From: The Royal Dental School, Malmö, Sweden
The Department of Histopathology
Head: Dr. odont. GÖSTA GUSTAFSON

FAILURE OF HEALING AFTER APICECTOMY AS A SEQUEL TO THE USE OF A SULPHONAMIDE PREPARATION

by

ANNA-GRETA GUSTAFSON

An apicectomy was performed on the upper left lateral incisor of a patient in 1946. The apical part of the root was removed and the resultant cavity curetted and filled with a sulphonamide preparation. As the periapical lesion did not heal, the tooth was removed some years later. Ten years after the apicectomy the patient still had trouble from this region and radiographs showed residual rarefaction of the alveolar bone. A flap was reflected, the rarefied area curretted and a piece of the tissue removed for histological investigation.

Sections 5 microns thick were cut and stained with haematoxylin and by van Gieson's method using celestine blue. Sections were also studied in polarized light using a gypsum red I compensator, and in ultra-violet light after fluorochromation with acridine orange.

The tissue is mostly composed of relatively acellular connective tissue with prominent bundles of collagen. In some areas there is a mild infiltration of inflammatory cells, mostly lymphocytes. In other areas there are large multinucleated cells. The cellular infiltration extends to the edge of the piece of tissue.

Throughout the tissue, irregular, homogenous bundles of needlelike masses are seen.

These are practically transparent and no structure is visible in ordinary light (Fig. 1). They show strong birefringence when viewed in polarized light (Figs. 2 and 9). The larger ones have a long crystalline structure and are obviously not remains of

birefringent fibrils or threads. Neither can they be the result of technical procedures in the preparation of the sections as crystals formed in this way have quite a different appearance. Examination of the sections under higher magnification (Fig. 3) reveals that the small birefringent particles have the same crystalline appearance as the large. Both were found to be negatively birefringent when examined with the gypsum compensator.

Apart from the crystals, the giant cells are most interesting. They show great variations in form which may correspond to stages in their development and degeneration. Different amounts of resorbed material are present in the different giant cells. Around the large crystals there are multinucleated cells of the usual foreign body giant cell type. There are also some giant cells of fairly normal appearance with small crystals within their cytoplasm (Fig. 8), which is otherwise normal. Other giant cells contain large masses of crystals (Figs. 9 and 10) and the nuclei of these cells either show pycnotic degeneration or have broken up.

Fluorescence investigation reveals that some of the nuclei are homogenous without any cell membrane (Figs. 7 and 12) while others appear empty but have a prominent cell membrane (Fig. 11). In the former cells only remnants of the nuclei remain and there is marked vacuolization of the cytoplasm. At this stage the border between the giant cell and the surrounding connective tissue is not sharp and it would appear as if the cell was breaking up.

The different stages are particularly well demonstrated by fluorochromation with acridine orange; less so with ordinary stains.

DISCUSSION

As there was failure of healing for such a long time and as the presence of the crystals cannot be explained in any other way, it seems likely that the dentist used a sulphonamide preparation which was not resorbed during the extensive period (10 yrs.) since the first operation. It is evident from the relatively mild lymphocyte infiltration that the preparation was tolerated fairly well by the tissues. The irritation from the crystallites has, however, been so great that healing has been delayed.

Evidently the giant cells could only resorb small particles but, from the presence of vacuoles, it would appear that they could dissolve these. There are no or very few crystals in the cells with marked vacuolization. Cells which have resorbed so many crystal fragments that their cytoplasm is completely filled, are ruined and various stages of resorption and degeneration can be seen in the sections.

SUMMARY

There was failure of healing after an apicectomy and even after extraction of the tooth. Histological investigation with polarized light revealed the presence of birefringent crystals of differing sizes. Some of these crystals had been resorbed by giant cells which show different stages of degeneration. These stages were investigated with the fluorescence microscope. It would appear that the failure of healing is due to the presence of these crystals which are probably remains of a sulphonamide preparation.

RÉSUMÉ

CRISTAUX DE SULFAMIDES À RÉSORPTION DIFFICILE AYANT CAUSÉ UN RETARD DE CICATRISATION APRÈS RÉSECTION APICALE

Après une résection apicale et une extraction, la cicatrisation fait défaut. Un examen histologique en lumière polarisée décèle la présence dans le champ opératoire de cristaux biréfringents de différentes grosseurs. Une partie de ces cristaux ont été résorbés par des cellules géantes présentant différents degrés de dégénération, ce qui fait l'objet d'un examen en fluorescence. Il apparait nettement que ce défaut de cicatrisation est dû à la présence de ces cristaux, qui sont vraisemblablement des restes de sulfamides.

