

YOUR PRACTICE BUILDER

A QUARTERLY PUBLICATION OF HEALTH CARE TRUST FOR GENERAL DENTAL PRACTITIONERS

FROM THE EDITOR'S DESK

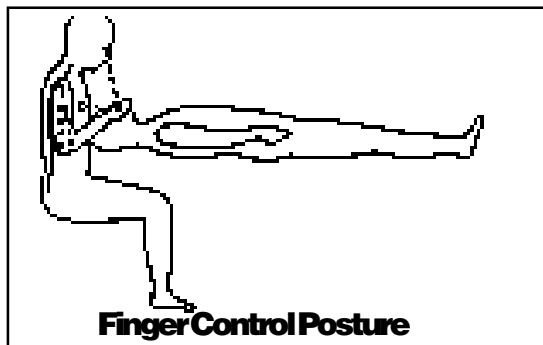
We have chosen dentistry as our profession and I am sure many of us are proud to be one. How can we render high class dental treatment year after year with a smiling face? It is possible when we have a healthy body without the aches and pains associated with faulty postures and habits while working on a patients. There are simple measures which can be easily adopted to keep you fit and healthy. It will be a great gift that you can give to yourselves.

A good endodontist's eyes are at his fingertips, because in many situations we have to work guided by the tactile sensations. Often we overlook the great amount of information obtainable from a simple intra-oral periapical radiograph. Endodontic series will give you the guidelines to extract most diagnostic information from your IOPA.

If you have a heavy load of endodontic cases or surgical cases where you want intra surgical radiographs, it is time to resort to digital radiographs in your clinic. Basic information on digital radiography and a brief outline to help you choose the equipment for your clinic are provided in this issue.

Many subscribers keep writing to us that they find articles in "Your Practice Builder" highly relevant and clinically useful. Well, the credit entirely goes to those select few who keep writing to us the topics on which they need information. I am sure many of us have some doubt, need some clarification, or an in-depth knowledge on some topic. I appeal to all of them to pen these topics down and write to us.

When we started YPB three years back, there was hardly any other similar publication. Recent times have seen a plethora of publications. It is your responses and feedback, which have helped us to maintain the position and standard of YPB.



Finger Control Posture

Nearly a hundred members have become life subscribers. I request all of you to send your life subscription (ch or DD for Rs. 500) to-day. It reduces our office work and helps us to concentrate on the main job ie. this publication.

Dr. Beena Rani Goel,

CARIES VACCINE

British scientists say they have developed a vaccine to prevent tooth decay by eliminating bacteria from the mouth.

*Read the full article in the next issue

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Digital Radiography

Digital radiography is a relatively new development in dentistry. It combines the power of computer and special X ray sensitive sensors. In due course of time this technique may get perfected to "live" X-ray mode. Digital radiography is gaining popularity over conventional film radiography due to its multiple **advantages** like:

- X-ray image is obtained immediately, eliminating developing time.
- Reduced radiation exposure (50-90%), compared to conventional X-ray technique.
- Elimination of processing chemicals
- Fast duplication, easy transfer of digital images.
- Ability to modify contrast, size, and colouration to aid in diagnosis.
- Progress during endodontic procedure can be assessed quickly and easily.

Currently there are two basic types of digital radiography machines.

I. Those using CCD (charged couple devices) e.g. MVG (monovisography) by Dexis, Sens-A- Ray, CDR System (Shick), RVG (Trophy).

II. Those using memory phosphor screens. e.g. Digora by Soredex, Finland.

In digital radiography, the conventional X-ray equipment is used to project X-ray beam onto a special sensor placed in the patient's oral cavity, like a conventional film. The sensor then transmits the data directly into the computer through cable link. (In Digora, sensor is placed in special scanner in computer to get the image).

The X-ray image captured on the sensor appears on the monitor and can be manipulated by computer to **change** the size of the image, resolution, orientation and contrast. Root canal working length can be electronically measured at this time using size 15 files. If size 10 files are used, the images will be inferior to routine radiography film images.

Disadvantages

- Reduced resolution compared to conventional x-rays.
- Initial investment is very high.
- Different systems available in the market are not compatible, making it difficult to export images between different systems.
- Some brand sensors have small area, making it necessary

to make multiple exposures.

- Sensors gradually degrade with time.
- These images are captured on the computer and can be easily altered, thus their value as a credible record may be less compared to conventional X-ray film.

CCD systems are faster (5 seconds). The sensor is attached to a cord, which transfers the image to computer. In Digora the sensor has no cord but should be placed in a special scanner attached to computer, and it takes about 20-30 seconds processing time.

