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The frequency and distribution of periapical cysts and granulomas

An evaluation of 800 specimens

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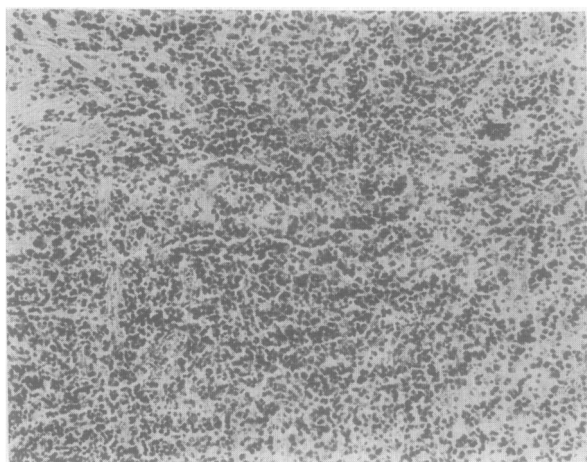
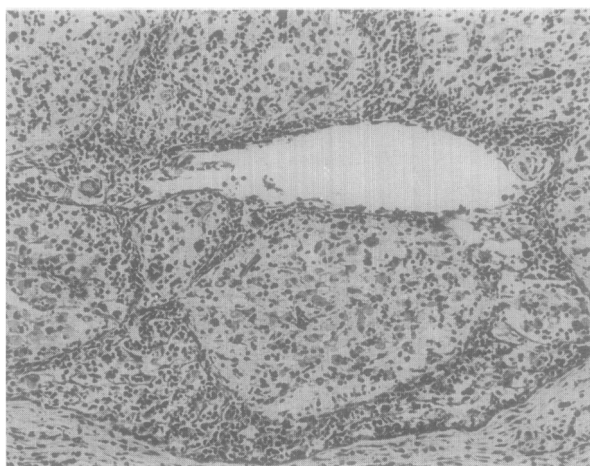
Dentists are repeatedly confronted with the problem of diagnosing and treating periapical lesions. Ordinarily, a nonsurgical endodontic approach is used in treating lesions that are thought to be periapical granulomas, whereas surgical therapy often is used if the lesion is believed to be cystic. Thus, choice of treatment usually depends on the clinical assessment of the lesion.

Accurate differential diagnosis between radicular cysts and periapical granulomas cannot be made from radiographs alone.¹⁻⁶ Histologic prevalence studies, therefore, assume special importance and may aid the clinician in making judgments regarding therapy. Unfortunately, however, different investigators,¹⁻⁸ applying histologic criteria to periapical specimens, have reported very different findings; the incidence of radicular cysts has ranged from 6 to 55 per cent, and of periapical granulomas from 46 to 84 per cent. These wide discrepancies in data, instead of providing a sound basis for therapy, have added to the clinician's insecurities.

The purpose of this study is to attempt to dispel some of the confusion caused by conflicting data from earlier investigations by presenting additional information on the frequency and distribution of various types of periapical lesion. It is hoped that these data may provide a foundation for more rational therapy, particularly with regard to the choice of surgical or nonsurgical endodontic techniques in the treatment of periapical lesions.

METHOD OF STUDY

This study was based on the microscopic examination of 800 periapical lesions submitted as routine biopsy specimens to the Department of Oral Pathology of the University of Kentucky College of Dentistry.

*Fig. 1.**Fig. 2.*

Almost all of the 800 specimens came from the Commonwealth of Kentucky: 225 came from within the College of Dentistry, 176 from private general practitioners, and 399 from specialists—primarily oral surgeons. The lesions were submitted by 134 different contributors.

Available histories revealed that 368 lesions were in male subjects, 415 were in female subjects, and the sex of the remaining 17 patients was unknown.

The specimens were fixed in 10 per cent formalin, grossly examined, and cut so that representative areas could be examined microscopically. Tissues were embedded in paraffin, sectioned at 6 to 8 microns, and stained with hematoxylin and eosin.

