

Endodontics

SIGNIFICANCE OF FINDINGS FOLLOWING BIOPSY AND HISTOLOGIC STUDY OF 100 PERIAPICAL LESIONS

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THE practice of endodontics includes many different phases and types of operations. To determine whether or not two of these procedures—curettage and apicoectomy involving periapical lesions—are always warranted is the primary objective of this report. As it is not intended to discount entirely the importance of endodontic surgery, the following cases in which such surgery usually is indicated are noted:

1. When the root is perforated with an instrument near the apex.
2. When there is external resorption near the apex of the root.
3. When only one sitting is possible.
4. When the root is fractured in the apical third.
5. When the presence of a large number of accessory canals is apparent.
6. When a moth-eaten apex denoting progressive resorption exists.
7. When broken-off root canal instruments are wedged in the apical third.
8. When teeth with extremely deflected apices offer themselves for treatment.
9. When grossly overfilled root canals are present.
10. When the operator is positive that the pathologic area is a cyst.

It is my intent, with the aid of an oral pathologist and appropriate excerpts taken from the writings of others, to demonstrate that the majority of periapical lesions associated with nonvital teeth are not cystic and that most endodontic operations involving periapical pathosis are unnecessary. The latter is true especially if the area is of a granulomatous nature because, as stated by Sommer, Ostrander, and Crowley,¹ it is a well-known fact that a periapical granuloma has within its structure the elements for healing and is essentially a defensive mechanism. Thus, when the cause of the granuloma

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namely, contents of the unfilled or poorly filled root canal is removed and properly treated and filled, the vast majority of these cases will heal and recalcify without surgical intervention. The belief that operations have to be performed because infections remain in the periapical areas following successful root canal treatment also has been proved false. Hedman's² study relative to the sterile condition of periapical lesions following the procurement of two consecutive negative cultures of the root canals proved experimentally that no residual infection remains in the areas.

In the hundreds of cases in which endodontic treatment was completed on personnel at the Great Lakes Naval Training Center, periapical radiographs revealed many instances in which a radiolucent area existed at the apex of the nonvital tooth. The question naturally arose, first, as to whether the area was cystic, of a granulomatous nature, or of some other type of pathosis and, second, whether an apicoectomy or curettage was actually indicated. On the one hand, the element of time usually entered the picture and it was impractical to wait in order to observe whether or not the area resolved of its own accord. It was also found to be a waste of advice to instruct the patient to have a follow-up study performed later and the operation then undertaken if necessary. As a rule, the patient either forgot the instructions, was stationed where dental treatment was not readily available, or did not deem any further procedures necessary since the tooth was asymptomatic. On the other hand, there were the results of the study by Sommer, Ostrander, and Crowley¹ in which they performed 170 root operations with subsequent biopsies. Their findings are shown in Table I.

TABLE I. RELATIONSHIP OF SIZE OF LESION TO BIOPSY DIAGNOSIS

SIZE OF LESIONS	TOTAL	GRANULOMA		CYST		OTHER	
		NO.	%	NO.	%	NO.	%
Small (under 4 mm. in any diameter)	15	12	80	1	7	2	13
Medium (greater than 4 mm. but less than 8 mm.)	64	54	84	2	3	8	13
Large (more than 8 mm.)	77	69	90	6	8	2	2
Not measured	14	8	58	2	14	4	28
Total	170	143	83	11	6.4	16	9.6

Our department, influenced by these findings, adhered to a conservative endodontic treatment of cases prior to February, 1957. At that time it was decided to carry on a study similar to the one that produced the results shown in Table I.

This study was conducted in two stages on a total of 100 nonvital anterior teeth with periapical lesions. Root surgery was instituted only after attainment of two consecutive negative cultures and proper obturation. All surgically enucleated tissues were submitted to an oral pathologist* for histopathologic

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study. A diagnosis of "cyst" was determined histologically only in those cases which presented a central lumen lined by epithelium. Evidence of epithelial rests of Malassez, remnants of Hertwig's sheath,³ in the section alone did not warrant the lesion being called a cyst.