CCD systems are more popular. **Dexis** system is marketed in India by Essenedmed (see Advertisement) and **Shick** is marketed by Confident. Shick system comes complete with computer and printer etc, but Dexis comes with a PCMCIA card, which can be placed in any computer, or even a laptop computer. This system can be easily used on multiple computers. Quality of image on both the above systems is comparable, but Dexis has been shown to be slightly superior in some studies. Shick has three different sizes of sensors while Dexis has only one size suitable to all needs.

In conclusion, Digital radiography is certainly a useful addition to the dental clinic. You can seriously consider its use if you have a heavy intraoral X-ray need in your clinic, particularly more in the area of endodontics. While buying a system, do not forget to get a replacement warranty for the sensor.

see article on page -4



Phalen's Test



Tinel's Sign

Dentists and Back pain

Once we have chosen dentistry, it will be appropriate to be aware of the occupational hazards of this profession. Dentistry is a mentally and physically demanding profession. Poor postures during work can lead to pain in the neck, shoulders and back.

Back pain is almost always the result of sitting and working in a faulty posture. A major portion of dentist's work is restorative. It may be a maxillary, mandibular, left or right side tooth on any of the five surfaces that face different directions.

To get a *good visual access* to the area, dentists often tend to bend their back, twist or over flex their necks and raise their arms and shoulders over long periods of time. This practice over-stresses the muscles and ligaments and often results in muscle spasm.

Site of Pain	Faulty posture
Neck	Over flexion and lateral twisting
Shoulder	Elbow raised
Arms and finger (referred pain)	Flexion and twisting of neck
Upper back	Over flexion of thoracic spine
Lower back	Over flexion of lumbar spine
Hip joint	Over splaying of thighs when seated
Thigh (sciatica)	Over flexion of lumbar spine

Muscles and ligaments pain in the early stages, and long term dislocations cause permanent damage to the areas. Even permanent damage to the spine may result, since working in distorted posture causes uneven pressures on inter vertebral discs and facet joints in the vertebrae. This damage is not reversible, and leads to limitations of movement, decreased work performance and in extreme cases, the need to give up dentistry completely.

By taking help from your dental assistant for 'four handed dentistry', you can have better visual access, reduced distortions and thus, reduce back pain.

But more important, the dentist needs to learn to sit in the correct posture. Dentist's stool should have a broad, rectangular seat to give plenty of support. The stool should also have a very firm, positive lumbar support.

While seated, the feet should be firmly placed on the ground and the upper border of the thighs should be about 15 degrees to the horizontal.

Maintain the patient in horizontal a position by keeping the dental chair initially flat. Adjust the headrest to keep the frontal plane of the patient's face totally horizontal. Dentist's thighs should not be splayed more than 30 degrees with the hip line also horizontal. Now adjust the patient's headrest so that the working point in the mouth is at the dentist's focal distance, which is usually about mid-sternal level and in the midline.

The dentist's upper arms should be hanging vertically with the elbows in light contact with the sides of the body. The forearms can then be raised, pivoting only the elbow joint to place the fingers at the correct height.

The correct posture called the '**finger control posture**'(diag. on front page) gives the dentist more control over five finger movements, providing greater accuracy in the work.

The dentist's head should be tilted to maximum 20 degrees downward to bring the line from his eyes to the patient's mouth as near vertical as possible. His inter pupillary axis should be horizontal at all times.

The **frontal plane** of the dentist's face should be in a parallel relationship to whatever tooth surface he is working on. To attain this:

- Rotate the patient's head left to right by up to 45 degrees on either side of the vertical.
- Tilt the patient's head forward/backwards.
- Move around on the mobile stool between 9.30 and 12.30 O'clock position.
- Raise or lower the patient's chair to keep the working point on the tooth at the dentist's focal distance.

Let us take a look at the common faults in dentist's position while working:see table on p.7

NOTE:

Because of lack of space the names of our Life members will be printed in the next issue

CARPAL TUNNEL SYNDROME

What is common between a typist and a dentist? The chances to get carpal tunnel syndrome (CTS) are common to both of them. Both the professions call for hand intensive work, increasing the incidence of carpal tunnel syndrome.

CTS is the most common compression neuropathy of the upper extremity. Dental professionals spend significant time grasping small diameter instruments while using repetitive wrist flexion and extension. These positions, along with forceful exertion, increase the strain of the flexor tendons through the carpal tunnel which increases the chance of mild tendonitis and synovitis. The increase of the tendon's diameter will decrease the space in the carpal tunnel. This decrease in space will increase the pressure on the median nerve, which will produce the signs and symptoms related to CTS.

There is a higher prevalence in woman between 40 and 60 years of age and during pregnancy due to water retention.

The factors increasing the risk of CTS in dentists are:

- Abnormal hand and body postures
- Repetitive motion
- Exposure to vibration
- Forceful pinching and gripping and
- Improper fit of gloves.