Generally accepted histologic criteria were used to make the microscopic diagnoses. The diagnosis of granuloma was based on the presence of granu-



Fig. 3.



Fig. 4.

lation tissue or chronic inflammatory tissue with or without epithelial rests (Fig. 1). When there was evidence of proliferation of the epithelial rests without definite lumen formation, the diagnosis of granuloma with early cystic transformation was made (Fig. 2). A diagnosis of radicular cyst was made only when there was an epithelium-lined lumen or a sufficient amount of stratified squamous epithelium to indicate that a cavity had existed (Figs. 3 and 4). Questionable inflammatory lesions, fibro-osseous lesions, and neoplasia were eliminated from this study.

RESULTS

Nine different types of lesion were microscopically diagnosed from the 800 periapical lesions. These are listed in Table I according to their incidence.

Table I. Incidence of various periapical lesions

<i>Diagnosis</i>	<i>No. of lesions</i>	<i>Incidence (per cent)</i>
Periapical granuloma	361	45.2
Radicular cyst	350	43.8
Granuloma with abscess formation	25	3.0
Granuloma with cystic transformation	19	2.4
Periapical foreign body reaction	13	1.6
Residual radicular cyst	13	1.6
Residual granuloma	10	1.3
Granuloma with cholesterol deposits	6	0.7
Periapical scar	3	0.4
Total	800	100.0

Periapical granulomas constituted 45.2 per cent of the lesions, and radicular cysts accounted for 43.8 per cent. Thus, the two lesions most frequently diagnosed made up 89 per cent of the specimens examined.

The data regarding location of these two most common lesions and the sex of the patients in whom they occur are presented in Figs. 5 and 6. Both cysts and granulomas occurred more frequently in the maxilla than in the mandible, and female patients were affected slightly more often than male patients. As shown in Fig. 7, almost equal numbers of cysts and granulomas were found associated with anterior teeth. The same was true for posterior teeth. The most commonly affected teeth were the maxillary lateral (105) and central (69) incisors; the next most common were the mandibular first (59) and second (43) molars and the maxillary first (44) molars.

In order to determine whether an unbiased sample had been collected, the numbers of periapical granulomas and radicular cysts were tabulated for each of the various groups of contributors (Table II). There was no significant deviation from the mean for any of the groups. Also, the data for the male and female subjects were representative of population figures in the United States. Thus, there is no obvious bias in our sample.

DISCUSSION AND CONCLUSIONS

In previous reports,¹⁻⁶ the incidence of radicular cysts has varied from 20 to 55 per cent, the mean being 34 per cent. This variance is attributed to the different methods used to collect the lesions that were examined. Only Sommer⁷ and Patterson and co-workers⁸ report less than a 20 per cent incidence of radicular cysts. The histopathologic criteria used by Sommer⁷ may account for the fact that only 6.4 per cent of the lesions were classified as radicular cysts. The 14 per cent incidence of radicular cysts reported by Patterson and associates⁸ was based on specimens collected after failure of nonsurgical endodontic therapy. In their study, the therapy may have altered the initial lesion, thereby making an accurate diagnosis impossible.

The results of our study correlate closely with the findings of Bhaskar.¹ In both studies, approximately 90 per cent of the periapical lesions were granulomas or radicular cysts, and the ratio of granulomas to radicular cysts was essentially the same (Fig. 8).

