OCCUPATIONAL CANCER OF MULE-SPINNERS.*

BY

A. H. SOUTHAM, M.D., M.Ch.Oxon., F.R.C.S.,
HONORARY ASSISTANT SURGEON, SALFORD ROYAL HOSPITAL; ASSISTANT
SURGICAL OFFICER, MANCHESTER ROYAL INFIRMARY; LECTURER IN
OPERATIVE SURGERY, MANCHESTER UNIVERSITY.

THE peculiar liability to skin cancer of workmen in certain trades, as a result of their occupation, has been recognized for over a hundred years. It was only in 1922, however, that we first drew attention¹ to the occurrence of epithelioma of the scrotum amongst mule-spinners in South Lancashire as the result of the soiling of the clothes in the region of the scrotum by the lubricating oil used in the cotton-spinning machinery.

The experience gained since that time and the clinical observations made of a large number of cases have enabled certain definite conclusions to be drawn as to the earliest signs, clinical features, and treatment of this type of skin cancer.

INCIDENCE OF MULE-SPINNERS' CANCER.

Epitheliomatous ulceration occurring in mule-spinners is usually found in operatives over the age of 50 years, though cases may be met with in younger men. It is only seen in those who have worked in the mill for long periods—rarely less than ten years.

The most common situation for the lesion is on the left side of the scrotum, but about 25 per cent. occur on other sites—namely, the forearm, face, and neck. The skin of the leg appears to be remarkably resistant to the action of mineral oil and is an infrequent site for spinners' cancer.

Over fifty cases of scrotal cancer occur in spinners each year, and the incidence of the disease is very much higher among persons employed in mule-spinning than in any other class of worker. Approximately 2.5 per 1,000 mule-spinners develop this disease. It is probable that idiosyncrasy plays a part in the development of these epitheliomata, and that a dry skin is an important etiological factor in carcinoma of the skin.

CLINICAL FEATURES.

The first clinical evidence of an epithelioma is a localized hyperplasia of the keratin-producing layer of the skin, clinically suggesting a warty plaque. This is followed by a secondary round-celled infiltration of the underlying corium, the demarcation of the epithelial layer from the subcutaneous tissue remaining sharp. Within a widely varying period of time epithelial cells appear to break through the dividing line and a true prickle-cell carcinoma develops. At this stage the lesion is about the size of a pea, is freely movable, and is relatively benign, though it must always be regarded as potentially malignant. It is covered with scales which the man may remove by scratching, leaving a small bleeding surface over which a scab forms. Such lesions may be present for months or years in a benign form before they show any of the characteristics of malignancy. In some cases the condition appears on a chronically inflamed skin, secondary, no doubt, to the prolonged contact with oil, and this condition is apparent before any wart formation.

Although frequently single, these lesions may be multiple, developing over a period of years. Sooner or later localized sloughing occurs and signs of inflammation around the lesion, due to secondary infection, follow. Definite ulceration ensues and the growth may then appear as a tumour, the size of a small cherry, raised above the skin, with a moist and red-coloured base. The growth extends peripherally and has now all the characteristics of malignancy and bleeds easily when touched. At this stage the disease is entirely local and the lymphatic glands are not yet involved, though they may be enlarged as the result of inflammatory infection. Malignant invasion of the glands is, however, bound to occur sooner or later, the length of time varying according to the situation of the growth and the extent of the underlying round-celled infiltration.

The glands are affected much earlier when the lesion is situated on the scrotum than when the primary lesion is situated elsewhere, these latter tumours being of relatively

low malignancy. As the disease progresses the glands tend to break down, and death ultimately occurs from septic absorption, exhaustion, or haemorrhage from the underlying vessels. Metastases in distant organs are only seldom found.

The occurrence of cancer of the skin amongst female cotton operatives is uncommon, but a case of epithelioma of the forearm has recently been observed in a female cardroom worker. This case was of interest in that the patient showed, in addition, a marked atrophy and dryness of the skin of both hands, forearms, and arms up to the level protected by clothing, and a similar condition of less severe degree occurred on the exposed areas of the face and neck.

TREATMENT.

