
Conclusions and Recommendations

Introduction

The scientific community agrees that low-level ionizing radiation has potentially adverse biologic effects, especially in children. New information on the effects of low-dose ionizing radiation supports our past information on risk. There is probably no zero risk; yet, the risk to children exposed to ionizing radiation from dental radiographs does not preclude the judicious use of diagnostic radiation. The objective should be to minimize the exposure to radiation. Dental radiographs should be prescribed according to individual patient need and should be made using techniques that will maximize the yield of diagnostic information while minimizing the exposure to ionizing radiation.

Children should be exposed to dental ionizing radiation only after a complete review and evaluation of their dental, oral, and general health. Following this review, dental radiographs should be ordered on the basis of the findings of a thorough clinical examination by a dentist. Only a dentist should order the films to be exposed.

Dentists should share a child's radiographs. They should request existing films from other dentists or physicians to prevent duplicate exposure. Parents should be encouraged to keep a record^a of all radiographs made of their children. This record, which should be brought to all dental visits, would include the date, type of radiograph, operator and where it was made.

Technical excellence is required in all phases of radiological examination. This includes, but is not limited to: the selection of equipment; film; film screen combinations and other receptors; the use of minimum exposure time and optimum developing time; utilization of meticulous dark room procedures; and a careful examination of the processed film in a darkened room with the use of proper illumination and magnification.

Dental radiographs may be made to establish the presence of pathosis or to aid in establishing a diagnosis. Radiographs may also be made in the absence of any clinically apparent problem to detect orofacial problems of low prevalence, which should be treated early to minimize morbidity and mortality (e.g., mesiodens), or orofacial problems of high prevalence with moderate need to be treated early (e.g., caries).

All dental radiographs should be carefully interpreted by the dentist and findings recorded in the child's dental chart.

General Recommendations to Minimize Exposure

I. Equipment Standards

- A. Dental radiographic equipment should be in compliance with federal (NCRP report no. 35) and state standards.
- B. Long cone, paralleling, 70-90 KVP technique is encouraged when indicated.
- C. Equipment should be inspected by a trained radiation technician at installation, modification, and at least five-year intervals.
- D. All states should develop and enforce radiology regulations.

II. Quality Assurance Programs

- A. Areas that require assessment include:
 - Generator performance
 - Tube head stability
 - Film processing
 - Dark room integrity
 - View box or viewing environment
 - Film quality

III. Previous X-ray Exposures

- A. Dentists should share radiographs with any other dentists or physicians when it would benefit the patient.
- B. Dentists have the responsibility to request existing films from both physicians and dentists when they would be useful.
- C. Parents should be encouraged to carry X-ray record cards^a which would list the date, type, and number of previous radiographic examination, and by whom they were made. The parent should maintain possession of this record.

IV. Shielding

- A. Leaded aprons to protect the gonads.
- B. Leaded collars to protect the thyroid glands when indicated.

V. Additional Aids to Further Reduce Radiation Exposure

- A. *Rectangular* collimation with restriction of

^aSee inside back cover of this issue.

beam size to film size.

- B. Use of the fastest speed film, film screen combinations, or other receptors suitable for the diagnostic purpose.
- C. Use of film holding and/or cone positioning devices.

Alternatives to Dental Radiography

There are no known alternatives to dental radiographs. However, the frequency of radiographic exposures may be minimized by a thorough history and clinical examination using visualization, transillumination, auscultation, percussion, and palpation.

Risks to Patients if Radiographs Are Not Taken

It is often impossible to identify dental disease and plan appropriate treatment without radiographs. Irreversible damage to teeth, alveolar bone, and other oral tissues, compromised treatment, increased risk of failure, and more costly care are all possible if radiographs are not made.

High-Yield Criteria for the Exposing of Dental Radiographs in Asymptomatic Children

High-yield criteria (also known as referral criteria, selection criteria, or decision rules) are descriptions of clinical conditions which identify patients who are most likely to benefit from a particular radiographic examination. Such criteria serve as a set of decision rules for patient selection, which increases the likelihood of achieving a useful result. The use of high-yield criteria reduces the number of unproductive radiographic examinations.

The following high-yield criteria assume that the child is asymptomatic and the dentist finds *no clinical indications* for radiographic examination. This does not include those conditions for which there is clinical evidence of injury, disease (such as caries), pulpal pathosis, delayed or accelerated eruption or exfoliation of teeth, swelling, hemorrhage, pain or ulceration, or those conditions where there is a need to evaluate treatment. In such cases, appropriate radiographs are indicated to establish and/or confirm the diagnosis and facilitate and evaluate treatment.