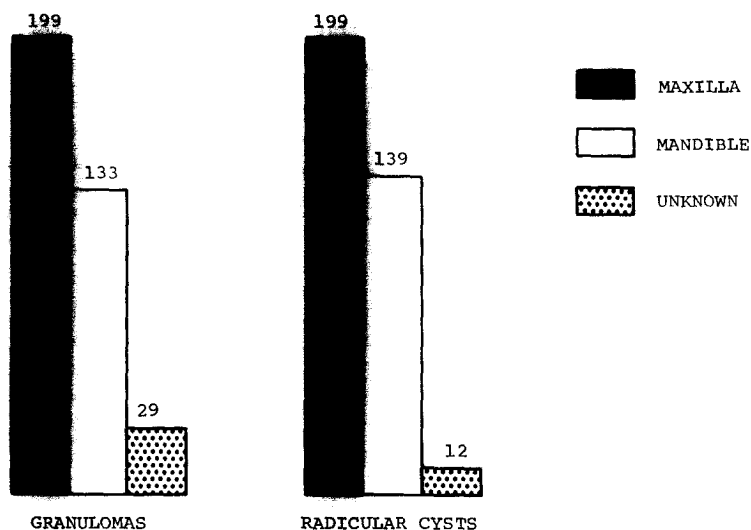


Fig. 5. Location of periapical granulomas and radicular cysts.

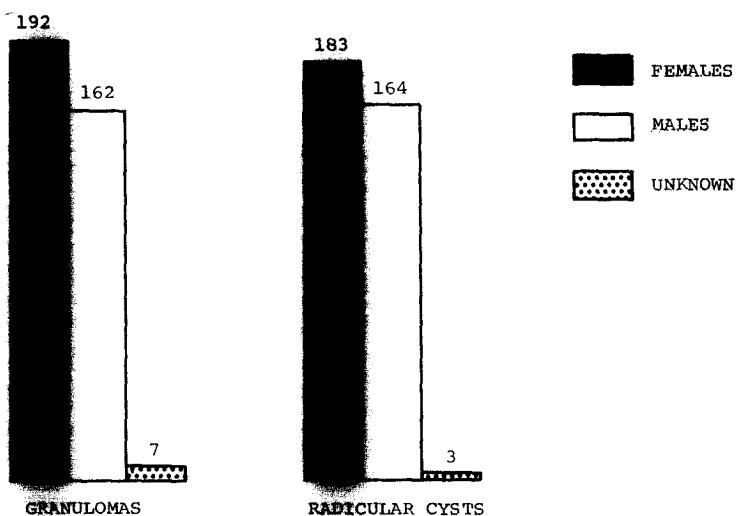


Fig. 6. Sex of patients with periapical granulomas and radicular cysts.

The most significant difference between Bhaskar's¹ data and ours involves the location of the lesions (Table III). Bhaskar found the ratio of lesions occurring in the maxilla as compared to the mandible to be about 3:1 for granulomas and 9:1 for cysts. Periapical lesions in our study favored the maxilla about 1½:1 for both granulomas and cysts. This discrepancy could be accounted for by the fact that surgical endodontic therapy is most frequently performed on maxillary anterior teeth, and the majority of specimens in Bhaskar's study were received from endodontists. As shown in Table II,

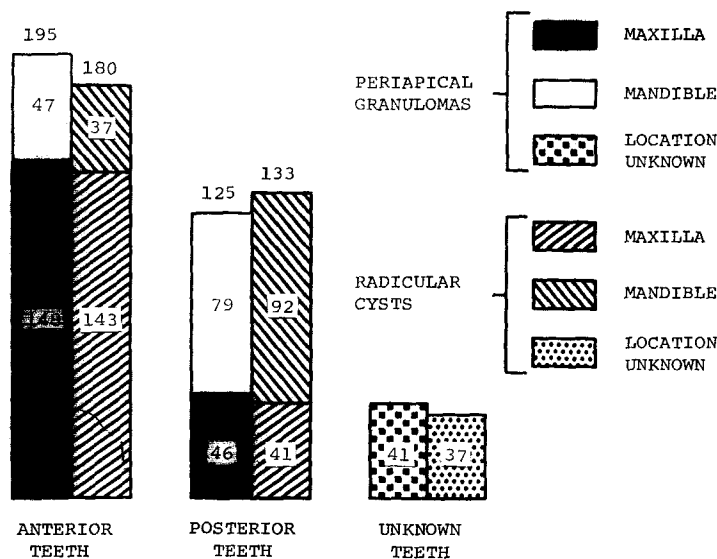


Fig. 7. Anterior and posterior distribution of periapical granulomas and radicular cysts within maxilla and mandible.

