISATION OF LUNG FUNCTION TESTING" 2005.

Following activities were strictly avoided before the spirometry
- Smoking within at least 1 h of testing
- Consuming alcohol within 4 h of testing
- Performing vigorous exercise within 30 min of testing
- Wearing clothing that substantially restricts full chest
and abdominal expansion
- Eating a large meal within 2 h of testing
- Lab records: Ambient temperature, barometric pressure and time of day were recorded.

**Statistical Analysis**
Chi-square test has been applied to find any association between two categorical variables. Student’s t-test has been used to find any significant difference between the normal and abnormal groups of variables with respect to average values. Spearman’s rank correlation was applied to find relation between the Level of CRP and FVC, FEV, and FEV/FVC.

**RESULTS**

The number of male patients was 2.33 times higher than the number of female patients of CKD. Mean age for all patients was 42.58 ± 13.85 years. Mean age of male patients was 43.6 ± 13.8 years while that of female patients was 40.2 ± 14.14 years.

The leading cause of chronic kidney disease in patients from urban areas (n=25) is diabetes mellitus accounting for 24% along with chronic glomerulonephritis (24%) of cases, followed by Hypertension (16%), Obstructive nephropathy (12%), UTI/Chronic pyelonephritis (8%) and sickle cell disease, renal stone and Polycystic Kidney disease in 4% each.

Among patients from rural areas (n=25) chronic glomerulonephritis was the etiology of chronic kidney disease in 20% of cases followed by obstructive nephropathy in 16% of cases. While Renal stone, UTI and hypertension were observed in 12% each. In patients from rural areas diabetes mellitus was etiological factor responsible for CKD in 8% while in urban it accounted for 24% of cases.

Diabetes was significantly more common in urban cases as compared to rural \((P<0.01)\).

Restrictive pattern on pulmonary function test was the most common anomaly accounting for 84% of the total cases followed by mixed pattern (6%) and obstructive pattern (4%). No anomaly was detected in 6% of the cases.

Severe restriction was significantly more common in males as compared to females.

Majority of patients who had restrictive pattern on PFT testing 38 (90.47%) were in stage III, IV and V (Overt nephropathy) while only 4 (9.53%) were in stage I and II (covert nephrophathy).

Severe restriction in stage V CKD was significantly more common than in stage III and IV.

There was no statistically significant difference between the mean hemoglobin in males and females in any stage of CKD. That Mean Hb was low in stage IV \((6.62 ± 1.90)\) and stage V \((6.68 ± 2.69)\) CKD as compared to other stages.

Malnutrition in the form SGA B or C was present in 94% of the patients included in study. Out of which 20% were severely malnourished. More Co-morbidities in the form of diabetes, hypertension and smoking were present in SGA C as compared to SGA B. Mean Serum albumin was significantly lower in severely malnourished (SGA C) as compared to well nourished (SGA A). Markers of inflammation were significantly more common in severely malnourished as compared to well nourished.

Mean forced vital capacity was lowest \((37 ± 11)\) in severely malnourished SGA C and highest \((82 ± 5)\) in well nourished (SGA A). Mean forced expiratory volume in 1st second \((FEV_1)\) was lowest \((41 ± 13)\) in severely malnourished (SGA C) and highest \((86 ± 3\) in well nourished (SGA A). Mean Peak Expiratory Flow Rate \((PEFR)\) was lowest in SGA C \((27 ± 9)\) and highest in SGA A \((65 ± 23)\). Mean FEV/FVC is almost same in SGA A, SGA B and SGA C.

Severe restriction is seen in 70% of severely malnourished (SGA C). Mean Age of hs CRP positive patients was significantly more than hs CRP negative patients. The mean hsCRP level was 9.6 ± 10.8 (range 1.2-38.4) mg/l. Mean GFR in CRP positive patients were 29.4 while it was 40 in CRP negative patients. Lower GFR was present in CRP positive patients. Significant negative correlations were found between hs CRP and the percent predicted value of FVC%, FEV1 and PEFR.

**DISCUSSION**

Analysis of Subjective Global Assessment status in CKD

There was no statistically significant difference as per the comorbid conditions are concerned between malnourished and wellnourished as per SGA. Various studies reported protein energy wasting in 19 to 20% while other studies demonstrate prevalence of malnutrition in the range of 30 to 50%. In our study the total patients with malnutrition were 47 out of 50 that shows that 94%. The reason for this is that in Indian cases malnutrition is widely prevalent. In eastern India, overall prevalence of malnutrition was 65% in predialysis patients. The cause of such a high amount
of malnutrition in our study can be because of its small sample size (n=50). Apart from that, most important is that the study is being done on low socioeconomic strata of the society. They are already malnourished in nature. If we consider severe malnutrition then our study demonstrated severe malnutrition in 20% (n=10). SGA is deficient in differentiating between mild to moderate malnutrition. Protein intake of Indian patients on a vegetarian diet is normally low. With low protein intake the wear and tear of the skeletal muscles is on stake, protein calorie malnutrition ensues and is responsible for the high SGA Score.

In study done under the name of CANUSA (CANADA-USA (CANUSA) peritoneal dialysis study group under principal investigators Churchill DN, et al 1996 on patients of CKD, there were 30 patients (4.2%) with severe malnutrition, 364 (51.2%) with mild to moderate malnutrition according to SGA. While in our study 20% (n=10) had severe malnutrition and 74% (n=37) had mild to moderate malnutrition. According to SGA, 70% of the patients had a normal nutritional status, 29% were classified as being mild to moderately malnourished and only 1% were classified as being severely malnourished in the study done by. Jansen MAM, et al 2001 on behalf of NECOSAD Study Group.

Prevalence of malnutrition in the form of SGA > 1 i.e SGA B or C was 36%. Our results suggest that the prevalence of inflammation among the pre-ESRD population is high and that an increased CRP in pre-dialysis patients predicts a constant inflammatory state. And this result is in accordance of Barany P et al 2001 and Prakash J, et al 2007.

On measuring the mean CRP level of 18 patients, the CRP level of which was documented by our laboratory. We found that the mean CRP level was 9.6 ± 10.8 (range 1.2-38.4). As compared to the result of Ortega O, et al 2002 the average CRP level in their study was 8.3 ± 14.2 mg/l (range 2-95 mg/l; median 2 mg/l). The mean value of hsCRP was 14.3 ± 11.4 mg/L (range 0.36-44.2 mg/L) in the study done by Abraham G et al 2009.

Spearman’s rank correlation of different parameters of pulmonary function with level of hs CRP

We compared the level of hsCRP in hsCRP positive patients with that of % decrease in FVC, FEV, and PEFR. We applied Spearman’s rank correlation for this variables and found significant degree of negative correlation of hs CRP with that of FVC%, FEV, % but not for PEFR.

In the study done by Nascimento MM, et al they got significant association between the CRP level and FVC%, FEV, % and PEFR. Thus serum CRP assay must be routinely done on pre-dialysis patients as there level negatively correlates with the degree of restriction in pulmonary function testing. Thus measures to curb high level of inflammation in these pre-dialysis patients such as higher antibiotic support and higher and proper nutrition be given to these patients thus preventing the fatal complication of high CRP level in these patients.

CONCLUSION

The present study shows that chiefly malnutrition and inflammation are responsible for severe restriction encountered on pulmonary function in pre-dialysis patients reported significant difference in mean FEV₁ (% predicted) and FVC (% predicted) in well nourished and malnourished but not regarding PEF (% predicted). The different spirometric parameter namely Spo₂, FEV₁, FVC, FEV₁/FVC and PEF was compared in between CRP positive and CRP negative group. Only statistically significant difference was found in mean FVC of the two groups. Nascimento MM, et al 2004 reported the difference in FEV₁, FVC, and FEV₁/FVC and mean PEF.

The Present study represents the restrictive pattern of intrapulmonary in nature. The reduction can be due to an increase in quantity of interstitial tissue in lung, for example interstitial pneumonitis, fibrosis, infiltration or edema. Alternatively the reduced lung compliance can be due to fibrosis of the visceral pleura and subpleural tissue. Any of these changes can increase the retractive force exerted on the walls of lung airways; the retraction reduces the airway resistance and increases the FEV1%. In this circumstance the peak expiratory flow can be well preserved or even supra maximal early in the disease process but, once lung volume becomes severely reduced the PEF also declines because it is then measured at a relatively small lung volume.

Spearman’s rank correlation of different parameters of pulmonary function with level of hs CRP

We compared the level of hsCRP in hsCRP positive patients with that of % decrease in FVC, FEV, and PEFR. We applied Spearman’s rank correlation for this variables and found significant degree of negative correlation of hs CRP with that of FVC%, FEV, % but not for PEFR.

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CONCLUSION

The present study shows that chiefly malnutrition and inflammation are responsible for severe restriction encountered on pulmonary function in pre-dialysis patients.
cases of CKD. Improvement in malnutrition by adequate nutrition to patients of CKD leads to a better outcome as far as pulmonary functions are concerned. Numerous studies have shown that there is a relation of FVC and cardiovascular mortality thus by improvising nutrition we can not only improvise the pulmonary function but also improve the cardiovascular profile even before starting dialysis.

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ABSTRACT

Objectives: To correlate clinical presentation and gender of patients with oral lichen planus with chronic liver disease by estimating the serum transaminase level.

Material & Methods: The present study included two groups; test group (patients with oral lichen planus) and control group (normal healthy adults without any clinical evidence of oral mucosal lesions) of 45 patients each. Both the groups were subjected to serum transaminase level test.

Results: At least one of two assays (either AST or ALT) showed altered results in 3 patients in the control group and 11(13.33%) patients in the test group. Both assays were raised in 2 patients in the control group and 6 patients in the test group. Out of these, six (4 males and 2 females) patients with elevated transaminase levels had erosive lesions.

Conclusion: We conclude that the presence of oral lichen planus particularly the erosive variant should be seen as a presentation of alteration in the functioning of the hepatocytes, which on further investigations might bring to light an asymptomatic liver disease.

Key Words: Oral Lichen Planus, Alanine transaminase (ALT), Aspartate transaminase (AST), Chronic active hepatitis, Primary biliary cirrhosis

INTRODUCTION

Lichen planus is derived from a Greek word LICHEN which means ‘Tree moss’ and a Latin word PLANUS which means ‘flat’.  

The strange name of the condition was provided by the British physician Erasmus Wilson, who first described the lesion in 1869. 

Lichen planus, one of the most common dermatologic immunopathological diseases to affect the oral mucous membrane, is a chronic, inflammatory, mucocutaneous disorder of undetermined etiology. The care and management of patients with oral lichen planus continues to challenge even the most experienced clinician, and strongly suspected associations with chronic liver disease further complicate matters.

