DERMATITIS IN THE STEEL INDUSTRY IN SHEFFIELD

BY

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An analysis has been made of the probable cause of dermatitis arising in 250 workmen in whom the condition was thought to be due directly to their work and in whom the dermatitis was so severe that they had to be away from work for at least three weeks. The great majority of these cases were seen for compensation purposes. It is estimated that in Sheffield and district about 80,000 men are employed in the steel industry, and when it is realized that in order to collect 250 cases I had to search my records of the last eight years it is evident that dermatitis directly due to the industry is uncommon.

It is impossible to state exactly the limits of the steel industry, and in this analysis I have included not only those who make and work steel but also those who handle and manufacture steel products ; and in Sheffield this ranges from steel making to the machining of steel products varying in size from ship propeller shafts to minute drills. In addition to the large firms employing tens of thousands of men there are in Sheffield many small specialist firms ; this is shown by the fact that the 250 cases arose from 84 different factories. It is partly because of these numerous small firms that complete medical supervision of the works ambulance room is so difficult.

Causes of Dermatitis

The accompanying Table shows the cause of dermatitis in various groups. It is surprising that no less than 34.8% of the cases—that is, the largest group—were incapacitated by dermatitis arising directly as a result of treatment of a relatively trivial injury such as a superficial burn or a small cut.

Cause of Dermatitis in 250 Steel-workers

Dermatitis following burns or trivial injury	87 (34.8%)
Contact with soluble oil—i.e., machinists, turners, grinders ..	57 (22.8%)
Contact with grease, heavy oil, etc., rolling-mills, fitters, slingers	46 (18.4%)
Contact with abrasive substances: moulders, core-makers, furnace-builders	14 (5.6%)
Contact with hardening or tempering liquids	14 (5.6%)
Miscellaneous causes	32 (12.8%)

These were usually treated in the ambulance room or by the "ambulance attendant," the man continuing to work and attending once or twice daily for dressing. After a few days sensitization dermatitis occurred around the treated site, and unfortunately in some the true nature of the condition was not appreciated and more of the sensitizing agent was applied under the mistaken idea that the "wound had gone septic." The two sensitizing agents most commonly used were acriflavine and its analogues and penicillin. In other cases various proprietary so-called antiseptics were responsible. The tragedy with these cases is that the dermatitis often takes weeks or months to settle, and, once the skin has broken down in this way, recurrence is likely when the patient again comes into contact with any mild irritant.

The next commonest cause of trouble is soluble oil used by machinists, turners, and grinders ; 22.8% of cases were in this category. The rash may be produced in several ways, the hands and forearms being affected. The soluble oil is usually alkaline and acts as a direct irritant, although very occasionally the workmen develop a true contact allergy to the substance. Another real factor is minute abrasion of the skin produced by small particles of steel

turnings in the coolant which are pumped round with the circulating liquid and come out of jets on to the work—and the skin—with considerable force.

Next on the list are those who come into contact with heavy grease, thick oil, etc. These men are employed as maintenance fitters in rolling-mills and as slingers. They develop oil folliculitis on the forearms and legs, but areas of dermatitis also appear on the hands and forearms. This may be caused not so much by the grease and oil as by the various methods of cleansing used by these men. Paraffin is a commonly used cleansing agent ; some use the alkaline soluble oil, and various abrasive soaps are also used. In using these degreasing agents the natural greases of the skin are removed, giving rise to dermatitis.

Dermatitis is also seen in those who come into contact with various solutions used in hardening and tempering : 5.6% of cases occurred in this group. A similar number was found in those who handle abrasives. Such men as moulders, core-makers, and furnace-liners come into contact with large quantities of abrasive dusts, and yet the incidence of dermatitis in these is relatively low.

In the miscellaneous group are the unusual types of dermatitis, the occasional nickel dermatitis, dermatitis due to the rubber of the respirator face-piece used in shot-blasting, etc.

Age of Onset.—In considering the age of onset of these cases, it was found that dermatitis was more likely to occur after the age of 40. The Chart contrasts the total number of

Age of onset of dermatitis. ----- Male operatives in steel industry in Sheffield. ——— Cases with dermatitis, excluding those following injury.

operatives employed in the industry with the age of onset of dermatitis in those cases not due to sensitization to some application used on an injury. In the steel industry in Sheffield there is very little movement between this and other occupations, most of the men remaining in the industry the whole of their working lives. Thus many have worked in the industry, on probably the same process, for at least 20 years before their skin breaks down, and a similar state of affairs is seen in other industries—such as coal-mining. This probably indicates that the ageing skin cannot so easily tolerate trauma and that the skin becomes, as it were, worn out by repeated insults. The sharp rise seen in the Chart at the 40-45 age group may be because after this age the workman tends to gravitate towards less physically arduous jobs in which there is, as it happens, less dermatological risk.