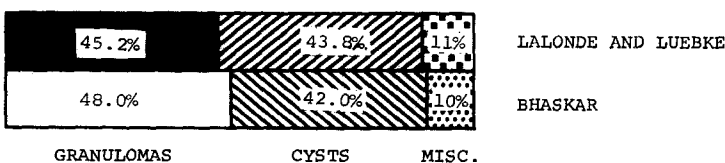


Fig. 8. Comparison of data relating to frequency of periapical lesions.

the majority of specimens in our study were submitted by oral surgeons following extraction of the involved teeth. Available histories revealed that only 6 per cent of the lesions included in our study involved endodontically treated teeth.

Despite previous studies,¹⁻⁶ many dentists still believe that 85 to 90 per cent of periapical lesions are granulomas.¹ However, on the basis of Bhaskar's data and ours, the clinician can expect that nine out of ten periapical lesions will prove to be periapical granulomas or radicular cysts and that these two lesions will occur with almost equal frequency.

The distribution data in this study suggest that current concepts of endodontic therapy should be reconsidered. At present the treatment of choice for periapical granulomas is nonsurgical endodontic therapy. If the lesion is thought to be cystic, endodontic therapy with apical surgery is usually recommended.⁹ The rationale for this concept is the belief that a cystic lesion will not resolve without surgical intervention. Although surgical therapy on posterior teeth is uncommon, a comprehensive study of endodontic success and failure by Ingle⁹ indicates that the success rate for posterior nonsurgical therapy is at least equal to the success rate of anterior therapy, with or without surgery.

Table II. Number of periapical granulomas and radicular cysts submitted by various types of contributors

Groups of contributors	No. of lesions submitted	Periapical granulomas		Radicular cysts	
		No.	Per cent	No.	Per cent
U.K. dental students	112	59	52.7	41	36.6
U.K. faculty (largely oral surgeons)	113	45	39.9	54	47.8
General practitioners	176	73	41.5	88	50.0
Specialists (largely oral surgeons)	399	184	46.6	167	41.8
Total	800	361	45.2	350	43.8

Table III. Comparison of data on the distribution of periapical granulomas and radicular cysts

	Periapical granulomas				Radicular cysts			
	Maxilla		Mandible		Maxilla		Mandible	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Lalonde and Luebke	181	60.0	122	40.0	184	58.9	123	41.1
Bhaskar	796	77.1	237	22.9	798	89.7	82	10.3

Furthermore, our data show that cysts occur almost as commonly as granulomas in both posterior and anterior areas. This suggests that some undiagnosed cystic lesions may have been resolved with conservative, nonsurgical endodontic therapy and, therefore, that at least some of the surgical therapy performed on anterior teeth is unnecessary.

SUMMARY

This study was based on the microscopic examination of 800 periapical lesions received as routine biopsy specimens. The specimens were contributed by students and faculty of the University of Kentucky College of Dentistry, by private general practitioners, and by specialists, most of whom were oral surgeons.

Periapical granulomas constituted 45.2 per cent of the lesions and radicular cysts 43.8 per cent. Thus, the diagnosis of periapical granuloma or radicular cyst was made for 89 per cent of the 800 periapical lesions submitted. The remaining 11 per cent of the lesions were related inflammatory lesions of various types. Therefore, clinicians can expect that nine out of ten periapical lesions will be periapical granulomas or radicular cysts and that these two lesions should occur with almost equal frequency.

The frequency of both cysts and granulomas was one and one-half times greater in the maxilla than in the mandible. The most commonly involved teeth were maxillary incisors, mandibular first and second molars, and maxillary first molars.

Radicular cysts were found to be almost as common as granulomas in both posterior and anterior areas of the mouth. Since posterior lesions resolve without

surgical endodontic therapy as frequently as anterior lesions, many of which are treated surgically, perhaps much apical surgery should be avoided.

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