In recent years a number of case reports have drawn attention to the possible association of mucocutaneous lichen planus with chronic liver diseases – namely, primary biliary cirrhosis and chronic active hepatitis being the prime ones, followed by primary sclerosing cholangitis, Wilson's disease, hemochromatosis and alpha-1-antitrypsin deficiency.

The histological abnormalities of lymphocytic infiltration of parenchymal tissue in liver disease and oral lichen planus, along with immunological abnormalities, autoimmune phenomenon and humoral immunity, are the factors that can be responsible for the association between the two diseases.

In the initial stage of chronic liver diseases, where the normal lobular architecture is preserved and the patients often remain well without progression of their...
disease over long periods, that is, patient is asymptomatic and completely unaware of the hepatic status, oral health care professionals, on a careful examination of the oral cavity with oral lichen planus, should be aware of possible existence and provide for timely diagnosis and institution of proper treatment.  

The present study has been undertaken to find out if there exists any association with the type of clinical presentation of oral lichen planus and the level of serum transaminases.

PATIENTS AND METHODS

The present study comprised of two groups of patients. A detailed case history performa was recorded for all the patients.

Study Group: 45 patients of oral lichen planus were recorded from the out patients attending the department of Oral medicine. All the patients were carefully examined for clinical assessment of OLP (their type and clinical symptoms), subjected to incisonal biopsy (for histopathological confirmation), and were subjected to serum SGOT and SGPT levels using BASIC version of clinical chemistry system manufactured by SECOMAM, loaded with 2.0 software was used.

Control Group: A control group of 45 normal healthy subjects, without any clinical evidence of oral lichen planus, were recorded from among the out patients attending the department of Oral medicine. They were tested for serum SGOT and SGPT levels.

Following patients were excluded from our study:

1. Patients with habit of alcohol, tobacco consumption (clinically evident tobacco related lesions namely leukoplakia, pre-leukoplakia, erythroplakia, nicotina stomatitis, tobacco pouch keratosis)
2. Patients with clinically compatible oral lichenoid lesions who were diagnosed as having following histopathological features:  
   · The sub epithelial infiltrate is more diffuse and less bank-like, with deeper extension in to the connective tissue, and a more mixed cell population, including eosinophils and plasma cells.
   · Perivascular infiltrate.
   · Parakeratosis.
   · Colloid bodies in the epithelial layer.
3. Patients, under medications (NSAIDS, antibiotics, HMG Co-A-reductase inhibitors, antiepileptic drugs, antituberculous drugs, herbal medications, illicit drug use), Celiac disease; Endocrine disease like hypothyroidism, Addison's disease; suffering from Congestive cardiac failure and ischemic hepatitis, Diseases of striated muscle, Glycogen storage diseases.
4. Patients with debilitating diseases which render them unfit for taking biopsy, including pregnant and lactating women.
5. Any soft tissue oral lesions that had obvious etiology were excluded, such as cheek biting, scar tissue, Fordyce’s granules, or linea alba & retro molar hyperkeratosis.

RESULTS AND FINDINGS

In the present study 45 patients with different types of Oral lichen planus have been recorded. Out of the 45 patients 21 were males and 24 were females. The mean age of the overall test group, being 38.22 years with a standard deviation 38.31 9.22.

The test group contained only two types viz, reticular, (66.67%), which dominated, and the erosive variety (33.33%). The odds ratio was calculated which were 2.20. Although female patients were more affected with oral lichen planus, the reticular form of oral lichen planus was more common among the male patients (76.20%), than in the female (58.33%) patients. On the other hand the erosive form of oral lichen planus was seen to affect female more (41.67%), than the males (23.80%).

It was found that although reticular type dominated all the age groups, erosive type was more prevalent than the reticular type in the 51-60 years of age group.
Only aspartate transaminase (AST) levels were elevated in 11 patients (24.44%), and only alanine transaminase (ALT) levels were elevated in 6 patients (13.33%) who also had a raised aspartate transaminase (AST) level. Therefore out of total of 45 test group 6 patients (13.33%) had raised transaminase levels (both AST & ALT). (Table I). Elevated transaminase levels (both AST & ALT) was seen more in male than female patients (Table I, Graph I).

A t-Test was conducted which showed the mean of aspartate transaminase (AST) level (p=0.035), mean of the alanine transaminase (ALT) level (p=0.030) and the mean of transaminase levels (both AST & ALT), for the two groups viz, control group and the test group as statistically significant (p=0.30, which was <0.05).

The erosive variant was associated with a greater alteration in transaminase levels (both AST & ALT) than its reticular counterpart. A t-Test showed this as statistically significant (p=0.032) (Table II & Graph II).

### Table I

<table>
<thead>
<tr>
<th>Transaminase levels</th>
<th>Control Group (n=45)</th>
<th>Test Group (n=45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevated AST levels (&gt;35)</td>
<td>03</td>
<td>11 (M:6; F:5)</td>
</tr>
<tr>
<td>Elevated ALT levels (&gt;45)</td>
<td>02</td>
<td>06 (M:4; F:2)</td>
</tr>
<tr>
<td>Elevated Transaminase levels (both AST &amp; ALT)</td>
<td>02 (4.44%)</td>
<td>06 (13.33%)</td>
</tr>
<tr>
<td></td>
<td>(M:4; F:2)</td>
<td></td>
</tr>
</tbody>
</table>
Table II- Elevated AST & ALT levels in the type of oral lichen planus

<table>
<thead>
<tr>
<th>Type of OLP</th>
<th>Elevated AST</th>
<th>Elevated ALT</th>
<th>Elevated Transaminase levels (both AST &amp; ALT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reticular type</td>
<td>3 (6.67%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Erosive type</td>
<td>8 (17.77%)</td>
<td>6 (13.33%)</td>
<td>6 (13.33%)</td>
</tr>
</tbody>
</table>

Graph II

All the cases of raised levels of AST & ALT had lesion of lichen planus in buccal mucosa, while tongue was also involved in two cases of raised levels of AST & ALT and gingiva was also affected in one case each of raised levels of AST & ALT.
DISCUSSION

The present study has been conducted for clinical analysis of oral lichen planus with specific reference to its association with the levels of serum transaminase. In analyzing 45 cases of oral lichen planus it was found that incidence of oral lichen planus to be more in females. This observation is in confirmation with the previous studies. 7,8,9,10,11

Oral lichen planus can occur in the age group of 20-60 years, in both male and female sex, but in the present study it was observed that lichen planus was predominant in the middle age group, particularly between 31-40 years age group which was followed by 41-50 years.

Oral lichen planus exists in many clinical forms, but in the present study only two clinical forms viz; reticular and erosive could be recorded. The incidence of reticular lichen planus was the highest in the test group. This finding matched with the study, where 95% of patients belong to the reticular variant. 12

The erosive form was more prevalent in females; it was double the number as compared to males. This finding matched with a study of seven patients with erosive lichen planus out of which five were females and two were males 13

All the cases of lichen planus in the present study were located on the buccal mucosa. This finding was observed previously in many studies which stated the involvement of buccal mucosa ranging from 80% to 94%. There was one case in the hard palate in a female patient.

The present study included two groups viz; test group (patients with oral lichen planus) and control group (normal healthy adults) of 45 patients each. Both the groups were subjected to serum transaminase level test. At least one of two assays (either AST or ALT)
showed altered results in 3 patients in the control group and 11 patients in the test group. Both assays were raised in 2 patients in the control group and 6 patients in the test group.

Out of the six patients with elevated transaminase levels, all had erosive lesions. This is in accordance with the following previous studies. A study in which five out of seven patients having chronic liver disease had erosive type of lichen planus.\(^{15}\)

Another study stated that prevalence of liver disease was higher in erosive than the reticular variety \(^{6}\) Also statistical correlation between erosive variant and hepatic damage was found \(^{18}\). It was observed that erosive variety occupied a central role in relation to association with chronic hepatopathies. \(^{15}\) It was concluded that the erosive lesions clearly predominated among patients with oral lichen planus who had altered liver test results \(^{35}\) which also lends support to the above finding.

In a study on 40 patients with different types of oral lichen planus, showed that SGOT and SGPT levels, was elevated in 19 cases (47.5\%) and in 4 cases (10\%) of the study group and control group, respectively (\(P = 0.0002\)). In relation to the type of oral lichen planus, out of 15 erosive cases, 80\% (12 cases) showed elevated SGOT/SGPT levels. They concluded that elevated transaminase levels might be related to the development of oral lichen planus lesions. There is a strong association between elevated SGOT/SGPT levels and detection of erosive type of such lesions\(^{15}\).

Results of a recent study regarding relationship between transaminase level and type of OLP, about 87.5\% patients with erosive forms showed elevated SGOT/SGPT. These findings are suggestive enough to indicate that in presence of severe liver pathologies leading to change in SGOT/SGPT levels (increase) there is greater tendency to development of aggressive OLP lesions. From this it can be inferred that the association of oral lichen planus with liver disorders is not a mere coincidence\(^{17}\).

The results showed that in the erosive type the average AST level was found to be 39 IU/L, while the average AST level in the reticular type was 20.03 IU/L. On the other hand the average level of ALT in the erosive type was 42.46 IU/L, while than in the reticular type was 23.23 IU/L. This data reinforced the findings of the above mentioned studies \(^{6,9,15,18,12,16,17}\).

Considering the gender involved, among the total of six patients in which both assays were raised, 4 were males and 2 females. This finding hits the bull’s eye with two separate studies, in which out of a total number of six patients who had altered laboratory findings, four were males and two were females \(^{19,20}\).

The site which was associated with raised levels of both the assays, was buccal mucosa, which can be attributed to the fact that the majority of the patients (95\%), had lesions on the buccal mucosa.

Although the aminotransferase levels are an excellent marker of hepatocellular injury, it is alanine transferase (ALT), more specific to the liver. Hepatocellular injury and not necessarily cell death is the trigger for release of these enzymes in the circulation. \(^{21}\)

Since 6 cases (13.33\%) of oral lichen planus, among the test group, had raised levels of both the assays (AST & ALT), as compared to the control group, in which only two patients showed an elevated level of both the assays, it can be safely said, that the proportion of cases of oral lichen planus with alteration of aminotransferase were significantly higher than that of controls (\(p\) value being less than 0.05).

