PEDIATRIC DENTISTRY/Copyright ©1984 by
The American Academy of Pediatric Dentistry
Volume 6 Number 4

Requirements for supplemental periapical radiographs following No. 0 and No. 2 bite-wings*

David R. Myers, DDS, MS James T. Barenie, DDS, MS Ronald A. Bell, DDS, MEd

Abstract

The purpose of this study was to determine the need for supplemental periapical radiographs in planning restorative services and pulp treatment for primary molars when a child's bite-wing radiographs were taken with No. 0- or No. 2-size film.

Forty-eight good quality bite-wing radiographs were selected from patients 5-7 years of age and sorted into four groups containing 12 films classified according to film size (No. 0 or No. 2) and caries severity (minimal or severe). Six dentists independently read the films on two occasions under standard viewing conditions. They were asked to indicate whether additional periapical radiographs would be needed to plan treatment for the child's primary molars.

The results revealed a highly significant interaction between film size and caries severity in determining the need for supplemental periapical radiographs. Children with severe caries whose bite-wing radiographs were taken with No. 0 film required significantly more periapical radiographs than did the other two groups.

When a child's cooperative ability permits, bite-wing radiographs should be exposed using No. 2 film — especially when extensive carious lesions are noted in the primary molars. This protocol will minimize the need to expose supplemental periapical radiographs.

A bite-wing examination is the most frequently performed radiographic examination for children.[1] Bite-wing radiographs are the most accurate means presently available to detect interproximal carious lesions in children.[1-3] Concerns about the potential harmful effects of low-dose ionizing radiation make it imperative that dentists obtain the maximum diagnostic information with every exposure.[4-5] Guidelines offered by the American Dental Association and the American Academy of Pediatric Dentistry prescribe that radiographs be exposed only as indicated by the findings of a clinical examination, however, these guidelines do not offer functional suggestions for common clinical situations.[6,7] Bite-wing radiographs can be made with No. 0, No. 1, or No. 2 films.[8] The No. 0 film is popular for children because of its small size. The purpose of this study was to determine the need for supplemental periapical radiographs to plan treatment for primary molars when bite-wing radiographs were taken with No. 0 or No. 2 films.

Method

One good quality bite-wing radiograph was selected from each of the records of 48 children, 5-7 years of age, who were in the primary or early mixed dentition stage of dental development. The 48 bite-wing radiographs were classified into four groups, each containing 12 films according to film size and caries severity (Figure 1).

Group A — No. 0 film with minimal caries (N = 12)
Group B — No. 0 film with severe caries (N = 12)
Group C — No. 2 film with minimal caries (N = 12)
Group D — No. 2 film with severe caries (N = 12).

The two minimal caries groups contained bite-wings with one or more early carious lesions which did not penetrate deep enough to endanger the pulp. The two severe caries groups contained bite-wings with at least one extensive carious lesion which would likely expose the pulp. Standard No. 0 and No. 2 D speed intraoral radiographic film was used for all the bite-

* Portions of this manuscript were presented at the 62nd IADR/AADR Annual Session, March, 1984, in Dallas, Texas.

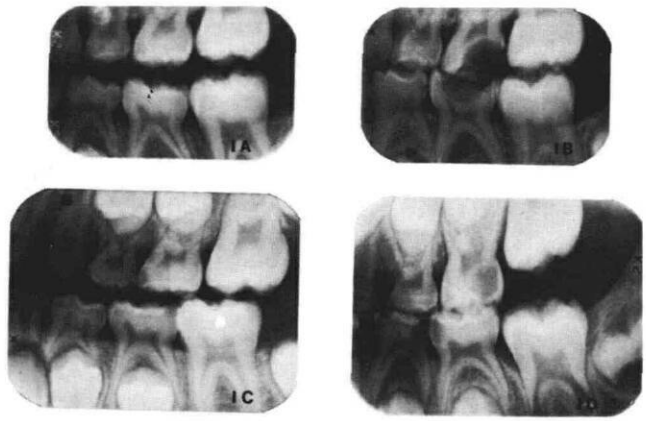

FIGURE 1. Representative radiographs from each group (A = Group A; B = Group B; C = Group C; D = Group D).

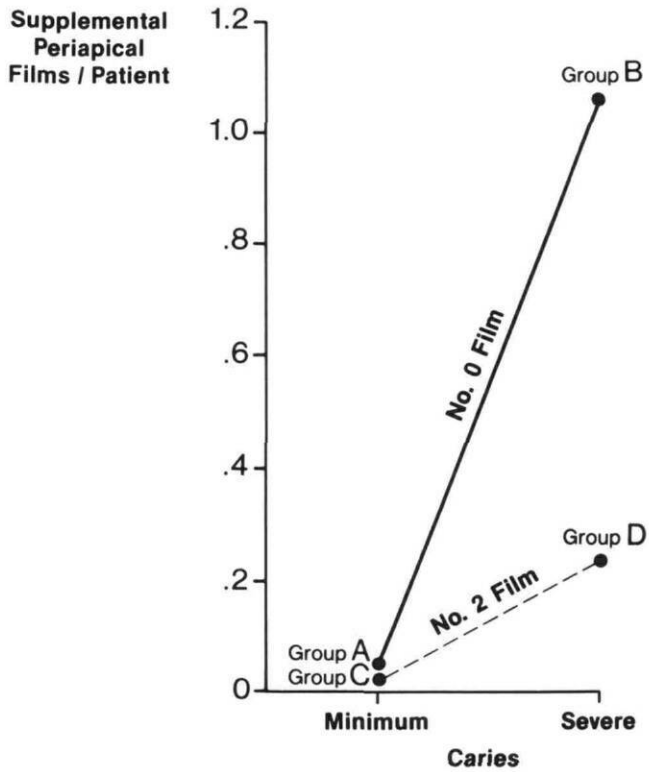

FIGURE 2. Interaction of film size and caries severity.

wings. All radiographs were exposed and processed according to manufacturer's recommendations.