Thus the predominating cause of dermatitis in the steel workers is trauma affecting particularly the ageing skin: trauma followed by the application of sensitizing medica-

ments; trauma caused by fine particles of metal in circulating soluble oil; and trauma produced by abrasive particles in moulding sand, refractory materials, etc. The first two causes—and these account for most of the cases—are preventable: the first by the education of the works first-aid departments to avoid the use of sensitizing applications, and the second by strict supervision of the various machines to ensure that all abrasive particles are filtered from the circulating coolants. The education of the works first-aid departments is a real problem, since there has grown up from the days of Lister the desire to “kill germs” at all cost. This desire is fostered both by qualified medical practitioners and by skilful advertising. Many antiseptics are potential sensitizing agents, and, although cases of sensitization dermatitis are uncommon, when they do occur they are tragic. The unfortunate individuals may, in the worst cases, never again return to their former skilled jobs, and, since these cases are preventable, they should never occur. In addition, one feels that, since many of these substances act by coagulating protein, they may also actively delay the process of tissue repair. In my opinion the treatment of relatively trivial injuries should consist in the area being cleaned thoroughly with 1% cetrimide solution and either a sterile dry dressing or a dressing of sterile paraffin applied, the dressing not being disturbed until healing has taken place.

Summary

An analysis is made of the causes of dermatitis occurring in 250 men employed in the steel industry in whom the disability was severe enough to put them on the sick list for a period of at least three weeks. In 34.8% of the cases the dermatitis was directly due to sensitization to some application used in the treatment of a relatively trivial injury. Acriflavine and its analogues and penicillin were the common sensitizing agents. Trauma plays a part in most cases, and, although the incidence of “industrial dermatitis” in the steel industry is low, many of these cases are preventable and the incidence could be made even lower.

SCOPE OF SURGERY IN MANAGEMENT OF DEAFNESS*

BY

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During my professional lifetime—that is, since the 1930's—the scope of surgery in the management of deafness has increased greatly. To-day we face a changed outlook and are offered new opportunities. It may be of interest to consider how this has been achieved.

Let me make a careful distinction at the outset of this paper. I hope to convince you that we have made and are still making substantial progress in the treatment of *conductive* deafness by surgery. In the treatment of established *perceptive* deafness, however, surgery has nothing to offer, and, apart from improved methods for rehabilitation of the deaf, we have made no progress in this field since the 1930's. I would make this exception, that there is a progressive cochlear degeneration associated with most cases of chronic otitis media which may be prevented by successful treatment in the early stages of this disease.

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In the 1930's we were constantly concerned, and with very good reason, about the dangers of uncontrolled infection in the middle ear and mastoid. We tried to assist recovery in the established acute ear infection by providing drainage with a myringotomy or a cortical mastoidectomy. In the chronic cases a radical mastoidectomy was carried out to remove disease and prevent complications. Then, as to-day, we were active in trying to prevent deafness from obstruction of the Eustachian tube or recurrent otitis media by removing tonsils and adenoids in children and by treating nasal and post-nasal infection; this might be followed by a course of politzerization or catheterization of the Eustachian tube.

That left us with many patients deaf from one reason or another whom we could only reassure by telling them that the ears were safe, and that they must compensate for the disability of progressive deafness by using a hearing-aid and by learning to lip-read. I well remember the feeling of despondency and impotence which I experienced when I told this tale to a young woman with early otosclerosis who had become aware of difficulty in hearing soon after the birth of her first baby. And I remember her brave attempt to suppress the tears of disappointment at the bitter prospect of an increasingly silent world.

Faced with such a young woman to-day, we should have much better hopes of being able to help her—and also those deaf from chronic otitis media. The techniques that have opened up these new possibilities are those of fenestration, stapes mobilization, and tympanoplasty. It is these three procedures, in particular the third, that I propose to discuss in some detail.

Fenestration

Already in the 'thirties we were reading with interest about the efforts of Holmgren and Sourdille to overcome the hazards associated with the surgical treatment of otosclerosis. It was well known that an otosclerotic could hear if an opening were made in the labyrinth, but almost inevitably either the opening closed or labyrinthitis supervened. Then in 1938 Lempert startled the less incredulous section of the otological world by devising a one-stage fenestration operation which, he claimed, restored the hearing permanently to a practical level in a substantial proportion of cases.

Curiously enough, the technique which made this operation possible was a development of his considerable experience in the treatment of chronic otitis media and the introduction of ideas of precision surgery using new instrumentation under the control of two-times binocular loupe magnification; that, I venture to suggest, was one of Lempert's more important contributions to modern otology. In his practical course, which I was privileged to take in 1947, Lempert taught not just how to perform a fenestration operation but, more important, how to carry out a complete dissection of a temporal bone. Seeing in this way the detailed anatomy of the normal ear, one began to appreciate more clearly the significance of the pathological changes in chronic otitis media.

Others, notably Shambaugh in America, and Simson Hall, Cawthorne, and Garnett Passe in this country, advocated the use of a microscope giving six to ten times magnification for the actual making of the fenestra. I am sure that this has enabled most otologists to improve their technique and their results with fenestration operations. Indeed, any otologist who has performed a substantial number of these operations has only to compare the results of his first hundred cases with those of his second hundred to demonstrate conclusively the value of an improved technique. My own results, showing the hearing gain one year after operation, certainly bear this out (see Table).