TABLE II. RELATIONSHIP OF SIZE OF LESION TO BIOPSY DIAGNOSIS

SIZE OF LESIONS	TOTAL	GRANULOMA		CYST		OTHER	
		NO.	%	NO.	%	NO.	%
Small (under 4 mm. in any diameter)							
Medium (greater than 4 mm. but less than 8 mm.)	16	12	75	1	6	3	19
Large (more than 8 mm.)	34	20	59	12	35	2	6
Total	50	32	64	13	26	5	10

The first fifty cases biopsied were those areas that it was felt certain were cystic. These were selected from 421 endodontically completed cases during a period of six months. The average age of the persons operated upon was 22 years. The criteria used in making a diagnosis of "cyst" from the dental films were as follows: (1) the large size of the lesion, (2) the presence of a pathologic area with a radiolucent central zone, and (3) the appearance of an area of rarefaction limited by a continuous radiopaque border. Table II illustrates numerically and percentage-wise the results of the fifty cases as reported by the oral pathologist.

TABLE III. RELATIONSHIP OF SIZE OF LESION TO BIOPSY DIAGNOSIS

SIZE OF LESIONS	TOTAL	GRANULOMA		CYST		OTHER	
		NO.	%	NO.	%	NO.	%
Small (under 4 mm. in any diameter)	14	12	86	1	7	1	7
Medium (greater than 4 mm. but less than 8 mm.)	17	15	88	2	12		
Large (more than 8 mm.)	19	15	79	4	21		
Total	50	42	84	7	14	1	2

In the second phase of this study it was decided to operate on fifty nonvital teeth having any type of pathologic lesion and to determine the percentage of cysts present by microscopic study of the tissue removed. These cases were gathered from 229 endodontically treated teeth over a period of four months. The average age of the patients in this series of cases treated and biopsied was 20 years. Procedures similar to those in the initial fifty cases were followed. Table III demonstrates the number of cysts and granulomas present, numerically, and percentagewise, and the relative sizes of the lesions removed.

The percentage of cysts found in the latter fifty cases was larger than that demonstrated by Sommer, Ostrander, and Crowley. It is thought that the

reason for the increase can be attributed to the types of patients seen in a naval training station. Most of them have been exposed to little or no dental treatment and, consequently, have been bearers of cariously exposed or nonvital teeth, if present, of long standing. It is felt that possibly the ever-present epithelial rests in the area of the periapical lesions, especially those of long standing, eventually proliferate and contribute to the formation of a cyst.

Despite the increase in the percentage of cysts in this study, the fact still remains that cysts do not occur as often as thought by many practitioners. Acting on this premise, the dentist, especially one in private practice who is able to recall patients, would be justified in pursuing a conservative course in the treatment of periapical lesions. Recalling the patient periodically for roentgenographic checkups after completion of the root canal restoration would be the ideal procedure. If, after four to six months, the area had not shown some signs of resolving, it could be assumed then that the area was cystic and the endodontic surgery could be performed at that time.

Conclusions

1. This study further substantiates the belief that periapical lesions cannot be diagnosed as "cyst" by means of dental radiography alone.
2. The majority of lesions observed at the apices of nonvital teeth in this study were of a granulomatous nature, rather than of a cystic nature.
3. The dentist who employs accepted scientific endodontic procedures and then routinely performs curettage or apicoectomy on nonvital teeth presenting periapical areas is performing root surgery unnecessarily in most instances.
4. The conservative treatment of nonvital teeth with periapical lesions in those cases in which the patient can be routinely recalled is warranted in most instances.

References

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3. Noyes, F. B., Schour, I., and Noyes, H. J.: *Oral Histology and Embryology*, ed. 6, Philadelphia, 1948, Lea & Febiger, p. 182.