Each of the 48 bite-wing radiographs was placed in a clear plastic mount and assigned a random number. Two experienced pediatric dentists, two second-year pedodontic residents, and two first-year pedodontic residents independently read the films in random order under standard viewing conditions on two occasions. There was a one-week interval between viewing sessions. The dentists had no knowledge of the research question, the group designations, or the assignment of any bite-wing film. At each session, the dentist was asked to indicate whether additional maxillary or mandibular periapical radiographs would be needed to plan restorative and pulp treatment for the child's primary molars. The resulting data were subjected to an analysis of variance.

Results

The total number of supplemental periapical radiographs recommended are shown in Table 1. Group B required significantly more supplemental radiographs than the other groups ($p < .0001$). At the first session, 72 additional radiographs were required in Group B compared to 4 in Group A; 0 in Group C; and 15 in Group D. At the second session, 81 additional radiographs were recommended in Group B, compared to 4 in Group A; 3 in Group C, and 17 in Group D.

There was a significant interaction between film size and caries severity regarding the need for supplemental periapical radiographs (Figure 2). Children with deep carious lesions were significantly more likely to require supplemental periapical films when the bite-wing radiographs were exposed using No. 0 film.

A secondary question was whether the experience level of the dentist made a difference in the perceived need for supplemental radiographs. Experience was significant but due to the small numbers it appears to have no practical implications ($p < .001$).

Discussion

The findings of this study indicate that a highly significant interaction exists between caries severity and film size which should be considered before performing a bite-wing radiographic examination for a child. Children with extensive carious lesions in primary molars whose bite-wings are exposed using No. 0 film required significantly more supplemental periapical radiographs to plan treatment for primary molars than did similar patients whose bite-wings were exposed using No. 2 film. The larger number of supplemental periapical radiographs were required because the No. 0 film frequently did not provide sufficient coverage of the primary molar roots and the periradicular area to assess completely the extent of the carious lesions and evaluate the condition of the pulp. These findings suggest that when a child's cooperative ability permits bite-wing radiographs should be exposed using No. 2 film. This is especially important when extensive carious lesions are noted in the primary molars. This protocol will provide the maximum diagnostic information and minimize the need to expose supplemental periapical radiographs.

Dr. Myers is a professor and chairman, Dr. Barenie is a professor, and Dr. Bell is an associate professor, pedodontics, Medical Col-

TABLE 1. Supplemental Radiographs Recommended

Group	*Session*	*First-Year Residents*	*Second-Year Residents*	*Faculty*	*Total Radiographs*	*Mean/Patient*
A	1	2	2	0	4	0.055
A	2	1	3	0	4	0.055
B	1	16	33	23	72	1.014
B	2	30	30	21	81	1.125
C	1	0	0	0	0	0.000
C	2	0	3	0	3	0.041
D	1	7	4	4	15	0.236
D	2	6	9	2	17	0.250

lege of Georgia, School of Dentistry, Augusta, GA 30912. Reprint requests should be sent to Dr. Myers.

1. White SC: Radiation exposure in pediatric dentistry: current standards in pedodontic radiology with suggestions for alternatives. Pediatr Dent 3:441–47, 1981.
2. Murray JJ, Majid ZA: The prevalence and progression of approximal caries in the deciduous dentition in British children. Br Dent J 145:161–64, 1978.
3. Silverstone LM: Relationship of the macroscopic, histologic, and radiographic appearance of interproximal lesions in human teeth: in vitro study using artificial caries technique. Pediatr Dent 3:414–22, 1981.
4. National Research Council, Committee on the Biological Effects of Ionizing Radiations: The Effects on Population of Exposure to Low Levels of Ionizing Radiation. Washington; National Academy Press, 1980.
5. Goepp RA: Risk/benefit considerations in pedodontic radiology. Pediatr Dent 3:437–40, 1981.
6. Council on Dental Materials and Devices: Recommendations in radiographic practices, March 1978. JADA 96:485–86, 1978.
7. Conference Proceedings: Radiation exposure in pediatric dentistry. Conclusions and recommendations. Pediatr Dent 3:461–63, 1981.
8. Parks CR: Dental radiology, in Textbook of Pediatric Dentistry, Braham RL, Morris ME, eds. Baltimore; Williams and Wilkins Co, 1980, p 191.

Quotable quote: Forbes on dentistry

The ADA claims the average dentist nets $59,530 a year, but that average covers a lot of grief. Adjusted for inflation, this figure has been shrinking since it peaked some dozen years ago. Dentists' real net incomes are no higher now, on average, than they were in the early 1960s.

The problems are particularly intense among younger practitioners. Older dentists went into business when demand was rising and entry costs were relatively low, but consider the obstacles that confront a dentist starting out in the world. Four years in a decent dental school easily can cost $50,000. And unless Daddy is affluent, that's all debt.

Then, try to set up a practice. The expenses are astronomical. Operating room equipment will run about $24,000; office supplies and reception area, $10,000; modern x-ray machine, $5,000. Add in the incidentials, and today an average office costs something like $60,000.

And that buys only one treatment room — what dentists call an operatorium. To make a really good living, a dentist needs two. That way he can work on one patient while his hygienist cleans teeth next door. But a second operatorium means spending another $40,000. So, starting a practice requires an investment, including education, of $150,000. Buying a patient list from another dentist who is moving or retiring could add $100,000 more. Annual interest costs easily could come to $37,000. Try cleaning enough teeth to cover that.

Green R: What's good for America isn't necessarily good for the dentists. Forbes, August 13, 1984.