ZUSAMMENFASSUNG

AUSBLEIBEN DER HEILUNG NACH WURZELSPITZENRESEKTION ALS FOLGE DER ANWENDUNG VON SULFAPRÄPARATEN

Nach Wurzelspitzenresektion und Extraktion blieb eine Heilung aus. Bei polarisiertem Licht zeigte die histologische Untersuchung, dass in der Umgebung des Operationsgebietes doppelt-

brechende Kristalle verschiedener Grösse vorhanden waren. Ein Teil dieser Kristalle wurde von Riesenzellen resorbiert, die verschiedene Degenerationsstadien aufwiesen. Diese Untersuchungen wurden bei ultraviolettem Licht nach sekundärer Fluorochromierung ausgeführt. Es zeigte sich dabei, dass das Ausbleiben der Heilung auf der Anwesenheit von diesen Kristallen beruhte. Die Kristalle waren wahrscheinlich Reste von Sulfapräparaten.

Address: *Tandläkarhögskolan*
Malmö S
Sweden

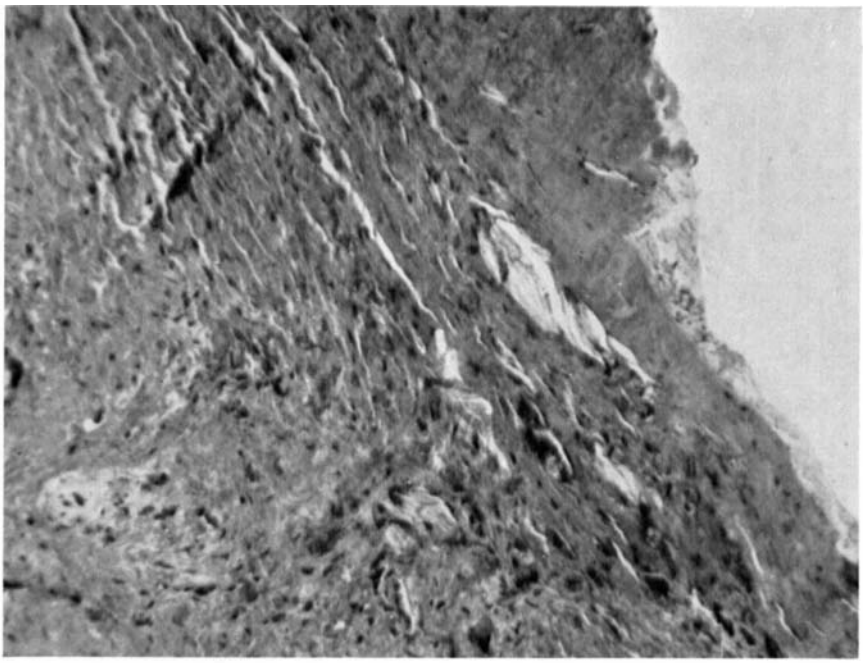
PLATES

FIG. 1.

Low magnification of a section stained in hæmatoxylin. The connective tissue is rich in fibrils and has irregular clear areas.

FIG. 2.

The same area as in Fig. 2 seen in polarized light. The clear areas are composed of birefringent substances.



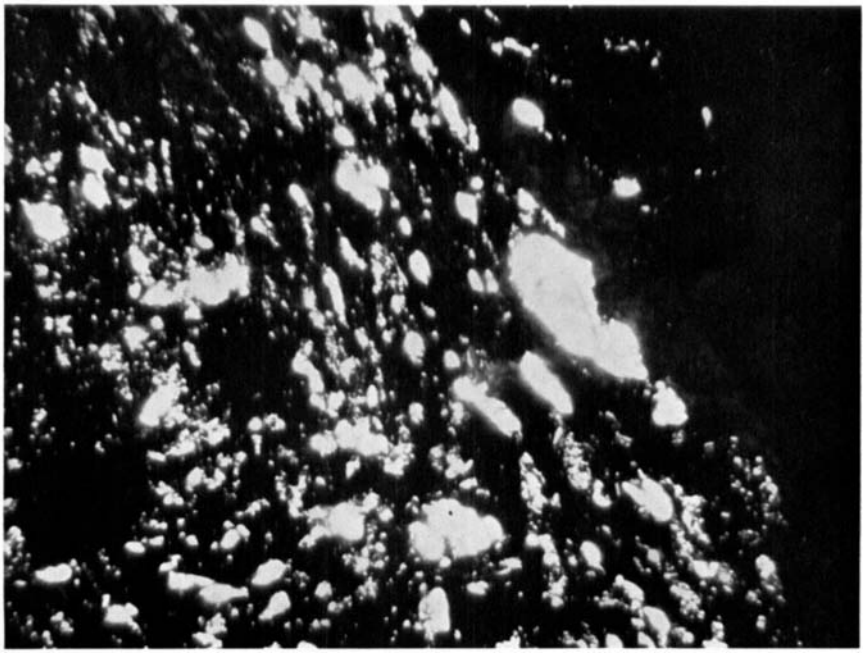


FIG. 3.

