

DENTAL EROSION IN A SOUTH AFRICAN CHEMICAL INDUSTRY

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While dental erosion has for many years been recognized by workers, and latterly by industrial practitioners,¹ as a hazard in the chemical industry, it has not previously, to my knowledge, been described in South Africa.

It is considered, in view of the progressive development of the chemical industry in this country (it is the fastest expanding section of our industrial economy), that the matter is of some local interest, and one of which our doctors and dentists should be aware. Moreover, the

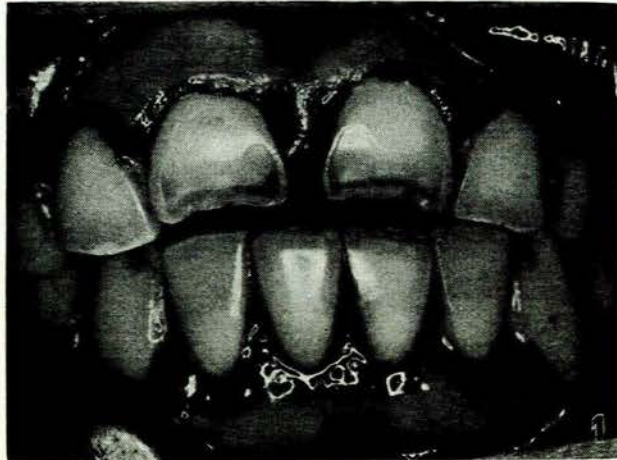


Fig. 1. An early case. This man had been exposed to 'nitre cake' dust for 6 months. He is a mouth breather. This case illustrates the early loss of the cutting edges of the maxillary incisors and erosion of the labial surface of the mandibular incisors.

chemical involved in the cases described in this paper has not previously been incriminated as causing dental erosion, which has been described in the manufacture of nitric, sulphuric and hydrochloric acids, and is also known to be caused by citric acid, tartaric acid, chlorine, chloride of lime, sodium carbonate, nitrogen dioxide and nitrogen peroxide.¹⁻³

The chemical involved in my series of cases is sodium acid sulphate, which is widely used in this and other countries as a sanitary cleanser. It is prepared by the fusion of sodium chloride and sulphuric acid, and the resultant product is set like toffee in pans—hence, in the old-fashioned parlance, its synonym 'nitre cake'. In the industry involved in the present series the nitre cake is then passed through a hammer mill and reduced to a powder of fairly fine proportions, levitable in air in the filling processes. Cases of acid erosion have been seen in operatives engaged in the filling of drums from the hammer mill, and in the subsequent process of filling into a domestic carton after mixing with a spreading agent. The 'nitre cake' used for this purpose contains an average equivalent proportion of sulphuric acid amounting to 35%; it is probably this content that has caused the dental erosion. Both filling processes in which cases have developed are attended by the generation of an unpleasant amount of dust, and inhalation and ingestion of the dust are both possible.

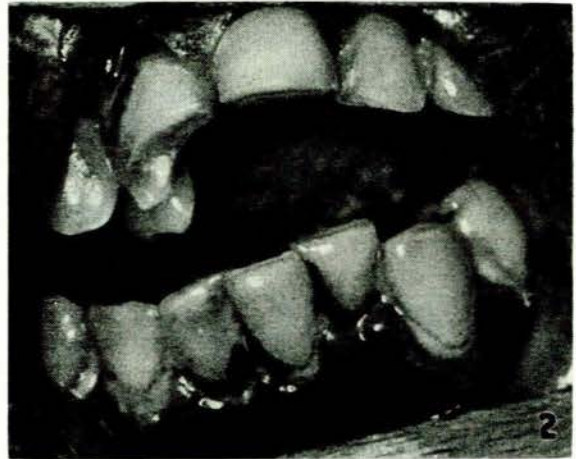


Fig. 2. Exposure 5 years. A man with a short upper lip. The cutting edges of the upper incisors are markedly lost, and so also to a lesser extent are those of the mandibular incisors.