In the past few years, several cases of oral lichen planus with abnormal liver function tests have been observed. This had prompted many to investigate the occurrence of abnormal liver function test and / or liver disease in patients with oral lichen planus and few of the studies have found some association between them. \(^{19,22,23,20,24,25,26,27,29}\)

Chronic liver disease comprising primarily of primary biliary cirrhosis, chronic active hepatitis and hepatic cirrhosis manifests clinically with signs such as jaundice, hepatomegaly, splenomegaly, hyperpigmentation, fatigue, pruritis and elevated serum amino – transaminase levels. \(^{27}\)

The association of chronic liver disease and oral lichen planus may be derived on an immunological basis. The
immunopathogenesis is explained by expression of the MHC class II antigen by the epithelial cells that are attacked and destroyed by activated T cells. It has been hypothesized that lesions of oral lichen planus, occur as a part of an immune response to some antigens presented to T-lymphocytes by epidermal Langerhans cells that subsequently induce T cell mediated responses directed against basal layer keratinocytes. It is possible that factors altering keratinocyte antigenicity may induce reactions that can damage keratinocytes and to some extent, hepatocytes. It is also possible that lichen planus is a nonspecific cutaneous manifestation of certain internal diseases that may or may not be limited to liver disorders.

A simplified hypothesis for the pathogenesis is as follows:

1. Unknown antigenic change in OMM
2. Focal accumulation of Langerhans cells within the epithelium
3. Activated helper/inducer T lymphocyte in the lamina propria.
4. Expression of ICAM and HLA-DR on the surface of keratinocytes
5. Influx of cytotoxic/suppressor T-cells within the epithelium
6. Keratinocyte damage
7. Basal cell degeneration
8. Pyknotic and shrunken basal cells (civatte bodies)
9. Apoptosis of Keratinocytes
10. Failure of Phagocytosis of Apoptotic cells
11. Colloid bodies (Underlying Dermis)
In discussing the overall observations of the present study, it can be said that although, the raised levels of serum transaminase (AST & ALT), are not specific marker of chronic liver disease, but in the absence of other common causes of raised transaminases, it should raise an eye brow of suspicion, regarding the hepatic status of that particular patient. The nature of the clinical presentation of oral lichen planus, should cast some light on the possible association of the two diseases, which may turn it into an invaluable clue for diagnosis, prognosis and monitoring the liver disorder, as it was observed in the previous studies, where alterations in at least one or both of the two assays (AST, ALT), were diagnosed (liver biopsies) to be liver cirrhosis, chronic active hepatitis, primary biliary cirrhosis.

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Oral lichen planus: A diagnostic marker of CLD

1982;107:616.


A comparative evaluation of inter articulator reproducibility of protrusive condylar guidance registration in four different semi adjustable articulators using two different recording materials

C.Dhinesh Kumar¹, Jayashree Mohan², N.Vidyasankari³, Deepesh K Gupta⁴, S.Senthil kumar⁵, Indumathi⁶
1. Senior Lecturer, Department of Prosthodontics, JKK Nataraja Dental College, Salem (TN)
2. Professor & HOD, Department of Prosthodontics,  VMS Dental College, Salem (TN)
3. Reader, Department of Prosthodontics, K.S.R Dental College, Salem (TN)
4. Reader, Department of Prosthodontics, Govt. Dental College, Raipur (CG)
5. Professor, Department of Restorative dentistry, JKK Nataraja Dental College, Salem (TN)
6. Reader, Department of Prosthodontics, Bheemavaram (AP)

Corresponding Author:
Dr. N.Vidyasankari, 12 S.S.D Road, Thiruchengodu (TN)
Contact Number – 919443940244, E-Mail ID: vidhya_3010@yahoo.com

ABSTRACT
The semi-adjustable articulators are being used in the fabrication of complete dentures are commonly programmed using the interocclusal records. This study was conducted to evaluate the interarticulator reproducibility of protrusive condylar guidance registration in four semi-adjustable articulators Hanau® Wide Vue , WhipMix® Model No.2240, Stratos® 300, Dentatus® ARH semi-adjustable articulators with two interocclusal recording materials in completely edentulous patient. The Quick setting plaster and Luxabite (bisacrylic composite) was used as interocclusal recording materials to program the protrusive condylar guidance angles in the articulators. The reproducibility of protrusive condylar guidance registrations between materials and between articulators was compared with the radiographically determined angle of inclination of articular eminence and protrusive condylar path angles. The study was concluded that the Luxabite material demonstrated better reproducibility of protrusive condylar guidance registration than the Quick setting plaster. The Non-arcon Dentatus® ARH semi-adjustable articulator showed reliable registration of protrusive condylar guidance angulations when compared to the radiographically determined angle of inclination of articular eminence to Frankforts horizontal plane. The Arcon articulators – Hanau® Wide Vue, Stratos® 300, WhipMix® Model No.2240, showed better reproducibility of protrusive condylar guidance angles when compared to the radiographically determined protrusive condylar path angles obtained from Quick setting plaster record and Luxabite material record.

Keywords: Interocclusal record, Protrusive condylar guidance, Semi-adjustable articulator.
INTRODUCTION
The International Prosthodontic Workshop on Complete Denture Occlusion at the University of Michigan in 1972 classified articulators into four classes Class I, Class II, Class III and Class IV based on instrument's function.²The so called Semi-adjustable articulators comes under Class III classification that stimulates condylar pathways by using averages or mechanical equivalents for all or part of the motion. These instruments may be arcon or non arcon and allow orientation of the casts relative to the TMJs. They are more popularly used in construction of several prosthesis for their simplicity in handling and programming. Interocclusal records either protrusive or lateral records are used to program the condylar guidance values of the semi-adjustable articulators. In this study the horizontal condylar guidance angles obtained with the two interocclusal recording materials Quick setting plaster and Luxabite-bisacryl composite in all four semi-adjustable articulators Hanau® Wide Vue, WhipMix® Model No.2240, Dentatus® ARH and Stratos® 300 were compared with radiographically determined protrusive condylar path and anatomic angle of inclination of articular eminence to determine the ideal interocclusal material and articulator for obtaining the accurate horizontal condylar guidance of the completely edentulous patient.

OBJECTIVES OF THE STUDY
1) To compare the effect of two interocclusal recording materials namely Quick setting plaster, and bisacryl composite (Luxabite) on reproducibility of protrusive condylar guidance records.

2) To compare the inter articulator reproducibility of protrusive condylar guidance records in four semi-adjustable articulators (Hanau® Wide Vue, WhipMix® Model No.2240, Dentatus® ARH and Stratos® 300) in completely edentulous patient.

3) To compare the radiographic protrusive condylar guidance values obtained in all four semi-adjustable articulators from Quick setting plaster record and Luxabite record with angle of inclination of articular eminence in lateral cephalograph.

METHODOLOGY
The completely edentulous patient with ideal Class I ridge relation, proper vertical dimension and neuromuscular coordination was selected for the study. Impressions and master cast for maxillary and mandibular arches were fabricated and duplicated into four pairs for articulating in four semi-adjustable articulators. Four set of maxillary casts were mounted onto four different semi-adjustable articulators with facebow transfer (Fig-1) followed by mandibular casts mounted in tentative centric relation. The Extraoral Gothic arch tracer with the pin was attached to the maxillary occlusal rim and correspondingly the tracing plate was attached to the mandibular occlusal rim. The occlusal rims with the tracers were inserted into the patient mouth and the centric, right lateral, left lateral and protrusive movements were obtained in the form of Arrow point tracing. The centre of the arrow represents the centric position, the right and left arms representing right and left lateral movements and the central line represents the protrusive movement. The interocclusal recording materials used in the study are Bis-acrylic bite registration resin and Luxabite (DMG, Germany), Quick setting plaster. The Quick setting plaster was obtained by mixing the 50g of Dental Plaster Type II with 30 ml of isotonic saline containing sodium chloride (which accelerates the setting of the plaster to 2%) and anti-expansion solution containing 4% potassium sulphate. Six interocclusal records were made using each material and these records were used to program the four semi-adjustable articulators.(Fig-2). Two operators performed the articulator settings for all the protrusive interocclusal records to prevent operator bias. The horizontal condylar guidance angles recorded in each articulator for each of the protrusive interocclusal records was noted and tabulated. Total of 48 interocclusal records with 96 horizontal condylar guidance readings are obtained. The values are stastically analysed to compare the repeatability of recordings within and between the articulators Lateral Cephalometric radiographs were made with centric position and protrusive position using Gothic arch
tracers with interocclusal recording materials Quick setting plaster, Luxabite (DMG, Germany) for both right and left sides of the patient. (Fig-3,4,5,6). The tracings of the radiographs were done. The tracings of the protrusive condylar positions were overlapped onto the tracing of centric positions for both right and left sides. The mean protrusive condylar guidance values of both right and left sides obtained with two different interocclusal recording materials in four different semi-adjustable articulators was then compared with the protrusive condylar path angles of right and left sides to the Frankfort horizontal plane, obtained from radiographic tracings. The angle formed between the slope of the articular eminence and Frankfort Horizontal plane may also be value in setting the condylar guidance in semi-adjustable articulators. 

![Fig-1-Semi-adjustable Articulators and Facebows used in the study.](image1)

![Fig-2-Protrusive Interocclusal records made with Quick setting plaster and Luxabite](image2)

![Fig-3&4- Lateral cephalometric radiograph and cephalometric tracing showing Centric position.](image3)
The condylar path from centric to protrusive position follows the slope of the articular eminence. There exists strong correlation between the protrusive condylar path and the inclination of articular eminence which was mathematically expressed and statistically described. So in Lateral Cephalometric radiographs made with centric position’s the angle of inclination of articular eminence was marked. i.e. the angle formed at the intersection of the two lines—the slope of articular eminence and tangent to Frankforts horizontal plane was noted down which gives degree of inclination of articular eminence to horizontal plane (34°). This value was used to compare the condylar guidance values obtained from Cephalometric tracing with two interocclusal recording materials Quick setting plaster, Luxabite (DMG, Germany). Descriptive and comparative statistics are presented as Mean, Standard Deviation and Coefficient of Variance. (Tables-1, 2, 3, 4). Two-way ANOVA was also carried out to know possible interaction effect (interocclusal recording materials X articulators) on protrusive condylar guidance angles. Average deviations from the reference angles obtained from radiographic tracings of protrusive condylar path angle to the Frankfort horizontal plane was also presented for determining the articulator ability to simulate patient’s protrusive condylar guidance angle. (Fig-7, 8).

Fig-5&6- Lateral cephalometric radiograph and cephalometric tracing showing protrusive position.

Fig-7-Articulators records made of Quick setting plaster to angle of slope of articular eminence.

Fig-8-Articulators records made of Luxabite to angle of slope of articular eminence.
RESULTS

1) The Luxabite recording material gave better reproducibility than Quick setting plaster with less variation of protrusive condylar guidance angle value (1.4° – 0.3° more than radiographic value) in all four semi-adjustable articulator with relation to radiographically determined protrusive condylar path angle with Luxabite record and of about only 3° more than radiographic value of angle of inclination of articular eminence (34°).