Mule-spinners' cancer is a most favourable type of malignant growth for surgical treatment, as it can be detected at a very early stage and complete removal is then a comparatively simple matter. The most malignant type of growth is that which occurs on the scrotum, and when in this situation it is very liable to be followed by secondary deposits in the lymphatic glands, and therefore requires a more radical operation for its complete removal. It is essential that all warts and papillomata seen on the skin in mule-spinners should be regarded as potentially malignant, for when malignant degeneration supervenes it always arises in one of these warty hypertrophies.

I am strongly of the opinion that excision of these growths is the only treatment to be considered, as, in my experience, treatment by radium or x rays does not appear to give such satisfactory results. In the early stages, before ulceration has occurred, the growth is relatively benign, and local removal is sufficient to eradicate the disease, as malignant invasion of the glands has not usually taken place.

When a definite ulcer is present an extensive operation, involving removal of the growth with an area of surrounding skin and excision of the lymph-bearing areas, must be carried out. This is especially important in scrotal cases, and removal of all the glands in both groins must be practised, since, although the growth may be found on the left side, the glands in both groins are often invaded owing to the free anastomosis of the superficial lymphatics across the mid-line of the scrotum.

The excision of the lymphatic nodes in the inguinal regions must be complete, and the operation must include all the fat and glands in this region and the upper part of the saphenous vein. No lymph channels appear to pass the inguinal glands to reach the iliac glands direct, and primary infection is found only in the former. Prophylactic application of x rays may be given for twelve months after operation.

PROGNOSIS.

The prognosis in this disease, as already stated, is good, as in other types of skin epitheliomata, when the lesion is detected in the early stages. Cases of scrotal cancer have been under observation for varying periods up to ten years that have remained free from recurrence after operation. But when the glands are invaded the outlook is serious and recurrence is very liable to take place. In 13 cases of scrotal cancer with involvement of the lymphatic glands, treated during a period of two years, recurrence or death followed in 9 cases (70 per cent.), and only 4 patients (30 per cent.) remained alive and well at the end of this period. Prophylactic applications of x rays had been given to these patients, but appeared of little value in preventing glandular or local recurrence of the disease.

This tendency to local recrudescence is well illustrated by the case of a man, aged 32, who had worked as a mule-spinner for twelve years. In 1925 he underwent a radical operation for epithelioma of the scrotum and removal of the glands in both groins. Since then I have removed four further epitheliomata from the scrotum (all confirmed by microscopical examination)—in October, 1926, June, 1927, December, 1927, and July, 1928.

Such cases as this are not uncommon in my experience, and emphasize the importance of frequent medical examination, particularly amongst operatives who show a tendency towards this condition.

* Read before the International Cancer Conference held in London on July 18th, 1928.

The disease, when it occurs on other sites of the body, is much less serious, and involvement of the lymphatic glands is a considerably later phenomenon, but in these cases also, when neglected, death from ulceration, secondary infection, and haemorrhage follows as in scrotal cases.

MULTIPLE PRIMARY MALIGNANT NEW GROWTHS.

An interesting feature occasionally met with is the development of a carcinoma of the skin and a second malignant new growth elsewhere in the body. This phenomenon has received little attention from pathologists, and is of importance from a medico-legal aspect when the second new growth is the actual cause of death.

Cases of epithelioma of the scrotum have been found associated with carcinoma of the stomach, tonsil, and lung, and in these cases an epithelioma of the scrotum had been removed by operation, the second new growth developing subsequently.

A record of such phenomena is of considerable interest, for while it has been assumed that the development of one malignant new growth tends to inhibit the subsequent development of a second, owing to some increased resistance in the individual, it is possible that the conditions may be somewhat different in the case of skin cancer.

CONCLUSION.

In conclusion I would emphasize the importance of the diagnosis of mule-spinners' cancer at an early stage, when operative treatment is a simple procedure and is followed by lasting cure.

By educating the workers to pay prompt regard to any warts or small sores on the skin, and the profession to realize the importance of early diagnosis and treatment, the proportion of cures will steadily increase and the number of radical operations progressively diminish.