A higher magnification viewed in polarized light. Long large crystals are spread irregularly throughout the tissue.

FIG. 4.

Another area in partially polarized light showing the soft tissues also. Even the small crystals are oblong.

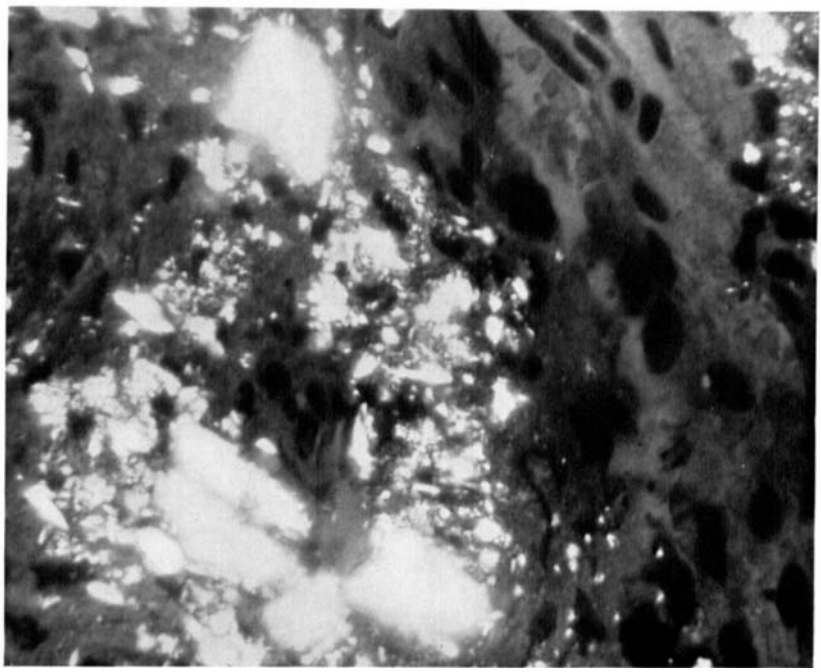
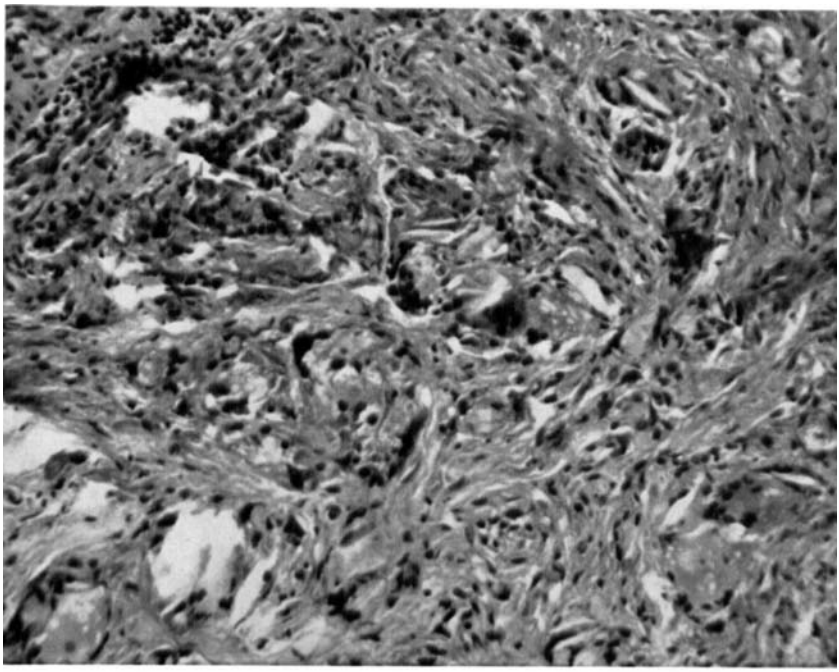


FIG. 5.

An area seen in ordinary light showing the light areas and the giant cells.

FIG. 6.

A higher magnification of a region in Fig. 5. In the centre there is a giant cell with prominent nuclei. This cell is lying against some large crystals. Immediately below it are the remains of another giant cell, with vacuoles in its cytoplasm. Farther up there is another giant cell with many nuclei.