2) The Non-arcon Dentatus® ARH semi-adjustable articulator showed reliable registration of angulations with minimum percentage deviation of 4.7% than the Arcon articulators - WhipMix® Model No.2240, Hanau® Wide Vue, Stratos® 300 when compared to the radiographically determined angle of inclination of articular eminence to Frankforts horizontal plane i.e (34°) which can be taken as a guide in setting Protrusive condylar guidance registration in semi-adjustable articulators.

3) The Arcon articulators - Hanau® Wide Vue, Stratos® 300 WhipMix® Model No.2240, showed better reproducibility of protrusive condylar guidance angles when compared to the radiographically determined protrusive condylar path angles. The Hanau® Wide Vue showed minimum percentage deviation of 0.7%, Stratos® 300 (1.7%), WhipMix®

Table.1. Comparison of Protrusive condylar guidance angles in four articulators with two interocclusal recording materials to the reference condylar path angle to the Frankfort horizontal plane, obtained from radiographic tracings using protrusive records of two materials Quick setting plaster and Luxabite.

<table>
<thead>
<tr>
<th>Reference angle In degrees</th>
<th>Hanau®</th>
<th>Dentatus®</th>
<th>Stratos®</th>
<th>WhipMix®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick setting plaster</td>
<td>41.8°</td>
<td>38.2°</td>
<td>40.8°</td>
<td>39.6°</td>
</tr>
<tr>
<td>▲ = 0.3</td>
<td>▲ = -3.3</td>
<td>▲ = -0.7</td>
<td>▲ = -1.9</td>
<td></td>
</tr>
<tr>
<td>%=0.7</td>
<td>%=8</td>
<td>%=1.7</td>
<td>%=4.6</td>
<td></td>
</tr>
<tr>
<td>Luxabite</td>
<td>36.6°</td>
<td>35.6°</td>
<td>36.7°</td>
<td>36.1°</td>
</tr>
<tr>
<td>▲ = -0.4</td>
<td>▲ = -1.4</td>
<td>▲ = -0.3</td>
<td>▲ = -0.9</td>
<td></td>
</tr>
<tr>
<td>%=1.1</td>
<td>%=3.8</td>
<td>%=1</td>
<td>%=2.4</td>
<td></td>
</tr>
</tbody>
</table>

Table.2. Comparison of the reference condylar path angle to the Frankfort horizontal plane, obtained from radiographic tracings using protrusive records of two materials Quick setting plaster and Luxabite to the radiographically determined angle of slope of articular eminence.

<table>
<thead>
<tr>
<th>Reference angle-angle of slope of slope of articular eminence</th>
<th>Quick setting plaster</th>
<th>Luxabite</th>
</tr>
</thead>
<tbody>
<tr>
<td>34°</td>
<td>41.5°</td>
<td>37°</td>
</tr>
<tr>
<td>▲ = -7.5</td>
<td>▲ = -3</td>
<td>▲ = -3</td>
</tr>
<tr>
<td>%=22</td>
<td>%=9</td>
<td>%=9</td>
</tr>
</tbody>
</table>
model no. 2240 (4.6%), Dentatus® ARH showed maximum percentage deviation of 8% when compared to the radiographic value.

**DISCUSSION**

Stimulation of jaw movements in an articulator requires the articulation parameters to be registered at the patient and transferred to the mechanical device (articulator). These parameters comprise of the protrusive condylar guidance angle, the Bennett angle, the inter-condylar distance, and the spatial relations of the dental arches with respect to the inter-condylar axis. If articulator settings do not match the patient’s individual parameters, the developed occlusion in the prosthesis may be of inaccurate and hampering the function. According to Weinbergh (1963)², “neither Arcon and non-Arcon articulators has mathematical advantage over the other and they produce the same motion of condylar ball on the inclined plane” thus the arcon as well as non-arcon articulators gave the same registration of protrusive condylar guidance angle irrespective of the materials and methods. Among the articulators the Non-Arcon semi-adjustable articulator showed significantly less reproducibility of protrusive condylar guidance angle value than the Arcon semi-adjustable articulators using both the materials Quick setting plaster record and Luxabite record when compared to the radiographically determined angle of inclination of articular eminence i.e. (34°) which can be taken as a guide in setting Protrusive condylar guidance registration in semi-adjustable articulators, the Nonarcon Dentatus® ARH articulator showed reliable registration of angulations than the

<table>
<thead>
<tr>
<th>Reference angle – Angle of slope of articular</th>
<th>Hanau°</th>
<th>Dentatus°</th>
<th>Stratos°</th>
<th>WhipMix°</th>
</tr>
</thead>
<tbody>
<tr>
<td>34°</td>
<td>41.8°</td>
<td>38.2°</td>
<td>40.8°</td>
<td>39.6°</td>
</tr>
<tr>
<td>Δ= -7.8</td>
<td>Δ= -4.2</td>
<td>Δ= -6.8</td>
<td>Δ= -5.6</td>
<td></td>
</tr>
<tr>
<td>%=23%</td>
<td>%=12.4%</td>
<td>%=20%</td>
<td>%=16.5%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reference angle – Angle of slope of articular eminence.</th>
<th>Hanau°</th>
<th>Dentatus°</th>
<th>Stratos°</th>
<th>WhipMix°</th>
</tr>
</thead>
<tbody>
<tr>
<td>34°</td>
<td>36.6°</td>
<td>35.6°</td>
<td>36.7°</td>
<td>36.1°</td>
</tr>
<tr>
<td>Δ= -2.6</td>
<td>Δ= -1.6</td>
<td>Δ= -2.7</td>
<td>Δ= -2.1</td>
<td></td>
</tr>
<tr>
<td>%=7.6%</td>
<td>%=4.7%</td>
<td>%=8%</td>
<td>%=6%</td>
<td></td>
</tr>
</tbody>
</table>

% = Percentage deviations
▲ = Mean deviations from reference angle
-ve = negative sign indicated higher value compared to reference angle.
Arcon articulators - WhipMix® Model no.2240, Hanau Wide Vue Stratos® 300. Brewka, Gilboa et al. Norman E. Corbett used cephalometric radiographic analysis for their studies on protrusive condylar path registrations in semi-adjustable articulators. Hence the lateral cephalometric radiograph method of comparative analysis was followed in this study. Jankelson (1962), Ren YF, Isberg A, Westesson (1991), Pammekiate S, Petersson A, Akerman S (1995), Gilboa, Cardash, Kaffe, Gross (2008), Gilboa et al. (2008) have shown that the angle formed between the slope of the articular eminence and Frankfort Horizontal plane may also be value in setting the condylar guidance in semi-adjustable articulators. Hence we determined the inclination of articular eminence to Frankfort horizontal plane in lateral cephalogram to predict the horizontal condylar guidance value for programming the articulator without using the protrusive interocclusal records. Among the materials the Luxabite recording material gives the nearly reliable protrusive condylar guidance angle value in all four semi-adjustable articulator with relation to radiographically determined protrusive condylar path angle and also with radiographically determined angle of inclination of articular eminence to Frankfort horizontal plane. Skurnik emphasized that the bisacrylic resin is easy to handle and has reproductive accuracy and is rigid when it sets; making it a good bite registration material for fixed, removable, unilateral and bilateral restorations. Although the angulations registered in each of the articulator differ they may produce similar mandibular movements as the condylar assemblies manufactured by the different companies may vary and the graduations will be given according to some relative values. The articulators need to be more freely adjusted to the interocclusal records so that they can be programmed more easily and accurately.

**CONCLUSION**

From the analysis of this study the setting of protrusive condylar guidance angle value in semi-adjustable articulator was influenced by recording materials, methods and also the inclination of articular eminence to Frankfort horizontal plane. So further research and evaluation can be attempted to correlate this inclination of articular eminence to protrusive condylar path settings of the articulators. The interocclusal recording materials Quick setting plaster and Luxabite i.e from the oldest to recent materials was compared in this study and the Luxabite material was dimensionally stable and made more precise protrusive interocclusal record in edentulous patients for programming the horizontal condylar guidance of the semi-adjustable articulators. The ideal combination of material and technique for making interocclusal records along with proper articulator selection would allow the fabrication of complete dentures in edentulous patients with minimum occlusal interferences and mandibular movements.

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Evaluation of tensile bond strength between tray adhesive and poly vinyl siloxane manipulated with and without petroleum gel: An invitro study

Adarsh Shetty¹, Jagadish Konchada², Balasubramaniyan R³, Shailendra Sahu⁴, Anurag Dani⁵, Manikandan R⁶
1. Senior Lecturer, Department of Prosthodontics, Yogita Dental College & Hospital, Khad (MH)
2. Senior Lecturer, Department of Prosthodontics, C D C R I, Rajnadngoan, (CG)
3. Professor, Department of Prosthodontics, Rajah Muthiah Dental College & Hospital, Chidambaram, (TN)
4. Reader, Department of Prosthodontics, C D C R I, Rajnadngoan, (CG)
5. Reader, Department of Prosthodontics, C D C R I, Rajnadngoan, (CG)
6. Senior Lecturer, Department of Prosthodontics, Rajah Muthiah Dental College & Hospital, Chidambaram, (TN)

Corresponding author:
Anurag Dani, Prosthodontist, Dani Hospital, Kelabadi, Civil Lines, Durg-491001, Chhattisgarh.
Email: dranuragdani@yahoo.com, Phone: 09893464987

ABSTRACT
Statement of problem: Clinicians tend to add petroleum gel with polyvinyl siloxane impression materials to extend working time especially while doing border molding in mandibular arches.
Purpose: To know the effect of petroleum gel on tensile bond strength between tray adhesive and poly vinyl siloxane impression materials
Material and Methods: a study was carried out in 120 identical specimens, out of which 60 were used as control Group – A, impression material was manipulated as per manufacturer instructions. Remaining 60 were used as Group- B in which petroleum gel (0.3ml) was included while manipulating impression material. The difference in tensile bond strength between the groups is to be evaluated.
Results: The results revealed that tensile bond strength measured high for control group-A than the test group-B.
Conclusion: Addition of Petroleum gel, however, increased the working time, but decreased the effective tensile bond strength between the tray adhesive and the resin custom tray.
Keywords: Tensile bond strength, Polyvinyl Siloxane impression material, Tray adhesive, Petroleum gel.