The carpal tunnel in the wrist area is formed on **three sides** by carpal bones, and on the fourth side by the transverse carpal ligament, which is about 2 mm thick and approximately 20 to 30 mm wide. This tunnel contains extrinsic flexor tendons and it provides protection for the **median nerve**. It cannot expand to accommodate any extra mass that may be introduced, thus causing compression of the median nerve.

Depending on the intensity and duration of compression, symptoms will vary. These may be numbness of the thumb, index, middle and radial half of the ring finger. Nocturnal paraesthesia, weakness of grasp and pinch after prolonged activity, atrophy of the intrinsic thumb muscles and pain radiating proximally may all be present.

To confirm the compression of the median nerve at the wrist, Phalen's test and Tinel's sign are commonly used.

Phalen's Test

Place the back of the hands together with wrists flexed. The test is positive if subjective sensory changes are noted within one minute. (see diag. on p.2)

Tinel's Sign

The ventral surface of the wrist is tapped. Tingling or an electric shooting pain into the fingers indicate nerve compression. (see diag. on p.2)

Treatment

Conservative treatment may be enough to relieve the compression. Symptoms may be allayed with anti-inflammatory drugs, splinting, tendon gliding exercises and/or steroid injection.

For surgical treatment, a small incision is made on the palmer surface of the hand just proximal to the wrist. The carpal tunnel is transected. After incision closure, the wrist is splinted in neutral position for 2-3 weeks, leaving fingers free to move.

Occurrence of this compression neuropathy can be minimised by reducing the risks in the work environment.

The work area should be arranged to limit reaching, forward bending and extremes of wrist flexion and extension.

It is important to adjust table and chair heights and position frequently used materials in an optimal height. While performing task requiring repetitive finger motion, the wrist should be held in a neutral position. Similarly, the forces on fingers should be limited during jobs that require wrist motion.

Individuals performing hand intensive work should adopt a *work-rest regime*. Tendon gliding exercises help to control the discomfort associated with compression of the median nerve at the wrist. Five repetitions of each exercise should be performed five times a day.

Exercise 1

Start with extended fingers, with wrist in neutral position i.e. hold your open palms facing each other. Fold your fingers to assume a "hook" position. Assume fist position. Now reverse the sequence-first-Hook, open palm. Repeat the whole process five times.

Exercise 2

Hold open palms facing each other. Bend the fingers at the base, at about 45 degrees to the Palm. Assume hook position and Complete by fist position. Reverse the sequence and complete one repetition. Source- Internet

Endodontic series-4

Radiographs in endodontics

At each step in the endodontic treatment viz. diagnosis, instrumentation, obturation and follow up, radiographs are of very great help. But there are many **limitations** to radiographs:

- It is a two dimensional picture of a three-dimensional object.
- The health status of the pulp can not be assessed from a radiograph.
- Many Periapical infections do not show any radiographic change.

To make endodontic success more predictable, it is imperative that the dentist understands a radiograph's limitation and improves his technique and interpretation.

Anatomic landmarks on Radiographs

Normal anatomic landmarks may resemble or obscure endodontic lesions. Always identify the following anatomic landmarks on your IOPA:

- Incisive foramen in the area between the roots of maxillary incisors.
- Nasal fossa
- Maxillary sinus
- Lingual foramen in the periapical region of mandibular incisor root
- Mental foramen
- Mandibular canal in the periapical region of mandibular second premolar and molar
- And lamina dura

The **anatomic end** of the root is the apex, whereas the **apical foramen** is where the root canal *exits* on to the root surface. In majority of the cases, the apical foramen is situated on the root surface about 0.5 to 1 mm from the root apex.

When the apical foramen is situated on the buccal or the lingual surface of the root, it may not be seen accurately on the radiograph. For better visualisation of the root, change the horizontal angulation 10-20 degrees, when the foramen may move to the edge of the root, where it can be visualised. The radiograph that shows the file closest to periodontal ligament will be the accurate one.

Radiographic Technique

Paralleling technique is preferred over bisecting angle technique because in the former, the distortion is less and chances of zygomatic process overlapping the maxillary molar roots are less. But in paralleling technique the procedure must be accurate to get consistent result. Any standard text can be referred for detailed technique.

Daylight quick processing tanks and high-speed chemicals are very useful for endodontic cases. It is important to wash these radiographs for at least 30 minutes after fixing to prevent deterioration with time.

Diagnosing from the radiographs

When a lateral radiolucent lesion is detected, suspect a necrotic pulp and a lateral canal. Since pulp degeneration starts coronally and moves apically, radiolucency can be seen on the lateral aspect of the root before it appears at the apex. Always make it a habit to view the radiograph from the periphery toward the center. Often we tend to focus on the obvious, which lies in the center of the radiograph and fail to see the actual cause of the patient's problem on the periphery of the radiograph.