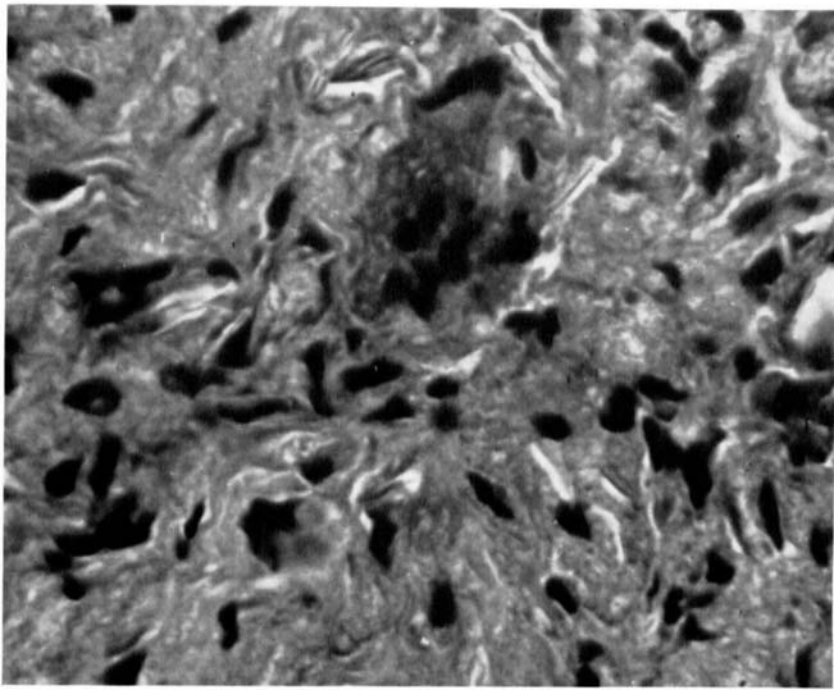


FIG. 7.

High magnification of a giant cell with commencing vacuolization.

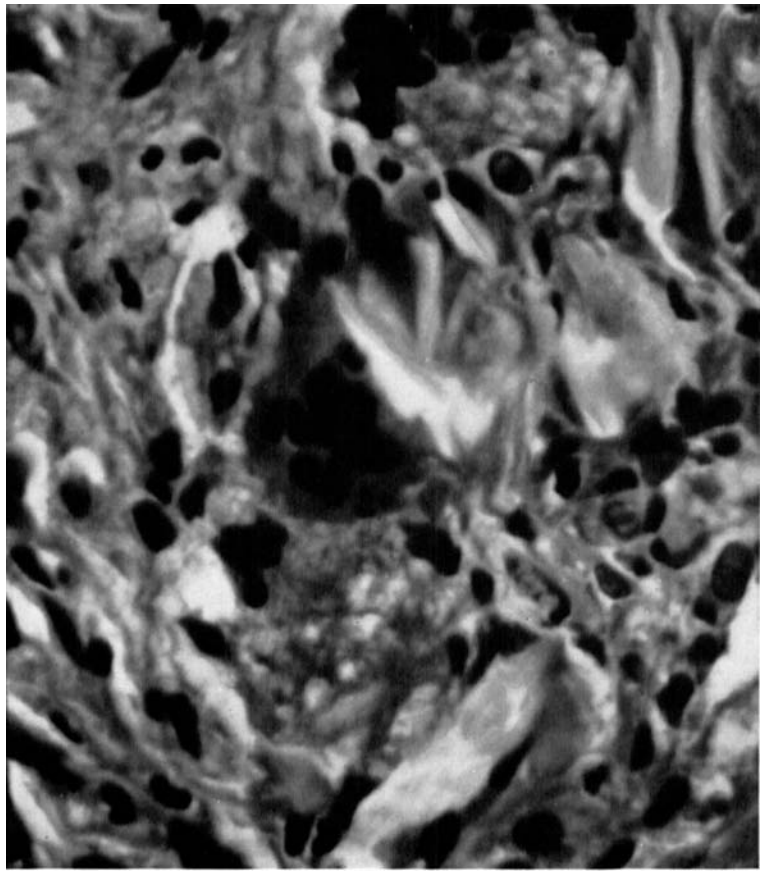


FIG. 8.

Photomicrograph taken in polarized light with a gypsum red I compensator. In the centre is a giant cell with a few crystals in the cytoplasm.

FIG. 9.

Polarized light—red I. There are some middle-sized crystals in the connective tissue, and two large and one small giant cells with numerous small crystals within them. The crystals appear blue or yellow according to their orientation in relation to the axis of the polarizing filters.

FIG. 10.

Polarized light—red I. Some large crystals with a giant cell. It is impossible to see whether the crystals lie within the cell or not. To the left is another giant cell containing numerous small crystals.

FIG. 11.

Fluorochromation with acridine orange at pH 6. Examined in ultra-violet light. Two large giant cells with nuclei and vacuoles (black spaces). The cell membrane is well shown.

FIG. 12.

Acridine organge, pH 4. The vacuoles contain some cornified substance. The nuclei appear homogeneous and there is no cell membrane. The border between the giant cell and the surrounding tissue is not sharp. There are weakly stained nuclei and vacuoles within the cell. In one area there are brownish masses which appear to be remains of giant cells.