I cannot better Donald Hunter's description of the disease process; he writes:² 'Workers lose the crowns of the mandibular incisors and the cutting edges of the maxillary incisors. Rarely are the canines involved . . . The erosion begins in the labial surface. There is no pitting, but always a smooth polished appearance. When the enamel has been destroyed the dentine is attacked and the pulp chamber shrinks. The condition is quite painless, except in rare cases where the erosion is so rapid that bacterial invasion of the pulp chamber occurs'.

I illustrate here, in the excellent photographs taken by my friend Mr. L. F. Brown, of Durban, (Figs. 1-3), 3 stages of the disease. In addition to the dental condition shown, a fair amount of incisoral gingivitis was present in all cases, probably traumatic in origin. Systemic effects—

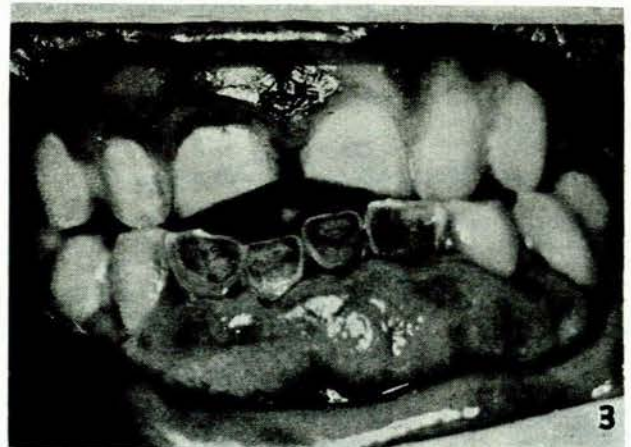


Fig. 3. An inveterate talker. Exposure 2 years. A progressive and rapid case. He has lost the cutting edge of the two upper central incisors; the 4 lower incisors have eroded into the gum, and abscess formation has occurred.

whether digestive by ingestion of the powder or pulmonary by its inhalation—were absent.

In this series of 14 workers exposed in the process of filling domestic containers with powdered nitre cake 5 were found to suffer from erosion. One other was edentulous and not therefore at risk (his extractions antedated his exposure). The 5 cases showing erosion varied in exposure time from 3 months to 10 years.

An inspection of the plant manufacturing the nitre cake showed no erosion in the 4 workers manufacturing the cake, but both men operating the hammer mill and filling drums with the resultant powder were found to have eroded teeth.

Discussion

The cases described here were discovered incidentally at routine health examination in the factory concerned. As the condition is painless, owing to the shrinkage of the pulp chamber and its subsequent overlay by dentine, it is not likely to be a source of complaint. Pain only supervenes if abscess formation follows bacterial invasion of the pulp chamber, as happened in the case illustrated in Fig. 3.

In discussing this condition Lynch and Bell¹ state: 'The site of erosion suggests to us the direct action of acid fume on those teeth exposed by talking or mouth breathing. The canines, premolars and molars are apparently ade-

quately protected by the salivary wash to which they are submitted.'

It is of interest that the most severely affected case in this series (Fig. 3) is an inveterate chatterer at work, and that one other (Fig. 1), whose exposure had been for 6 months only, was an obvious mouth breather.

Personal preventive measures have been adopted at this factory as an interim measure pending the redesign of the plant with adequate enclosure of dust and exhaust ventilation. Masks adequate to the situation have been introduced, and if worn should be effective. It has, however, been difficult to ensure their use in the Natal coastal summer climate, particularly as the nitre-cake dust, settling on and dissolving in the facial sweat pooling about the mask facepieces, causes a facial irritation more irksome than the dissolution of teeth! To supplement the masks, opportunity for frequent mouth washing has been provided.

Summary

Of 20 men engaged in the manufacture and packing of sodium acid sulphate ('nitre cake') 7 have been found to have dental erosion. The cases are described and discussed.

REFERENCES

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3. Hunter, D. (1957): *Diseases of Occupations*, pp. 533 and 726. London: English Universities Press.