I. Stage of Development of the Dentition

Dental radiographs are indicated in the following situations:

A. *Primary dentition.*

If the proximal surfaces of the primary teeth cannot be visualized and probed, and the child can be expected to cooperate for exposure, then dental radiographs should be made to determine the presence of interproximal caries. If all surfaces of all primary teeth can be clinically

examined due to open contact, radiographs are not indicated.

If the child's behavior is such that obtaining films of adequate diagnostic quality is doubtful, radiographs should be deferred until behavior can be managed or improves.

B. *Early Transitional Dentition* (after appearance of permanent first molars and/or permanent lower incisors).

About the time the first permanent tooth should be erupting (posterior or anterior), an anterior occlusal radiograph should be made, to detect conditions such as supernumerary teeth or missing teeth.

A radiographic examination that includes all tooth bearing areas of the mandible and maxillae is recommended at about the time of onset of the early mixed dentition (6-7 years) to assess the dental age of the patient, to identify pathoses and proximal caries, and to aid in the early diagnosis of developmental anomalies.

The radiographic examination may consist of posterior bitewings and one of the following: a. posterior periapical radiographs or, b. panoramic radiograph or, c. lateral jaw 45° projections.

C. *Early Permanent Dentition* (postpubertal; late adolescence).

Radiographs are made to evaluate the same tissues as in the early transitional dentition and to evaluate the position and developmental status of the third molars. This examination should be made within two years following the eruption of the permanent second molars. A cephalometric radiograph may be prescribed by the practitioner who is providing the orthodontic diagnosis and/or treatment.

II. Risk of Dental Caries

A. A high risk to dental caries may be associated with:

1. poor oral hygiene,
2. fluoride deficiency,
3. prolonged nursing (bottle or breast),
4. high carbohydrate diet,
5. poor family dental health,
6. developmental enamel defects,
7. developmental disability and acute or chronic medical problem,
8. genetic abnormality.

The child with a high risk of dental caries should have bitewing radiographs made as soon as posterior primary teeth are in proximal contact. The age of the patient is not an important variable. If interproximal caries are detected and restored, follow-up radiographs are indicated semi-annually until the child is caries-

free and classified as having a low risk of dental caries.

B. Low risk of dental caries.

A child with a low risk to dental caries may be defined as a normal, healthy asymptomatic patient, exposed to optimal levels of fluoride, performing daily preventive technics and consuming a diet low in cariogenicity.

The low risk patient with closed proximal contacts should have posterior bitewing radiographs made. If no caries are found, then radiographs may be made every 12 to 18 months if primary teeth are in contact, or up to 24 months if permanent teeth are in contact. Bitewing radiographs may be made more frequently if the child enters the high risk category. The more rapid progression in primary teeth should be considered in determining the time interval between bitewing radiographs.

Documentation of Treatment

Exposing radiographs to document treatment results, when not needed to establish the presence of pathosis or to aid in establishing a diagnosis, is considered unnecessary and an unwarranted exposure of the child to ionizing radiation.

Conclusions

These recommendations are an attempt to fulfill the profession's obligation to establish guidelines for the optimal use of diagnostic radiography with minimal radiation exposure.

The participants all agreed there is need for a pediatric dental radiology committee to be established by the American Academy of Pedodontics that would collect and evaluate the latest information and disseminate it to health providers, and that more funds should be made available for radiological research and for the education of dental radiologists.

Continuing Education Course

Pedodontic Radiology: Review and Update for the 80's

29 May 1982, Galleria Plaza Hotel, Houston, Texas

A comprehensive and practical course on pedodontic radiology for the private practitioner based on information and recommendations from the Radiation in Pediatric Dentistry Conference held in Cincinnati.

Topics to be presented include:

1. Ionizing radiation — Review, Concerns, and Recommendations to Parents, Patients, and Staff,
2. High Yield Criteria in Pedodontic Radiology,
3. Pedodontic Radiographic Interpretation,
4. Radiographic Techniques — Equipment, Holding and Positioning Devices, Dark Rooms, Duplication, and Protection Devices,
5. Quality Assurance Programs for the Private Office,
6. Panel Discussion — Radiographic Concerns and Recommendations for the Private Practice.

Speakers will be nationally recognized experts in dental radiology, along with members of the Academy. Further information will be sent to all members and announcements will be in the Newsletter. Additional information: Ms. Merle C. Hunter, Executive Director, American Academy of Pedodontics Suite 1036, 211 East Chicago Ave., Chicago, Illinois 60611.