At the present time there is no safer method of cure than by surgery, and we can secure most satisfactory results. No doubt the time is not far distant when other and better remedies may be discovered or effective preventive methods be adopted, by means of which mule-spinners' cancer as an occupational disease will be totally abolished.

REFERENCE.

¹ *British Medical Journal*, November 18th, 1922.

TELESCOPIC SPECTACLES.*

BY

A. H. LEVY, M.D., C.M., F.R.C.S.,
Surgeon, Central London Ophthalmic Hospital.

TELESCOPIC spectacles are low-power wide-angled Galilean binocular telescopes made as compact and as light in weight as possible, so that they may be used constantly as spectacles in the ordinary way without serious disfigurement or discomfort.

Correcting telescopic spectacles were first proposed for highly myopic patients towards the end of the eighteenth century. H. Dixon in 1785 patented a method of making such spectacles (Patent No. 1375, December 14th, 1785). He first started with two spherical mirrors, but later replaced these by spherical lenses. As a matter of curiosity it may be mentioned that Eschinardi in 1660 described a similar system suitable for close work. After Dixon many workers occupied themselves with the problem, notably W. Kitchiner, in a book published in London in 1824, but owing to various causes the results were not very good and the method was not much used.

In recent times the problem was raised afresh by Professor Hertel of Strasbourg. He was led to consider this problem by the publication of Fukala's papers in 1890 and 1893. In these communications Fukala sought to revive the operation originally suggested by Boerhaave in 1708 and Desmonceaux in 1778 of removing the crystalline lens for the cure of high myopia. This operation was

extensively practised, but the very definite dangers impressed themselves upon Hertel, and he sought to find some optical method of improving the acuity of these patients. The details of the problem, as set out by Hertel, were worked out more or less satisfactorily by Dr. M. von Rohr in the research laboratory of Messrs. Carl Zeiss in Jena (see *Archiv für Ophthalmologie*, 1910, vol. 75, p. 561).

The difficulties of designing telescopic spectacles are many, but I will mention only two: first, the astigmatic deformation of obliquely incident light, and secondly, the chromatic aberration.

The astigmatic deformation can be partly overcome by adopting a series of measures the most important of which are (1) suitably bending the optical elements in the telescope, (2) by limiting the field of vision so that only tolerable distortions of the images are evident at the edges of the field, and (3) by varying the separation of the two elements. This last factor—separation of the two elements—is only of limited use, since the distance between the elements must be exactly the difference of their focal lengths. The chromatic aberration was a great difficulty because it was impossible to make the object glass achromatic on account of the weight, and it was only simplified when Gullstrand showed that the chromatic correction would be sufficient if the chromatic difference of magnification of the principal rays entering the eye was removed—that is to say, the chromatism would be sufficiently corrected for practical purposes in such a low-power telescope by making the eye lens of a combination of a flint and crown glass.

These telescopic spectacles can be designed to give a magnifying power up to nearly two diameters. The usual magnification selected for emmetropic spectacles is $\times 1.8$, and the resulting improvement of vision is due to the image formed on the retina being nearly twice as large as the image formed with the unaided eye or with ordinary spectacles.

In Fig. 1a is given a diagram showing the general optical construction of the spectacles, and the path of the light for a distant object and relaxed accommodation of an emmetropic patient. The relative position of the patient's

FIG. 1a.

FIG. 1b.

FIG. 1c.

eye is shown in broken lines. Fig. 1b shows how the light from the spectacle is refracted by the cornea and crystalline lens of the eye. In Fig. 1c is given a diagram for objects at a finite distance. It will be noticed that only simple lenses are shown for the eye lens, although it is stated earlier in these notes that Gullstrand recommended a cemented eye lens to get rid of chromatic difference of magnification. In recent years it has become possible to secure at a reasonable price optical glasses of such properties that the chromatic trouble referred to can be very substantially reduced by suitable choices of glass of different dispersive powers for the two simple lenses, thus avoiding the additional weight of achromatic lenses. It is improbable that the acuity of vision of patients needing these spectacles would be good enough to appreciate the more precise achromatization which can be obtained by using an achromatic eye lens.

* Read in the Section of Ophthalmology of the Annual Meeting of the British Medical Association, Cardiff, 1928.