INTRODUCTION
A negative replica made with an impression material must be securely attached to the tray to assure an accurate impression resulting in dimensionally stable cast.¹ As the mechanical locking of the impression material with the custom tray is minimal, some means of bonding is to be provided to secure the same to the tray. Hence the accuracy and consistency are best maintained with the help of adhesive between custom tray and impression.² Metal and plastic trays are used routinely for dental impressions with the putty material, but chances of air entrapment are more and hence not accurate as custom trays. The use of custom tray is recommended to reduce the quantity of material for making impression. Therefore, any dimensional changes attributed to the materials can be minimized.³ Silicone impression materials used for border molding require sufficient working time, especially while
working in mandibular arch. Clinicians tend to add Petroleum gel with polyvinyl siloxane impression materials to extend the working time. A pilot study was conducted to evaluate the effect of Petroleum gel on working time and setting time of poly vinyl siloxane (Aquasil, Dentsply) impression material. The results obtained from the pilot study proved that the working and setting time of the impression material is increased. Further, this fact initiated us to know the effect of petroleum gel on tensile bond strength between the tray adhesive and poly vinyl siloxane impression material. Studies have been done to evaluate the tensile bond strength between poly vinyl siloxane impression material and tray adhesive. The present study is aimed at evaluating the difference in tensile bond strength between tray adhesive and poly vinyl siloxane impression material manipulated with and without petroleum gel.

MATERIALS AND METHODS

The study was conducted on 120 identical specimens, out of which 60 were used as control Group-A, impression material was manipulated as per manufacturer instructions. Remaining 60 were used as Group-B in which Petroleum gel (0.3ml) was included while manipulating impression material. The difference in tensile bond strength between the groups is to be evaluated. Acrylic resin specimens of uniform size are made using metal mould (30mm × 1.5mm) to standardize. Following the manufacturer's recommendation acrylic resin was mixed and poured into the metal mould. Hundred and twenty identical round acrylic resin tray specimens were obtained (Figure-1). The tray specimen was allowed to polymerize and the excess material beyond the mold was trimmed. A small (1 inch) attachment screw was inserted into the tray specimen when it is in dough stage, on the opposite side of the test surface. The test surface was polished with 80 grit sand paper and tray adhesive (caulk, Dentsply) was applied once uniformly and allowed to polymerize for 15 minutes (Figure-2). A standard round die stone mould of 30 mm inner diameter and 3 mm depth without undercuts and smooth inner surface was made ready for making uniform sized impression material specimens (Figure-3). Each test consists of two acrylic specimens with impression material in between. The difference in tensile bond strength between the tray adhesive and poly vinyl siloxane in group A and group B was evaluated.

To evaluate the bonding efficiency of the tray adhesive on acrylic specimens, Universal testing machine is used. The test side of the first tray specimen which was coated with tray adhesive is attached to the PVS impression material (Aquasil, Dentsply) (Figure-4). The optimum technique for the use of poly vinyl siloxane impression is to construct a custom tray and make the impression. Thus the material used in this study was poly vinyl siloxane -putty impression material (Aquasil, Dentsply). In the mould and the impression material was taken along with that. Adhesive coated free surface of the second tray specimen is attached with the free end of
the impression material. Excess material beyond the tray specimens was carefully removed with sharp BP blade. Care was taken not to compress the impression material. The whole assembly was allowed to polymerize for 5 minutes as recommended by the manufacturer. (Group-A)

According to pilot study, 0.5 ml of petroleum gel added to the impression material, increased the working time by two folds. As our area of concern was regarding the tensile bond strength such an extended working time was not desired and so decided to add less amount of Petroleum gel (0.3ml). To ensure homogenous mix of Petroleum gel with putty impression material, polyvinyl siloxane base material was mixed with Petroleum gel (0.3ml) at the first instant, followed by the accelerator with Petroleum gel mixed base. Thus 30 remaining samples were prepared which formed the Test Group-B. Adhesive applied tray specimens was attached to the impression material in the mould as like control Group-A. Each of the Group-A and Group-B assembled specimens was attached to the Universal testing machine (SERVO, UNITEK -94100, Crosshead speed: 0.5mm-250mm/min Load range: 0-100KN) (Figure-5) with bigger size hooks. The specimens were tested for its tensile strength using automated universal testing machine which offered the facility of recording the exact bond strength during the time of detachment of the impression materials from the tray specimens.

**RESULTS**

Tensile bond strength between the tray adhesive and poly vinyl siloxane impression materials are measured in KN (Kilo Newton). In group-A (control group) the minimum tensile bond strength measured as 0.070 KN and a maximum as 0.120 KN (Table-1). In group-B (test group) the minimum tensile bond strength measured as

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Bond Strength</th>
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<tr>
<td>1</td>
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<td>11</td>
<td>0.085</td>
<td>21</td>
<td>0.095</td>
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<tr>
<td>2</td>
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<td>12</td>
<td>0.085</td>
<td>22</td>
<td>0.085</td>
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<tr>
<td>3</td>
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<td>13</td>
<td>0.095</td>
<td>23</td>
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<tr>
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<td>14</td>
<td>0.085</td>
<td>24</td>
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<tr>
<td>5</td>
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<td>15</td>
<td>0.085</td>
<td>25</td>
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<tr>
<td>6</td>
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<td>16</td>
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<td>26</td>
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<tr>
<td>7</td>
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<td>17</td>
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<tr>
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<tr>
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<tr>
<td>10</td>
<td>0.085</td>
<td>20</td>
<td>0.070</td>
<td>30</td>
<td>0.105</td>
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</tbody>
</table>

Table-1: Representing Control Group- A specimens (where bond strength is measured without addition of Petroleum gel with impression material)
0.050 KN and a maximum as 0.090 KN (Table-2). The results thus obtained (Table-1 and Table-2) were evaluated statistically for p-value as given in (Table-3). Mean average values obtained for group A is 0.09 and group B is 0.07 with a significant p-value 0.001.

**DISCUSSION**

An impression made with an impression material must be securely attached to the tray to assure an accurate impression resulting in dimensionally stable cast. It has been suggested that custom trays to be fabricated at least 24 hours before the impressions are made, allowing the material to become dimensionally stable. Autopolymerising custom tray material is most commonly employed for tray fabrication because of ease in fabrication and is cost effective as compared to visible light cured resin. Hence the samples in this study were made with the auto-polymerising custom tray material. As the mechanical locking of the impression material with the custom tray is minimal, some means of bonding is to be provided to secure the same to the tray. Hence the accuracy and consistency are best maintained with the help of adhesive between custom tray and impression. Metal and plastic trays are used routinely for dental impressions with the putty material, but chances of air entrapment are more and hence not accurate as custom trays. The use of custom tray is recommended to reduce the quantity of material for making impression. Therefore, any dimensional changes attributed to the materials can be minimized. The custom acrylic resin trays with occlusal stops ensure a uniform distribution of impression material. Addition of petroleum gel when manipulating PVS putty material is widely believed technique. It increases the working and setting time. It provides sufficient time for the intraoral procedures to be carried out. The tensile bond strength between tray adhesive and poly vinyl siloxane impression material showed a significant difference in the values between Group A and B. According to results obtained test specimen mixed with Petroleum gel (Group-B) showed less bond strength than the specimen without Petroleum gel (Group-A).

PVS material for the test specimens were hand mixed, whereas it is strongly recommended that the materials should be automixed. Mixing time variation between the samples could also be the reason for difference within the test groups. Moreover when a auto mixing dispenser is used, less chances of air entrapment is been proved. In this study impression material was
hand mixed and attached to the tray resin material, with hand pressure and every effort was made to maintain the even thickness between the test specimens. So chances of air inclusions between the adhesive layer and the PVS materials are always present. According to the results obtained from the study it showed less bond strength when compared with previous studies. Inclusion of Petroleum gel, may also be the reason for decrease in bond strength.

Retention of an impression adhesive on a tray material depends on the ability of solvent in the adhesive to dissolve the tray material. Actually dimethyl polysiloxane reacts with the tray material to create micro porosities so that the adhesive bonds physically and mechanically. Role of Petroleum gel on dimethyl polysiloxane is not known. So this also could be the reason for decrease in bond strength when Petroleum gel is used.

CONCLUSION

The results revealed that tensile bond strength measured high for control group than the test group. Addition of Petroleum gel, however, increased the working time, but decreased the effective tensile bond strength between the tray adhesive and the resin custom tray. Reasons for decrease in tensile bond strength may be attributed to Inclusion of Petroleum gel.

Impression materials were hand mixed; auto mixing is preferred to avoid air inclusion and to ensure homogenic mix.

Elastomeric impression materials should be stored in 23°C, whereas study was carried out in room temperature of (30-32°C).

Further studies are required to know the role of petroleum gel with impression material in altering the working time and alteration of properties of the impression material.

BIBILOGRAPHY

Dermatoglyphics in oral clefts

Chinar Fating¹, Rolly Gupta², Anil Agrawal³, Rana K Varghese⁴, Gopkumar Nair⁵, Preeti Thakur⁶

1. Senior Lecturer, Department of Oral Medicine and Radiology, CDCRI, Rajnandgaon, Chhattisgarh, India.
2. Senior Lecturer, Department of Oral Pathology and Microbiology, CDCRI, Rajnandgaon, Chhattisgarh, India.
3. Senior Lecturer, Community and Preventive Dentistry, New Horizon Dental College, Bilaspur, Chhattisgarh, India.
4. Prof. and Head, Department of Conservative Dentistry, New Horizon Dental College, Bilaspur, Chhattisgarh, India.
5. Prof. and Head, Department of Oral Medicine, New Horizon Dental College, Bilaspur Chhattisgarh, India.
6. MS (Ayurved)

Corresponding Author:
Dr. Chinar Fating, Senior Lecturer, Department of Oral Medicine and Radiology, CDCRI, Rajnandgaon, CG, India,
Email: chinarfating@gmail.com, Contact No: 9754550098

ABSTRACT
Objectives: To evaluate variations seen in the dermatoglyphic pattern between children with oral cleft and normal children and to determine the significance of dermatoglyphics while studying the genetic etiology of oral clefts.
Study Design: Study was conducted on 60 children, 30 with cleft lip and palate (CL/P) and 30 control groups; and dermal patterns were obtained using the Ink and Pad technique.
Results: The dermal pattern on the finger bulbs showed an increase in ulnar loops and the “atd” angle showed an increase and fluctuating asymmetry was also noted.
Conclusion: Changes in the palmar patterns, “atd” angle and the asymmetry led to the conclusion that there is some degree of genetic instability in Oral Cleft cases and dermatoglyphics can serve as a useful tool in diagnosis of such cases.
Keywords: dermatoglyphics, oral clefts, ulnar loops, atd angle.