The number of canals may be inferred from the outline of the root. Cone shaped roots as seen on the angled view usually indicate a single canal, or two canals in the same root coming together and exiting at one foramen.

Short, wide or blunt roots indicate that each of two canals may have its own separate foramen. An angled view radiograph is best to determine the number of canals.

When the radiographic density of the *canal shadow* shows sharp changes, it may be an indication of bifurcation or trifurcation into thinner canals, or a wide buccolingual canal width that narrows apically, as seen in the canines.

Ribbon shaped roots or two separate roots may be seen as double root images on the radiograph.

Vertical radiolucent lines on the root are:

- Root canals if the lines funnel into the pulp chamber, or
- They represent root outline if the lines go into the periodontal ligament.

If the root canal does not seem centrally placed to the root outline, suspect more than one canal in the root. Discharging sinus may not always be situated near the offending tooth. So the sinus tract should be traced to determine the source of infection. Insert gently a **fresh gutta percha** into the sinus tract until it stops. Now take a radiograph of the area. The tip of the gutta percha will point to the infected area. Sometimes the offending tooth may be two or three teeth away from the exit of the sinus tract. They can even cross the midline.

When you detect a radiolucent area associated with a vital tooth, take another radiograph with changed horizontal angulation. If the radiolucency was due to an anatomic landmark like mental foramen, the radiolucency will move away from the apex in the second radiograph. A true periapical lesion will always stay at the apex.

Buccal object rule

The buccal object rule is used to determine the relative bucco-lingual location of objects in the oral cavity. It is easier to understand this concept by remembering a simple mnemonic-the word SLOB (Same Lingual Opposite Buccal). The lingual object will always follow the X-ray tube head. When the radiograph of the maxillary premolar is taken from the mesial, lingual root will be seen on the mesial. Move the X-ray tube to the distal and the lingual root and canal on the radiograph will appear to move to the distal, while the buccal root will appear to have moved in the opposite direction to the mesial.

If we remember certain clues, we can determine from which horizontal angulation (mesial or distal) the radiograph was made. Once we know the SLOB rule, it is used to determine where the object lies i.e. on the buccal or lingual.

Here are those **clues**:

- If proximal contacts overlap, the radiograph was made from either the mesial or distal, but not straight on.
- The lingual roots or cusps lie closest to the film and appear more distinct than the buccal roots and cusps.

- Palatal roots appear to be longer than the buccal roots since maxillary radiographs are usually made from a positive vertical angle.
- Position of the palatal root of the maxillary molars is the most important clue in the maxillary arch. The palatal root will be seen between the two buccal roots if the radiograph is taken at a straight right angle to the tooth. If the palatal root lies behind the mesio-buccal root, the X-ray beam came from the mesial direction. On the other hand, the palatal root of the maxillary molar will lie behind the distobuccal root if the X-ray was taken from the distal.
- In the mandibular arch, the most important clue is whether the canine or the molar is seen in the X-ray. When canine is seen, the radiograph was probably taken from the mesial. When the radiograph is taken from the distal horizontal angle, the second and third molars and not the canine will be seen in the film.

Cont. on page 7



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.....from p. 6

•The buccal cusp is seen most coronal in the X-ray since mandibular radiographs are shot at a negative vertical angulation. The buccal cusp moves in the opposite direction of the X-ray cone.
 By following proper radiographic technique, the need to repeat the X-rays can be eliminated. Electronic apex locators are reasonably accurate in determining root canal working length, thus reducing patient exposure. Further, the use of digital radiographic equipment can considerably eliminate radiation hazard.

Ref. Edward Besner et al: Practical Endodontics, C.V. Mosby 1994, p. 41-61

...from Page 3:

Fault	Consequences	Solutions
1. Dentist too far away from the patient's head	Overflexion of thoracic and cervical spines and elimination of the concave lumbar curve.	Dentist should move closer to the patient's head
2. Patient's chair too low.	Overflexion of the back.	Raise the chair to the dentist's focal distance
3. Patient's head too far down the head rest	Overflexion of thoracic and cervical spines and elimination of the concave lumbar curve	Move the patient up the chair so that the top of the head is in level with the top of the head rest
4. Chairback tilted forward	Overflexion of the back and neck particularly lumbar and thoracic spines.	Lower chair back to horizontal
5. Headrest tilted too far forwards	Overflexion of the neck in order to maintain vertical eyeline.	Tilt head rest farther back to produce horizontal frontal plane in the patient
6. Excessive twisting of cervical and thoracic spine.	Neck/ shoulder/ upper arm pain	Rotate patient's head and move dentist's location
7. Using direct vision to see upper teeth, back rest not flat and headrest not flat.	Neck/ shoulder/ upper arm pain	Lower backrest and headrest and use mirror vision

Ref. BDA factfile Feb. 1997