INTRODUCTION

Dermatoglyphics, is the study of dermal ridge configurations on palmar and plantar surfaces of hands and feet. It was first introduced by Cummins and Midlo in 1926. They have been studied for fortune telling by palmists and as a definitive and unalterable tool for identification by forensic experts. From cradle to grave until the body decomposes finger prints remain unchanged i.e. the dermal patterns once formed remain constant throughout the life. Dermatoglyphics can be considered a window of congenital abnormalities and is a sensitive indicator of intrauterine abnormalities.¹²³

Dermatoglyphic studies have gained scientific acceptance in the recent years and were being used as an adjunct to other diagnostic methods in identifying specific syndromes of genetic origin. The current status of dermatoglyphics is such that the diagnosis of some illnesses can be done solely on dermatoglyphic analysis. Several researchers claim high degree of accuracy in their prognostic ability from the features of the hand.²³

Cleft of the lip and palate are inherited defects having a broad phenotypic gamut and represent failure of the facial and palatal processes to completely fuse during embryonic development. Cleft of the lip and palate account for about 65% of all congenital malformations. They are observed with a frequency in about 1/500 to 1/2500 live births depending on geographic origin and socioeconomic status.⁴ The study of congenital cleft lip and palate anomalies has been the subject of controversy regarding the etiology and mode of transmission. While most of the cases have a polygenic
mode of inheritance, a certain proportion results from rare mutant genes, chromosomal aberrations and unknown exogenous factors. However, the exact etiology and mechanism of transmission of these malformations is still obscure.\(^5\),\(^6\),\(^7\)

The development of the dermal ridges takes place along with the development of the primary palate during the 7th week of Intrauterine Life (IUL) and is completed by the 12th to 13th week of IUL and both are ectodermal in origin. The genetic code that is deciphered for palate and dermal ridges (normal/abnormal) is reflected in the dermatoglyphics.\(^8\)

Hence this study was conducted to evaluate the differences in dermatoglyphic pattern between children with cleft and normal children and to determine the significance of dermatoglyphics in studying the genetic etiology of oral clefts.

**MATERIALS AND METHOD**

This study was performed in the Department of Oral Medicine & Radiology, New Horizon Dental College, Bilaspur after obtaining approval from the institutional ethical committee. A total of 60 children were included in this study that were between the ages of 5-9 years with no difference between the sexes. The control group consisted of 30 normal and healthy children without any medical or congenital anomalies. The study group consisted of 30 non-syndromic children with oral clefts without any other external manifestations. After informed verbal consent (as it is a non-invasive procedure), bilateral palmar and fingerprints were collected using the ink and pad technique. (Fig. 1)

![Figure 1](image1)

Fig. 1—The patterns on the terminal phalange of the digits were classified as either as loops, whorls, arches or composite patterns (Galton in 1892).\(^1\) The frequency of different patterns occurring on the terminal phalange of the digits of oral cleft children were then compared with that of the normal children. (Fig. 2)

The triradius formed at the base of the fingers have been designated as 'a,b,c and d' along the base of the index finger to the base of the little finger respectively (Fig. 3). The triradius formed at the base of the palm, i.e., the thenar area is designated as 't'.

![Figure 2](image2)

![Figure 3](image3)
For the present study the angle formed between 'atd' along with the symmetry of the “atd” angle was taken into consideration (Fig. 4). The frequency of true patterns of arches, loops and whorls were observed in both groups.

The “atd” angle was measured on the palms of the oral cleft and normal children and classified into four groups, i.e., <40°, 40-45°, 45-50° & >50°. Statistical analysis was done using the Chi-square test and Pearson’s correlation coefficient.

The fluctuating asymmetry of the “atd” angle between the hands were seen in each individual and classified into four groups 0°, between 1-4°, 4-7° and >8°

**Results**

On comparison of the fingerprint patterns on the distal phalanges of the sixty children, it was observed that the children with CL/P had greater frequency of ulnar loops (24/30) as compared to control group who had ulnar

![Diagram 1](image1)

The atd angle was greater (45-50˚) in children with cleft (16/30) which was highly significant.

![Diagram 2](image2)

A higher frequency of normal children had the atd angle <45° which was also highly significant. (diagram 2).

Asymmetry of the atd angle was higher in children with cleft (4-7’). The results showed significant p-value, and
DISCUSSION

Cleft lip and palate are most common congenital facial abnormalities. The etiology is complex and both polygenic and multifactorial inheritance pattern has been proposed.\(^3,4,9\)

It is known that the finger and palm prints are formed during the first 6-7 weeks of the embryonic period and are completed after 15-20 weeks of gestation. Abnormalities in these areas are influenced by a combination of hereditary and environmental factors, but only when the combined factors exceed a certain level, can these abnormalities be expected to appear.\(^3,4,10\)

The epidermal ridges of the fingers and palms are formed from the same embryonic tissues (ectoderm) during the same embryonic period (6-9 weeks) as is the development of lip and palate. Since the facial structures like lip, alveolus and palate also develop at 6-9 weeks, the genetic and environmental factors that are responsible for causing cleft lip and palate may also cause peculiarities in the dermatoglyphic patterns.\(^11,12\).

Fluctuating asymmetry is defined as the random differences between two sides of quantitative traits in an individual which increases in parallel to the decreasing buffering ability of an organism and hence inability to maintain developmental homeostasis. In the case of dermatoglyphics, it is the degree of asymmetry, which will already be present during the early fetal stages, and the magnitude of fluctuating asymmetry that will express the level of developmental homeostasis of the individual.\(^13,14\)

Isolated or non-syndromic CL/P is considered to be multifactorial in origin with both genetic and environmental factors playing a role.

In this study, we observed that the children with oral clefts had an increasing frequency of ulnar loops (24/30) on the distal phalanges of fingers whereas normal children had an increased frequency of whorls (15/30). On comparison of the add angles between the children with oral clefts and the normal children, the children with clefts were found to have an atd angle in the higher ranges, i.e., 45-50° (16/30) as compared to that of normal children (2/30). The asymmetry of the atd angle was greater in children with cleft (4-7°) than in normal children.

The findings of the present study reveal statistically significant difference between dermatoglyphic patterns of controls and those of children with cleft lip/palate. As the dermatoglyphics are genetically determined and develop at the same time as the development of the palate, any deviation in the dermatoglyphic features indicates a genetic difference in the study group and the controls. Thus indicating a definite correlation between dermal ridge pattern and cleft lip and palate. Considering the expenses involved in chromosomal analysis; dermatoglyphics can prove to be an extremely useful tool for preliminary investigations in subjects with suspected genetic abnormality, by being non-invasive and cost effective procedure. But further studies have to be done with a larger sample size in order to evaluate the significance of these variations in the dermatoglyphic features in the oral cleft individual.

REFERENCES


Carcinoma cervix and renal failure: A study from central India.

Sanjay Verma¹, Punit Gupta², Prakash Khunte³
1. Associate Prof., Pt.J.N.M.Medical College & Dr.B.R.A.M.Hospital Raipur (C.G.)
2. Associate Prof., Nephrology Unit, Deptt. of Medicine, Pt.J.N.M.Medical College, Raipur (C.G.)
3. PG Student, Dept. of Medicine, Pt.J.N.M.Medical College & Dr.B.R.A.M.Hospital Raipur (C.G.)

Corresponding Author:
Sanjay Verma
Associate Professor, Department of Medicine, Pt.J.N.M.Medical College & Dr.B.R.A.M.Hospital Raipur (C.G)
Mobile No.- 9826136022, E-Mail ID: roopalisanjay@hotmail.com

Abstract
A total of 31 patients of Carcinoma Cervix was studied in Nephrology Unit at Dr.B.R.A.M Hospital Raipur C.G. An underlying malignant disorder was the cause of the obstruction in most of the patients. Carcinoma of the cervix was the most frequent malignant disorders, resulting in more severe renal failure. The mean age of presentation of Carcinoma of the cervix was 45.77 ± 11.25 years. Out of 31 patient 19 patient underwent hemodialysis. The mean urea level were 146.4 ± 47.6 mg/dl, creatinine level were 8.7 ± 4.7 mg/dl. Most patients were severely anaemic, mean hemoglobin level were 7.7 ± 2.1 gm%. Most patient have bilateral hydronephrosis obstructive uropathy in ultrasonographic finding resulting in severe renal failure. 5 patients were dead before the hemodialysis. Most patient were hypoalbuminria and electrolyte abnormality. The overall prognosis was poor and most patient require hemodialysis.

Introduction
Cancer of the uterine cervix is one of the leading causes of cancer death among women worldwide. The estimated new cancer cervix cases per year are 500,000 of which 79% occur in the developing countries. (Shanta V et al ). Cervical cancer is the most common female cancer in the developing countries and its incidence in India is about 32 per 100,000 women. (National Cancer Registry Programme 2005 ).
Over 70% of the cases present in advanced stages of the disease with associated poor prognosis and high mortality rate. Cancer cervix occupies either the top rank among cancers in women in the developing countries. The cervical cancer burden in India alone is estimated as 100,000 in the year 2001. The differential pattern of cervical cancer and the wide variation in incidence are possibly related to environmental differences. About 70% of them present as locally advanced disease, and one-third of them with renal failure. Such patients have dismal prognosis and are usually managed with palliative radiation or sometimes best supportive care. Kidney disease frequently complicates malignancy and its treatment. The spectrum of disease in this setting includes acute kidney injury, chronic renal failure, and tubular disorders. Fortunately, these complications are often preventable or reversible with prompt diagnosis and treatment. (Turka LA et al )

Material & Method:
This study was conducted at Nephrology Unit, Dept of Medicine, Dr.B.R.A.M. Hospital & Pt.J.N.M.Medical College, Raipur (C.G). Study was conducted among 31 patients and age between 30 years and 65 years. Complete laboratory investigation was were complete blood count, blood urea, serum creatine, serum lipid profile, thyroid profile, serum albumin level, ds. Chest Xray, E.C.G, ultrasonography was done in all patients.

Results
All patient were female with minimum age was 30 years and maximum age was 65 years. The mean age of presentation of Carcinoma of the cervix was 45.77 ± 11.25 years. The most common presentation was decrease urine output followed by facial puffiness seen in most patients, the mean blood pressure was 131.1+23.1/76.5+10.9 mmhg, pulse rate was 96.9+10.3
Pallor, oedema seen in 100% of cases. Mean hemoglobin level was 7.7 ± 2.11 gms, total leucocyte were 10900 ± 4972 /mm3. Renal failure seen in all cases with mean blood urea and creatinine level 146.4 ± 47.6 and 8.7 ± 4.7 mg/dl. Grade + proteinuria seen in 60% of cases. Hypocalcemia seen in 26% cases followed by and hyperkalemia, hypernatremia in 22% & 8% cases. Hyponatremia and hypokalemia in 18% and 22% cases. 19 patients were underwent hemodialysis and 5 patient died due to late presentation of diseases. 70% shows bilateral hydronephrosis obstructive uropathy. Most patient have hypoalbuminemia.

Graph 2 - shows symptoms presenting with the disease.
DISCUSSION

Acute kidney injury (AKI) secondary to bilateral ureteric obstruction (BUO) is a common urological problem and the underlying etiology can be malignant or benign. Malignant obstruction is often from direct tumor compression of the distal ureters, most frequently from genitourinary most common carcinoma cervix cancers. (Nandakumar A et al)

Over 70% of the cases present in advanced stages of the disease and are associated with poor prognosis and high mortality rates. In many of them, it is difficult to offer definitive treatment as they present in uremia due to associated obstructive uropathy. The results are unpredictable in terms of benefits achieved in these cases. (Vick CW et al)

Cervical cancer can spread to adjacent structures like the lower uterine segment, vagina and para cervical space along the broad and uterosacral ligaments. It can also have lymphatic and hematogenous spread. The parametrium is the connective tissue between the leaves of the broad ligament. Medially, it abuts the uterus, cervix, and proximal vagina. Laterally, it extends to the pelvic side wall. Inferiorly, it is contiguous with the cardinal ligament. The parametrium consists primarily of fat through which uterine vessels, nerves, fibrous tissues and lymphatic vessels run. The distal ureter is in the parametrium as it passes from the pelvic side wall to the bladder approximately two centimeters lateral to the margin of the cervix. When cervical cancer extends into the parametrium, the ureter can be encased by tumor and this leads to hydro ureteronephrosis and eventually renal failure. (Lee SK et al)

Ureteral obstruction due to malignancy carries a poor prognosis with a resulting median survival of three to seven months. Hence most patients are treated with best supportive care or some palliative diversion procedure.

It is very important to select patients for curative treatment. Patients with features of uremia, frozen parametrium, non-functioning kidney are unlikely to show response and hence are best treated with supportive care. The non-recovery of renal function after the relief of hydro ureteronephrosis is dependent on age and renal cortical thickness. Age beyond 50 years and decreased renal cortical thickness (less than 13 mm) indicate poor recovery of renal function. Use of cisplatin as radio sensitizer with radiation is avoided as it is a nephrotoxic drug and worsens the pre existing renal failure. Various other chemotherapeutic drugs like carboplatin and gemcitabine can be tried. (James M et al)

Crude mortality rates in critically ill patients with AKI are systematically higher in those with cancer than in those without. The performance status and associated comorbidities have an additional adverse impact on both short-term and long-term outcome in cancer patients.

Age and cancer characteristics by itself, with of extensive metastatic or uncontrolled recurrent disease in solid tumor patients, have only a minor impact on the 6-month mortality in critically ill cancer patients. (James M et al)

Furthermore, outcomes have been found to be worse in patients who experience further deterioration in renal function despite advanced life support in the ICU. AKI may also play an important role. Sepsis-induced AKI is often associated with protracted multiple organ dysfunction whereas this will be less or only rarely the case in AKI caused by nephrotoxic drugs. (Cohen E P et al)

In both the benign and malignant groups, the degree of renal impairment as measured by presenting serum creatinine was similar and did not serve as a differentiating variable. After relief of obstruction with percutaneous nephrostomy tubes or ureteric stents, renal function improved significantly and was decreasing on discharge in both groups. Multiple studies have shown both stents and nephrostomy tubes are effective methods to restore kidney function after ureteric obstruction.

CONCLUSION

The overall prognosis is poor in patients requiring hemodialysis and high mortality rate in carcinoma cervix with renal failure patients. Early diagnosis of disease is required for good prognosis of patients.
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Immediate denture as an immediate solution

N.Vidyasankari¹, S.Senthil kumar², Deepesh K. Gupta³, Maheshwaren⁴
1. Reader, Department of Oral and Maxillofacial Prosthodontics, K.S.R Dental College, Salem (TN)
2. Professor, Department of Restorative dentistry, JKK Nataraja Dental College, Salem (TN)
3. Reader, Department of Prosthodontics, Govt. Dental College, Raipur (CG) India.
4. Senior Lecturer, Department of Prosthodontics, K.S.R Dental College, Salem (TN)

corresponding Author:
Dr. N. Vidyasankari,
MDS, 12 S.S.D Road, Thiruchengodu – 637211, Tamil Nadu, India.
Contact Number – 09443940244, E-Mail ID: vidhya_3010@yahoo.com

ABSTRACT
An immediate denture is "a complete denture or removable partial denture inserted immediately after the removal of natural teeth". The primary advantage of an immediate denture is the maintenance of patient’s appearance because there is no edentulous period. Circum-oral support, muscle tone, vertical dimension of occlusion, jaw relationship, and facial height can be maintained. Thus this article speaks about the needs and construction of an immediate complete denture.

Key words – Denture, Surgical Templates, Extraction, Transitional Denture

INTRODUCTION
One of the most bewildering clinical problems to the prosthodontist & general dentist is to encounter the patients who are going for complete edentulism. Immediate dentures are one of the options for the patient facing the edentulous state. It provides restoration of esthetics, phonetics and masticatory function. Immediate dentures act as a bandage or splint, promotes healing and protects blood clots, patient gets used to the immediate dentures as sooner than conventional dentures, can resume their daily work early. Patients do not have to endure a long healing process without teeth¹,²,³,⁴. In addition, it facilitates the transition from dentulous to the edentulous state.

Immediate dentures are more challenging to make than routine complete dentures for both the dentist and the patient, because anterior wax try-in is not possible beforehand and the patient may not be completely comfortable with the resulting appearance and fit of the immediate denture when inserted¹,²,³,⁴. Hence the dentist must explain the patient must about the limitations of the procedure before the treatment begins.

CASE REPORT:
A 46 year old female patient with partially edentulous upper and lower arches was reported to the Department of Prosthodontics for the prosthesis. On examination the teeth present were 11,12,13,14,16, 21, 22, 23, 27, 34, 36, 41, 43 & 45. The periodontal status of all the remaining natural teeth was poor with grade III mobility and poor oral hygiene. The periodontal status of all the remaining natural teeth was poor with grade III mobility and poor oral hygiene.

The treatment plan was total extraction of remaining natural teeth followed by conventional complete denture rehabilitation and was suggested to the patient. However, the patient was so conscious about her appearance & refused for the treatment because of the fear of being edentulous for 3 months since extraction. Hence, it was decided for Transitional Immediate denture rehabilitation. All the remaining lower teeth and the upper posterior teeth were extracted except the upper six anterior teeth [fig 1].
Initial phase - pre extraction procedures:

Initial impression was made with irreversible hydrocolloid in a stock tray, and poured with dental stone. A custom-made tray was fabricated with Auto-polymerizing Acrylic resin by covering the remaining teeth with a double thickness base plate wax. The custom tray was placed in the patient's mouth and evaluated for overextensions and borders refined by using low fusing green stick compound. Perforations & tray adhesives were placed in the tray to enhance the retention of impression material. Light-bodied polysiloxane rubber base impression material was used for the final impression.

Record blocks were fabricated with temporary denture base made of autopolymerizing acrylic resin. Jaw relation was recorded [fig 2]. Appropriate shape, size and shade of the teeth were selected. The posteriors were arranged first to provide multiple posterior contacts in centric relation. The lower anteriors were set according to the remaining upper natural teeth with no contacts in centric relation. Posterior try-in was scheduled to verify centric relation, vertical dimension and the posterior palatal seal.

Preparation of surgical template:

The predetermined cross marked teeth to be extracted were trimmed using a sharp knife and round bur up to the level of gingival margin for cast modification [fig 3 and 4]. The gingival margins on the facial and lingual surfaces of the cast were outlined. A pencil line 2mm above and parallel to this gingival contoured line were scribed on the cast. The stone cast was beveled from labial to lingual aspect with the depth of 2mm at the gingival margin areas. A duplicated cast was made on which a clear acrylic surgical template was fabricated to evaluate the surgical site latter.

The remaining anterior teeth were arranged in their position. The contours of the dentures were waxed properly. The dentures were processed using heat.
activated acrylic resin.

**Surgical phase – extraction procedure:**

The six anterior teeth were extracted under local anesthesia following proper surgical protocol [fig 5]. Surgical template [fig 6] was used to check for any tissue blanching. The hard tissue was trimmed at the blanched area. Simple interrupted suture was placed without tension [fig 7].

The maxillary denture was positioned and seated & checked for pre-mature contacts. Only gross pre-maturities were eliminated, the final correction was not done to avoid further trauma to the extraction sites. The denture adapts well and the labial undercut present provides a better retention [fig 8,9,10]. The patient was discharged with the instruction of not removing the denture for 24 hours, have fluid food and report the dental clinic the next day.
Post insertion review:
During follow-up review occlusion was verified and any ulceration from denture pressure or over extension was relieved. Dentures were cleaned for debris and the patient was asked to rinse the mouth with mouthwash gently. Denture reinserted & advised the patient not to remove the denture for the next 24 hours.

The same procedures done on the first day was repeated on the second consequent visit. Patient asked to have soft cold baby feeds and chopped vegetables. Patient asked to report after 5 days. After a week, sutures were removed [fig 11]. Tissue surface was examined with pressure indicator paste and there was no soreness or irritation found. Hence the need for the addition of medicaments is not needed. After a month, the occlusion was refined. The patient was told to report for checkup once in a month. Later after 6 months, the interim denture can be replaced with the conventional new denture.

CONCLUSION
Immediate dentures are a more challenging modality than complete dentures because the presence of teeth makes impressions and maxillomandibular positions more difficult to record. An occlusal adjustment, or even selective pretreatment extractions, may be needed to make accurate records at the proper vertical dimension of occlusion.

The most compelling reasons for the immediate denture prescription are the patient wish not to live without teeth for a day and consequently an uninterrupted normal lifestyle of smiling, talking, eating, and socializing. The patient is likely to adapt more easily to dentures at the same time recovery from surgery is progressing. Speech and mastication are rarely compromised, and nutrition can be maintained. Overall, the patient's psychological and social well-being is preserved.

Thus a careful planning, operator experience, attention to details of the technique and proper motivation of the patient best address this inherent problem of being edentulous.

REFERENCES:
Unrecognized swallowing of a partial denture and surgical retrieval by cervical oesophagotomy: A case report

C. Sunil Kumar,¹ B. M. M. Reddy,² A. Samantaray,³ D. S. R. Reddy⁴
1.Professor, Department of Conservative Dentistry, C.K.S. Theja Institute of Dental Sciences & Research, Tirupati, A.P
2.Professor, Department of Prosthodontics, C.K.S. Theja Institute of Dental Sciences & Research, Tirupati, A.P
3.Additional Professor, Department of Anaesthesiology and Critical Care, SVIMS, Tirupati, A.P
4.Reader, Department of Conservative Dentistry & Endodontics, C.K.S.T. Institute of Dental Sciences & Research, Tirupati, A.P

Corresponding Author:
Dr. C. Sunil Kumar,
1.Professor, Department of Conservative Dentistry, C.K.S. Theja Institute of Dental Sciences & Research, Tirupati, A.P
Phone No :- 9849481124, E-Mail – sunildec674@gmail.com

ABSTRACT

Dental prosthesis may be swallowed or can be aspirated that may result in acute medical or life threatening emergencies. A case of accidental swallowing of a four-unit removable partial denture by Dementia patient is reported, and the important fact is that, the patient was unaware that the denture was ingested and came to the clinic for a new partial denture. Patients with removable dental prosthesis should be informed of this potential risk of swallowing and sometimes even unrecognised.

Key words: Removable dentures, Ingestion, Foreign body, Impaction, oesophagotomy

INTRODUCTION

Cases of impaction of foreign bodies in the upper part of the alimentary canal are not infrequently met within hospital practice, but the greater proportion are cases in which the foreign body is lodged in the pharynx, and can generally be dealt with from the mouth. Foreign bodies arrested in the oesophagus command attention because their presence is a source of great danger and their removal becomes immediately a very vital problem. Aspiration and accidental swallowing of foreign bodies is more common in children, because of their curiosity, habitual insertion of objects into their mouths while playing and speaking, and the lack of posterior dentition. Reviews from otolaryngology reports coins, marbles, buttons, batteries, safety pins, bottle tops and screws are the common objects ingested in children. In adults, about 62 % of the cases are due to chicken bones, fish bones, or poorly fitted artificial teeth.¹

In regard to the situation at which foreign bodies may become lodged, it has been observed that small pointed bodies which easily penetrate the mucous membrane may become fixed at any point in the oesophagus. Larger bodies usually cannot pass through the isthmus and remain in the pharynx. The larger variety of foreign body which has passed through the pharynx lodges at those places where, the oesophagus is constricted, just behind the criocoid cartilage, the middle constriction which is about opposite the bifurcation of the trachea at level of 7th cervical vertebra, and the inferior constriction, where the oesophagus passes through the diaphragm.³

Swallowing of dental objects may also occur away from the clinic and seems to be more common than aspiration in the elderly. In the older age group, the most common foreign body swallowed is a denture because of decreased sensation of the oral cavity in denture wearers, and poor motor control of laryngopharynx.² Other reasons for aspiration can be maxillofacial trauma, dental treatment procedures, dementia or intellectual impairment, autism, Parkinson’s disease, Cerebral palsy and mental retardation.

Swallowing of dental materials and devices may be a serious complication during routine dental treatment.
For example, screw driver or implant itself during implant placement, a cast crown, bands and brackets during orthodontic treatment, a file or a reamer during endodontic therapy has been reported in the literature. Various measures have been proposed to prevent such occurrences such as using barriers (rubber dam, throat packs) and ligation of object (Eg. Files, Reamers, Rubberdam clamps etc) because they carry some risk of ingestion. The majority of foreign bodies entering the oropharynx will pass through the alimentary canal if they are small or they may cause perforation of the gut if sharp, which may lead to serious complications and even death. If the denture is made of radiolucent material as in acrylic removable partial denture, endoscopic examination and removal is suggested in a symptomatic patient with positive history. Surgery is rarely performed unless the foreign body is impacted, or failure to remove by routine endoscopic method. This report presents removal of an impacted removable partial denture with cervical oesophagotomy under general anaesthesia. The dangers of Oesophagotomy for foreign bodies are by no means negligible, chief causes being haemorrhage, shock and infection resulting in death sometimes.

**CASE REPORT**

A 78-year old dementia patient came to the clinic for replacement of maxillary anterior teeth. The patient was using removable acrylic partial denture since 5 years. Patient complains that the denture was missing since 1 month and they could not find the denture anywhere in the house. So she decided to get a new denture fabricated. Maxillary and mandibular impressions were made. During impression making patient complained of pain in the neck region. On proper enquiry about the patient’s general health, her son revealed that she was complaining of pain and difficulty during swallowing solid food and was under liquid diet for the past 15 days that too with great difficulty. Correlating the symptoms of the patient, with missing denture a suspicion aroused about the swallowing of removable partial denture where the patient immediately denied the possibility. To confirm the suspicion the case was referred to Sri Venkateswara Institute of Medical Sciences, Tirupati. Preliminary radiological examination did not reveal anything but subsequent endoscopic examination showed a foreign body about 22 cm away from maxillary incisors in the midoesophageal region. Routine retrieval procedure was not successful because the denture was swallowed 1 month back and was deeply impacted in the mid oesophagus. The patient was subsequently posted for cervical oesophagotomy under general anaesthesia. Impacted denture was removed successfully and absence of any fistulous tract into the trachea was confirmed. Intraoperative course was uneventful. The patient was extubated in the operation theatre and shifted to intensive care unit. In
I.C.U. the patient was kept under observation for 7 days and discharged on 7th postoperative day. The cause of aspiration in this case is because of old age with impaired cough reflexes and some degree of intellectual impairment as evidenced by the lack of a clear positive history of swallowing her own loose fitting denture during sleep one month back.

**DISCUSSION**

According to the National Health and Nutrition Examination Survey (NHANES) 1 of every 5 persons between the ages of 18 and 74 years has full or partial dentures. The inadvertent swallowing of a dental prosthesis is not uncommon in the adult population. In a study by Abdullah et al 2 out of 200 patients were with a known history of an impacted tracheal or oesophageal foreign body, dental prostheses accounted for 11.5% of the cases. Examination of the patient with definite/suspected foreign body ingestion/entrapment This is often unhelpful, but careful examination should be carried out for acute clinical and medicolegal reasons:

- Assess the airway and respiratory function to exclude any compromise.
- Check vital signs, open the mouth and observe the oropharynx with a bright light.
- Consider indirect laryngoscopy and/or fibre-optic examination of the pharynx.
- Gently palpate the neck and assess tracheal position/compression.
- Formally examine the chest and listen to the lungs.
- Perform a cardiovascular examination.
- Carefully examine the abdomen.

Clinical history may be vague, and patients may or may not report a definite history of swallowing their dentures. Patients can present with vague symptoms of neck pain, dysphagia, odynophagia, and excessive salivation. Thus further reports may also be anticipated of sore throat, choking sensation, retrosternal pain, and coughing up blood. If not diagnosed early, progressive edema, infarction, ulceration and necrosis may lead to perforation and fistula formation. Fistulas can involve the trachea, oesophagus, mediastinum, aorta and bronchial tree in various combinations. Early diagnosis and treatment can avoid late complications that may require surgical intervention. The use of a unilateral removable partial denture to replace one or two missing teeth especially in elderly patients should be avoided because small size makes it easy for a patient to ingest or aspirate this prosthesis, with potentially serious consequences. Difficulty has been reported in the identification and location of prosthesis when it is made of radiolucent acrylic resin (PMMA) with little or no metal framework. The inclusion of radiopaque materials into these types of prostheses is strongly advised. Computerized tomography (CT) may be used to localize the offending object in 3-dimensions and also in locating the prosthesis because it has greater contrast resolution than conventional radiography and may reveal a radiolucent foreign body of dental origin.

**Differential diagnosis**

- This clinical scenario is unlikely to be confused with another illness, with the possible exception of space-occupying oesophageal pathology – eg: oesophageal carcinoma causing obstruction of a normal food bolus.
- Always consider the possibility that a foreign body has been inhaled, particularly if a patient presents acutely with respiratory compromise or with chronic chest symptoms.
- An acute presentation of mediastinitis may be due to perforation by a swallowed foreign body, or the primary form of the disease.
- Retropharyngeal abscess can cause similar symptoms to impacted objects in the upper oesophageal area.

**Investigations**

Blood tests are usually unhelpful, with the exception of chronic presentations or febrile patients where FBC/ESR may provide useful clues as to the cause of symptoms.

- Plain X-rays: Where there is a history of a swallowed radio-opaque object that may be located within the upper gastrointestinal (GI) tract, plain X-ray should be carried out to confirm or refute the possibility of oesophageal entrapment. Where the ingested object is not radio-opaque, X-ray investigations are unlikely to help and will probably only delay more relevant investigations such as upper GI endoscopy.
  
  Very small children can be imaged using a mouth-to-anus radiograph. In adults, a PA and lateral chest radiograph and/or plain abdominal X-ray are more useful. Only about 20-50% of food bones will be visible on X-rays.

- CT scans: CT scanning of the thorax/abdomen is highly useful for locating entrapped objects of various types and considered superior by many to plain X-ray imaging. CT scanning is the investigation of choice.
of choice if there is reason to suspect perforation or abscess formation.

- **Endoscopy:** Urgent endoscopy is mandatory in cases where there is airway obstruction or evidence of other severe complications. When there is a clear history of swallowing objects, such as toothpicks and/or aluminium bottle caps/can rings, endoscopy is the investigation/procedure of choice, as there is a high risk of complications with such objects. Definite indications for endoscopy are objects that are sharp, non-radio-opaque, elongated, or when there are multiple swallowed objects or a high risk of oesophageal injury. Endoscopy is also indicated for gastric or proximal-duodenal foreign bodies that have a diameter of > 2 cm, and length of > 5-7 cm. Endoscopy is a relatively safe procedure in experienced hands, but expensive, and should therefore be avoided as a routine intervention if possible.

- **Other tests:**
  - Barium swallows are sometimes used to detect non-radio-opaque items but CT is usually preferred, as there is a better yield and barium must be avoided when perforation is suspected.
  - Hand-held metal detectors can be used to trace the passage of metallic objects through the GI tract and reduce exposure to ionising radiation.

**CONCLUSION**

Since foreign body ingestion may result in acute medical or life threatening emergency, prevention of such occurrence is therefore the best approach. Knowledge of the dental team of the signs and symptoms of a swallowed object, documentation and proper medical follow-up are all essential for better management of ingested objects. Configurations and overall dimensions of prosthesis are important and patients receiving small dentures should be informed of this potential risk of swallowing. Fixed bridges with good cementation is preferred to removable prosthesis. However, fixed prosthesis may also be ingested if inadequately retained. So proper design and adequate retention of partial dentures is most important, either removable or fixed. Dentures also require proper fitting and checking on a regular basis to maintain an optimum fit. Elderly patients must be advised not to gulp large pieces of meat. Patients should be informed strongly to avoid wearing dentures during sleep. Unilateral single tooth replacement should be avoided as it does not have cross arch stabilization and accidental ingestion will be easier.

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